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MINISTRY OF INDUSTRY AND TRADE

Department of Electrical Engineering
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National Energy Efficiency Action Plan of the Czech Republic

pursuant to Article 24(2) of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency

Contents

1. INTRODUCTION

More than 50% of current energy consumption in the Czech Republic is covered by domestic primary energy sources. The import energy dependence indicator (including nuclear fuel) is therefore less than 50% and is one of the lowest in the EU. The current EU average is approximately 60%. The Czech Republic is fully self-sufficient in the production of electricity and heat. The structure of electricity sources is stable. The Czech energy sector is dominated by coal-fired installations which, as baseload plants, supply almost 60% of electricity and a large proportion of heat (through district heating). The most significant change in the last decade has been the construction of Temelín Nuclear Power Plant. The promotion of renewable energy sources in recent years has increased the share of renewable sources other than hydropower, but despite high subsidies they have failed to displace any significant portion of fossil-fuel installations. The share of heat from domestic fuel is about 60%, and more than 80% in heat supply systems. In the Czech Republic, the combined generation of electricity and heat is well established. In large and medium-sized sources, gross heat production from cogeneration accounts for almost 70% of the total gross heat production.

It is worth noting that, under Communism, the energy intensity of the Czech economy (especially industry) increased. This situation was caused by the underinvestment of production facilities, the predilection for the development of heavy industry, and state-regulated energy prices which failed to respond to global changes.

In 1989, the political landscape was repainted, resulting in a return to democracy and a market economy. The economic changes were of a truly fundamental nature unprecedented in their scope and in the time it took to implement them. Market liberalisation was swift, pushing energy prices up to a level more reflective of the cost and opening up the Czech Republic to foreign competition. Numerous companies failed to survive the privatisation period. Those that did make it through this period and are moving forward, along with newly formed companies, must be able to hold their own in the face of international competition. Energy intensity is one of the factors affecting the competitiveness of businesses and, indeed, the economy as a whole. Economic transition included a sharp increase in energy efficiency. This change is evidenced by the graphs below. The Czech Republic, in part because of its economic structure, is fast approaching the EU average. Nevertheless, it is also important to emphasise here that, in the Czech Republic, there are two simultaneous processes that contradict each other in terms of energy intensity. While the technological demands of the economy are contracting, the standard of living – which is well below that of developed neighbouring countries (Germany, Austria) – is increasing. As the standard of living rises, the

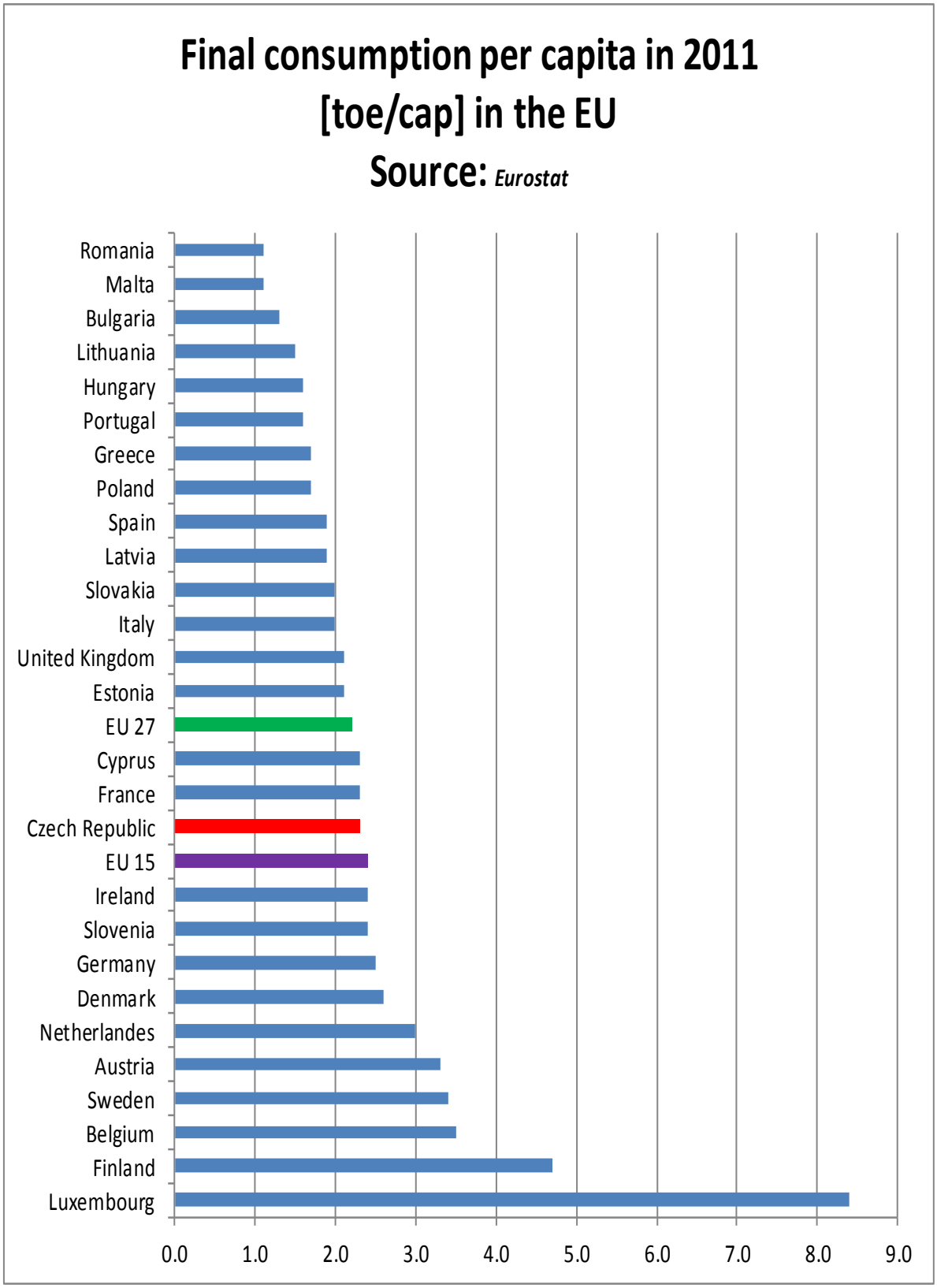
consumption of energy (especially electricity) is going up among households (due to the higher numbers of appliances).

If we compare the period over which the economy's energy intensity worsened (spanning approximately 50 years) and the time between the beginning of the transition to a market economy and the present (about 23 years), we are compelled to note that changes related to improvements in energy efficiency since 1989 have been very rapid and that substantial progress has been achieved.

The share of industry (including the energy sector) accounts for about 30% of gross value added, and therefore the energy intensity indicators are higher than the EU average. This fact is compounded by the Czech Republic's location in the middle of Europe, making it a transit country. The share of industry in total final consumption is approximately 30% (IEA). In the Czech Republic, heavy industries such as metallurgy and engineering account for a large proportion.

Although the downward trend in energy intensity since 1990 has been uninterrupted, the rate of decline is unstable due to the path followed by economic growth. Compared to 2000, the energy intensity of the Czech economy has fallen by 19.0%. The pace of the decline in energy intensity (2.5% in PPP, IEA Czech Republic 2010 Review) for the period since 1990 is among the highest in Europe (the European average in the same period was 1.5%). In 2011, the energy intensity of the economy was 505.6 GJ/CZK thousand (2005 constant prices) and was reduced by 3.3% year on year. In the longer term, there has been an overall decrease in energy intensity by 23.6% since 2000 (when this value was 661.8 GJ/CZK thousand). Broken down by sector, industry and transport take up the largest share of the energy intensity of the economy. While the energy intensity of industry has been steadily declining in the long term (reporting a 47% drop between 2000 and 2009), energy intensity in the transport sector has either expanded or fluctuated.

The Czech Republic has strongly supported improvements in energy efficiency since 1989. It was quick to liberalise the energy market, delivering a major boost to enhanced energy efficiency. To increase energy efficiency, the Czech Government has long made active use of regulatory instruments (legislation), economic instruments and awareness. Economic instruments draw on both national resources and the Structural Funds. The Czech Republic, in accordance with the Europe 2020 strategy, promotes the use of significant funding from the future multiannual financial framework for energy efficiency and support for business to help to ensure Europe's competitiveness. The structure of the Czech Republic's economy means there is still potential for energy savings in industry.


Final consumption per capita in 2011 [toe/cap] in the EU
Source: Eurostat
Romania
Malta
Bulgaria
Lithuania
Hungary
Portugal
Greece
Poland
Spain
Latvia
Slovakia
Italy
United Kingdom
Estonia
EU 27
Cyprus
France
Czech Republic
EU 15
Ireland
Slovenia
Germany
Denmark
Netherlandes
Austria
Sweden
Belgium
Finland
Luxembourg
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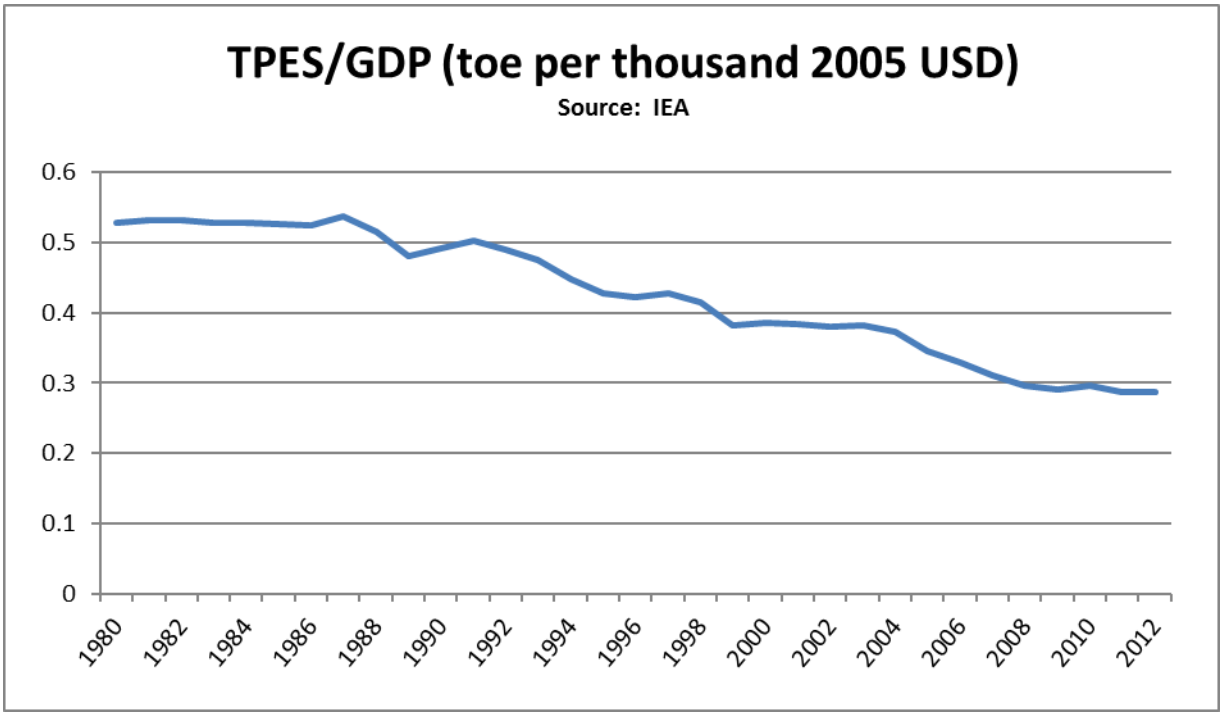
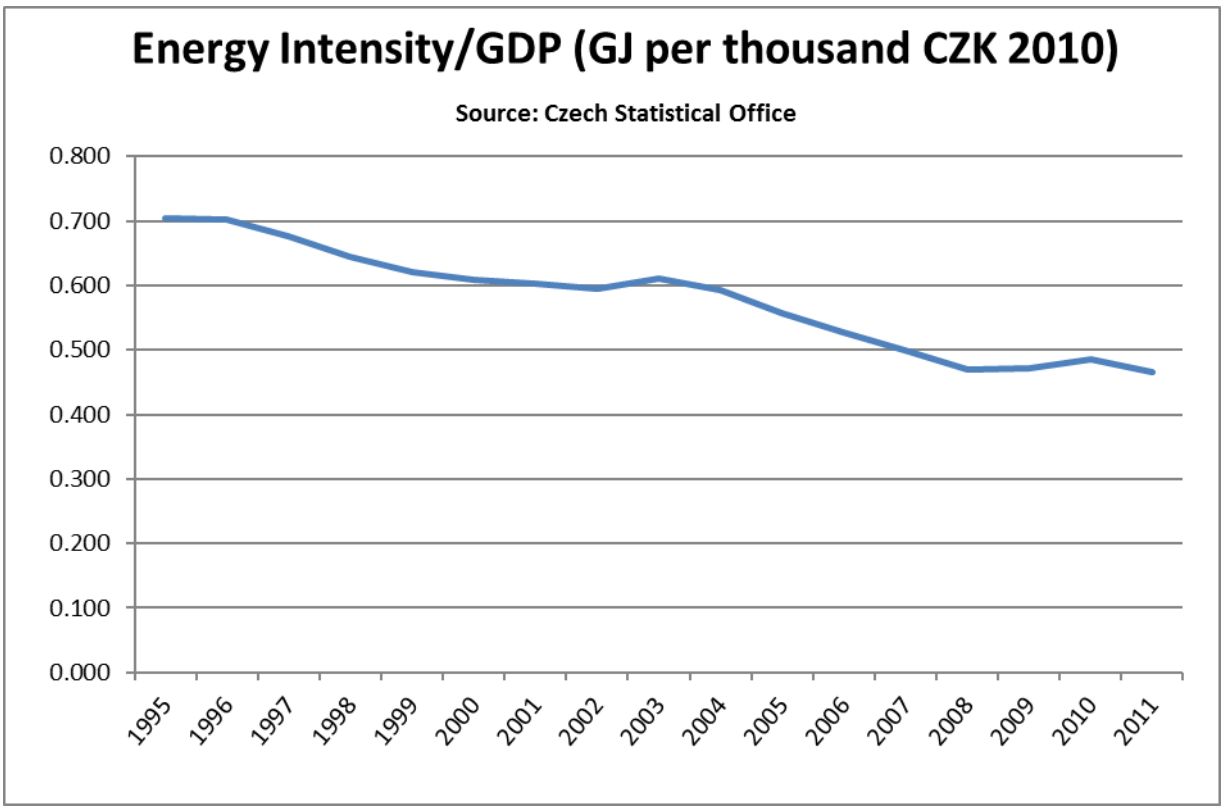
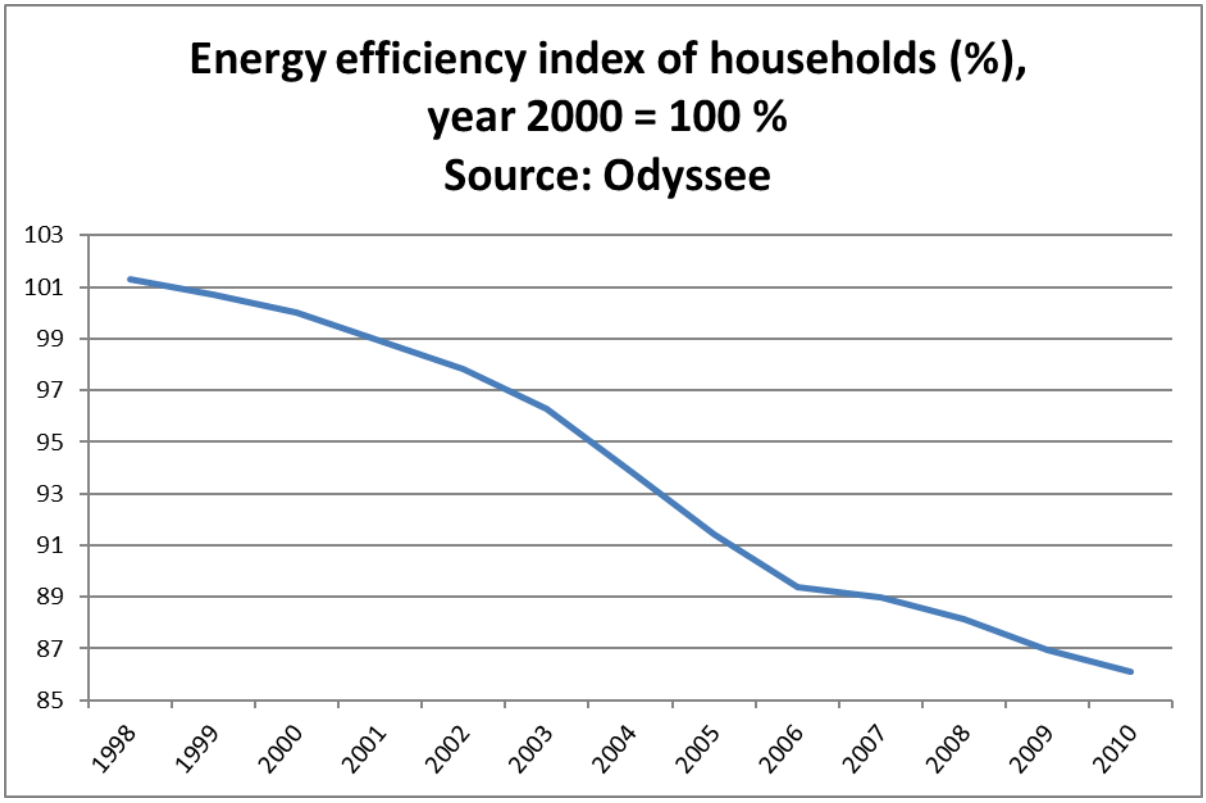
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0


TPES/GDP (toe per thousand 2005 USD)
Source: IEA
0.6
0.5
0.4
0.3
0.2
0.1
0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012


Energy Intensity/GDP (GJ per thousand CZK 2010)
Source: Czech Statistical Office
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011


Energy efficiency index of households (%),
year 2000 = 100 %
Source: Odyssee
103
101
99
97
95
93
91
89
87
85
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010

2. OVERVIEW OF NATIONAL ENERGY EFFICIENCY TARGETS AND SAVINGS

2.1 NATIONAL ENERGY EFFICIENCY TARGETS UP TO 2020

The basis for setting the Czech Republic's national indicative targets is the document 'Update of the Czech Republic's State Energy Policy' (the 'Update'), which was duly acknowledged by the Government in a resolution of 8 November 2012. This is a key strategy document which aims to ensure a reliable, safe and environmentally friendly energy supply for the needs of the population and economy of the Czech Republic at competitive and affordable prices under standard conditions.

Further to the passing of Directive 2012/27/EU of the European Parliament and of the Council, the Czech Republic has launched a process to transpose it into national legislation. The Czech Republic is obliged to transpose the Directive by 5 June 2014. In connection with the setting of the indicative national energy efficiency target, it should therefore be noted that, in view of the ongoing process of transposing Directive 2012/27/EU into Czech legislation, certain provisions of the Directive may yet be interpreted in more detail, and circumstances necessitating a review of the national indicative target may arise. In light of substantive and procedural uncertainties relating to the implementing regulations for Directive 2012/27/EU, the Czech Republic, wishing to fulfil its EU commitments in a due and proper manner, reserves the right to make a final determination of the indicative national target on the basis of discussions with the European Commission.

The Czech Republic views the indicative national target defined in Article 3 of Directive 2012/27/EU as a framework, non-binding target which does not establish any specific and legally enforceable obligation for either the Czech Republic or other entities.

In particular, the setting of targets up to 2020 is affected by a number of factors and assumptions (including the two fundamental ones mentioned above), which may evolve over time due to external factors or for other reasons beyond control. In the future, any significant change in these input parameters could necessitate a review of the indicative national targets by the Czech Republic.

By reference to current analyses, the Czech Republic's national indicative target has been set at 47.78 PJ (13.27 TWh) of new final energy savings by 2020, with a cumulative target of 191.10 PJ. Net final consumption less non-energy use of 1 020 PJ and primary energy consumption in 2020 of 1 660 PJ, according to International Energy Agency (IEA) methodology for the preparation of the energy balance, are consistent

with that target. Historically, the Czech Republic has compiled its energy balance according to IEA methodology, which it also applies to the Updated State Energy Concept.

However, methodological differences may exist between energy consumption information published according to IEA methodology and according to Eurostat methodology. Mutual comparisons should take these methodological differences into account. **Bearing in mind the methodological differences between IEA and Eurostat methodology, we estimate that net final energy consumption according to IEA methodology in 2020 of 1 020 PJ (the level of net final energy consumption after taking account of the national indicative target) is consistent with the level of consumption under Eurostat methodology, which stands at 1 060 PJ. After considering the same methodological differences, we estimate that primary energy consumption according to IEA methodology in 2020 of 1 660 PJ is consistent with the level of primary consumption under Eurostat methodology, which stands at 1 660 PJ.**

PRIMES projections (based on Eurostat methodology) indicated that final consumption in 2020 would be 1 324.87 PJ, i.e. 31 644 Mtoe, without taking into account the effect of savings from the implementation of this Directive. If a 20% decrease (i.e. the EU target) is reflected in this level of consumption, the target value of final consumption comes to 1 059.89 PJ, i.e. 25 315 Mtoe. Therefore, we believe that the Czech Republic's target makes an adequate contribution to the EU's overall target in this area.

Moreover, as is clear from the overview of energy indicators in the previous section, the Czech Republic's final energy consumption per capita is on a par with the EU average, so from the Czech Republic's viewpoint its proportional contribution to the pursuit of the European target is adequate.

Article 7 of the Directive establishes a binding end-use energy savings target by 2020 equivalent to achieving new savings of 1.5% of the annual energy sales to final customers. After converting this information to absolute figures and factoring in all rebates established by the Directive, the target stands at 47.78 PJ of new annual savings by 2020.

At the same time, in view of the large mandatory final energy savings under Article 7, the Czech Republic has set a value consistent with Article 7 as its national indicative target under Article 3.

The Czech Republic's national indicative target has thus been set at 47.78 PJ (13.27 TWh) of new final energy savings by 2020, the cumulated value being 191.10 PJ.

2.2 OTHER ENERGY EFFICIENCY TARGETS

Generally or secondarily established targets for energy savings/energy efficiency are included in the following national documents:

- National Reform Programme
- International Competitiveness Strategy
- State Energy Policy
- Raw Material Policy
- Secondary Raw Material Policy
- State Environmental Policy
- Climate Protection Policy
- Sustainable Development Strategic Framework
- Territorial Development Policy
- 2014–2020 Regional Development Strategy
- 2014–2020 Transport Policy Strategy
- 2014–2020 Concept of State Tourism Policy in the Czech Republic

The State Energy Concept has incorporated general pressure on reducing emissions produced by the energy sector, coupled with pressure to increase efficiency and savings among producers and consumers alike. Priority II is to increase energy efficiency and energy savings throughout the economy and among households. Increased energy efficiency and energy savings are a common denominator for all three components of the energy strategy, i.e. security, competitiveness and sustainability. Higher efficiency has been prompted by requirements associated with the contracting availability of our own disposable resources and the persistent industrial focus. Here, the Czech Republic must keep to, and where appropriate accelerate, the trend of declining energy intensity in the generation of GDP, and must aim for a situation where, after 2020, energy intensity in the various sectors is on a par with comparable economies in the EU.

For example, the Transport Policy pursues a goal where the share of road transport stock not driven by petroleum products should increase from 0.03% in 2011 to 3% in 2020, and where the share of petrol, diesel and kerosene in total energy consumption in the transport sector should fall from 93% in 2011 to 85% in 2020. The share of freight capacity carried by rail and water transport in the total volume of freight transport for shipments of more than 300 km should increase from 41% in 2011 to 50% to 2020.

2.3 FINAL ENERGY SAVINGS

According to Article 27(1) of the EED, Member States must comply with the requirements of Article 4(1) to (4) of the ESD on the general end-use energy savings target of 9% by 2016. To this end, a top-down method has been employed, which has required maximum possible use of information from the ODYSSEE database of internationally

comparable energy efficiency indicators (http://www.indicators.odyssee-mure.eu/energy-efficiency-database.html). At the time of the valuation, indicators up to 2010 were available.

Evaluation employing the top-down methodology was derived directly from Standard en 16212 – Energy Efficiency and Savings Calculation, Top-down and Bottom-up Methods. The savings in each area were evaluated. Cross-cutting measures were not quantified by means of the top-down method because the indicators, or more precisely the values of the indicators of cross-cutting measures, are already included in sectoral measures. The agriculture sector was not assessed separately because of the paucity of statistics.

Savings calculated by means of the top-down method for the period from 2008 to 2010, compared to the savings planned in NAPEE II, are presented in the following table

Table: Summary of energy savings proposed in NAPEE II and evaluation by means of the top-down method

Measures in sectors	**NAPEE II plan TJ, 2008–2010**	**Analysis of implementation by means of the top-down method, TJ, 2008–2010**
Households	4903.2	13056
Tertiary sector/services	1947.6	11095
Industry	1796.4	3078
Transport	3715.2	- 132
Agriculture	230.4	not assessed
Cross-cutting measures	7131.6	n.a.
Total	**19724.4**	**27097**

Applying the top-down method in the use of the best indicators available and taking account of available statistics, the household sector was found to have saved 13 PJ in 2010 compared to 2008. Sizeable savings of 11 PJ were also made in the service sector. In contrast, the transport sector reported no energy savings. This can be attributed to passenger road transport, which accounts for the highest share of overall final consumption throughout the transport sector, and where energy efficiency became worse. This impaired energy efficiency was set off at least partially by freight road

transport, where the energy efficiency has quite plainly improved. Other modes of transport (rail, air, water) made only minor contributions to overall trends in energy efficiency in the reporting period. On the whole, the quantified NAPEE II plan was exceeded.

3. POLICY MEASURES TO IMPLEMENT THE DIRECTIVE

3.1 HORIZONTAL MEASURES

3.1.1 ENERGY EFFICIENCY OBLIGATION SCHEMES AND ALTERNATIVE MEASURES

Overall savings target

Article 7 of Directive 2012/27/EU on energy efficiency (the 'Directive') establishes a binding end-use energy savings target by 2020 equivalent to achieving new savings of 1.5% of the annual energy sales to final customers.

The basis of the calculation of the binding target under Article 7 was final energy consumption determined according to methodology and statements sent by the Czech Republic to the International Energy Agency and Eurostat every year. Final energy consumption statistics were used for 2010, 2011 and 2012.

Calculation methodology

Non-energy use of fuels and consumption in transport (liquid and gaseous fuels; electricity consumed by traction; coal for steam engines) was subtracted from final energy consumption in the relevant year (2010, 2011, 2012) to provide a 'base', from which own final consumption of energy is also deducted.

Non-energy substances are products derived directly from non-energy processes in the refinement of fuel which are inherently intended for non-energy purposes (they are generated in the high-temperature carbonisation of coal in coke ovens, in pressure gasification and in the production of liquid fuels). They also include non-energy petroleum products, such as paraffin, bitumen, lubricants and waxes, as well as gas and diesel oil (a heavy distillate used as a raw material in the petrochemical industry). Petroleum and petroleum products, as well as coal tar, for example, are also put to non-energy use as base raw materials and the petrochemical industry.

Own consumption includes:

- Consumption of own biomass, primarily in households (garden, forest)
- Own wood waste from sawmills, own cellulose extract, etc., as feedstock for own production of electricity and heat
- Energy from solar collectors
- Energy from a heat pump medium
- Biogas for energy production for own consumption (farms, wastewater treatment plants)
- Waste for energy production for own consumption
- Coke, coke-oven, blast-furnace and converter gas produced and consumed in own business
- Coal mined in own deposit and used for energy production for own consumption
- Other fuel and energy not named above but used analogously

In this way, we arrived at the adjusted final consumption of fuels and energy sold from 2009 to 2011. The three-year average was then calculated from this adjusted final consumption. Based on that average, 1.5% annual savings were calculated.

Transport was not included in the calculation of the target because the Czech Republic has no plans for the large-scale inclusion of this sector among those sectors in which energy-saving measures will be implemented to meet the target under Article 7; this is due to the potential for savings in transport and obligations to increase efficiency in transport arising from existing or forthcoming legislation.

Using the values referred to in Article 7(2)(a) of the Directive, after deducting the savings generated by the Green Savings Programme and the third call under the ECO-ENERGY Scheme of the Operational Programme Enterprise and Innovation (Article 7(2)(d)), a binding target of savings amounting to 47.78 PJ in 2020 (i.e. cumulative savings in 2020) was calculated for the Czech Republic from the cumulative energy savings (1.5% in 2014 to 2020).

Table 1: Calculation of the three-year average as the basis for the calculation of the target

	2010	**2011**	**2012**
	PJ	*PJ*	*PJ*
Final consumption	1132.82	1087.24	1074.26
Transport	247.97	248.97	239.61
Non-energy use	112.80	105.97	114.76

Final energy consumption not sold, Own consumption	129.52	137.44	137.32
Adjusted final consumption of fuels and energy sold	642.54	594.86	582.78
Three-year average	**606.73**		

1098.1 PJ	245.5 PJ Transport
	245.9 PJ Own consumption
	606.7 PJ Base

	Cumulative savings 2014-2020
Required savings	254.8
Reduction (25%)	63.7
Target 2014-2020	191.1

Cumulative target for 2020	**191.10 PJ**

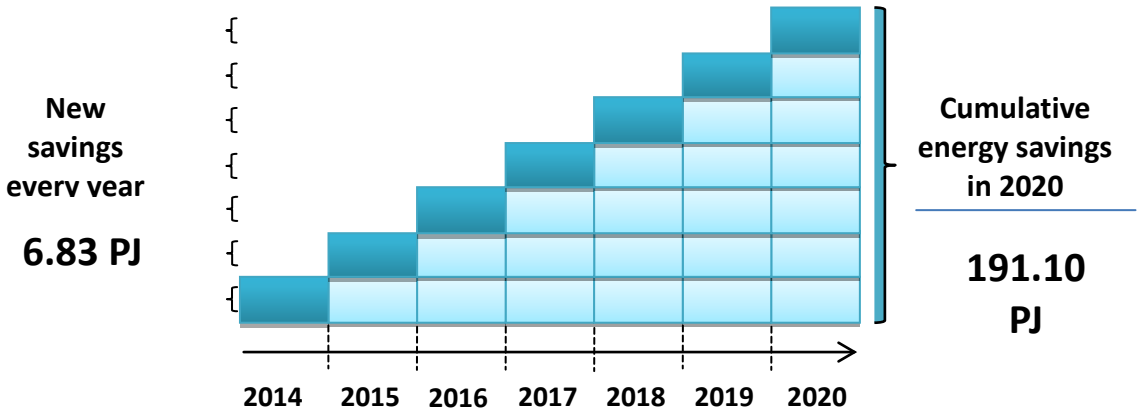
Table 2: Calculation of binding savings target

Year	**Three-year average**	**Binding percentage of savings**	**Cumulative volume of savings**
2014	606.7	1%	6.06
2015		1%	12.12
2016		1.25%	22.74
2017		1.25%	30.32
2018		1.5%	45.50

2019		1.5%	54.60
2020		**1.5%**	**63.70**

The Czech Republic has chosen to stagger the build-up of savings over the period to 2020. Therefore, if savings are evenly distributed between 2014 and 2020, and the target is 47.78 PJ in new savings, the overall savings will be 191.10 PJ, with 6.83 PJ of new savings every year.

Graph 1: Calculation of savings up to 2020



Use of exemptions

The Directive allows the savings commitment to be reduced by up to 25% of the original target in four ways. The Czech Republic made use of the option provided for in Article 7(2)(a) and (d) of the Directive, i.e. the commitment was calculated using the stated percentages (1% in 2014 and 2015; 1.25% in 2016 and 2017; 1.5% in 2018, 2019 and 2020). The energy savings achieved by the Green Savings Programme and the third call under the Eco-Energy Scheme of the Operational Programme Enterprise and Innovation (6.85 PJ) were deducted from that amount. The Green Savings Programme was announced in April 2009, and the third call of the Eco-Energy Scheme of the Operational Programme Enterprise and Innovation was announced on 1 February 2010. These programmes thus meet the Directive's requirement that individual measures be introduced from 31 December 2008. *(Note: the reference date for support to implement energy saving measures under the Green Savings Programme was 1 April 2009 and thereafter.)* Under the programmes, a monitoring, processing and reporting system was

put in place. Its results were regularly evaluated. Therefore, thanks to the individual measures, the savings achieved are measured, reported and verifiable. As the programmes focus on long-term savings and promote the installation of heating sources using renewable energy and investments in energy savings when structures are retrofitted or newly built, as well as savings in technology and buildings in the business sector, they are expected to have an impact even beyond 2020.

Applying these exemptions reduces the target overall by 63.70 PJ, which is in line with the Directive's requirement that the use of such concessions must not reduce the target by more than 25%.

Table 3: Calculation of the use of exemptions

Exemption	Potential target reduction
Article 7(2)(a) – Slower introduction of savings	Potential reduction 19.76 PJ
Article 7(2)(b) – Exclusion of the energy consumption of customers covered by the EU emissions trading system	Not applied
Article 7(2)(c) – Inclusion of savings achieved in the energy transformation, distribution and transmission sector	Not applied
Article 7(2)(d) – Inclusion of part of the savings under the Green Savings Programme	Potential reduction 43.94 PJ
Total	**Approx. 63.7 PJ**

Alternative policy measures and the national energy efficiency obligation schemes

To comply with Article 7, the Czech Republic has opted to implement a set of other policy measures in accordance with Article 7(9) of the Directive. For implementation purposes, we call this method an 'alternative scheme'.

Of the other policy measures offered and described by the Directive, we will make use of financing schemes and instruments, as well as training and education, including energy advisory programmes, that lead to the application of energy-efficient technology or techniques and have the effect of reducing end-use energy consumption.

- Financial engineering instruments
- Investment subsidies
- Non-investment subsidies (analyses of the appropriateness of the Energy Performance Contracting method, energy management, education: advice centres, seminars, publications)

These methods enjoy a long-standing tradition in the Czech Republic. Appropriate processes are established here for the approval of individual projects, and all stakeholders (public authorities, entrusted parties and beneficiaries from the ranks of natural persons and legal persons – public administration, businesses, housing cooperatives, and unit owner associations) have experience of them.

These are methods under which reporting on savings, including cost effectiveness, can be carried out transparently.

If financial resources for the above forms of support are exhausted and are insufficient to achieve the savings target set by the Directive, we will investigate other instruments feasible under alternative policy measures. **If further alternative measures cannot be used and there are insufficient financial resources to pursue the energy-saving target in an alternative scheme, it is assumed that an energy efficiency obligation scheme will be introduced in order to work towards the target.** Discussions on the parameters of the scheme are already underway. Presumably, the introduction of an energy efficiency obligation scheme will be preceded by a trial stage in which companies will be able to take part on a voluntary basis.

We do not have sufficient experience of the administration, efficient use and evaluation of all mechanisms, and the successful implementation of pilot projects will be required to show their feasibility.

If a compulsory system of energy savings is introduced, the Czech Republic does not currently have any experience in this field.

At this stage, we have no plans to introduce any of the following beyond the requirements of EU legislation:

- Taxes (on energy or carbon dioxide)
- Regulation

- Stricter rules and standards
- Labelling

Setting intermediate periods

We plan to introduce two periods, namely:

- **Period I: 4 years (1 January 2014 – 31 December 2017)**
- **Period II: 3 years (1 January 2018 – 31 December 2020)**

This method of distribution makes more time available in Period I for the approval of the alternative scheme's conditions, introduction and implementation, while providing enough time in Period II for any modifications to support and incentive mechanisms which help the overall goal to be reached by 2020.

Implementing public authorities and entrusted parties

Choosing an alternative scheme means that implementation will be in the hands of public bodies or their delegated bodies, and therefore there will be no obligated parties in this system. Consequently, they are not contemplated further. As financial engineering instruments and investment subsidies financed from public funds are expected to be the primary mechanisms, their administration will be entrusted to entities that already have experience of them. In the Czech Republic, these entities are: the Ministry of Industry and Trade, the Ministry of the Environment, the Ministry of Regional Development and regions involved in the Joint Boiler Replacement Scheme.

To implement the alternative scheme, the focus of interventions will be configured so as to fulfil the principles of synergy and complementarity. In other words, the interventions of the various entities will be coordinated and, rather than competing with each other, they will complement each other to make the system effective. A detailed breakdown of policy measures, including a sectoral breakdown, among the various implementing public authorities or entrusted parties is described on a separate page in Annex 3 to this document.

The Ministry of Industry and Trade will gather information from public authorities and entrusted entities, which it will then process and send to the European Commission.

List of alternative policy measures by sector

Households

- New Green Savings 2013
- New Green Savings *(2014–2020)*
- Integrated Regional Operational Programme
- JESSICA Programme
- Panel Programme
- Joint Boiler Replacement Scheme

Services

- Operational Programme Enterprise and Innovation (business entities)
- Operational Programme Enterprise and Innovation for Competitiveness (business entities)
- EFEKT Programme – investment part (public service sector, lighting)
- Operational Programme Environment (2007–2013) (public service sector)
- Operational Programme Environment (2014–2020) (public service sector)

Industry

- Operational Programme Enterprise and Innovation
- Operational Programme Enterprise and Innovation for Competitiveness

3.1.2 ENERGY AUDITS AND ENERGY MANAGEMENT SYSTEMS

In the Czech Republic, final customers have had access to energy audits since 2000, when Act No 406/2000 on energy management was promulgated. Today, in the wake of several amendments to this law and implementing decrees, we are in a position to state that in the Czech Republic:

- high-quality energy audits are drawn up;

- they are cost-effective;

- in order to save costs on the production of energy audits, there are several cases where simpler energy assessments are admissible;

- they are conducted by energy specialists who hold authorisation granted by the Ministry of Industry and Trade to draw up energy audits and energy assessments;

- energy audits are checked by the State Energy Inspectorate;

- in the Czech Republic, numerous training courses are available for energy specialists in order to prepare them for a professional examination – which must be passed by those seeking authorisation;

- to safeguard independence, energy audits cannot be conducted by a company's internal specialists, even though this is admissible under Article 8(1) of the Energy Efficiency Directive;

- starting in 2014, energy-saving proposals will be collected electronically via the Ministry of Industry and Trade (to form a database) based on the results of each audit.

Energy audits must be conducted:

- if the total average annual energy consumption of a building or energy management system for the past two calendar years has been higher than energy consumption amounting to 35 000 GJ (9 722 MWh) per year as the sum for all buildings and energy management systems of the relevant person, and this concerns only individual buildings or individual energy management systems which report energy consumption of more than 700 GJ (194 MWh) per year.
- for a major change in a completed building, where requirements for the energy performance of the building are not met.
- at organisational units of the state, regions and municipalities, and organisations partly funded from the public purse, if the total average annual energy consumption of a building or energy management system for is higher than energy consumption amounting to 1 500 GJ (417 MWh) per year as the sum for all buildings and energy management systems, and this concerns only individual buildings or individual energy management systems which report energy consumption of more than 700 GJ (194 MWh) per year.

- energy audits are also a requirement for those seeking subsidies from certain state aid schemes. In these cases, they are used as underlying documentation and the subsidy applicant must select and implement one of the versions of the recommended measures;

- under the new EED, energy audits may be conducted by a company's internal specialists, provided that the quality of auditing is efficiently controlled. This is inadmissible under Czech national legislation because it would be an infringement of independence in the production of energy auditing. Likewise, we have not introduced an instrument for energy auditing on the basis of voluntary agreements. The obligation to conduct an energy audit is derived directly from the law.

Energy assessments are mandatory if:

- an assessment is conducted on the technical, economic and environmental feasibility of alternative energy supply systems in the construction of new buildings or upon a major change in a completed building with a source of energy with an installed capacity greater than 200 kW; the energy assessment shall constitute part of the building energy performance certificate;
- an assessment is conducted on the feasibility of introducing electricity production in an energy management system with a total calorific output greater than 5 MW, if documentation on the structure pursuant to special legislation[4, 14] is submitted for the construction of a new source of energy or for a change in completed structures where sources of energy have already been constructed;
- an assessment is conducted on the feasibility of introducing heat supply in an energy management system with a total electrical capacity greater than 10 MW, if documentation on the structure pursuant to special legislation[4, 14] is submitted for the construction of a new source of energy or for a change in completed structures where sources of energy have already been constructed; for an energy management system using gas turbines, this obligation shall apply to a total electrical capacity greater than 2 MW, and for internal combustion engines, this obligation shall apply to a total electrical capacity greater than 0.8 MW;
- an assessment is conducted on the feasibility of projects related to the improved energy performance of buildings, greater energy efficiency, reduced emissions from combustion sources of pollution, the use of renewable or secondary sources or the combined generation of electricity and heat financed under support programmes from state or European funds or funds derived from the sale of greenhouse gas emission allowances;

- since 2008, approximately 1500 energy audits are conducted in all sectors annually in the Czech Republic;

- in the Czech Republic, there are 400 energy specialists authorised to conduct energy audits and assessments;

- the State Energy Inspectorate may impose the obligation to implement saving-related measures proposed by an energy audit;

- institutions which have commissioned an energy audit may seek the State Energy Inspectorate's verification of the correctness thereof, including on a private basis.

In relation to the obligation to conduct energy audits of buildings and energy management systems, Czech legislation does not currently make a difference between small, medium-sized or larger enterprises. The criterion is the total annual energy

consumption or a major change in existing buildings where the energy performance requirement is not met.

With a view to transposing the Energy Efficiency Directive, an amendment to Act No 406/2000 on energy management regulates a new obligation for large enterprises to conduct an energy audit every four years, starting as of 5 December 2015. Alternatively, large enterprises may opt to introduce an energy management system in accordance with ČSN EN ISO 50001 – Energy management systems, or in accordance with ČSN EN ISO 14001 – Environmental management systems. This obligation will affect approximately 2 150 companies. At present, energy management systems are not regulated at all by law. Consultancy and financial support in this area tends to be provided by regions and municipalities.

Energy management support has been declared, as in previous years, under the State Programme on the Promotion of Energy Savings and the Utilisation of Renewable Energy Sources. One of the activities covered in this area is the support of projects for the 'Implementation of systematic energy management pursuant to ČSN EN ISO 50001'. This support has been made available for regions and chartered cities. The support focuses on the introduction, enhancement and, where appropriate, certification of a region's energy management system. All of the measures proposed must be implemented in accordance with ČSN EN ISO 50001 and must be geared towards the certification of the entity's energy management system. The support aims to put in place a functioning system of energy management at all structures owned by the applicant which meet the requirements of the aforementioned standard. The support primarily centres on the production of basic documents required by the standard, organisation (a definition of processes, responsibilities, information flows, etc.), the preparation of systems for monitoring and evaluating energy consumption, and system certification. Upon receiving a subsidy, beneficiaries undertake to provide the Ministry of Industry and Trade, as required, with aggregated data on the results of energy management system implementation for a minimum period of the five years following completion of the project. Every year, these projects are supported with approximately CZK 1 million.

Overview of legislation governing the system for the performance of energy audits, mandatory checks of boilers and air conditioning systems, energy efficiency, heating, hot water supplies and the efficiency of heat distribution systems:

<u>Acts:</u>

- Energy Management Act, as amended (406/2000)

- Energy Act, as amended (458/2000)
- Supported Energy Sources Act (165/2012)

Provisions implementing Act No 406/2000 on energy management:

- Implementing Decree on energy audits and energy assessments (450/2012)
- Implementing Decree on energy specialists (118/2013) (Note: the term 'energy specialist' encompasses persons authorised to perform energy audits and energy assessments, draw up building energy certificates, conduct checks on boilers and thermal energy distribution systems in operation, and conduct checks on air conditioning systems.)
- Implementing Decree on the energy performance of buildings (78/2013)
- Implementing Decree laying down the details of energy efficiency in the distribution of heat and in the internal distribution of heat and cold (193/2007)
- Implementing Decree laying down rules for heating and the supply of hot water, specific indicators of heat consumption for heating and for hot water heating, and requirements for the fitting of the internal heat equipment of buildings with appliances regulating the supply of heat to final consumers (194/2007)
- Implementing Decree establishing the minimum energy efficiency in the production of electricity and thermal energy (441/2012)
- Implementing Decree on the inspection of boilers and thermal energy distribution systems (194/2013)
- Implementing Decree on the inspection of air-conditioning systems (193/2013)

The above legislation is a guarantee that the Czech Republic complies with and goes beyond the minimum criteria of energy audits, including energy audits performed as part of an energy management system in accordance with Annex VI to the new Energy Efficiency Directive.

3.1.3 METERING AND BILLING

The metering of the size of final supplies of electricity, natural gas, and supplies of heat and cold, including supplies of hot water, enjoys a long-standing tradition in the Czech Republic. This system currently provides sufficient information to final customers on actual consumption over a given period.

Metering and billing obligations are transposed by Act No 458/2000, the Energy Act, and by Act No 406/2000 on energy management, as amended, as well as by Implementing Decree No 82/2011, as amended, on the metering of electricity and on the method for determining compensation for damage in cases of the illegal offtake, illegal supply, illegal transmission or illegal distribution of electricity, and Implementing Decree No 108/2011, as amended, on the metering of gas and on the method for determining compensation for damage in cases of the illegal offtake, illegal supply, illegal storage, illegal transmission or illegal distribution of gas.

Final customers have their electricity, gas and heat metered, and typically make payments in the form of monthly advances accompanied by quarterly or annual settlement. Bills provide detailed economic data and information itemising individual parts of the payment, and include a graph showing a comparison with consumption in the previous period. It is up to customers which method they use to pay their bills. In the wake of a study comprehensively addressing smart meters, the Czech Republic has decided that, for the time being, it will hold back from the blanket deployment of such devices. Nevertheless, we do not rule out a situation in the future where customers will be able to apply for the installation of smart meters, provided that they pay for the extra costs incurred. This will give customers the opportunity to assess the costs and benefits of smart metering themselves and will help them to reach an optimal decision.

Where heat and hot water are supplied from a central source, billing meters are used at transfer stations. As a matter of priority, transfer stations set up separately for individual customers, especially where major reconstruction projects are involved. The further breakdown of billing of consumption metered in this way is transparent, aided by various types of cost allocators for heat and hot water.

The billing of supplies of electricity, gas, heat and cold is governed by Implementing Decree No 210/2011 on the scope, particulars, and dates for the billing of supplies of electricity, gas or thermal energy and related services. The final settlement of electricity and gas billing is carried out at least once a year, and may take place at shorter intervals. Payments are made in the form of monthly advances.

Thermal energy suppliers provide customers with free billing of thermal energy supplies at least once per calendar year, calculated as at 31 December of the calendar year, as this is the last day of the billing period. Suppliers provide customers with the billing of thermal energy supplies for the calendar year by 28 February of the following calendar year, unless otherwise agreed with the customer.

Under an amendment to Act No 406/2000, as amended, individual thermal energy metering devices will have to be fitted on radiators. These obligations will be laid down in implementing legislation.

3.1.4 CONSUMER INFORMATION PROGRAMMES AND TRAINING PROGRAMMES

This National Energy Efficiency Action Plan contains several measures designed to improve consumer awareness:

- **Measure 2.3 –** Awareness of the energy savings in heat consumption in households. The aim of this measure is to hold information campaigns and awareness events on energy savings in households (the media, leaflets, lectures, etc.).

- **Measure 2.4** – Energy labelling of household appliances – support of implementation. The labelling of household appliances is a compulsory measure derived from EU legislation aimed at fitting household electrical appliances with labels providing information on their energy efficiency, which can serve as a basis for households when purchasing such devices.

- **Measure 2.7** – Expansion of the role of the public sector in demonstrating new technologies. The main thrust of this measure is to introduce green procurement in state administration. This would be mandatory for organisations falling within the scope of the effect of the Public Procurement Act.

Since November 2010, 'Rules for the application of environmental requirements in central and local government procurement procedure and purchasing' have applied in the Czech Republic. These rules were adopted by the Government to promote green procurement in the public sector. The rules only define basic parameters, i.e. they state the bodies for which they are binding, and how and when evaluations of their implementation are to be evaluated. Selected product groups are regulated by more detailed methodologies. These methodologies establish environmental requirements for products and services procured, and also include detailed instructions on how to incorporate these requirements into public procurement.

At present, methodologies are available for the purchase of furniture and office computer equipment, which, as of 1 November 2010, should govern the procedure followed by central bodies of state administration (the Government Office, ministries and other institutions, such as the Energy Regulatory Office, etc.). Further to international developments, methodologies that are also significant from the perspective of energy consumption are also due to be incorporated into the rules:

- energy-saving and environmentally friendly buildings;

- public street lighting;

- wall panels;

- mobile telephones;

- combined heat and electricity generation;

- boilers;
- air conditioning and heat pumps;
- windows.

The target groups are organisations of state administration and local government, organisations subject to the Public Procurement Act and other business entities.

- **Measure 2.9 –** Energy Star – Support for the sale of energy-saving office technology by labelling compliant products with the Energy Star label, and the possibility of selecting compliant products from a publicly accessible database. Office technology manufacturers may subscribe to the Energy Star scheme and have their products certified within the scope of this programme. Certified products bear the Energy Star label and are entered in a database of energy-saving appliances. Energy Star labels and the database of energy-saving products are designed to help consumers when purchasing such products.

The draft amendment to Act No 406/2000 on energy management proposes new special technical conditions that central institutions must observe in the public procurement procedure. These rules are in accordance with Article 6 and Annex III to the Energy Efficiency Directive.

3.1.5 AVAILABILITY OF QUALIFICATION, ACCREDITATION AND CERTIFICATION SCHEMES

The following qualification schemes are available in the Czech Republic:

1) Energy specialists

Energy specialists are natural persons holding an authorisation granted by the Ministry to:

a) perform an energy audit and produce an energy assessment;

b) produce a certificate;

c) inspect boilers and thermal energy distribution systems in operation; or

d) inspect air-conditioning systems.

Energy specialists may hold all four authorisations. However, they must apply for each one separately and must comply with the conditions for each one separately. Authorisation applicants must pass a professional examination, have full legal capacity, be persons of integrity, and be professionally competent.

The register of energy specialists is publicly accessible.

Energy specialists must also undertake regular, continuous training to update their knowledge. This consolidates, deepens and updates expert knowledge of applicable legislation on energy management, the energy performance of buildings and energy management systems, and the energy efficiency of energy production plants, including plants producing energy derived from renewable energy sources, secondary energy sources and the combined generation of electricity and heat.

If the State Energy Inspectorate, which is the inspection body in this area, detects an error in the activities carried out by an energy specialist, the Ministry of Industry and Trade invites that specialist to retake an examination to show his knowledge and work before an expert panel.

Authorisation to engage in professional activities is removed from those energy specialists who fail to comply with the requirements of continuing training or re-examination.

2) Person authorised to install selected installations generating energy from renewable sources

A person authorised to install selected installations generating energy from renewable sources (hereinafter referred to as a 'person authorised to carry out installation') means a natural person holding:

a) a trade authorisation for plumbing and heating installations, for the assembly, repair and reconstruction of refrigeration equipment and heat pumps, for the assembly, repair, inspection and testing of electrical equipment, or for stove-fitting; and

b) a relevant certificate demonstrating professional qualifications in accordance with the Act on the Recognition of the Results of Further Training that is not more than five years old.

A person established in another EU Member State may install selected installations generating energy from renewable sources in another country provided that he is authorised to engage in such activity under the legislation of that other EU Member State.

Another qualification scheme for energy service providers has been proposed in the amendment to Act No 406/2000 on energy management.

3.1.6 ENERGY SERVICES

Current situation:

In 1999, support began to be channelled into energy-saving projects from the State Programme on the Promotion of Energy Savings and the Utilisation of Renewable

Energy Sources. This support took the form of subsidies granted to energy service providers, which were contributions from the investment framework for installed energy-saving installations.

In 2006, the strategy for the support of the EPC method was revised, and subsidies were provided to contracting authorities seeking energy service providers for the preparation of a project employing EPC methods and for the organisation of public procurement tendering procedure. In 2012, support was renewed under the EFEKT Programme in the form of subsidies to identify projects suitable for clients from the ranks of public administration.

Since 1999, State Programme support has been used to produce booklets, leaflets, recipe books for contracting authorities, and websites (a database of EPC and EC projects), training seminars have been held, and subsidies have been granted for the production of methodology aids (EPC Project Contracting Methodology, Code of Conduct, improvements in the quality of EPC contracting).

The financing of investments in installed energy-saving measures are another common element of EPC-type energy services provided. In this case, energy service providers require sufficient access to financial resources in order to carry out their activities. In the Czech Republic, it is common practice to sell receivables, and such claims are sold almost exclusively to entities holding a CNB banking licence. The name of the specific financial institution to which a receivable is assigned is usually specified in the EPC contract prior to the signing thereof. Negotiations with the financing institution are completed after notification of the selection of the best bid and completion of the tendering procedure. The assignment of a receivable does not change the status of the customer. This liability remains a trade payable, i.e. it is supplier credit. The sale of a receivable does not change supplier credit into bank credit, which would influence the customer's debt service indicator. No contractual relationship is established between the customer and the financial institution (the bank), i.e. from an accounting and legal perspective, the assignment of a receivable has no impact on the customer or the customer's debt service indicator. The contractual obligations of the energy service company do not change. Installed savings measures, upon completion, are transferred to the customer's assets without the establishment of any liens. The assignment of receivables has been used in almost all projects completed since 2005. These have been EPC projects in the public sector (towns, regions, and central government authorities partly funded from the public purse).

Since 2011, information on energy service companies has been available on the website of the Association of Energy Service Providers (www.apes.cz) along with other information and links.

A model contract has been created primarily for the purposes of public contracting for guaranteed energy services by contracting authorities. In this respect, it is publicly available at the website of the Ministry of Industry and Trade:

http://www.mpo.cz/dokument105425.html

The content of the model EPC contract continues to be edited, even though it is generally consistent with Annex XIII of the Directive. These modifications are included in the draft amendment to Act No 406/2000 on energy management

Other documents promoting the development of guaranteed energy services are also available on the Ministry's website, including:

- Annex 1: Government Resolution No 109 of 22 February 2012 on the finalisation of the methodology for the use of the Energy Performance Contracting (EPC) method – guaranteed energy services (Government Resolution).

- Annex 2: Model contract for contracting with guaranteed energy service providers.

- Annex 3: Schedules to an agreement on the provision of guaranteed-result energy services via the EPC method.

- Annex 4: Code of Conduct – Guaranteed energy services.

- Annex 5: The process of preparing public tendering procedure for the provision of guaranteed-result energy services via the EPC method.

- Annex 6: Methodology for the preparation and implementation of energy-saving projects handled using the EPC method.

Measures proposed:

In this area, proposals have been prepared forward for the provision of energy services employing the EPC method in the tertiary sector, and the promotion thereof. The idea of this measure is to remove legislative hurdles hampering the application of the EPC method and to draw up methodology for the preparation and implementation of projects using the EPC method in state and public administration so that EPC becomes the main method employed in achieving energy savings in buildings.

The EPC (Energy Performance Contracting) method seeks to reduce the operating costs of energy in buildings. The basis of this method is that customers do not need to make their own investments in the replacement of obsolete technology. In the conclusion of EPC service supply agreements, the service supplier undertakes to cover the cost of investments in savings measures from its own resources, and the customer repays them from the savings achieved in operating costs. The hallmark of EPC is it is guarantee that a project will make savings.

At present, use of the EPC method by organisational units of the state is precluded by Act No 218/2000 on budgetary rules, especially Section 49 thereof, which does not allow organisational units of the state to receive loans. Organisations partly funded from the public purse, on the other hand, may make use of this type of service. However, they are frequently concerned about making mistakes when accounting for these projects because they view this process as the financing of investments from operating costs. The idea of this measure is to remove legislative hurdles hampering the application of the EPC method and to draw up methodology for the preparation

and implementation of projects using the EPC method at organisational units of the state.

There are currently about 15 energy service companies operating on the market in the provision of energy services applying the EPC method. Of these, 13 have organised themselves into the Association of Energy Service Providers (APES), which was founded in 2010. The APES website (www.apes.cz) includes a list of member energy service companies, with their contact details and websites offering more detailed information about them. In terms of the standard, quality and scope of energy service provision, the Czech Republic ranks among the most advanced within the European Union.

The provision of energy services using the EPC method has a history stretching back 20 years in the Czech Republic. Throughout that time, approximately 200 projects have been implemented. In recent years, the annual volume of investments in the implementation of EPC projects has stood at around EUR 10 million. Between 10 and 15 new projects are implemented every year. In this light, trends over the past 10 years indicate that, to a certain extent, further advances can be expected. According to an expert estimate, in the future we can expect the implementation of projects including the provision of guaranteed-result energy services in approximately 30 to 50 structures, with average annual energy savings of between 600 and 1 000 GJ per structure. That would be tantamount to overall energy savings of at least 30 TJ per year, and this range could increase further.

A qualification scheme for energy service providers has been proposed in the amendment to Act No 406/2000 on energy management.

3.1.7 OTHER ENERGY EFFICIENCY MEASURES OF A HORIZONTAL NATURE

The Czech Republic implements awareness-raising programmes in the field of energy efficiency on an ongoing basis. The measures are listed in Annex 4. In parallel, technical material has been drawn up; this takes the form of interpretative communications, and these are listed under 3.1.6. Information on legislative barriers is also given under 3.1.6.

3.2 ENERGY EFFICIENCY OF BUILDINGS

The energy performance of buildings is covered by Act No 406/2000 on energy management, Sections 7 and 7a of which set out the energy performance requirements themselves and requirements relating to the building energy performance certificate and the particulars to be recorded. More detailed provisions are set out in the implementing legislation, i.e. the Decree No 78/2013 on the energy performance of buildings:

• the cost-optimal level of energy performance requirements for new buildings, major alterations to completed buildings and alterations other than major alterations to completed buildings, and for nearly zero energy buildings;

• the method of calculating the energy performance of a building;

• the model for assessing the technical, economic and ecological feasibility of alternative energy supply systems;

• the model for establishing recommended measures for improving the energy performance of a building;

• a model for the certificate and its contents and specification of how the certificate is to be drawn up and displayed in the building.

Energy performance certificates are to be produced for buildings and their energy performance is to be evaluated in the cases defined in Act No 406/2000, as amended. To establish the reference value for the minimum energy performance requirement, it is proposed that use be made of the procedure set out in standard ČSN EN 15 217 Energy performance of buildings - Methods for expressing energy performance and for energy certification of buildings and the standards and regulations in force to which it refers. The reference value for energy performance is the energy performance value calculated for a building having the same location, function, size, etc., but with properties such as the level of insulation, heating system efficiency, internal heat gain, etc. replaced by reference values.

The evaluation of energy performance is linked to compliance with a number of energy performance indicators. The energy performance indicators are as follows:

a) total primary energy per year;
b) non-renewable primary energy per year;
c) total energy supplied per year;
d) energy supplied for different technical systems (heating, cooling, ventilation, humidity regulation, hot water production and lighting) per year;
e) average thermal transmittance coefficient;
f) thermal transmittance values for individual structures at the system boundary;
g) efficiency of technical systems.

New buildings must simultaneously comply with three energy performance indicators, namely non-renewable primary energy per year (b), total energy supplied per year (c) and the average thermal transmittance coefficient for the building envelope (e).

For renovated buildings or where a major modification is made to a completed building, and where a modification other than a major modification is made to a completed building, it is possible to select a combination of indicators that need to be complied with. In the case of a major modification to a completed building, it is necessary to meet both the requirement relating to non-renewable primary energy per year (b) and that relating to the thermal transmittance coefficient (e), or total energy supplied per year (c) and thermal transmittance coefficient for the building envelope (e). For modified elements of a building envelope or technical systems, it may be possible to comply only with the requirements relating to the modified elements (f) and (g).

The other EN indicators listed above are indicative and no requirements are laid down regarding compliance with them.

The parameters and values for energy performance requirements ENB are, except in the case of nearly zero energy buildings, laid down in such a way as to ensure cost-optimal energy performance levels for buildings and building elements, as calculated for their estimated economic life cycle, in accordance with the EU's comparative methodology framework.

In Decree No 78/2013, requirements are expressed in terms of compliance with class C for total energy supplied to a building, in kWh/m^2.

In the context of implementing the requirements of Directive 2010/31/EU, new buildings must meet the requirement to be met by nearly zero energy buildings by 2020. Act No 406/2000 provides for a timeframe for introducing this obligation. A ‘nearly zero-energy building’ is defined as a 'building that has a very high energy performance whose energy consumption is covered to a very significant extent by energy from renewable sources'.

Practical aspects and implementation of this requirement are covered by Decree No 78/2013.

The action plan also includes a long-term building stock renovation strategy as provided for in Article 4 of the Energy Efficiency Directive. The document contains a survey of the building stock and the opportunities it presents for energy savings. It examines various scenarios for the renovation of the building stock, the costs and benefits thereof, and proposes policy, legislative and economic instruments to implement them. It focuses in detail on residential buildings. It has been possible to obtain good-quality statistics on this building stock and to classify measures leading to energy savings by type. It also supplements estimates for non-residential buildings; these need further clarification. This is covered by Annex 6.

3.2.2 FURTHER IMPROVEMENTS IN THE ENERGY PERFORMANCE OF BUILDINGS

List of measures, by sector, which contribute to improvements in the energy performance of buildings

Households

- New Green Savings 2013
- New Green Savings *(2014–2020)*
- Integrated Regional Operational Programme
- JESSICA Programme
- Panel Programme
- Joint Boiler Replacement Scheme

Services

- Operational Programme Enterprise and Innovation (business entities)
- Operational Programme Enterprise and Innovation for Competitiveness (business entities)
- Operational Programme Environment (2007–2013) (public service sector)
- Operational Programme Environment (2014–2020) (public service sector)

Industry

- Operational Programme Enterprise and Innovation
- Operational Programme Enterprise and Innovation for Competitiveness

3.3 ENERGY PERFORMANCE OF THE BUILDINGS OF PUBLIC BODIES

3.3.1 BUILDINGS OF CENTRAL GOVERNMENT AUTHORITIES

In the implementation of Article 5 (Exemplary role of public bodies' buildings) of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012

on energy efficiency (hereinafter referred to as the 'Directive'), further to Article 5(6) of the Directive the Czech Republic has decided to opt for an alternative approach to Article 5(1) to (5) of the Directive.

The alternative measures the Czech Republic wishes to adopt include changes in behaviour in building management, i.e. zero-cost or low-cost measures. Measures will then be taken with an economic return of up to 10 years, which will primarily encompass the reconstruction of heat sources and heating systems and the introduction of efficient regulation. After this, we will proceed to measures with a longer period of return, i.e. structural and technical measures. This approach has been drawn up on the basis of economic efficiency and also takes into account the fact that many central government authorities in the Czech Republic can be found in buildings with historical facades, where it would be impossible to implement comprehensive measures.

In its reporting on the equivalent improvement in the energy performance of the buildings, the Czech Republic drew on Annex IV to the Public Procurement Directive (2004/18/EEC), which contains a list of central government authorities. It then drew up a list of buildings, mirroring the standard approach, which are used by these authorities, and established the energy savings that would be achieved by the annual renovation of 3% of the floor area of the buildings affected by the Directive. These energy savings, consistent with energy savings under the standard procedure, will then be achieved by means of the aforementioned measures.

A list of buildings has been published on the website of the Ministry of Industry and Trade. http://www.mpo.cz/dokument145673.html

Article 6 of the Energy Efficiency Directive has been proposed for transposition in the Energy Management Act. Here, with regard to the purchase of certain products and services and the purchase and rent of buildings, central government authorities which conclude public works, supply or service contracts will be set the obligation that their purchasing decisions should be based on energy efficiency, but also with consideration for other applicable European legislation in this area.

3.3.2 BUILDINGS OF OTHER PUBLIC BODIES

Since 2012, the EFEKT Programme has promoted the introduction of energy management in regions and towns in accordance with ČSN EN ISO 50001, along with analyses of the feasibility of implementing the EPC method.

The following public entities have been supported in the introduction of energy management:
the South Moravian Region, the Moravia-Silesia Region, the Plzen Region, the chartered city of Opera, the Liberec Region, the Pardubice Region, the Central Bohemia Region, and the chartered city of Hradec Králové.

3.4 MEASURES TO IMPROVE ENERGY EFFICIENCY IN INDUSTRY AND TRANSPORT

List of measures which contribute to improvements in energy efficiency in industry

- Operational Programme Enterprise and Innovation
- Operational Programme Enterprise and Innovation for Competitiveness

Energy intensity is one of the factors affecting the competitiveness of businesses and, indeed, the economy as a whole. As regards reducing the energy intensity of industrial processes, the Czech Republic has made substantial progress since it came into being. Nevertheless, in absolute terms, the energy intensity of Czech industry is still more than just short of three times the EU-15 average. There is huge untapped economic potential for energy savings at a lower cost per unit of energy saved than is normally the case in the residential sector.

OP Enterprise and Innovation for Competitiveness will be the principal instrument for implementing savings measures in industry. In the first period, between 2014 and 2016, it should achieve savings of 8.571 PJ and, in the second period from 2017 to 2020, 11.429 PJ. Overall, then, industry will contribute 20 PJ towards achieving the target set under Article 7 of the Directive in the 2014-2020 period. A total of CZK 20 billion will be allocated to achieve those savings under this programme. The rate of financing is expected to be 40% of total investment costs.

Two basic types of supported measure will be the improvement of the energy performance of buildings and the increase in the energy efficiency of technologies. These measures have a service life of 10 or more years. Activities supported in the 2014-2020 period will include:

- modernisation or replacement of existing facilities producing energy for own consumption, which will increase their efficiency;
- introduction and upgrading of measurement and control systems;
- modernisation, reconstruction and loss reduction in electricity and heat distribution systems in buildings and production plants;
- implementation of measures to improve the energy performance of buildings in the business sector;
- re-use of waste energy in production processes;
- improvement of energy performance and increase in the energy efficiency of production and technological processes;

- installation of RES for an undertaking's own consumption;

- installation of a cogeneration unit with maximum use of electricity and thermal energy for the undertaking's internal consumption;

- support in respect of the extra costs incurred in achieving the standard of a nearly zero energy building and a passive energy standard in the reconstruction of, or construction of new, business buildings.

The above measures will be carried out either separately or as a set of several measures (comprehensive projects) based on recommendations arising from an energy audit. As regards financing, both the use of a conventional subsidy scheme and the introduction of financial engineering instruments are envisaged.

Measures which contribute to improvements in energy efficiency in transport

The Operational Programme Transport supports the construction, modernisation and development of trans-European transport networks (TEN-T) and regional rail transport networks.

In particular, the transport aspects of the key strategic targets of the National Development Plan are implemented in the Operational Programme Transport. There is a particular focus on the modernisation of railway and road networks. The main programme indicators are a reduction in the accident rate, an increase in transport volumes, time savings and a reduction in greenhouse gases.

Energy savings are calculated by reference to the indicator of reductions in greenhouse gases.
Basic overview of priority axes and areas of intervention:

- Priority axis 1 – Modernisation of the TEN-T railway network
- Priority axis 2 – Construction and modernisation of the TEN-T motorway and road network
- Priority axis 3 – Modernisation of the non-TEN-T railway network
- Priority axis 4 – Modernisation of non-TEN-T Class I roads
- Priority axis 5 – Modernisation and development of the Prague Metro and systems for the management of road transport in Prague
- Priority axis 6 – Support of multimodal freight transport and development of inland waterway transport
- Priority axis 7 – Technical assistance

The programme's total allocation in the period between 2007 and 2013 was EUR 5.8 billion. We envisage the same amount for the 2014–2020 period.

3.5 PROMOTION OF EFFICIENT HEATING AND COOLING

3.5.1 COMPREHENSIVE ASSESSMENT

Description of the procedure and methodology used to conduct the cost-benefit analysis meeting the criteria laid down in Annex IX to the Directive.

A comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling, within the meaning of Article 14(1) of the Directive, has yet to be conducted in the Czech Republic. In keeping with the Directive's requirements, this assessment is expected to be conducted by 31 December 2015.

The Ministry of Industry and Trade last assessed the potential of cogeneration in 2006. The results are available in the Report on the results of an analysis of national cogeneration potential in the Czech Republic pursuant to Directive 2004/8/EC. That report identified economic potential for a 5.6 TWh increase in the production of electricity from cogeneration by 2020.

Procedure and methodology for cost-benefit analysis in accordance with Part 1 of Annex IX has yet to be drawn up. There are plans to prepare by the end of 2014 so that it can be used to process a comprehensive assessment of potential pursuant to Article 14(1) by the end of 2015.

3.5.2 OTHER MEASURES

The support of electricity from high-efficiency cogeneration is provided for by Act No 165/2012 on supported sources.

For the purposes of defining such support, electricity from high-efficiency cogeneration means electricity produced in a combined process associated with the supply of useful heat at a facility which has been issued with a certificate of origin of electricity from high-efficiency cogeneration, in the production of which relative savings are made in the input primary fuel needed to produce such electricity and heat amounting to at least 10% compared to the separate production of electricity and heat. The requirement to achieve a relative saving in the input primary fuel applies only to electricity generated in an electricity production plant with installed electrical capacity of more than 1 MW.

The support of electricity from high-efficiency cogeneration applies to electricity from high-efficiency cogeneration generated at electricity production plants in the Czech Republic which are connected to the Czech grid directly, via a point of delivery, or via another electricity production plant connected to the Czech grid.

The support of electricity from high-efficiency cogeneration is provided for the quantity of electricity reported by the producer.

The same law also defines the certificate of origin of electricity from high-efficiency cogeneration or secondary sources (hereinafter referred to as a 'certificate of origin'). These certificates are used to prove that a facility has the capacity to produce electricity from high-efficiency cogeneration or secondary sources.

Act No 406/2000 on energy management also lays down the obligation for producers of electricity who produce electricity, without supplying useful heat, with energy efficiency lower than the prescribed value to make a payment to the market operator for non-compliance with minimum energy efficiency in the combustion of lignite within 90 days of the efficiency inspection.

3.6 ENERGY TRANSFORMATION, TRANSMISSION AND DISTRIBUTION AND DEMAND RESPONSE

3.6.1 ENERGY EFFICIENCY CRITERIA FOR NETWORK TARIFFS AND REGULATIONS

The regulatory framework for distribution system operators includes an incentive to reduce overall losses in distribution networks. A loss specification (i.e. the permitted rate [%] relative to the planned quantity of electricity on entry into the distribution system) is established as a constant for the entire regulatory period (five years) based on actual (measured) values in the previous regulatory period. Permitted costs of losses are obtained by multiplying the specification by the planned quantity of electricity on entry into the system and the prescribed price of electricity for loss coverage. If a distribution system operator achieves a reduction in the share of losses in distribution, the difference between the permitted costs of losses and the actual costs of losses constitutes additional profit. This means that distribution companies have a financial incentive to increase the efficiency of electricity distribution.

Network tariffs incorporate time differences so that, when the network load is high, a high tariff is applicable, and at other times a low tariff is used. This time-of-use tariff system is accompanied by technical measures for the use of heating appliances. This system makes it possible to shift the use of heating appliances into bands where the load on the distribution system is lower. The system has been in use for several decades now, and limits peaks in the grid load diagram (this is known as peak shaving). This has facilitated the optimisation of investment in the distribution network in recent decades. Peak shaving also reduces electricity losses in the network.

The following types of dual tariff exist in the Czech Republic:

- Eight-hour accumulation – this is designed for supply points equipped with a storage electrical appliance (e.g. a boiler) used to heat water or a building. With this rate, the installed electrical equipment and its load must have a value corresponding to at least 55% of the value of the main circuit breaker before the electricity meter. These appliances heat up water during the low tariff period. The low tariff is controlled during the day based on developments in electricity consumption in the Czech Republic. The low tariff switchover time is determined by the distributor. The low tariff may be broken down into several intervals throughout the day. The aggregate of these times must always be at least eight guaranteed hours. The minimum uninterrupted interval for the low tariff is one hour. Modes: low tariff lasting at least eight hours a day, high tariff lasting a maximum of 16 hours a day.
- Sixteen-hour accumulation – this is designed for supply points equipped with hybrid electrical appliances (a combination of storage and direct appliances) used to heat water or a building. The sum of the output of all devices must correspond to at least 50% of the value of the main circuit breaker before the electricity meter. Modes: low tariff lasting at least 16 hours a day, high tariff lasting a maximum of 8 hours a day.
- Direct heating – designed for buildings and households equipped with electric direct appliances used for spatial heating. The sum of the consumption of all devices must correspond to at least 40% of the value of the main circuit breaker before the electricity meter. Modes: low tariff lasting at least 20 hours a day, high tariff lasting a maximum of 4 hours a day.
- Heat pumps – designed for spatial heating by means of a heat pump. Modes: low tariff lasting at least 22 hours a day, high tariff lasting a maximum of 2 hours a day.
- Weekend – designed for recreational cottages and structures intended for weekend stays, where the cheap electricity tariff (the lower tariff) is set year-round from midday on Friday until 10 p.m. on Sunday.
- Since 2013, it has been accompanied by a special tariff designed for the recharging of electric vehicles, which is contingent on the ownership or right of use of an electric vehicle. The low tariff mode lasts for eight hours a day during the night.

Preparations are currently underway to supplement the tariff system with a dual tariff with no technical conditions (a dual tariff which is not contingent on the use of heat appliances). Therefore, this is another measure in this area.

3.6.2 FACILITATION AND PROMOTION OF DEMAND RESPONSE

In the performance of Task 14 in the annex to Communication COM (2012) 663 final, 'Ensure the functioning of the internal energy market', of 15 November 2012, the Czech Republic is preparing a Smart Grid action plan, which, among other things, will include further measures to facilitate and develop demand side response.

Demand response is currently facilitated primarily by the ripple control system. The possibility of directly controlling consumption by means of ripple control technology has long been used in the Czech Republic. The ripple control system is a unidirectional group communication system using the electricity distribution network as a joint transmission channel shared by many receiving end stations. The distribution network predicted for the transmission of electricity with a frequency of 50 Hz is also used for the transmission of various higher-frequency ripple control signals. From this perspective, ripple control can be ranked among the narrow-band PLC technologies.

At present, approximately 46% of the overall household electricity consumption and 31% of the overall small-business electricity consumption takes place in the ripple-controlled low tariff. Ripple control receivers control the running of systems for spatial heating by means of electricity, the electric storage heating of water and the recharging of electric vehicles of households or small businesses. In this respect, ripple control plays the role of a platform offering deferred consumption.

The primary reason for deploying ripple control in the 1960s was to reduce investment in the distribution system by optimising the system load. Ripple control distributed the energy-intensive offtake by households throughout the day.

Distribution system operators also use ripple control for the following purposes: Optimisation of the system load (a reduction of losses in the distribution system, an increase in the transmittance of the distribution system), the handling of emergencies in the Czech grid, the management of electricity production in dispersed sources and the provision of system and ancillary services in distribution systems required for the proper operation of distribution systems and the grid as a whole. In the course of normal operations, distribution system operators use ripple control to distribute the controllable consumption in order to satisfy the needs of as many customers as possible, to ensure optimal use of networks, to increase transmittance and to ensure

low losses in networks, to carry out switching in networks for operating purposes where necessary, and to optimise the purchase of electricity to cover losses.

Ripple control is managed, operated and financed by distribution system operators. These costs are incorporated into the price for the distribution of electricity. The main reason for using ripple control is to spread out consumption evenly, i.e. to optimise the operation of the distribution system. Ripple control is also used to handle emergencies in the grid. In the face of emergencies and other high-alert situations, ripple control is used to prevent and eliminate such situations and to clear up any consequences thereof.

The ripple control system is closely linked to the dual tariff system described in the responses above. Electricity customers who make some of their consumption available through controlled appliances are compensated for deferred consumption in the form of a lower rate for electricity distribution. Customers' consent to the control of specified appliances by the distribution system operator is included in connection contracts. Distribution tariffs are defined by the Energy Regulatory Office, including pricing. This system's traders use and offer commercial dual tariffs to customers with ripple control. Commercial tariffs are valid for the same duration as distribution tariffs. However, the difference in commercial low/high tariffs is not as pronounced as in the distribution tariffs, mainly thanks to the situation on the electricity market.

3. LIST OF ANNEXES

Annex 1

List of alternative policy measures according to Article 7 and quantification of the energy savings made in final consumption by such measures

Annex 2

List of measures according to Article 3 and quantification of the energy savings made in final consumption by such measures

Annex 3

Detailed description of individual energy-saving measures under Article 7

Annex 4

Detailed description of individual energy-saving measures under Article 3

Annex 5

Second annual report from the Czech Republic under Article 24(1) of the Energy Efficiency Directive

Annex 6

Buildings renovation strategy under Article 4 of the Energy Efficiency Directive

Annex 1: List of alternative policy measures according to Article 7 and prediction of the energy savings made in final consumption by such measures

Sector	Measure number	Measure	2008-2010	2011-2013	2014-2016	2017-2020	Allocation (estimate)
			TJ	TJ	TJ	TJ	CZK billions
Households	1.1	Regeneration of high-rise pre-fabricated buildings – PANEL/NEW PANEL Programme (MRD)	1 192	198	486	648	4.5 (est.)
	1.2	Green Savings (MoE)	2 950	2 950	0	0	-
	1.3	New Green Savings 2013 (MoE)	0	0	442	0	1
	1.4	New Green Savings 2014–2020 (MoE)	0	0	3 667	10 641	27
	1.5	JESSICA Programme (MRD)	0	0	92	147	2.55
	1.6	Integrated Regional Operational Programme (MRD)	0	0	1 800	7 200	16.9
	1.7	Joint Boiler Replacement Scheme (MoE)	0		354		0.15 (est.)
	1.9	Operational Programme Environment 2014–2020 (MoE) (household part, priority axis 2)	0	0	699	2302	10
Services	1.8	Operational Programme Environment 2007-2013 (MoE)	139	1 168	1 385	0	-
	1.9	Operational Programme Environment 2014–2020 (MoE)	0	0	462	1 521	13.4
	1.10	State programmes on the promotion of energy savings and the utilisation of renewable energy sources (EFEKT) – investment subsidies (MIT)	165	21	20	27	0.1 (est.)
	1.11	Operational Programme Prague Growth Pole – buildings part (Prague)	0	0	18	25	1
	1.12	Operational Programme Enterprise and Innovation (MIT) (commercial services)	200	680	720	0	-
	1.13	Operational Programme Enterprise and Innovation for Competitiveness (MIT) (commercial services)	0	0	1 714	2 286	4
Industry	1.12	Operational Programme Enterprise and Innovation (MIT)	800	2 720	2 880	0	-
	1.13	Operational Programme Enterprise and Innovation for Competitiveness (MIT)	0	0	6 857	9 143	16
Total			**5 446**	**7 737**	**21 596**	**33 940**	**96.6**

The table in Annex 1 summarises all the measures which, having regard to additionality and materiality, the Czech Republic is planning to take in order to meet the target set in Article 7 of the Directive. These measures will be continuously evaluated and, having regard to cost-effectiveness, will be modified and updated so as to achieve proper implementation of the Directive.

Annex 2: List of other measures and quantification of the energy savings made n final consumption by such measures

Sector	Measure number	Measure	2008-2010	2011-2013	2014-2016	2017-2020
			TJ	TJ	TJ	TJ
Households	2.1	Support for the modernisation of housing stock by means of building society savings schemes	1 922	1 359	1 094	1 033
	2.2	Loans to municipalities to upgrade housing	0	9	7	0
	2.3	Awareness of energy savings in heat consumption in households	190	149	224	72
	2.4	Energy labelling of household appliances – support of implementation	774	774	774	1 032
	2.5	Electricity savings in household lighting	110	352	547	871
Services	2.6	Provision of energy services employing the EPC method in the tertiary sector, and the promotion thereof	95	109	127	201
	2.7	Expansion of the role of the public sector in demonstrating new technologies	0	864	864	1 152
	2.8	Electricity savings in tertiary sector lighting and in public street lighting	61	192	278	432
	2.9	Energy Star	0	184	151	187
	2.10	State programmes on the promotion of energy savings and the utilisation of renewable energy sources (EFEKT) – awareness	149	139	135	180
Industry	2.11	Support of voluntary commitments	0	0	1 088	2 900
Agriculture	2.12	Summary of measures to increase the energy efficiency of agricultural plants	210	300	420	560
Transport	2.13	Reduction in the emission and energy intensity of passenger vehicles placed on the market	0	268	1 286	4 556
	2.14	National strategy for the development of cycling transport	0	0	135	180
	2.15	Operational Programme Transport	696	696	696	928
	2.16	Operational Programme Prague Growth Pole – transport part	0	0	39	52
Cross-cutting measures	2.17	Benefits of implementing the recommendations of mandatory energy audits	2 138	1 425	998	0
	2.18	Obligation to produce energy performance certificates for buildings (building certification)	4	4	5	7
	2.19	Support for the dissemination of information and the promotion of energy savings by the state	33	39	39	52
	2.20	Application of the Ecodesign Directive	0	300	400	530
	2.21	Effect of the introduction of environmental tax reform on energy savings	1 700	0	0	0
	2.22	Increase in the efficiency of heat supply systems	0	0	1 533	3 067
	2.23	Targeted greening of pollution sources	96	81	48	0
Total			**8 178**	**7 244**	**10 880**	**10 992**

ANNEX 3 – DETAILED DESCRIPTION OF INDIVIDUAL ENERGY-SAVING MEASURES UNDER ARTICLE 7

Measure number	**1.1**

TITLE OF THE MEASURE	**Regeneration of high-rise pre-fabricated buildings – PANEL/NEW PANEL/PANEL 2013+ Programme**

Sector	**households**

Brief summary	The provision of subsidies to cover interest on loans and to secure loans for the comprehensive regeneration of multi-family buildings.

Description of the measure	This programme offers low-interest loans for the repair and upgrading of multi-family buildings. An emphasis is placed on comprehensive repairs so that owners spend financial resources in a purposeful manner. Projects supported include: • Rehabilitation of foundations and repairs of substructure waterproofing • Rehabilitation of static disorders in the supporting structure • Building envelope repair and re-profiling of the contacts of building envelope components • Repair of enclosed or open balconies, including railings • **Insulation of that part of the envelope impervious to light with concurrent rehabilitation of the building envelope** • **Replacement of external doors and windows with enhanced materials in terms of heat and noise technology** • **Repair and insulation of roofs, including vertical extensions, e.g. machine rooms, pergolas, etc.** • **Regulation of the heating system** • Repair or replacement of the distribution systems for sanitary installations and gas • Replacement of open balconies or repair of enclosed and open balconies, including railings • **Insulation of selected internal structures** • **Improvement in the central regulation of the heating system** • Lift repair or replacement, including necessary intervention in the lift shaft • Repair or replacement of electrical equipment and wiring, heavy and light current • Replacement of the entrance walls to structures with a design ensuring protection from damage by vandals • Refurbishment or replacement of flat entrance doors • **Repair of building transfer stations or machine rooms with water heating equipment** • **Modernisation of the heating system, including the use of**

	renewable energy sources, associated with the replacement of distribution systems and, where appropriate, radiators • Repair or modernisation of flat sanitary units, including distribution systems for electricity, sanitary installations and gas • Repair or modernisation of ventilation technology • The installation of a new lift or the repair or replacement of a lift, including necessary intervention in the lift shaft • Repair of lightning rods and fire equipment and structures • **Installation of thermo-solar panels** • **Glazing of enclosed or open balconies** • Replacement of entry steps and railings, low walls and paving located in front of a building • Repair of interior walls and ceilings • Repair of floor finishes and floor constructions in common areas • Repair of pathways • Modification of the entrance and staircase area, including mailboxes and lighting • **Measurement of heat consumption for the heating system, hot water consumption, cold water consumption** • Replacement of cooking gas distribution systems with an electricity distribution system • Modernisation of the hot water system, especially lever taps, riser pipe insulation, household hot water meters • Changes to the layout of a flat • Duplex extension by merging a flat on the top floor • Project work, design documentation • Static report • Building equipment inspections • **Acquisition of building energy performance certificate**

Regional application	This measure can be applied throughout the Czech Republic.

Target group	This programme is intended for all owners of multi-family buildings, irrespective of the technology used in construction (prefab, brick). The programme is open to cooperatives, associations of owners, natural and legal persons, and municipalities which own a multi-family building.

Projects targeted at end users	Support granted: • Interest – starting with the European cup commission reference rate (0.75% p.a. as of 1 October 2013) • Interest remains fixed throughout the repayment period, which may be set for a maximum of 30 years. • Security – standard, as a guarantee, or other forms of security depending on the amount of the loan.

Effectiveness	This programme focuses primarily on the overall regeneration of multi-family buildings. One of the requirements is that the heat and technical parameters of buildings required by the relevant standard must be met.

	From this perspective, the measure can be regarded as effective.

Basis of calculation	Annual reports: • State Housing Development Fund • Českomoravská záruční a rozvojová banka • Union of Bohemian and Moravian Housing Cooperatives Panel, New Panel, Panel 2013+ and Green Savings Programmes 2011 Population and Housing Census Normative requirements and legislation

Annual energy savings expected in 2016

The energy saving calculation is based on the annual reports of the State Housing Development Fund. Based on information about the amounts of subsidies, the loan is guaranteed, and the number of flats repaired, average numbers of repaired flats per CZK 1 million of subsidies and per 1 million of guaranteed loans were determined. Based on the budget projected for the programme, the numbers of repaired flats in future years were estimated. Savings were calculated based on the number of repaired flats and the average energy savings per flat. The average energy savings per flat respect a gradual tightening of standards regarding heat and technical parameters of buildings.

Year	Amount of subsidy (CZK thousands)	Loan supported (CZK thousands)	Number of dwellings repaired	
2001	34 904	119 707	1 600	5
2002	251 933	778 259	4 537	33
2003	429 155	1 377 663	5 684	58
2004	363 418	1 187 118	8 866	50
2005	221 719	876 797	9 032	37
2006	1 599 995	5 591 400	45 073	236
2007	4 299 981	12 506 976	100 140	528
2008	1 999 974	11 422 881	76 570	483
2009	2 653 385	13 064 550	82 403	552
2010	999 960	3 736 952	36 568	158
2011	998 807	3 934 754	29 644	166
2012	-	-	-	0
2013	346 300	-	5 518	32
2014	1 000 000			162
2015	1 000 000			162
2016	1 000 000			162
2017	1 000 000			162
2018	1 000 000			162
2019	1 000 000			162
2020	1 000 000			162

Approach to the calculation of savings for future years	We expect approximately the same resources to be allocated for the continuation of the PANEL 2013+ programme after 2016.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	1.192	0.198	0.486	0.648

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	This is a measure with a service life of 15 or more years.

Monitoring of the benefits of the measure	The production of underlying documentation for an application is split into two parts for the sake of simplification and in order to make the whole process cheaper. Mandatory particulars of a loan application – Part I – include a building energy performance certificate (if this needs to be supplied) and the average thermal transmittance coefficient. That the building energy performance certificate specifies the class before and after implementation of the measure. Following implementation of the measure, the class must be C or better. The thermal transmittance coefficient for the building envelope must comply with standard values. In the absence of this obligation, compliance with the prescribed average thermal transmittance coefficient (Uem) at the structure for which the loan is to be used (in accordance with the government regulation) is documented. Use of the loan must commence within six months of the date on which the loan agreement is signed. Use of the loan must end within three years of the date on which the loan agreement is signed. The borrower completes the repairs or upgrading of the building within three years of conclusion of the loan agreement. To calculate the energy savings, the implementing public authority uses the method of forecast savings. An ex-ante generic approach is used based on the application for a loan from State Housing Development Fund resources for the repair and upgrading of buildings in the Czech Republic in accordance with Government Regulation No 468/2012, and, where measures concern the building envelope, also based on the building energy performance certificate and proof of the average thermal transmittance coefficient.

	In relation to the energy performance of buildings, additionality is set at the minimum amount required or at an amount higher than that admitted under existing legislation. Detailed information about the programme can be found on the following website: http://www.sfrb.cz/programy/uvery-na-opravy-a-modernizace-domu/

Measure number	1.2

TITLE OF THE MEASURE	Green Savings Programme

Sector	Households

Brief summary	The Green Savings Programme focuses on support for the installation of heating sources using renewable energy sources, and on investments in energy savings during reconstruction and new development projects. The programme supports the high-quality insulation of single-family buildings and multi-family buildings, the replacement of non-ecological heating with low-emission sources running on biomass and efficient heat pumps, the installation of such sources in low-energy new structures, the installation of solar thermal collectors, and construction to a passive energy standard. Of the Czech Republic has obtained financial resources for this programme mainly by selling Kyoto Protocol emission credits for reductions in greenhouse gas emissions. Under an amendment to Act No 695/2004 on conditions for trading in greenhouse gas emissions of 18 July 2008, the revenue from the sale of carbon credits is revenue of the State Environmental Fund (SEF) and can be used only to promote activities and projects aimed at reducing greenhouse gas emissions. The State Environmental Fund is responsible for the administration of the Green Savings Programme. In the preparation of the programme for the period from 2008 to 2012, an emissions surplus of about 150 million tonnes of CO_2 eq. (or AAUs – Assigned Amount Units) was envisaged. Of this, approximately 100 million AAUs were to be traded under the IET (International Emission Trading) mechanism pursuant to Article 17 of the Protocol. It was estimated that the revenue from the sale of this quantity of AAUs would be between CZK 15 billion and CZK 25 billion (at a price of EUR 10 per AAU). In the end, the programme allocation was CZK 20 billion. The support was conceived to be semi--mandatory, i.e. prepared so that programme resources could be used throughout the programming period from 1 April 2009 to 31 December 2012 without any major change in conditions, and so that subsidies could be granted to anyone who applied for support and met those conditions. Resources can be used throughout the whole period from the announcement of the programme until 31 December 2014. Applications for subsidies could be made either before or after the implementation of the measure, but it was not possible to apply for support under measures completed before the announcement of the programme.

Description of the measure	The Green Savings Programme supports the following measures: • A. Heating energy savings ✓ A.1 Comprehensive insulation of the outer building shell, leading to a low-energy standard ✓ A.2 Quality insulation of selected parts of the outer building shell (partial insulation). • B. New construction to nearly zero energy standard B1. Promotion of new construction to nearly zero energy standard • C. Use of renewable energy sources for heating and hot water ✓ C.1 Replacement of non-ecological heating with low-emission sources running on biomass and efficient heat pumps. ✓ C.2 Installation of low emission sources running on biomass and efficient heat pumps in new buildings. ✓ C.3 Installation of solar thermal collectors. • D. Bonus subsidy for selected combinations of measures • Since a change was made in the conditions of the Green Savings subsidy programme on 10 August 2009, it has also been possible to assist the complete insulation of pre-fabricated multi-family buildings under the A.1 area of intervention.

Regional application	Projects may be implemented anywhere in the Czech Republic.

Target group	Eligible aid applicants are owners of single-family buildings and multi-family buildings, i.e. natural persons, associations of housing unit owners, housing cooperatives, towns and municipalities (including boroughs) or businesses. According to Guidelines of the Ministry of the Environment 7/2010, the Green Savings Programme was also open to the owners of public-sector buildings (e.g. schools, social care institutions, retirement homes, etc.).

Projects targeted at end users	A.1 – complete insulation: (Eligible subsidy under this measure per m^2 of floor area) ✓ complete insulation of single-family buildings to 70 kWh/m^2 1 550 CZK/m^2 ✓ complete insulation of single-family buildings to 40 kWh/m^2 2 200 CZK/m^2 ✓ complete insulation of multi-family buildings (whether or not prefabricated) to 55 kWh/m^2 1 050 CZK/m^2 ✓ complete insulation of multi-family buildings (whether or not prefabricated) to 30 kWh/m^2 1 500 CZK/m^2 The only requirement under Measure A2 – partial insulation – is to reduce the value of the specific heat demand for heating per m_2 of floor area by 20% or 30%. The following values are defined for reductions in the value of specific heat demand by 20%: ✓ single-family buildings 650 CZK/m^2 of floor area ✓ multi-family buildings 450 CZK/m^2 of floor area

	The following values are defined for reductions in the value of specific heat demand by 30%: ✓ single-family buildings 850 CZK/m^2 of floor area ✓ multi-family buildings 600 CZK/m^2 of floor area B – Promotion of new construction to nearly zero energy standard A fixed amount of CZK 250 000 per single-family building at nearly zero energy standard with annual specific demand of up to 20 kWh per m^2 and CZK 150 000 per flat in a multi-family building with annual heat demand for spatial heating of up to 15 kWh per m^2. C – Use of renewable energy sources for heating and hot water For these areas of aid, fixed amounts are set for the implementation of these measures according to the different types of technologies: Single-family buildings : C. 1 – biomass source CZK 95 000/CZK 80 000/CZK 50 000 depending on the type C. 1 – heat pump CZK 75 000/CZK 50 000 depending on the type C. 2 – for new buildings, the same as subsidies in sub-areas C.1, C.3 C. 3 – solar power system CZK 55 000 (hot water) C. 3 – solar power system CZK 80 000 (hot water and heating) Multi-family buildings (per housing unit): C. 1 – biomass source CZK 25 000 C. 1 – heat pump CZK 15 000 or CZK 20 000 C. 2 – for new buildings, the same as subsidies in sub-areas C.1, C.3 C. 3 – solar power system CZK 25 000 (hot water) C. 3 – solar power system CZK 35 000 (hot water and heating) D bonus subsidy Combinations of selected measures may result in a bonus subsidy of CZK 20 000 per single-family building or CZK 50 000 per multi-family building.

Effectiveness	The New Green Savings Programme, in the secondary programme documents, clearly defines the requirements for each measure supported with an immediate effect on reducing the consumption of fuel and energy in final energy consumption for heating and hot water. From this perspective, therefore, the measure may be regarded as effective.

Basis of calculation	Annual reports of the Green Savings Programme. An evaluation of the Green Savings project in terms of implementing the national indicative target under Directive No 2006/32/EC, drawn up by SEVEn. According to outputs for the 2012 annual report related to the project 'Verification of the reduction in CO_2 emissions under the Green Savings Programme', by 31 December 2012 a total of 74 662 applications had been approved under the programme. Overall, we verified a reduction in CO_2 emissions in relation to these approved applications amounting to

	801 942 tonnes of CO_2/year. These applications sought subsidies totalling approximately CZK 20 billion, including project support and the bonus subsidy. Savings were defined by reference to the original source of energy in the relevant structure. The basis was the relevant value of the annual reduction in CO_2 emissions under the individual projects. The expected annual savings in final consumption for heating and hot water are based on the Green Savings evaluation drawn up in December 2013. CZK 20 billion was allocated, resulting in savings of 8.9 PJ.

Annual energy savings expected in 2016	

Approach to the calculation of savings for future years	

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	2.950	2.950		

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X		
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	The average service life of these measures is 15 to 30 years after they are put into operation.

Monitoring, verification, methodology for establishing energy savings and additionality	Programme benefits are monitored ex ante on the basis of information from energy audits which form part of the subsidy applications submitted.

Measure number	1.3

TITLE OF THE MEASURE	New Green Savings Programme 2013

Sector	households

Brief summary	This programme of the Ministry of the Environment, administrated by the State Environmental Fund, focuses on energy savings and renewable energy sources in single-family buildings. This programme was active in 2013. Financial resources under the programme must be exhausted by the end of 2014. The call published in August 2013 focused exclusively on the insulation of single-family buildings, conditional on the replacement of unsatisfactory heating sources powered by solid fossil fuels, separately in buildings which were already insulated to the required standard, and the installation of solar systems for hot water in single-family buildings.

Description of the measure	This programme is broken down into the following basic areas of intervention:
	
	A. Improvement in the energy performance of existing single-family buildings
	
	• A.1. Level 1
	  o A.1.1. Level 1, requirement to comply with the average thermal transmittance coefficient for the building envelope
	  o A.1.2. Level 1, requirement to comply with the specific annual heat demand for spatial heating
	• A.2. Level 2
	• A.3. Level 3
	B. Construction of single-family buildings with very high energy performance
	
	• B.1. Level 1
	• B.2. Level 2

	C. Efficient use of energy sources • C.1. Replacement of heat sources using solid and specified liquid fossil fuels with efficient, environmentally friendly sources (with the simultaneous implementation of measures under area of intervention A) o C.1.1. Biomass boilers with manual fuel feeding o C.1.2. Biomass boilers with automatic fuel feeding o C.1.3. Biomass fireplace stoves with a heat exchanger with manual fuel feeding and closed fireplace inserts with heat exchanger o C.1.4. Biomass fireplace stoves with an exchanger with automatic fuel feeding o C.1.5. Heat pumps (water – water system) o C.1.6. Heat pumps (ground – water system) o C.1.7. Heat pumps (air – water system) o C.1.8. Gas condensing boilers • C.2. Replacement of heat sources using solid and specified liquid fossil fuels with efficient, environmentally friendly sources (without the simultaneous implementation of measures under area of intervention A) o C.2.1. Biomass boilers with manual fuel feeding o C.2.2. Biomass boilers with automatic fuel feeding o C.2.3. Biomass fireplace stoves with a heat exchanger with manual fuel feeding and closed fireplace inserts with heat exchanger o C.2.4. Biomass fireplace stoves with an exchanger with automatic fuel feeding o C.2.5. Heat pumps (water – water system) o C.2.6. Heat pumps (earth – water system) o C.2.7. Heat pumps (air – water system) o C.2.8. Gas condensing boilers • C.3. Installation of thermic solar systems o C.3.1. solar system for hot water o C.3.2. solar system for hot water and auxiliary heating • C.4. Installation of mechanical ventilation systems with heat recovery (with the simultaneous implementation of measures from area of intervention A) **D. Support for the preparation and implementation of the supported measures** • D.1. Production of an expert opinion for area of intervention A • D.2. Arrangements for the professional technical supervision of a client for area of intervention A • D.3. Production of an expert opinion and measurement of the building envelope's airtightness for area of intervention B • D.4. Production of an expert opinion for area of intervention C.2 **E. Bonus for a combination of selected measures** • E.1. Combination bonus with the simultaneous implementation of measures from area of intervention A and sub-area of

	intervention C.3 • E.2. Combination bonus with the simultaneous implementation of measures from area of intervention A, sub-area of intervention C.3, and sub-area of intervention C.1 • E.3 Combination bonus with the simultaneous implementation of measures from sub-area of intervention C.2 and sub-area of intervention C.3

Regional application	Projects may be implemented anywhere in the Czech Republic.

Target group	Support applicants are owners of and investors behind single-family buildings – both natural and legal persons.

Projects targeted at end users	**A. Improvement in the energy performance of existing single-family buildings** • A.1. Level 1 (support intensity 30%) • A.2. Level 2 (support intensity 40%) • A.3. Level 3 (support intensity 50%) **B. Construction of single-family buildings with very high energy performance** • B.1. Level 1 (support of CZK 400 000) • B.2. Level 2 (support of CZK 550 000) **C. Efficient use of energy sources** • C.1. Replacement of heat sources using solid and specified liquid fossil fuels with efficient, environmentally friendly sources (with the simultaneous implementation of measures under area of intervention A) Maximum support intensity 75% • C.2. Replacement of heat sources using solid and specified liquid fossil fuels with efficient, environmentally friendly sources (without the simultaneous implementation of measures under area of intervention A) Maximum support intensity 55% • C.3. Installation of thermic solar systems Maximum support intensity 40% • C.4. Installation of mechanical ventilation systems with heat recovery (with the simultaneous implementation of measures from area of intervention A) **D. Support for the preparation and implementation of the supported measures**

	• D.1. Production of an expert opinion for area of intervention A Maximum support intensity CZK 10 000 • D.2. Arrangements for the professional technical supervision of a client for area of intervention A Maximum support intensity CZK 5 000 • D.3. Production of an expert opinion and measurement of the building envelope's airtightness for area of intervention B Maximum support intensity CZK 35 000 • D.4. Production of an expert opinion for area of intervention C.2 Maximum support intensity CZK 5 000 **E. Bonus for a combination of selected measures** Maximum bonus CZK 10 000. • E.1. Combination bonus with the simultaneous implementation of measures from area of intervention A and sub-area of intervention C.3 • E.2. Combination bonus with the simultaneous implementation of measures from area of intervention A, sub-area of intervention C.3, and sub-area of intervention C.1 • E.3 Combination bonus with the simultaneous implementation of measures from sub-area of intervention C.2 and sub-area of intervention C.3

Effectiveness	The New Green Savings Programme 2013, in the secondary programme documents, clearly defines the requirements for each measure supported with an immediate effect on reducing the consumption of fuel and energy in final energy consumption for heating and hot water. From this perspective, therefore, the measure may be regarded as effective.

Basis of calculation	The programme's annual reports.

Annual energy savings expected in 2016	The expected annual savings in final consumption for heating and hot water are based on the Green Savings evaluation drawn up in December 2013. CZK 20.3 billion was allocated, resulting in savings of 8.9 PJ. To determine the benefit of New Green Savings calls, the same amount of subsidy for the GJ saved (2 270 CZK/GJ) was used as in Green Savings. However, under the Green Savings programme, the average level of subsidy was 60% for single-family buildings and 66% for multi-family buildings. Under the New Green Savings Programme, we project that the average level of subsidy would be 50%. Courtesy of high investments, the

	programme should be more effective than the Green Savings Programme in terms of the subsidy resources spent on the saved GJ. We expect savings to emerge starting in 2015, when the first supported projects will be implemented.

Approach to the calculation of savings for future years	The allocation for 2013 is known – CZK 1 billion. The programme is not being continued in subsequent years.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
			0.442	

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced		X	X	
New measures – implementation process not commenced				

Service life	The average service life of these measures is 15 to 30 years after they are put into operation.

Monitoring, verification, methodology for establishing energy savings and additionality	Administration is governed by rules laid down in Guidelines of the Ministry of the Environment + Annexes (Guideline of the Ministry of the Environment No 9/2013, as amended by Addendum No 2/NGS 2013/). Applicants submit applications initially electronically and then on paper. In addition to formal annexes, the following documents are also

	submitted: - A cover sheet setting out the technical parameters (a summary of fundamental technical information and figures – similar to a registration sheet) - An expert opinion (general designation – it contains two parts): - a) design documentation (accompanying and technical report, drawings) – only an authorised person of the Czech Chamber of Chartered Engineers and Technicians or the Czech Chamber of Architects may draw up such documentation - b) energy assessment (in accordance with Implementing Decree 480/2012) – only an energy specialist with authorisation to conduct energy audits and energy assessments may draw up this documentation Applications are evaluated at various stages of implementation – some prior to commencement, others while they are in progress, and some on completion of implementation (chosen by the applicant). Checks on the correctness of applications (the sample size is 100% of applications) focus primarily on inspecting the cover sheet setting out technical parameters and the expert opinion (the assessment of input data and a comparison of resultant values with the programme terms and conditions) However, subsidies are always paid out ex-post. Prior to payment, applicants are required to present the fund with all documents associated with the implementation of the measure (invoices, proof of payment, handover reports, final approbation consent/consent to the use of a structure – if relevant) A selected sample of applications is also subject to supervision or public-administration checks (associated with an on-the-spot check of implementation) The fund does not carry out retrospective monitoring of supported buildings To calculate the energy savings, the implementing public authority uses the method of forecast savings. An ex-ante generic approach is used based on the expert opinion and, where measures relate to the building envelope, on the building energy performance certificate. Additionality is established in the form of best available techniques for the technical facilities of buildings. The energy performance of buildings is required at a level higher than that admitted by existing legislation. A precise description of the parameters required can be found here: New Green Savings 2013: http://www.nzu2013.cz/vyrobci-a-dodavatele/vyrobci/smernice-c-9-2013-ve-zneni-dodatku-c-1/

Measure number	1.4

TITLE OF THE MEASURE	New Green Savings Programme

Sector	households

Brief summary	This programme of the Ministry of the Environment, administrated by the State Environmental Fund, focuses on energy savings and the efficient use of the energy sources in structures. This programme is running between 2014 and 2020, and has been prepared for the owners of and investors behind single-family buildings. The first quarter of 2014, announced in April 2014, centres on three types of measures – on improving the energy performance of existing single-family buildings, on the construction of single-family buildings with very high energy performance, and on the efficient use of energy sources. The next call will not be announced earlier than in 2015 and will focus on multi-family buildings. A call for public buildings is also being considered. Here, the conditions will be similar to those set forth in the Operational Programme Environment.

Description of the measure	Support under the programme is channelled into the following areas of intervention:
	
	A. Improvement in the energy performance of existing single-family buildings
	
	• A.1. Level 1
	  o A.1.1. Level 1, requirement to comply with the average thermal transmittance coefficient for the building envelope
	  o A.1.2. Level 1, requirement to comply with the specific annual heat demand for spatial heating
	• A.2. Level 2
	• A.3. Level 3
	• A.4. Production of an expert opinion for sub-area of intervention A.1, A.2 or A.3
	• A.5. Arrangements for the professional technical supervision of a client for sub-area of intervention A.1, A.2 or A.3

B. Construction of single-family buildings with very high energy performance

- B.1. Level 1
- B.2. Level 2
- B.3. Production of an expert opinion and measurement of the building envelope's airtightness for sub-area of intervention B1 or B.2

C. Efficient use of energy sources

- C.1. Replacement of heat sources using solid and specified liquid fossil fuels with efficient, environmentally friendly sources (with the simultaneous implementation of measures under area of intervention A)
    - C.1.1. Biomass boilers with manual fuel feeding
    - C.1.2. Biomass boilers with automatic fuel feeding
    - C.1.3. Biomass fireplace stoves with a heat exchanger with manual fuel feeding and closed fireplace inserts with heat exchanger
    - C.1.4. Biomass fireplace stoves with an exchanger with automatic fuel feeding
    - C.1.5. Heat pumps (water – water system)
    - C.1.6. Heat pumps (ground – water system)
    - C.1.7. Heat pumps (air – water system)
    - C.1.8. Gas condensing boilers
- C.2. Replacement of heat sources using solid and specified liquid fossil fuels with efficient, environmentally friendly sources (without the simultaneous implementation of measures under area of intervention A)
    - C.2.1. Biomass boilers with manual fuel feeding
    - C.2.2. Biomass boilers with automatic fuel feeding
    - C.2.3. Biomass fireplace stoves with a heat exchanger with manual fuel feeding and closed fireplace inserts with heat exchanger
    - C.2.4. Biomass fireplace stoves with a heat exchanger with automatic fuel feeding
    - C.2.5. Heat pumps (water – water system)
    - C.2.6. Heat pumps (earth – water system)
    - C.2.7. Heat pumps (air – water system)
    - C.2.8. Gas condensing boilers
- C.3. Installation of thermic solar systems
    - C.3.1. solar system for heating water
    - C.3.2. solar system for hot water and auxiliary heating
    - C.3.3 Combination bonus for the simultaneous implementation of selected measures
- C.4. Installation of mechanical ventilation systems with heat recovery (with the simultaneous implementation of measures from area of intervention A)
- C.5. Production of an expert opinion for area of intervention C.2

Regional application	Projects may be implemented anywhere in the Czech Republic.

Target group	Support applicants are owners of and investors behind single-family buildings – both natural and legal persons.

Projects targeted at end users	**A. Improvement in the energy performance of existing single-family buildings** • A.1. Level 1 (support intensity 30%) • A.2. Level 2 (support intensity 40%) • A.3. Level 3 (support intensity 55%) **B. Construction of single-family buildings with very high energy performance** • B.1. Level 1 (support of CZK 400 000) • B.2. Level 2 (support of CZK 550 000)

Effectiveness	The New Green Savings Programme, in the secondary programme documents, clearly defines the requirements for each measure supported with an immediate effect on reducing the consumption of fuel and energy in final energy consumption for heating and hot water. From this perspective, therefore, the measure may be regarded as effective.

Basis of calculation	Annual reports of the Green Savings Programme.

Annual energy savings expected in 2016	The expected annual savings in final consumption for heating and hot water are based on the Green Savings evaluation drawn up in December 2013. CZK 20.3 billion was allocated, resulting in savings of 8.9 PJ. To determine the benefit of New Green Savings calls, the same amount of subsidy for the GJ saved (2 270 CZK/GJ) was used as in Green Savings. However, under the Green Savings programme, the average level of subsidy was 60% for single-family buildings and 66% for multi-family buildings. Under the New Green Savings Programme, we project that the average level of subsidy would be 50%. Courtesy of high investments, the programme should be more effective than the Green Savings Programme

	in terms of the subsidy resources spent on the saved GJ. We expect savings to emerge starting in 2015, when the first supported projects will be implemented.

Approach to the calculation of savings for future years	For 2014-2020, an allocation of CZK 27 billion is expected. CZK 1.9 billion has been allocated to the call in 2014. A gradual increase in the annual allocation to CZK 3–5 billion per year is envisaged in the period between 2015 and 2020.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
			3.667	10.641

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced			X	X
New measures – implementation process not commenced				

Service life	The average service life of these measures is 15 to 30 years after they are put into operation.

Monitoring, verification, methodology for establishing energy savings and additionality	Administration is governed by rules laid down in Guideline of the Ministry of the Environment + Annexes (Guideline No 1/2014, as amended by Addendum No 1/NGS/). Applicants submit applications initially electronically and then on paper.

	In addition to the formal annexes, the following items are submitted: - A cover sheet setting up the technical parameters (a summary of fundamental technical information and figures – similar to a registration sheet) - An expert opinion (general label – it contains two parts): - a) design documentation (accompanying and technical report, drawings) – only an authorised person of the Czech Chamber of Chartered Engineers and Technicians or the Czech Chamber of Architects may draw up such documentation - b) energy assessment (in accordance with Implementing Decree 480/2012) – only an energy specialist with authorisation to conduct energy audits and energy assessments may draw up this documentation Applications are evaluated at various stages of implementation – some prior to commencement, others while they are in progress, and some on completion of implementation (chosen by the applicant). Checks on the correctness of applications (the sample size is 100% of applications) focus primarily on inspecting the cover sheet setting out technical parameters and the expert opinion (the assessment of input data and a comparison of resultant values with the programme terms and conditions) However, subsidies are always paid out ex-post. Prior to payment, applicants are required to present the fund with all documents associated with the implementation of the measure (invoices, proof of payment, handover reports, final approbation consent/consent to the use of a structure – if relevant) A selected sample of applications is also subject to supervision or public-administration checks (associated with an on-the-spot check of implementation) The fund does not carry out retrospective monitoring of supported buildings To calculate the energy savings, the implementing public authority uses the method of forecast savings. An ex-ante generic approach is used based on the expert opinion and, where measures relate to the building envelope, on the building energy performance certificate. Additionality is established in the form of best available techniques for the technical facilities of buildings. The energy intensity of buildings is required at a level higher than that admitted by existing legislation. A precise description of the parameters required can be found here: New Green Savings: http://www.novazelenausporam.cz/zadatele-o-dotaci/rodinne-domy/prvni-vyzva/smernice-c-1-2014-ve-zneni-dodatku-c-1/

Measure number	1.5

TITLE OF THE MEASURE	JESSICA Programme

Sector	Households

Brief summary	Low-interest long-term loans to revitalise deprived urban zones

Description of the measure	This programme offers long-term low-interest loans for the reconstruction and upgrading of multi-family buildings.

Regional application	This measure may be applied only in the deprived zones of 41 towns and cities with an Integrated Urban Development Plan.

Target group	This programme is intended for all owners of multi-family buildings, irrespective of their legal personality. • Municipalities; • Housing cooperatives; • Other legal and natural persons owning a multi-family building; • Associations of owners of residential units; • Non-profit organisations specialising in social housing

Projects targeted at end users

Support granted:

Fixed interest rates throughout the repayment period, and a repayment period of up to 30 years. The maximum amount of the loan is CZK 120 million, and this may cover up to 90% of total costs.

Interest rates for owners of multi-family buildings		Interest ratesfor socialhousing	
Up to 10 years	0.71% p.a.	Up to 10 years	0.71% p.a.
10-20 years	1.71% p.a.	10-20 years	1.5% p.a.
2030 years	2.71% p.a.	20-30 years	2% p.a.

Effectiveness	The programme is geared towards: • **the insulation of interior structures and the building envelope, including the replacement of windows and doors;** • **the reconstruction of technical equipment in the building** (e.g. **the heating system, distribution of heat**, gas, water, ventilation technology, lifts); • replacement or upgrading of enclosed or open balconies, railings; • the removal of static disorders in supporting structures;

	• the rehabilitation of foundations and substructure waterproofing; • arrangements to ensure modern social housing by renovating existing buildings. From this perspective, the measure can be regarded as effective.

Basis of calculation	Annual reports: • State Housing Development Fund • Českomoravská záruční a rozvojová banka Panel, New Panel, Panel 2013+ Programmes, loans to municipalities for the repair and upgrading of housing stock, and the Green Savings Programme

Annual energy savings expected in 2016	The calculation of energy savings is similar to that used in the PANEL Programme. To estimate the number of repaired flats, the number of flats repaired per CZK 1 million of loans provided under the PANEL Programme was used. Based on the budget projected for the programme, the numbers of repaired flats in future years were estimated. Savings were calculated based on the number of repaired flats and the average energy savings per flat.

	Financial volume of concluded contracts (CZK thousands)	Energy savings in TJ
2014	304 500	28
2015	304 500	28
2016	400 000	37
2017	400 00	37
2018	400 000	37
2019	400 000	37
2020	40 000	37

Approach to the calculation of savings for future years	After 2015, it is expected that the programme will continue with total financing of CZK 2 billion.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0	0	0.092	0.147

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced			X	X

New measures – implementation process not commenced				

Service life	This is a measure with a service life of 20 or more years.

Monitoring, verification, methodology for establishing energy savings and additionality	To calculate the energy savings, the implementing public authority uses the method of forecast savings. An ex-ante generic approach is used based on the building energy performance certificate. The building energy performance certificate is part of the loan application. In relation to the energy performance of buildings, additionality is set at the minimum amount required or at an amount higher than that admitted under existing legislation. Detailed information about the programme can be found on the following website: http://www.sfrb.cz/programy/program-jessica/

Measure number	1.6

TITLE OF THE MEASURE	Integrated Regional Operational Programme

Sector	Households

Brief summary	A programme of the Ministry of Regional Development Focusing on for basic objectives of the Czech Republic's regional policy, as formulated in the Czech Republic's Regional Development Strategy for 2014–2020: • to promote an increase in competitiveness and the harnessing of the economic potential of the regions (growth objective); • to lessen the growing gaps in the negative regional differences (balancing objective); • to reinforce environmental sustainability (preventive objective); • and to optimise the institutional framework for regional development (institutional objective).

Description of the measure	This programme is broken down into the following priority axes: 1. Competitive, accessible and safe regions 2. Improvements in public services and living conditions for regional inhabitants 3. Good territorial governance and in more efficient public institutions 4. Community guided local development 5. Technical assistance In terms of energy savings, importance is attached to priority axis 2 and its investment priority 4 – Support of energy efficiency, smart energy management systems, and the use of energy from renewable sources in public infrastructures, inter alia in public buildings and in housing.

Regional application	All Czech regions (NUTS 3) except the City of Prague

Target group	Owners of multi-family buildings

Projects targeted at end users	A measure influencing the energy performance of buildings or improvements in the quality of the indoor climate • insulation of the envelope of a multi-family building • replacement and renovation of windows and doors • components of passive heating and cooling, shading • installation of controlled ventilation systems with waste heat recuperation Installations for special heating or for the production of hot water

	• replacement of the heat source of a multi-family building used for spatial heating and burning solid or liquid fossil fuels with an efficient biomass source; • replacement of the heat source of a multi-family building used for the production of hot water and burning solid or liquid fossil fuels with an efficient biomass source; • heat pumps; • gas condensing boilers or installations for cogeneration using renewable sources or natural gas and covering the primary energy needs of buildings where they are located.

Effectiveness	The individual measures supported have an immediate impact on reducing energy consumption. Therefore, this measure can be regarded as effective.

Basis of calculation	The expected annual savings in final consumption are based on the Green Savings evaluation drawn up in December 2013. The Integrated Regional Operational Programme allocation projected for 2014–2020 is CZK 16.9 billion. The investment of this amount is expected to result in savings in final energy consumption amounting to almost 7.5 PJ. A lower average rate of subsidy than in the Green Savings Programme (50%) is expected. The constant distribution of financial resources amounting to CZK 3.38 billion is projected in the period between 2015 and 2020. Savings generated by the implementation of this measure will start to emerge in 2016. Savings in that year should amount to 1 800 TJ.

	2016	**2017**	**2018**	**2019**	**2020**
Energy savings TJ/year	1 800	1 800	1 800	1 800	1 800

Annual energy savings expected in 2016	1 493 TJ

Approach to the calculation of savings for future years	In subsequent years there are plans for annual calls with constant allocations and therefore constant annual savings of 1.8 PJ as from 2016.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0	0	1 800	7 200

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				

New measures – implementation process commenced			X	X
New measures – implementation process not commenced				

Service life	The average service life of these measures is 15 to 30 years.

Monitoring, verification, methodology for establishing energy savings and additionality	Unlike the Operational Programme Enterprise and Innovation for Competitiveness and the Operational Programme Environment, for example, the Integrated Regional Operational Programme does not have a direct predecessor. Until now, the support of multi-family buildings has been provided in the Czech Republic by programmes which provided support for comprehensive measures in the renovation of multi-family buildings at the Ministry of Regional Development (i.e. not only measures supporting energy efficiency), or by a sub-programme of the Green Savings Programme (2009–2012). The Integrated Regional Operational Programme Is currently being negotiated with the European Commission. Therefore, it is impossible to disclose specific technical parameters related to the programme's configuration at this time. Nor is there any continuity with previous programmes, so we are unable to refer directly to such programmes' parameters, unlike the situation with the Operational Programme Enterprise and Innovation for Competitiveness and the Operational Programme Environment. Nevertheless, with this type of programme we expect the method of forecast savings to be used in the calculation of energy savings made by the public authority. An ex-ante generic approach will be used based on the building energy performance certificate. The building energy performance certificate will be part of the subsidy or financial instrument application. Additionality will be established by the minimum building energy performance standards required, which will be higher than the level required by legislation. Technically, the level of parameters required could be derived from the parameters established in the 2009–2012 Green Savings Programme. The technical facilities of buildings would also comply with the minimum energy efficiency parameters.

Measure number	1.7

TITLE OF THE MEASURE	Joint Boiler Replacement Promotion Scheme

Sector	households

Brief summary	Subsidy for the replacement of manually filled boilers running on solid fuel with new efficient low-emission heat sources in households.

Description of the measure	The aim of the Join Boiler Replacement Promotion Scheme is to reduce air pollution generated by small combustion sources up to a thermal output of 50 kW, i.e. local incinerators using solid fuel. The subsidy is for the replacement of existing manually filled boilers running on solid fuel with new efficient low-emission heat sources. The programme is based on the principle that equal amounts are contributed by the Ministry and the region. This means that the more money the regions manage to find, the more they will receive from the Ministry.

Regional application	Projects may be implemented anywhere in the Czech Republic.

Target group	Owners of single-family buildings in Czech regions signing up for the programme. So far, the regions involved are the Ústí nad Labem, Moravia-Silesia and the Central Bohemia Regions.

Projects targeted at end users	To ensure a minimum standard of quality, only boilers certified by the State Environmental Fund will be supported under the programme. A list has been published on the programme's website.

<table>
<tr><td>Effectiveness</td><td>The programme only supports low-emission heat sources. Therefore, the measure may be regarded as effective.</td></tr>
<tr><td>Basis of calculation</td><td>The maximum amount of a subsidy for a new boiler depends on the type, and ranges from CZK 15 000 to CZK 60 000. The calculation anticipates a subsidy of CZK 40 000. The annual saving per boiler replaced is projected to be 25 GJ. With an annual allocation of CZK 300 million, 7 500 boilers will be replaced and the annual saving in final consumption will be 188 TJ.

We expect savings to emerge the year after the calls are closed.

The allocation in each call is shown in the following table:
<table>
<tr><td></td><td>2013</td><td>2014</td></tr>
<tr><td>Call 1</td><td>CZK 33 720 000</td><td></td></tr>
<tr><td>Calls 2–4</td><td>CZK 231 740 000</td><td></td></tr>
<tr><td>Calls in 2014</td><td></td><td>CZK 300 000 000</td></tr>
</table>
<table>
<tr><td></td><td>2013</td><td>2014</td><td>2015</td></tr>
<tr><td>Saving</td><td></td><td>166 TJ</td><td>188 TJ</td></tr>
</table></td></tr>
</table>

Annual energy savings expected in 2016	0 TJ. A similar scheme will exist under the Operational Programme Environment as from 2015.

Approach to the calculation of savings for future years	For 2014, an allocation of CZK 300 million is expected.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
			0.353	

Status of implementation and precise time frame	2008-2010	2011-2013	2014-2016	2017-2020
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced		X	X	
New measures – implementation process not commenced				

Service life	The average service life of these measures is 15 years.

Monitoring, verification, methodology for establishing energy savings and additionality	Administration will be governed by rules laid down in Guidelines of the Ministry of the Environment. However, subsidies are always paid out ex-post. Prior to payment, applicants are required to present the fund with all documents associated with the implementation of the measure. A selected sample of applications is also subject to supervision or public-administration checks (associated with an on-the-spot check of implementation) The fund does not carry out retrospective monitoring of supported projects. To calculate the energy savings, the implementing public authority uses the method of forecast savings. An ex-ante generic approach is used based on the number of installations replaced. Additionality is established in the form of best available techniques for the technical facilities of buildings.

Measure number	1.8

TITLE OF THE MEASURE	Operational Programme Environment 2007–2013

Sector	Services

Brief summary	Support of energy efficiency in two priority axes of the Operational Programme Environment.

Description of the measure	The Operational Programme Environment is one of the Czech Republic's sectoral programmes approved by the European Commission for the 2007–2013 programming period. The Operational Programme Environment focuses on improving the quality of the environment. It helps to improve the state of the air, water and soil, it addresses waste and industrial pollution, and it promotes care for the landscape, the use of renewable sources of energy and the building of infrastructure for environmental awareness. The Operational Programme Environment has eight priority axes, which are broken down into areas of intervention. The priority axes are: 1. Improvement of water management infrastructure and reduction of flood risk 2. Improvement of air quality and reduction of emissions 3. Sustainable use of energy sources 4. Improvement of waste management and rehabilitation of old ecological burdens 5. Limitation of industrial pollution and reduction of environmental risks 6. Improvements in nature and the landscape 7. Development of infrastructure for environmental education, consultancy and awareness 8. Technical assistance

Regional application	This measure can be applied throughout the Czech Republic.

Target group	This programme is designed primarily for beneficiaries in the public sector. Beneficiaries may be, for example, municipalities, regions, organisations partly funded from the public purse, state enterprises, state organisations, organisational units of the state, churches and religious communities, non-governmental organisations, and, in certain areas of intervention, business entities and natural persons.

Projects targeted at end users	The activities supported are as follows: • the construction or reconstruction of water purification plants, sewage systems, water treatment plants; • projects to improve or maintain the quality of the air and to limit emissions of core pollutants into the air; • reductions in energy consumption, increases in the use of renewable sources of energy in the production of heat or electricity, and the reuse of waste heat; • improvement of waste management, reductions in the generation of waste, and rehabilitation of old ecological burdens; • limitation of industrial pollution and reduction of environmental risks; • a stop to the declining biodiversity and an increase in the ecological stability of the landscape; • implementation of environmental education programmes.

Effectiveness	In terms of energy savings, the most significant priority axis is number three, which supports projects for the construction or reconstruction of facilities using renewable sources of energy and cogeneration, and projects aimed at energy savings and the reuse of waste heat in the non-business sector. Priority axis 2 is also significant. It focuses on improving air quality which, in some cases, reduces energy consumption.

Basis of calculation	The expected annual savings are calculated from data on the potential benefits of investments under the Operational Programme Environment in areas of intervention 3.2 and 2. As disclosed by the 2012 annual report of the Operational Programme Environment, the accumulated energy savings achieved at the end of 2012 were 257 051 GJ. Energy savings under the Operational Programme Environment are shown in the following table.

		2008	**2009**	**2010**	**2011**
	Energy savings TJ/year	0	120	19	210

2012	**2013**	**2014**	**2015**
Energy savings TJ/year	236	722	593	793

Annual energy savings expected in 2016	0 TJ

Approach to the calculation of savings for future years	

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.139	1.168	1.385	0

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X		
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	For investment measures, the service life is 15 or more years.

Monitoring, verification, methodology for establishing energy savings and additionality	1. Submission of an application – the basic documents and accompanying the application are the energy audit, the building envelope energy label, the budget and a declaration by the designer on the area of structures insulated. The energy consumption balance before and after implementation, and the project benefits (in particular the reduction in CO2 emissions and the energy savings achieved), are taken from the energy audit and included in the application. In the application, the average building envelope coefficient (before and after implementation) and the required building envelope coefficient (a reference building) are sourced from the building envelope energy label (this may be part of the energy audit). Compliance with the thermal transmittance coefficient for the individual structures insulated is also checked by reference to the building envelope energy label. 2. Design documentation, including any updates to the declaration on the area of insulated structures, and a works contract, including the budget, are submitted for the issuance of a subsidy decision. The indicator values in the subsidy decision are taken from the design documentation or the designer's declaration (the metres of insulated structures). The energy-saving parameters and CO2 reductions are based on the application or, where appropriate, the updated energy audit (if there is a change in the project). If the figures are different from those in the application, a reassessment must be conducted to determine whether the project and the changed parameters would be supported. If this is not confirmed, the result would be withdrawal from support. 3. Final project evaluation (typically 15 months from permanent commissioning – approbation). Here, the opinions of the designer and the energy auditor are put forward. The designer's opinion confirms the compliance of the implementation with the design documentation submitted for the subsidy decision (the scope of the work, the structures insulated). The energy auditor's opinion, by reference to real data (energy consumption), confirms compliance or non-compliance with the monitoring indicators (energy savings, reductions in CO2), and where appropriate comments are added on non-compliance, accompanied by a proposal for remedial action. 4. Operational monitoring reports (over the duration of sustainability) – here only confirmation is provided that, following implementation, there have been no changes in relation to the use and ownership of the subject

	of support. To calculate the energy savings, the implementing public authority uses the method of forecast and measured savings. Two generic approaches are used – an ex-ante approach based on energy audits, and an ex-post approach based on monitoring reports or energy assessments. Additionality is established by higher required heat and technical properties of the building envelope than those provided for by legislation. A requirement relating to best available techniques is established for the technical facilities of buildings.

Measure number	1.9

TITLE OF THE MEASURE	Operational Programme Environment 2014-2020

Sector	Services, households

Brief summary	Support of energy efficiency in two priority axes of the Operational Programme Environment.

Description of the measure	The Operational Programme Environment focuses on improving the quality of the environment. It helps to improve the state of the air, water and soil, it addresses waste and industrial pollution, and it promotes care for the landscape, the use of renewable sources of energy and the building of infrastructure for environmental awareness. The Operational Programme Environment 2014–2020 has two priority axes fewer than in 2007–2013. It has six priority axes, which are broken down into areas of intervention. The priority axes are: 9. Improvement of water quality and reduction of flood risk 10. Improvement of air quality in human settlements 11. Waste and material flows, ecological burdens and risks 12. Protection of and care for nature and the landscape 13. Energy savings 14. Technical assistance For purposes of energy savings, the most important are priority axes 2 and 5.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	In priority axis 2: Owners of single-family and multi-family buildings.

	In priority axis 5: Organisational units of the state, state organisations partly funded from the public purse, municipal organisations partly funded from the public purse, regional organisations partly funded from the public purse, municipalities, regions, associations of municipalities, public research institutions, public and state higher-education institutions, legal persons providing educational services, civic associations, churches and religious communities, publicly beneficial companies, other entities serving the public interest, in particular organisational units of municipalities, organisational units of regions, companies owned 100% by municipalities or other public-law entities, state organisations established by special law.

Projects targeted at end users	In priority axis 2 Improvement of air quality in human settlements, the following activities are supported: • The replacement of boilers running on solid fuel with new boilers running on solid fuel • The replacement of boilers running on solid fuel with new stationary combustion sources running on gaseous or liquid fuel • The replacement of boilers running on solid fuel with heat pumps • The above replacements combined with supplementary non-combustion sources of thermal energy In priority axis 5 Energy savings, the following activities are supported: • Insulation of the envelope of a building; • Replacement and renovation of windows and doors; • Implementation of structural measures having a demonstrated influence on the energy performance of buildings or improvements in the quality of the indoor climate; • Implementation of mechanical ventilation systems with waste heat recuperation; • Implementation of systems reusing waste heat; • Replacement of heat sources for spatial heating or for the production of hot water using solid or liquid fossil fuels with efficient sources using biomass, heat pumps, gas condensing boilers, or facilities for cogeneration (micro-cogeneration) using renewable sources or natural gas; • Installation of solar thermic collectors for auxiliary heating or only for the production of hot water.

Effectiveness	In priority axes 2 and 5, the measure can be regarded as effective.

Basis of calculation	The expected annual savings up to 2020 are calculated from data on the potential benefits of investments under the Operational Programme Environment 2007–2013 and from the programme's annual reports. We envisage an allocation of CZK 13.4 billion for priority axis 5 and an allocation of CZK 10 billion for priority axis 2. Forecast energy savings under the Operational Programme Environment 2014–2020 are shown in the following table.

	2015	**2016**	**2017**	**2018**	**2019**	**2020**
Energy savings TJ/year	331	831	956	956	956	956

Annual energy savings expected in 2016	831 TJ

Approach to the calculation of savings for future years	For subsequent years, the calculation is the same as for 2016.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
			1.161	3.823

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and				

still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced			X	X
New measures – implementation process not commenced				

Service life	For investment measures, the service life is 15 or more years.

Monitoring, verification, methodology for establishing energy savings and additionality	The programme is currently under preparation. Nevertheless, at this point in time we assume that the methodology and procedures will be similar. For the sake of information, the procedure applied under Operational Programme Environment 2007–2013 is attached. 1. Submission of an application – the basic documents and accompanying the application are the energy audit, the building envelope energy label, the budget and a declaration by the designer on the area of structures insulated. The energy consumption balance before and after implementation, and the project benefits (in particular the reduction in CO2 emissions and the energy savings achieved), are taken from the energy audit and included in the application. In the application, the average building envelope coefficient (before and after implementation) and the required building envelope coefficient (a reference building) are sourced from the building envelope energy label (this may be part of the energy audit). Compliance with the thermal transmittance coefficient for the individual structures insulated is also checked by reference to the building envelope energy label. 2. Design documentation, including any updates to the declaration on the area of insulated structures, and a works contract, including the budget, are submitted for the issuance of a subsidy decision. The indicator values in the subsidy decision are taken from the design documentation or the designer's declaration (the metres of insulated structures). The energy-saving parameters and CO2 reductions are based on the application or, where appropriate, the updated energy audit (if there is a change in the project). If the figures are different from those in the application, a reassessment must be conducted to determine whether the project and the changed parameters would be supported. If this is not confirmed, the result would be withdrawal from support.

	3. Final project evaluation (typically 15 months from permanent commissioning – approbation). Here, the opinions of the designer and the energy auditor are put forward. The designer's opinion confirms the compliance of implementation with the design documentation submitted for the subsidy decision (the scope of the work, the structures insulated). The energy auditor's opinion, by reference to real data (energy consumption), confirms compliance or non-compliance with the monitoring indicators (energy savings, reductions in CO2), and where appropriate comments are added on non-compliance, accompanied by a proposal for remedial action. 4. Operational monitoring reports (over the duration of sustainability) – here only confirmation that, following implementation, there have been no changes in relation to the use and ownership of the subject of support is evidenced. To calculate the energy savings, the implementing public authority uses the method of forecast and measured savings. Two generic approaches are used – an ex-ante approach based on energy audits, and an ex-post approach based on monitoring reports or energy assessments. Additionality is established by higher required heat and technical properties of the building envelope than those provided for by legislation. A requirement relating to best available techniques is established for the technical facilities of buildings.

Measure number	1.10

TITLE OF THE MEASURE	State programmes on the promotion of energy savings and the utilisation of renewable energy sources (EFEKT)

Sector	Services, cross-cutting

Brief summary	Support for energy savings by increasing public awareness, public sector support for the economical management of energy.

Description of the measure	The aim of the EFEKT Programme is to increase energy savings by raising awareness among small customers, by increasing the quality of energy services, and by supporting the public sector in the economical management of energy. It focuses on raising awareness and disseminating information (with a stress on energy-saving measures and the use of renewable sources of energy), and on small-scale investment projects (the implementation of energy-saving projects primarily in municipalities).

Regional application	This measure can be applied throughout the Czech Republic.

Target group	Undertakings, municipal boroughs, municipalities, regions, schools, social and health care facilities, special-interest associations, clubs, chambers. The target groups differ depending on the specific activity.

Projects targeted at end users	The activities supported are as follows: • Measures to reduce the energy intensity of public street lighting; • the reconstruction of a heating system and the heat generator in a building; • energy consulting provided by energy consulting and information centres; • courses and seminars about the energy sector; • publications, guides and informative materials about the energy sector; • the introduction of an energy management system; • the preparation of energy-saving projects handled using the EPC method.

Effectiveness	This measure is quite clearly effective because it helps to raise energy savings while reducing energy intensity.

Basis of calculation	The calculation was based on data presented by the Czech Energy Agency and the State Environmental Fund in their annual reports for the periods

	from 2000 to 2005. These reports show that the annual benefit of both programmes in 2005 was defined by the evaluation report as 0.141 PJ/year (SP A) and 0.126 PJ/year (SP B). As is evident from the calculated benefits of the programmes, the benefit depends directly on the amount of funds allocated and therefore reports a downward trend in 2005. The benefits of the measure (Parts A and B) in 2008 were estimated to total 233 TJ/year. In 2008, almost CZK 39 million was spent under the EFEKT Programme on projects with direct energy savings. This amount delivered total investments for CZK 118 million and prompted a total saving of almost 95 TJ. The average specific investment cost of saving 1 GJ was CZK 1 251. In 2011, CZK 8.4 million was spent under the EFEKT Programme on projects with direct energy savings. This amount delivered total investments for almost CZK 24 million and prompted a total saving of almost 7.5 TJ. The average investment cost of saving 1 GJ was CZK 3 205. The calculations anticipate that the State Programme will continue to be regularly announced even after 2014 with the same allocation of CZK 30 million and the same distribution of support for direct projects and support for an increase in greater public awareness.

Annual energy savings expected in 2016	51.7 TJ

Approach to the calculation of savings for future years	For subsequent years, the calculation is the same as for 2014–2016.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.412	0.160	0.155	0.155

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	For investment measures, the service life is 10 or more years. The effect of procuring noninvestment projects can be considered permanent.

Monitoring, verification, methodology for establishing energy savings and additionality	To calculate the energy savings, the implementing public authority uses the method of forecast and measured savings. Two generic approaches are used – an ex-ante approach based on energy audits, and an ex-post approach based on monitoring reports or energy assessments. Additionality is configured based on the economic returns of projects. Projects where the return is too quick and where the measures do not support a particularly long return are not supported.

Measure number	1.11

TITLE OF THE MEASURE	Operational Programme Prague – Growth Pole

Sector	Transport, services

Brief summary	Support for an improvement in the energy performance of buildings and technical equipment used to ensure the operation of urban public and road transport.

Description of the measure	The aim of the Operational Programme Prague – Growth Pole is to contribute to the Union strategy for intelligent and sustainable growth, promoting the incorporation and attainment of economic, social and territorial cohesion. The Operational Programme contains five priority axes, namely: Priority axis 1: Reinforcement of research, technological development and innovation **Priority axis 2: Sustainable mobility and energy savings** Priority axis 3: Support of social inclusion and the fight against poverty Priority axis 4: Training and education Priority axis 5: Technical assistance From the perspective of energy savings, investment priority 1 of priority axis 2 (Sustainable mobility and energy savings) is noteworthy. This priority aims to reduce the consumption of energy in urban structures, and increase the use of appropriate renewable sources of energy, energy efficient equipment and smart management systems.

Regional application	This measure can be applied only in the City of Prague.

Target group	City of Prague Organisations founded by the City of Prague Dopravní podnik hl. m. Prahy, a.s. (Prague transport company)

Projects targeted at end users	An increase in energy efficiency in structures and technical equipment for the operation of urban public transport (e.g. the more efficient use of energy recuperated from rolling stock, the renovation of lighting systems by employing the most advanced energy-saving sources, including smart lighting regulation, the installation of a mechanical ventilation system with waste heat recuperation, the installation of suitable and energy-efficient equipment using renewable sources of energy, etc.)

Effectiveness	The objective focuses on supporting an increase in the energy efficiency of urban public transport.

Basis of calculation	Specific result indicators.

Annual energy savings expected in 2016	The Operational Programme Transport programme document anticipates a reduction in final consumption among the supported entities, expressed by the indicator 364300. In the period from 2014 to 2023, energy consumption is projected to fall by 129 TJ.

Approach to the calculation of savings for future years	Annual savings throughout the period from 2014 to 2023 are expected to remain constant.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0	0	0.039	0.052

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced			X	X
New measures – implementation process not commenced				

Service life	This is a measure with a service life of 30 or more years.

Monitoring of the benefits of the measure	Within the scope of the energy-saving measure, this entails a complementary programme to the Operational Programme Environment in the City of Prague. The programme is now being negotiated with the European Commission. Therefore a final document, including the specific configuration, is not available. Nevertheless, to calculate the energy savings, the implementing public authority uses the method of forecast and measured savings. Two generic approaches are used – an ex-ante approach based on energy audits, and an ex-post approach based on monitoring reports or energy assessments. Additionality will be established by higher required heat and technical properties of the building envelope than those provided for by legislation. A requirement relating to best available techniques will be established for the technical facilities of buildings.

Measure number	1.12

TITLE OF THE MEASURE	Promotion of energy efficiency under the Operational Programme Enterprise and Innovation – Eco-energy

Sector	Industry, services

Brief summary	Investment aid to increase energy efficiency in industry

Description of the measure	Investment aid in the 2007–2013 period included: • Cogeneration • Improvement in the energy performance of manufacturing processes • Upgrading of measurement and control • Improvements in the thermal and technical properties of buildings •

Regional application	This measure can be applied throughout the Czech Republic.

Target group	Business entities owning energy management systems or buildings

Projects targeted at end users	The rate of financing ranged between 30% and 45% of total investment costs.

Effectiveness	This measure is highly effective because investments are channelled into increasing energy efficiency.

Basis of calculation	Projects realised under calls I, II and III and energy-saving projects approved under call III – extended – should deliver total annual energy savings of 10.6 PJ according to the evaluation of these calls. Of this, annual savings of approximately 8 PJ should be consistent with final consumption savings under Directive 2006/32/EU.

Annual energy savings expected in 2016	0 TJ

Approach to the calculation of savings for future years	For 2016, follow-up takes the form of the Operational Programme Enterprise and Innovation for Competitiveness.

Energy savings forecast [TJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	1000	3400	3600	

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	This is a measure with a service life of 10 or more years.

Monitoring, verification, methodology for establishing energy savings and additionality	When the registration application is submitted, a basic project description is provided. This is merely a brief outline of the investment plan and is assessed from the perspective of compliance with the activities supported. In the registration application approval procedure, the assessment focuses in particular on the applicant in terms of the financial and non-financial health of the undertaking (applicant). Upon approval of the registration application, applicants are required to submit a full application, which must contain a more detailed description of the project, with a list of specific saving measures which must be presented in the recommended version of the energy audit, or clarified in a feasibility study. These documents are mandatory attachments to the full application. The full application must also include the value of the binding indicator 'Annual energy savings in GJ/year', which must be consistent with the projected energy savings in the energy audit registration sheet. In the approval procedure for a full application, a project manager from the mediating agency CzechInvest initially conducts an assessment of compliance with the activities supported under the programme call, and then passes it on to an external evaluator for assessment. This evaluator calculates a score based on the pre-published selection criteria. In particular, these criteria reflect cost-effectiveness, the benefit to the

	improved environment, and the investment return of the whole project. If the project score is more than 50 points, according to the selection criteria, it is forwarded for the production of two technical-economic opinions (or three opinions in case of discrepancies), which assess the project in terms of its economic returns and correct use of technology, etc. The project is then passed on to an evaluation committee composed of the representatives of specialist sections, higher-education institutions, energy associations, etc. The evaluation committee, by reference to all of the opinions submitted and the presentation of the project by the CzechInvest project manager, decides whether or not to recommend it for approval. Finally, the implementation department accepts or rejects that recommendation and approves the project for support. Savings are reported within the scope of project monitoring upon project completion. This means that applicants must report the value presented in the energy audit registration sheet and, by extension, in the full application, in the form of monitoring reports for 12 consecutive months following the date of project completion specified in the full application. The reporting period is two years and in at least one of them the specified value must be reached or exceeded. Within the scope of extensive projects, applicants also submit an energy audit addendum. However, this is not mandatory. With regard to the eligibility of costs, an essential condition is that the costs are eligible after approval of the registration application and, naturally, they must be consistent with the full application, the assessment and the energy audit. They must also be directly related to the project and have a positive impact on energy savings. To calculate the energy savings, the implementing public authority uses the method of forecast and measured savings. Two generic approaches are used – an ex-ante approach based on energy audits, and an ex-post approach based on monitoring reports or energy assessments. Additionality is configured based on the economic returns of projects. Projects where the return is too quick and where the measures do not support a particularly long return are not supported. The text of the call for projects under the Operational Programme Enterprise and Innovation ECO-ENERGY, which includes the evaluation criteria, is available for download at the link below: http://www.mpo.cz/dokument104996.html

Measure number	1.13

TITLE OF THE MEASURE	Operational Programme Enterprise and Innovation for Competitiveness

Sector	Industry, services

Brief summary	Investment aid to increase energy efficiency in industry

Description of the measure	Activities supported in the period from 2014 to 2020 will include the following: • The modernisation or replacement of existing energy production facilities for internal purposes, which will increase their efficiency; • the introduction and upgrading of measurement and control systems; • modernisation, reconstruction and loss reduction in electricity and heat distribution systems in buildings and production plants; • the implementation of measures to improve the energy performance of buildings in the business sector (building envelope insulation, the replacement and renovation of windows and doors, other structural measures having a demonstrable influence on the energy performance of buildings, the installation of ventilation technology with waste heat recuperation); • re-use of waste energy in production processes; • improvements in energy performance and energy efficiency in production and technological processes; • the installation of renewable energy sources for an undertaking's own consumption; • the installation of a cogeneration unit with maximum use of electricity and thermal energy for the undertaking's internal consumption, the support of extra costs in achieving the standard of a nearly zero-energy building and a passive energy standard in the reconstruction or construction of new business buildings. Extra costs will be derived from model examples and, for the purposes of support, will be set as a fixed amount for a clearly measurable quantity (e.g. per square metre of energy-related area).

Regional application	An improvement in the energy performance of the business sector, and the broader application of energy services in all regions of the Czech Republic, including the city of Prague.

Target group	Business entities (small, medium-sized and, where appropriate, large enterprises); for intervention in the field of energy savings (the insulation of production and business structures), also agricultural holdings, food

	businesses, undertakings providing accommodation and catering services, and retail organisations.

Projects targeted at end users	The above measures will be carried out either separately or as a set of several measures (comprehensive projects) based on recommendations arising from an energy audit. Eligible expenditure will comprise all investment costs having an influence on energy savings, construction costs, technology acquisitions, the production of design documentation and the energy audit, etc. The rate of financing is expected to be 40% of total investment costs.

Effectiveness	This measure is highly effective because investments are channelled, in particular, into increasing energy efficiency.

Basis of calculation	The basis of the calculation is the expected allocation of funds amounting to CZK 20 billion for all investment aid. Another assumption factored into the calculation is that aid intensity will be 40% of the total investment costs and therefore total investments in the implementation of energy saving measures will amount to CZK 50 billion. The calculation was based on a detailed ex-ante evaluation of activity 1 'energy saving projects' under projects implemented within the scope of calls I, II, and III of the Eco-energy programme, as drawn up by SEVEn. The study analysed in detail 536 projects within the scope of activity 1 (50 projects from call I, 241 projects from call II, and 245 projects from call III), which provides a sound basis for an estimate of energy savings in the new operational programme. Considering the share of energy-saving projects implemented under call III, investment expenditure of CZK 20 billion would annually save 8.5 PJ in final consumption. Investment expenditure of CZK 50 billion would translate into savings of 21.3 PJ. Of this, CZK 21 billion, giving a saving of 4.8 PJ, should be invested in projects to improve the thermal and technical properties of buildings. Due to the exhaustion of less costly projects, however, we should anticipate lower savings, i.e. approximately 20 PJ. Nevertheless, the resultant savings in final consumption depend on many factors, such as the precise amount of the subsidy, the way the calls are configured, and the shares of the individual measures within them. The total allocation and its benefits were broken down into the period from 2014 to 2020. Over the seven-year duration of the programme, savings of 20 PJ are projected; the annual benefit is calculated at 2 857 TJ.

Annual energy savings expected in	2 857 TJ

2016	

Approach to the calculation of savings for future years	For 2016 and beyond, we anticipate the same annual savings as in the period between 2014 and 2016.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
			8.571	11.429

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced				
New measures – implementation process not commenced			X	X

Service life	This is a measure with a service life of 10 or more years.

Monitoring, verification, methodology for establishing energy savings and additionality	The Operational Programme Enterprise and Innovation for Competitiveness will follow up on the Operational Programme Enterprise and Innovation 2007–2013. At present, individual support schemes have yet to be produced and approved. However, in the implementation of calls for investment subsidies, we will methodologically follow up on the previous programme (see measure 16). The programme also anticipates the introduction of financial engineering instruments. Monitoring within the scope of these instruments will be both ex-ante and ex-post.

ANNEX 4 – DETAILED DESCRIPTION OF INDIVIDUAL ENERGY-SAVING MEASURES

HOUSEHOLD SECTOR

Measure number	**2.1**

TITLE OF THE MEASURE	**Support for the modernisation of housing stock by means of building society savings schemes**

Sector	**households**

Brief summary	A building society savings scheme is a financial product with a relatively good interest rate. Its appeal is enhanced by the provision of a state subsidy. Building society savings schemes are advantageous in particular because of the subsequent opportunity to borrow money to invest in housing. These loans have a fixed rate, which at present ranges from 3% to 6%, depending on the building society and amount of the loan selected.

Description of the measure	Building society savings schemes are one of the ways of making a large return on resources and a means of accessing some of the most affordable loans for housing. Building society savings schemes include a saving stage and, subsequently, a claim to a loan. Building societies provide further resources in the form of a bridging loan. Although less advantageous, this loan is readily available. It helps those applicants who have not saved enough of their own money but want to finance their housing needs. In the past five years or so, approximately 45% of the loans granted have been used to upgrade and reconstruct flats and single-family buildings.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	Households are the sole target group of this measure.

Projects targeted at end users	The provision of advantageous loans for, among other things, the reconstruction and upgrading of flats and single-family buildings.

Effectiveness	Building society savings schemes are generally intended to cover housing needs. Activities supported include the reconstruction and upgrading of flats and single-family buildings, and are usually accompanied by energy-saving measures. From this perspective, the measure can be regarded as effective.

Basis of calculation	The figures were taken from the annual reports of the Association of

	Czech Building Societies, published for the years 2003 to 2012. Further data were taken from the 2011 Population and Housing Census, energy legislation and building standards.

Annual energy savings expected in 2016

The energy saving calculation is based on the annual reports of the Association of Czech Building Societies. Numbers of repaired flats were determined by reference to information on the number and volume of loans provided and the share of loans used for upgrading and reconstruction. The numbers of flats repaired in future years is based on the current downward trend in these loans and newly concluded contracts on building society savings schemes. This declining trend can be attributed primarily to the fall in state subsidies and the tighter conditions applicable to the use of resources from building society savings schemes. Savings were calculated based on the number of repaired flats and the average energy savings per flat. The average energy savings per flat respect a gradual tightening of standards regarding heat and technical parameters of buildings.

We took into account that energy savings would be 15% lower than for subsidies because the conditions applicable to lending under building society savings schemes are more relaxed and upgrades need not always include measures to reduce energy consumption. Reconstruction is a concept encompassing projects from the renovation of sanitary units, entailing no energy savings, to the comprehensive insulation of multi-family buildings owned by housing cooperatives and associations of unit owners, implemented by drawing on individual building society savings schemes.

Year	Number of loans	Volume of loans	Average amount ofloan	Reconstruction and upgrade loans		Energy saving per loan	Annual energy savings
	[thousands]	[CZK billions]	[CZK thousands]	number [thousands]	[]	[GJ/year]	[TJ]
2007	162 822	72.5	445	74 800	46.0%	11.3	842
2008	144 907	73.6	508	65 032	45.0%	11.	732
2009	128 54	65.7	511	55 670	43.0%	11.3	626
2010	113 611	57.8	509	5172	44.0%	11.3	564
2011	92 785	48.0	517	41 373	45.0%	11.3	465
2012	77 149	41.7	541	34 717	45.0%	13.5	469
2013	70 000	36.4	520	31 500	45.0%	13.5	425
2014	65 000	33.8	520	29 250	45.0%	13.5	395
2015	60 000	31.2	520	27 000	45.0%	13.5	365
2016	55 000	28.6	520	24 750	45.0%	13.5	334
2017	50 000	26	520	22 500	45.0%	13.5	304
2018	45 000	23.4	520	20 250	45.0%	13.5	273
2019	40 000	20.8	520	18 000	45.0%	13.5	243
2020	35 000	18.2	520	15 750	45.0%	13.5	213

Approach to the calculation of savings for future years	For future years, our basis is the continuing decline in the number of loans, which can be attributed to the falling interest in building society savings schemes and the lower numbers of newly concluded contracts for building society savings schemes. We anticipate that the current average

	amount per loan will remain the same, as will the share of loans used for upgrading and reconstructing housing.

Energy savings forecast [PJ]	2008-2010	2011-2013	2014-2016	2017-2020
	1.922	1.359	1.094	1.033

Status of implementation and precise time frame	2008-2010	2011-2013	2014-2016	2017-2020
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	This is a measure with a service life of 15 or more years.

Monitoring of the benefits of the measure	The benefits of the measure will be monitored by using the relative savings. Here, technical and engineering estimates will be applied on the basis of the number of flats reconstructed.

Measure number	2.2

TITLE OF THE MEASURE	Loans to municipalities to repair and upgrade housing stock

Sector	households

Brief summary	The provision of soft loans to municipalities for the comprehensive regeneration of multi-family buildings.

Description of the measure	This programme offers low-interest loans for the repair and upgrading of multi-family buildings owned by municipalities.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	This programme is intended for municipalities owning multi-family buildings, irrespective of the technology used in construction (prefab, brick).

Projects targeted at end users	Support granted: • Loans with a fixed interest rate of 3% p.a. throughout the repayment period, and a repayment period of up to 10 years. A loan may cover up to 50% of the overall costs.

Effectiveness	This programme focuses primarily on the overall regeneration of multi-family buildings owned by municipalities. One of the requirements is that the heat and technical parameters of buildings required by the relevant standard must be met. From this perspective, the measure can be regarded as effective.

Basis of calculation	Annual reports: • State Housing Development Fund • Českomoravská záruční a rozvojová banka • Union of Bohemian and Moravian Housing Cooperatives Panel, New Panel, Panel 2013+ Programmes, loans to municipalities for the repair and upgrading of housing stock, and the Green Savings Programme 2011 Population and Housing Census Normative requirements and legislation

Annual energy savings expected in 2016	The energy saving calculation is based on the annual reports of the State Housing Development Fund. Only the numbers of loans and the overall amount thereof are available for the programme. No figures on the number of reconstructed flats are available. Therefore, to estimate the

	number of repaired flats, we used the number of flats repaired per CZK 1 million of loans provided under the PANEL Programme. Based on the budget projected for the programme, the numbers of repaired flats in future years were estimated. Savings were calculated based on the number of repaired flats and the average energy savings per flat. The average energy savings per flat respect a gradual tightening of standards regarding heat and technical parameters of buildings.

Year	Number of contracts	Financial volume of the contracts concluded (CZK thousands)	Number of flats repaired	Specific energy savings/flat [GJ/year]	Energy savings [TJ]
2001	1	8 0	**59**	10	**0.586**
202	73	333 395	**2 4**	10	**24.438**
2003	31	78 475	**575**	10	**5.752**
2004	24	117 350	**860**	10	**8.602**
2005	14	53 600	**393**	12.5	**4.911**
2006	11	35 717	**262**	12.5	**3.273**
2007	15	88 206	**647**	12.5	**8.082**
2008	0	0	**0**	12.5	**0.000**
2009	0	0	**0**	12.5	**0.000**
2010	0	0	**0**	12.5	**0.000**
2011	14	64 240	**471**	12.5	**5.886**
2012	8	17 800	**130**	12.5	**1.631**
2013		20 000	**147**	12.5	**1.833**
2014		20 000	**147**	15	**2.199**
2015		20 000	**147**	15	**2.199**
2016		20 000	**147**	15	**2.199**
2017			**0**	15	**0.000**
2018			**0**	15	**0.000**
2019			**0**	15	**0.000**
2020			**0**	15	**0.000**

Approach to the calculation of savings for future years	The programme of loans to municipalities to repair and upgrade housing stock is not expected to continue after 2016.

Energy savings forecast [PJ]	2008-2010	2011-2013	2014-2016	2017-2020
	0	0.006	0.007	0

Status of implementation and precise time frame	2008-2010	2011-2013	2014-2016	2017-2020
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	
New measures – implementation process commenced				
New measures – implementation				

process not commenced				

Service life	This is a measure with a service life of 15 or more years.

Monitoring of the benefits of the measure	The benefits of the measure will be monitored by using the relative savings. Here, technical and engineering estimates will be applied on the basis of the number of flats reconstructed.

Measure number	2.3

TITLE OF THE MEASURE	Awareness of energy savings in heat consumption in households

Sector	households

Brief summary	Raising household awareness of the opportunities for energy savings by means of information campaigns and events.

Description of the measure	The aim of this measure is to hold information campaigns and awareness events on energy savings in households (the media, leaflets, lectures, etc.).

Regional application	The measure may be applied anywhere in the Czech Republic.

Target group	Households are the target group of this measure.

Projects targeted at end users	The holding of awareness campaigns focused on household energy savings.

Effectiveness	Awareness of household energy savings can be regarded as effective if it is used as a complement to other measures because it is one of the avenues prompting households to take the decision to make savings. Information campaigns may also influence household behaviour. However, this effect generally fades after the end of the campaign.

Basis of calculation	• Savings achieved under Measures 1.1 to 1.4 • The estimated share of awareness raised via the various existing programmes and activities of distribution companies interested in implementing energy saving measures in households

Annual energy savings expected in 2016	The effect of awareness-raising on measures leading to energy savings is difficult to establish because of the synergistic effects of other measures. Therefore, the calculation is derived from the total savings achieved under the specific investment measures 1.1 to 1.4. We assume that the influence of information and awareness, which, under the above programmes and other programmes in the given period, is and will be devoted to heat savings related to heating and hot water heating in homes, will be reflected in additional savings of 4% under investment measures 1.1 to 1.4.

Approach to the	The anticipated benefit of awareness in households includes the expected

calculation of savings for future years	increase in its share of energy savings related to heating. The benefits of awareness were estimated at 4% in the years 2008 to 2010, 6% in 2011–2013 and 7% from 2014 to 2016; they are calculated as a percentage of savings achieved in the consumption of thermal energy by measures 1.1 to 1.4.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.190	0.149	0.224	0.072

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	Because we express the benefits of awareness as a share in investment savings under measures 1.1 to 1.4, the estimated service life of the measure is the same as for those measures, i.e. 15 years or more.

Monitoring of the benefits of the measure	It is virtually impossible to monitor the benefits of awareness campaigns directly. The level of benefits will always be just an estimate of the share in savings achieved by other measures.

Measure number	2.4

TITLE OF THE MEASURE	Energy labelling of household appliances – support of implementation

Sector	households

Brief summary	The labelling of devices to inform purchasers of the energy efficiency of electrical appliances.

Description of the measure	The labelling of electrical appliances is a compulsory measure derived from EU legislation aimed at fitting household electrical appliances with labels providing information on their energy efficiency, which can serve as a basis for households when purchasing such devices.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	Households are the target group of this measure. However, labelling can also have an influence on other groups of consumers, e.g. sole traders and entrepreneurs.

Projects targeted at end users	The compulsory energy labelling of household electric appliances sold in order to provide information on the energy efficiency of specific products.

Effectiveness	Considering the low costs and market trends towards more energy-saving appliances, this measure can be regarded as highly effective.

Basis of calculation	The calculation is based on statistical data (Czech Statistical Office) concerning total electricity consumption in households, and the extent to which households have individual types of appliances. The share of electrical appliances in total electricity consumption has been expertly estimated on the basis of estimates put forward by domestic and foreign research studies. The share of the increase in energy efficiency in relation to the operation of electrical appliances was conservatively estimated based on statistics from previous trends on the domestic and European market.

Annual energy savings expected in 2016	The average annual electricity consumption in households is 52 611 TJ (the 2002–2006 average for the calculation of the target under the First Energy Efficiency Action Plan), i.e. 14 614 GWh per year. The share of electrical appliances and the share of electrical appliances with energy labels is approximately 70% (washing machines, refrigerators, lamps, air conditioning, dishwashers, etc., but excluding electric storage water heaters).

	Subject to strict compliance with legislation on energy labelling, its promotion to consumers, reviews of energy classes and expansion to include new appliances, the regular replacement of appliances in households would result in increased efficiency in their operations by 1% per year (the energy efficiency of new appliances sold), and the overall impact of labelling on energy consumption in the Czech Republic would be 258 TJ/year.

Approach to the calculation of savings for future years	Stable developments and benefits of energy labelling in the saving of energy are expected. Although some types of appliances may, over time, have less potential to reduce operational energy intensity, such potential may be covered by other appliances, whose share in household equipment will grow.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.774	0.774	0.774	1.032

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	As labelling has resulted in the gradual withdrawal of most less-efficient appliances from the market, the benefits of this measure can be regarded as long-lasting.

Monitoring of the benefits of the measure	The benefits of labelling can be computed by reference to statistics on the extent to which households are fitted out with electrical appliances, and by reference to figures on sales of appliances, broken down by category. The average life of appliances can be established according to the ENERGO statistical survey of households (from 2003; a further survey may be conducted in 2014) Figures on the annual use and sales of appliances in the individual categories are not readily accessible – here it is also necessary to draw on available foreign sources. We consider it advisable to consider the introduction of some means of monitoring sales of electrical appliances by energy class.

Measure number	2.5

TITLE OF THE MEASURE	Electricity savings in household lighting

Sector	households

Brief summary	Gradual replacement of light sources which are energy-inefficient (conventional and halogen bulbs) with efficient lighting and LED sources.

Description of the measure	The subject of this measure is the gradual replacement of energy-inefficient light sources (conventional and halogen bulbs) with efficient lighting and LED sources. This replacement is driven primarily by the phasing-in of a ban on sales of conventional and halogen bulbs.

Regional application	This measure can be applied throughout the Czech Republic.

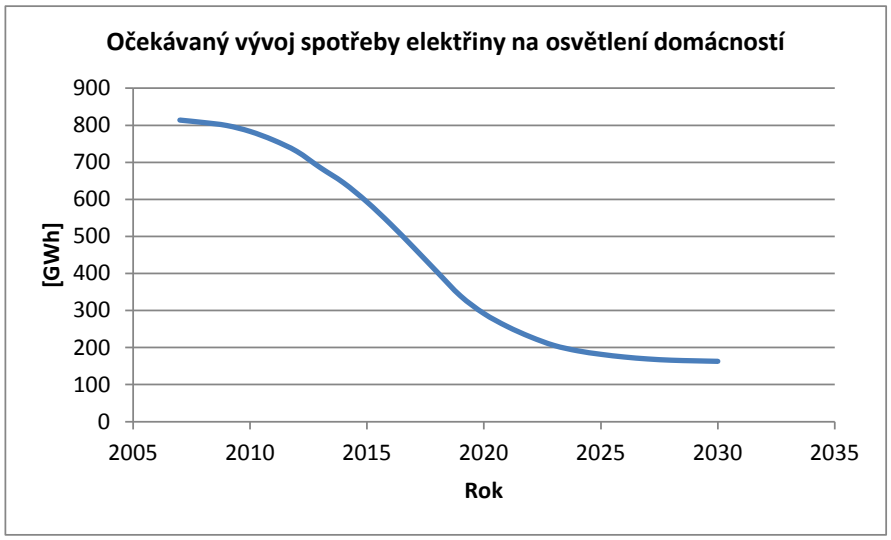
Target group	manufacturers and sellers of lighting equipment

Projects targeted at end users	Since 2004, the main driver behind energy savings in lighting has been the gradually phased-in ban on sales of conventional bulbs, as required by Commission Regulation (EC) No 244/2009. Under that Regulation, the schedule for the ban on bulbs is as follows: • 1 September 2009: a ban on all bulbs with non-clear lumps, a ban on 100 W bulbs and above • 1 September 2010: a ban on 75 W bulbs and above. • 1 September 2011: a ban on 60 W bulbs and above. • 1 September 2012: a ban on all bulbs (light sources of a class worse than C, ordinary bulbs are E). • 1 September 2016: a ban on all light sources of a class worse than B (including halogen bulbs, because they are classes C to D).

Effectiveness	From the perspective of energy savings, this measure is quite clearly effective. A negative impact of this measure has been the increase in the quantity of hazardous waste, because energy saving bulbs contain mercury.

Basis of calculation	The estimate is based on the total electricity consumption of households and the proportion of lighting in such consumption. The assumption is that initially most lamps were fitted with conventional bulbs.

Annual energy	The savings potential works on the assumption that the gradual

savings expected in 2016	replacement of light sources will reduce energy consumption to a fifth of the initial value, which is consistent with the replacement of conventional bulbs with primarily LED sources. Besides the schedule for the ban on sales, when estimating the lead-in curve, we also took into account the life of existing bulbs, stocks of conventional bulbs still held by households, and efforts to circumvent the ban on sales. We also expect that energy-saving bulbs will gradually be replaced by LED sources. The total electricity consumed in the lighting of households in the Czech Republic is approximately 814 GWh/year (the average for 2002–2006 based on the number of households, the light sources fitted and their daily use). The estimated decline in the consumption of electricity used for lighting in households is shown in the following graph: **Forecast developments in the consumption of energy on household lighting** [GWh] Year 

Approach to the calculation of savings for future years	See the description and the graph 'Forecast developments in the consumption of energy in household lighting' above.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.110	0.352	0.547	0.871

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				

New measures – implementation process not commenced				

Service life	As the ban on sales of inefficient light sources is permanent, this measure has a virtually permanent effect.

Monitoring of the benefits of the measure	The benefits of the measure can only be monitored indirectly by reference to information on sales of the various types of light sources to households.

SERVICE SECTOR

Measure number	**2.6**

TITLE OF THE MEASURE	**Provision of energy services employing the EPC method in the tertiary sector, and the promotion thereof**

Sector	**Services**

Brief summary	The idea of this measure is to remove legislative hurdles hampering the application of the EPC method and to draw up methodology for the preparation and implementation of projects using the EPC method in state and public administration so that EPC becomes the main method employed in achieving energy savings in buildings.

Description of the measure	The EPC (Energy Performance Contracting) method seeks to reduce the operating costs of energy in buildings. The basis of this method is that customers do not need to make their own investments in the replacement of obsolete technology. In the conclusion of EPC service supply agreements, the service supplier undertakes to cover the cost of investments in savings measures from its own resources, and the customer repays them from the savings achieved in operating costs. The hallmark of EPC is it is guarantee that a project will make savings.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	state and public administration organisations

Projects targeted at end users	At present, use of the EPC method by organisational units of the state is precluded by Act No 218/2000 on budgetary rules, especially Section 49 thereof, which does not allow organisational units of the state to receive loans. Organisations partly funded from the public purse, on the other hand, may make use of this type of service. However, they are frequently concerned about making mistakes when accounting for these projects because they view this process as the financing of investments from operating costs. The idea of this measure is to remove legislative hurdles hampering the application of the EPC method and to draw up methodology for the preparation and implementation of projects using the EPC method at organisational units of the state.

Effectiveness	This measure is effective because it does not require own financial resources, and responsibility for achieving the anticipated energy savings is transferred to service providers.

Basis of calculation	The calculation is based on the assumption that EPC energy services will be provided to end users of energy in the tertiary sector, with an estimate of the annual decline in thermal energy consumption of 30 TJ.

Annual energy savings expected in 2016	According to an expert estimate, we can expect the implementation of projects including the provision of guaranteed-result energy services in approximately 30 structures, with average annual energy savings of 1 000 GJ per structure. That would be tantamount to overall energy savings of 30 TJ per year.

Approach to the calculation of savings for future years	It can be assumed that the volume of energy saved will rise due to the effects of good practice and interest in the implementation of energy-saving projects. Year-on-year growth can be estimated at 5%. Therefore, in 2011 it is possible to make a calculation using annual energy savings of 35 TJ. In the final year of the period from 2008 to 2016, final consumption will be reduced by approximately 330 TJ due to the influence of the use of energy services in the tertiary sector. Trends in forecast savings are presented in the following table:

Year	Annual savings [TJ]
2008	30.0
2009	31.5
2010	33.1
2011	34.7
2012	36.5
2013	38.3
2014	40.2
2015	42.2
2016	44.3
2017	46.5
2018	48.9
2019	51.3
2020	53.9

Energy savings forecast [PJ]	2008-2010	2011-2013	2014-2016	2017-2020
	0.095	0.110	0.127	0.201

Status of implementation and precise time frame	2008-2010	2011-2013	2014-2016	2017-2020
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations			X	X
New measures – implementation process commenced	X	X		

New measures – implementation process not commenced				

Service life	The service life of measures implemented in buildings is predominately 15 years or more.

Monitoring of the benefits of the measure	The EPC method includes the measurement and verification of energy savings made. To monitor the benefits of the measure, it would be advisable to gather information on savings centrally in the CRAB (Central Register of Administrative Buildings).

Measure number	2.7

TITLE OF THE MEASURE	Expansion of the role of the public sector in demonstrating new technologies

Sector	Services

Brief summary	The main thrust of this measure is to introduce green procurement in state administration. This would be mandatory for organisations falling within the scope of the effect of the Public Procurement Act.

Description of the measure	Since November 2010, 'Rules for the application of environmental requirements in central and local government procurement procedure and purchasing' have applied in the Czech Republic. These rules were adopted by the Government to promote green procurement in the public sector. The rules follow up on the European Community's Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan, approved in 2008. The rules were primarily drawn up for organisations governed by Act No 137/2006 on public procurement. However, they may also be used by businesses and other entities on both the demand and supply side. The rules only define basic parameters, i.e. they state the bodies for which they are binding, and how and when evaluations of their implementation are to be evaluated. Selected product groups are regulated by more detailed methodologies. These methodologies establish environmental requirements for products and services procured, and also include detailed instructions on how to incorporate these requirements into public procurement. At present, methodologies are available for the purchase of furniture and office computer equipment, which, as of 1 November 2010, should govern the procedure followed by central bodies of state administration (the Government Office, ministries and other institutions, such as the Energy Regulatory Office, etc.). The requirements in the methodologies encompass the most pronounced environmental impacts of products. In particular, there are requirements concerning the content of hazardous substances, the free use of recycled materials, easy recycling, the energy efficiency of computers, the use of legally logged wood for furniture, etc. Based on an evaluation of the application of the methodologies above, methodologies for the following product groups were created and submitted to the Czech Government for approval: • foodstuffs and catering services; • transport and transport services; • clothing, uniforms and other textiles;

	• paper and printing services; • cleaning products and services. Further to international developments, methodologies that are also significant from the perspective of energy consumption are also due to be incorporated into the rules: • energy-saving and environmentally friendly buildings; • road construction; • public street lighting; • wall panels; • mobile telephones; • cogeneration; • boilers; • air conditioning and heat pumps; • hard floor coverings; • thermal insulation; • equipment for the health sector; • windows.

Regional application	This measure can be implemented throughout the Czech Republic.

Target group	Organisations of state administration and local government, organisations subject to the Public Procurement Act and other business entities.

Projects targeted at end users	Rules on the application of environmental requirements, and therefore energy efficiency requirements, in public procurement and purchasing by state administration and local government bodies.

Effectiveness	This measure is effective because it ensures purchases of more energy-efficient appliances and equipment.

Basis of calculation	This set of measures comprises: • The purchase of equipment and vehicles based on lists of energy-efficient product specifications • Energy audits • The introduction of energy performance certificates • Energy efficiency and energy savings as an assessment criterion in competitive tendering for public contracts The contribution by some of them to the achievement of energy savings is assessed in other chapters (energy audits, certificates of energy performance of buildings). The calculation is based on the total consumption of the public sector.

Annual energy savings expected in 2016	At present, there is no strict legal obligation in the Czech Republic to use green shopping. Few ministries have established internal regulations governing the purchase of environmentally friendly products. We expect

	a legislative and administrative framework to be formed that will guarantee the implementation of the above requirement. The method of calculation is based on a forecast of annual savings of 0.5% of total consumption by the public sector.

Approach to the calculation of savings for future years	Regarding the procurement requirement, with the inclusion of energy efficiency and life cycle costs, savings can be estimated at approximately 0.5% of the energy consumption of the public sector, i.e. each year, as of 2011, the annual savings will be approximately 80 GWh. In 2016, the total savings will amount to approximately 480 GWh.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
		0.864	0.864	1.152

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations			X	X
New measures – implementation process commenced		X		
New measures – implementation process not commenced				

Service life	The service life of the measure varies, from three years for ICT to more than 25 years for structural components.

Monitoring of the benefits of the measure	Until a system of centralised procurement is introduced for state administration, the benefits of the measure can only be monitored indirectly by drawing on information about sales of appliances, vehicles and other products influencing energy consumption.

Measure number	2.8

TITLE OF THE MEASURE	Electricity savings in tertiary sector lighting and in public street lighting

Sector	Services

Brief summary	**Office lighting:** Gradual replacement of light sources which are energy-inefficient (conventional and halogen bulbs) with efficient bulbs and LED sources for office lighting. **Public street lighting:** The replacement of inefficient low-pressure discharge sources (fluorescent lamps) and, especially, high-pressure mercury lamps, with modern high-pressure sodium vapour and metal halide lamps in public street lighting. The use of only electronic accessories instead of loss-generating electromagnetic lamp reactors.

Description of the measure	The subject of this measure is the gradual replacement of energy-inefficient light sources (conventional and halogen bulbs) with efficient lighting and LED sources. This replacement is driven primarily by the phasing-in of a ban on sales of conventional and halogen bulbs. For public street lighting, this will mean the replacement of fluorescent lamps and mercury lamps with sodium vapour and metal halide lumps, or LED sources.

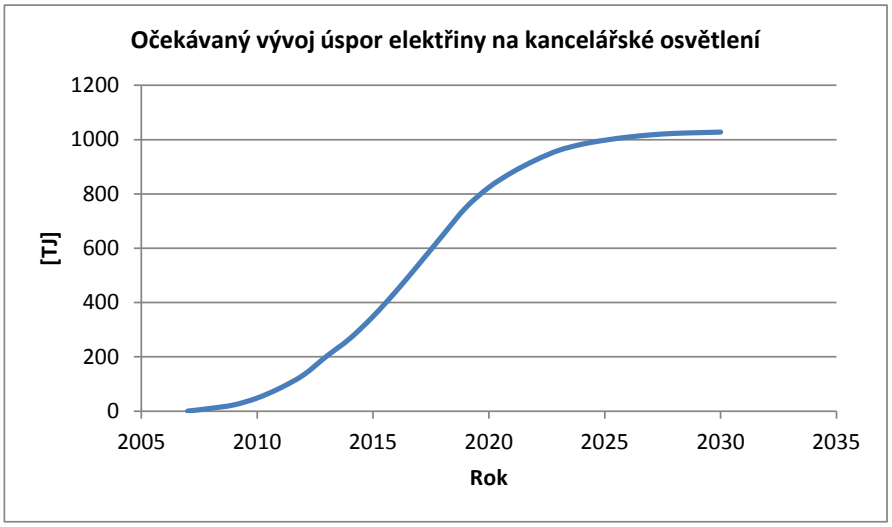
Regional application	This measure can be applied throughout the Czech Republic.

Target group	manufacturers and sellers of lighting equipment, tertiary sector, public sector

Projects targeted at end users	Since 2004, the main driver behind energy savings in lighting has been the gradually phased-in ban on sales of conventional bulbs, as required by Commission Regulation (EC) No 244/2009. Under that Regulation, the schedule for the ban on bulbs is as follows: • 1 September 2009: a ban on all bulbs with non-clear lumps, a ban on 100 W bulbs and above • 1 September 2010: a ban on 75 W bulbs and above. • 1 September 2011: a ban on 60 W bulbs and above. • 1 September 2012: a ban on all bulbs (light sources of a class worse than C, ordinary bulbs are E). • 1 September 2016: a ban on all light sources of a class worse than B (including halogen bulbs, because they are classes C to D).

Effectiveness	From the perspective of energy savings, this measure is quite clearly effective. A negative impact of this measure has been the increase in the quantity of hazardous waste, because energy saving bulbs contain mercury.

Basis of calculation	Energy-efficient light sources in the tertiary sector may deliver up to 80% savings in electricity compared to inefficient technologies; their service life is several times longer and they offer good quality colour rendering of light. A large area of potential savings in electricity exists in public street lighting, which can be achieved by replacing inefficient low-pressure discharge sources (fluorescent lamps) and, especially, high-pressure mercury lamps, with modern high-pressure sodium and metal halide lamps. Approximately another 20% of energy can be saved by using only electronic equipment, i.e. by replacing loss-generating electromagnetic coils.

Annual energy savings expected in 2016	**Office lighting:** Average electricity consumption in the tertiary sector between 2002 and 2006 was 11 895 GWh, of which the share of lighting was approximately 10%, i.e. 119 GWh. Unlike households, in the tertiary sector there is a high share of lighting using fluorescent lamps, and the rate of replacement of light sources is also higher. Therefore we estimate that the share of light sources requiring renovation is 30%. The driving force behind the replacement of lighting in the tertiary sector since 2008 has been the ban on sales of low-efficiency light sources, in particular, conventional bulbs. Taking account of the schedule in place for the ban on sales of bulbs, the residual service life of light sources, stocks of bulbs, and attempts to circumvent the ban on sales of bulbs, we believe that progress in electricity savings in relation to office lighting will be according to the following graph: **Forecast developments in office lighting electricity savings** [TJ] Year 

	The graph works on the assumption that the renovated light sources will consume a fifth of the energy compared to the baseline situation. **Public street lighting:** Taking into account that there are 800 000 lampposts, with an average power of 150 W, and daily lighting of 8 hours/year, the total annual power consumption is 350 GWh. Given the average potential for savings is 20% per lamppost, the total potential savings are 70 GWh and the contribution of this measure to those savings is 5% per year. In this case, the annual energy savings resulting from the implementation of the measure are 3.5 GWh (as of 2010).

Approach to the calculation of savings for future years	See the description in the preceding paragraph.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.061	0.192	0.278	0.432

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	The effect of the measures can be regarded as permanent because the ban on the sale of inefficient light sources essentially precludes the reintroduction of sources with lower efficiency in the future.

Monitoring of the benefits of the measure	The benefits of the measure can only be monitored indirectly by reference to information on sales of the various types of light sources.

Measure number	2.9

TITLE OF THE MEASURE	Application of the Energy Star Agreement on office equipment

Sector	Services, research and development

Brief summary	Support for the sale of energy-saving office technology by labelling compliant products with the Energy Star label, and the possibility of selecting compliant products from a publicly accessible database.

Description of the measure	Office technology manufacturers may subscribe to the Energy Star scheme and have their products certified within the scope of this programme. Certified products bear the Energy Star label and are entered in a database of energy-saving appliances. Energy Star labels and the database of energy-saving products are designed to help consumers when purchasing such products.

Regional application	This measure can be implemented throughout the Czech Republic.

Target group	users of computer and office technology in the tertiary sector and in households, manufacturers and distributors of office technology

Projects targeted at end users	The Energy Star labelling of appliances. This label informs consumers that an independent laboratory has certified the product as energy efficient in accordance with the requirements of the Energy Star programme. Energy efficient applications can be selected from a publicly accessible database.

Effectiveness	This measure is effective because it results in a situation where predominantly equipment complying with Energy Star specifications is marketed.

Basis of calculation	The Energy Star Programme concerns the promotion of energy savings for office appliances. The form applicable in the EU is the result of an agreement between the European Commission and the US EPA, where the programme was founded. The importance of the Energy Star Programme lies in the fact that office equipment contributes significantly to electricity consumption in the tertiary sector and households, and the number of appliances is growing. The estimated benefit of the measure was based on experience of its application in the European Union. Total consumption was estimated based on computers and other office appliances in the service sector and households.

Annual energy savings expected in 2016	In the Czech Republic, 54% of households had a computer in 2009, i.e. there was at least one computer in more than 2.3 million households. The Energy Star Programme also encompasses monitors, laptops, printers, copiers, faxes, scanners and other appliances. The current version of the Energy Star Programme, according to expert estimates, could deliver energy savings in all EU Member States in the years 2007–2009 of up to 30 TWh, or 10 TWh/year. From 2011 and 2014, we expect the programme to decline in effectiveness by 10% annually. The Czech Republic's share in these savings, referred to as a ratio of the population (2.23%) and economic development as an indicator of the availability of computer technology (70% of EU-25 GDP) and the share of the measure in the achievement of savings in the Czech Republic (10%), is a total of 93 GWh of electricity, or 0.29% of average total annual electricity consumption. Annual electricity savings in the period: 2011-2013: 17 GWh; 2014-2016: 14 GWh.

Approach to the calculation of savings for future years	From 2017 to 2020, we forecast that annual energy savings will be 13 GWh as a result of the Energy Star programme.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
		0.184	0.151	0.202

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations		X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	The service life of office technology and consumer electronics is three years. Because the energy efficiency of electronics is improving all the time, there is no danger that end-of-life equipment will be replaced with less efficient devices. However, there could be an increase in electricity consumption due to the increasing number of such devices, especially in households.
Monitoring of the benefits of the	The benefits of the measure can only be monitored indirectly by reference to sales of appliances with and without the Energy Star label.

measure	

INDUSTRIAL SECTOR

Measure number	2.11

TITLE OF THE MEASURE	Support of voluntary commitments

Sector	industry

Brief summary	Support for the voluntary commitment to increase energy efficiency in industry

Description of the measure	Voluntary energy efficiency agreements focus on reducing energy consumption and the related emissions, or on increasing energy efficiency. The main advantage of long-term voluntary agreements is that they promote an active approach by industry towards better energy efficiency or towards addressing environmental protection issues. Experience from abroad (especially from the Netherlands, United Kingdom, and Denmark, where long-term agreements enjoy a well-established tradition) indicates that, in industry (and in other sectors), these agreements facilitate economically efficient solutions and pave the way for the faster introduction of energy savings into practice than has been achieved by legislative measures. The principle of voluntary agreements is that, on the one hand, the state imposes an obligation on industry and, on the other hand, industry proposes an alternative way of meeting that obligation which is more advantageous for it, and this is enshrined by signatures on a voluntary agreement, the essence of which is more or less collective. If the subject matter of the agreement is not delivered, sanctions come into play, which typically take the form of the enforcement of the original obligation. An evaluation of voluntary agreements in various countries has shown that voluntary agreements essentially become an alternative means of introducing stricter regulations than those deriving from existing legislation for industry in an attempt not to compromise its competitiveness and yet achieve further reductions in industry's energy demands. If such voluntary agreements are to be prepared and concluded in the Czech industrial sector, certain general requirements have to be met. Since these are agreements between state administration and industry, a key factor is that sectoral associations must be involved in these agreements. In order to motivate undertakings to enter into voluntary agreements, energy efficiency must be incorporated into natural incentives in order to change their behaviour. These could be: • Economic benefits for undertakings (a cut in energy costs, lower charges for discharging pollutants) • Replacement of regulation with voluntary commitments

	• The possibility of tax relief in exchange for compliance with a particular energy efficiency target. Within the scope of voluntary agreements, a whole number of variants is opening up as to how they can be implemented in practice. These possibilities differ in the scope and method of application of the voluntary agreement. These agreements could be signed either by the Czech Confederation of Industry or by a sectoral association, or be concluded directly with individual undertakings.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	Owners of industrial plants, industrial associations, Czech Confederation of Industry. Voluntary agreements would be applied to undertakings which do not fall within the ETS system.

Projects targeted at end users	The principle of voluntary agreements is that, on the one hand, the state imposes an obligation on industry, e.g. • An increase in energy efficiency by x% per year or x% by 2020. On the other hand, it offers some sort of advantage, perhaps in the form of tax concessions or investment aid to invest in energy savings. It is up to each industrial enterprise to propose a way of meeting that obligation which is more advantageous for it, and this is enshrined by signing a voluntary agreement, the essence of which is more or less collective. If the subject matter of the agreement is not delivered, sanctions come into play, which typically take the form of the enforcement of the original obligation.

Effectiveness	This measure is highly effective because investments are channelled into increasing energy efficiency. Undertakings have the opportunity to select the most effective means of reaching the targets.

Basis of calculation	The calculation is based on the average annual energy consumption in industry (companies not included in the emission trading scheme) in the 2009–2011 – data from Eurostat. There is currently no programme in the Czech Republic enabling us to deduce information about the expected savings. Therefore, the calculation was based on the monitoring of similar projects abroad, e.g. in Finland and the Netherlands. Sources: • Energy efficiency agreements 2008 – 2010 results, Motiva 2011 • Long-term agreements on energy efficiency in the Netherlands – results for 2009, Agency NL 2010. • Voluntary Agreements in the Field of Energy Efficiency and Emission Reduction: Review and Analysis of the Experience in Member States of the European Union, Joint Research Centre,

	2010. The average energy consumption in industry (companies not included in the emission trading scheme) in the period from 2009 to 2011 stands at about 145 000 TJ. According to available sources, 85% of energy consumption in industry is covered by voluntary agreements in Finland; the figure for the Netherlands is as high as 90%. However, this figure also includes large enterprises falling within the emission trading scheme. Such participation cannot be expected in the SME sector. The expert estimate of coverage here is 50% – 72 500 TJ. The introduction of this measure places relatively high demands on administration, so we cannot expect the measure to begin before the end of the second period of the action plan (2014-2016). Due to the slow implementation of specific efficiency measures in situ, energy savings will not be generated until 2016 (perhaps 2017). To calculate energy savings, we again draw on foreign examples. For example, the system of long-term agreements in NL between 1989 and 2000 led to a reduction in energy intensity by 20% (± 2% per year) at large industrial enterprises. Similar figures could be used as basis in the Czech Republic. Considering the pace of the decline in energy intensity (2.5% in PPP, IEA Czech Republic 2010 Review) for the period since 1990, we can assume that the reduction in energy intensity will be 2.5% per year. We can count on renewed economic growth from 2014, accompanied by a rise in energy consumption (estimated at 1% per year). A reduction in energy intensity by 2.5% translates into an absolute reduction in energy consumption by 1.5% per year as from 2016. The total contribution for the 2016–2020 period will be 5 438 TJ (1 510 GWh).

Annual energy savings expected in 2016	1088 TJ

Approach to the calculation of savings for future years	For 2017–2020, we anticipate the same annual savings as in 2016 (725 TJ).

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
			1.088	4.350

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**

Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced			X	X
New measures – implementation process not commenced	X	X		

Service life	This is a measure with a service life of 10 or more years.

Monitoring of the benefits of the measure	The benefits of the measure will be monitored for each industrial enterprise. The whole programme is monitored in depth and the benefits of the measure are regularly published.

Measure number	2.12

TITLE OF THE MEASURE	Summary of measures to increase the energy efficiency of agricultural plants

Sector	Agriculture

Brief summary	A reduction in energy intensity in agricultural production, and support for the use of renewable sources of energy.

Description of the measure	This measure includes a combination of a legislative instrument and subsidy resources in agricultural production.

Regional application	This measure can be implemented throughout the Czech Republic.

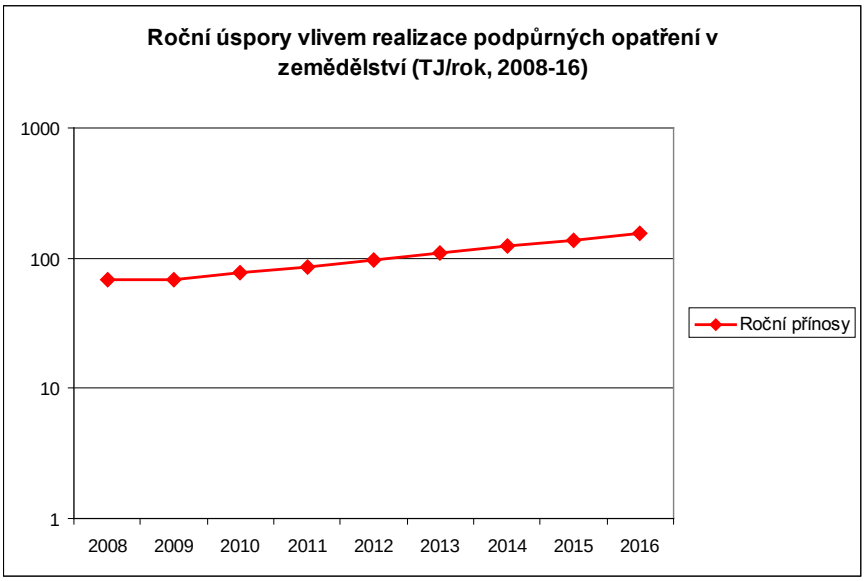
Target group	agricultural and forestry holdings

Projects targeted at end users	legislative instruments subsidy instruments

Effectiveness	Part of the measure will result in direct energy savings; the use of renewable energy sources in itself does not reduce energy consumption, it only squeezes out non-renewable sources.

Basis of calculation	The basis of calculation is the total consumption of fuels and energy in agriculture (the Statistical Office's table for target setting). The estimated annual savings achieved due to a combination of legislative measures and the influence of subsidy funds in agricultural production. These savings range from 0.35% to 0.8% annually between 2008 and 2016. The lower rate of savings in the first AP can be attributed in part to the financial situation at agricultural holdings and a lack of investment in energy savings, the replacement of technology, or use of RES. In terms of total consumption, we forecast savings of 4.78% as at 2016.

Annual energy savings expected in 2016	Annual consumption of fuel and energy is multiplied by the coefficient of annual savings. Annual savings are added together for each three-year period. The coefficient has a growth character of 0.35 to 0.8% annual savings. The savings rate is as follows: **Annual savings due to the implementation of ancillary measures in agriculture (TJ/year, 2008–2016)**

	Annual yields 

Approach to the calculation of savings for future years	Savings for the future period have been determined by extrapolating the current trend.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.210	0.300	0.420	0.560

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	This is a measure with a service life that is generally 15 or more years.

Monitoring of the benefits of the measure	Considering the comprehensive nature of the measure, its benefits can only be monitored indirectly by reference to statistics.

Measure number	2.13

TITLE OF THE MEASURE	Reduction in the emission and energy intensity of passenger vehicles placed on the market

Sector	transport

Brief summary	The aim of this measure is to reduce the emissions and, by extension, the energy intensity of new passenger vehicles by establishing performance-related emission standards.

Description of the measure	The essence of the measure is to achieve targets as regards emissions and, by extension, the energy consumption of new passenger cars placed on the domestic market, as defined by Regulation No 443/2009 of the European Parliament and of the Council. Technological improvements in engines should make it possible to achieve average values of 130 g CO_2/km in new cars by 2015, progressing to 95 g CO_2/km in 2020.

Regional application	This measure is applied throughout the Czech Republic.

Target group	The regulation covers all manufacturers of cars in the EU.

Projects targeted at end users	Manufacturers are motivated by improvements in the technology of internal combustion engines.

Effectiveness	The measure will primarily reduce emissions. This is achieved in large part by reducing fuel consumption.

Basis of calculation	The basis of calculation is data on sales of passenger cars on the Czech market in the last five years, published by the Association of Car Importers. It provides information on the number of cars sold annually in the domestic market, broken down into individual categories and types of fuel/drive used. These statistics subsequently form the basis from which the current average energy and emission intensity of these cars is derived, and, via an expert estimate of the average total mileage, the total initial/benchmark energy consumption after they are put into operation is calculated.

Year of reporting period
BAU scenario
Proposed scenario
Vehicle sales
of which:
petrol
diesel
alternative
Annual mileage

Year of reporting period
Total [TJ]

Rok sledovaného období	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
BAU scénář	**150**	**147**	**145**	**142**	**140**	**138**	**135**	**133**	**131**	**129**
Navrhovaný scénář	**150**	**145**	**140**	**135**	**130**	**122,5**	**115**	**107,5**	**100**	**95**
Prodej vozů	168662	171192	173760	176366	179012	181697	184422	187189	189996	192846
z toho:										
benzin	0,60	0,55	0,52	0,48	0,44	0,39	0,34	0,27	0,20	0,11
nafta	0,40	0,44	0,47	0,50	0,53	0,57	0,61	0,65	0,70	0,75
alternativní	0,00	0,01	0,01	0,02	0,03	0,04	0,05	0,07	0,10	0,14
Roční projezd	15000	15375	15759	16153	16557	16971	17395	17830	18276	18733

Rok sledovaného období	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Celkem v TJ	0	87	182	284	393	609	833	1060	1282	1380

Annual energy savings expected in 2016	0.609 PJ

Approach to the calculation of savings for future years	The calculation procedure is the same as for the years 2011 to 2016.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
		0.268	1.286	4.556

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	This is a measure with a service life of 10 or more years.

Monitoring of the benefits of the measure	Under the regulation, only the average specific emissions of CO_2 by new passenger cars are monitored. Energy savings can be estimated by drawing on knowledge of the annual mileage of all vehicles and their average consumption.

Measure number	2.14

TITLE OF THE MEASURE	National strategy for the development of cycling

Sector	transport

Brief summary	Cycling infrastructure development

Description of the measure	Stimulation of the promotion of cycling transport by constructing cycling infrastructure. Financing primarily from the State Transport Infrastructure Fund, where the following measures are supported: • construction and maintenance of cycling infrastructure; • interlinking of cycling with public transport; • use of existing roads and pathways for the needs of cyclists; • the new construction and reconstruction of cycling lanes, paths, bridges and subways.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	The programme is designed for towns, municipalities, regions and micro regions.

Projects targeted at end users	The maximum contribution for 2013 was 65% of total eligible costs. The maximum contribution is CZK 10 million. The total budget of the State Fund for Transport Infrastructure earmarked for cycling paths should be CZK 150 million per year.

Effectiveness	This programme focuses primarily on the construction and maintenance of cycle paths. In urban and suburban areas, cycling can compete very well with car transport, which would save energy. Therefore, the measure is effective.

Basis of calculation	Data sources used for the calculation: • 2011 Population and Housing Census – commuters; • Energy consumption by passenger cars in 2011; • Transport volumes in the Czech Republic. The following assumptions are applied in the structure of energy savings: • Savings are achieved by replacing cars with bicycles for the everyday commute to work; • The average journey there and back is 25 km; the average fuel

	consumption is 6 litres per 100 km; • Annually there are 130 journeys, which corresponds to half of the working days in the year (no one uses a bicycle in winter); According to the 2011 Population and Housing Census, 943 000 people travel by car every day. Assuming occupancy is 1.3 persons per vehicle, this equates to approximately 725 000 cars. The implementation of the proposed measures will reduce the number of persons commuting to work by car by 1%, resulting in savings of 45 TJ per year.

Annual energy savings expected in 2016	In 2013, we expect the annual saving to be 45 TJ.

Approach to the calculation of savings for future years	After 2016, we believe that the annual saving could be 45 TJ provided that the budget remains at CZK 150 million per year.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.135	0.135	0.135	0.180

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	This is a measure with a service life of 30 or more years.

Monitoring of the benefits of the measure	The benefits of this measure are not monitored

Measure number	2.15

TITLE OF THE MEASURE	Operational Programme Transport

Sector	Transport

Brief summary	The provision of support for the construction, modernisation and development of trans-European transport networks (TEN-T) and regional rail transport networks.

Description of the measure	In particular, the transport aspects of the key strategic targets of the National Development Plan are implemented in the Operational Programme Transport. There is a particular focus on the modernisation of railway and road networks. The main programme indicators are a reduction in the accident rate, an increase in transport volumes, time savings and a reduction in greenhouse gases. Energy savings are calculated by reference to the indicator of reductions in greenhouse gases. Basic overview of priority axes and areas of intervention: • Priority axis 1 – Modernisation of the TEN-T railway network • Priority axis 2 – Construction and modernisation of the TEN-T motorway and road network • Priority axis 3 – Modernisation of the non-TEN-T railway network • Priority axis 4 – Modernisation of non-TEN-T Class I roads • Priority axis 5 – Modernisation and development of the Prague Metro and systems for the management of road transport in Prague • Priority axis 6 – Support of multimodal freight transport and development of inland waterway transport • Priority axis 7 – Technical assistance • The programme's total allocation in the period between 2007 and 2013 is EUR 5.8 billion. We envisage the same amount for the 2014–2020 period.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	The programme is intended for all owners and managers of the infrastructure in question, owners of rolling stock, rail transport operators, the owners of multimodal transport transfer mechanisms, and, where appropriate, other relevant entities.

Projects targeted at end users	The rate of financing is set at 85% of eligible costs.

Effectiveness	Programme is primarily focused on updating railway and road networks. One of the programme indicators is a reduction in greenhouse gas emissions and an increasing carrying capacity. From this perspective, the measure can be regarded as effective.

Basis of calculation	Programme documents of the Operational Programme Transport, and annual reports.

Annual energy savings expected in 2016	The projected reduction in CO_2 emissions is calculated in a programme document of the Operational Programme Transport. The projected energy savings are calculated as follows: • Specific commissions were considered at a level of 749.38 t CO_2/GWh of electricity generated in the Czech Republic. • Based on an estimate, specific emissions of 17 022 t of CO_2 per year were set in priority axis 5 – Modernisation and development of the Prague Metro and systems for the management of road transport in Prague, resulting in a saving of approximately 82 PJ per year. • Emission savings for the programme as a whole are estimated at 48 380 t CO_2/year, equivalent to a saving of approximately 232 TJ per year. • An evaluation of the programme for the period from 2007 to 2013 will be conducted in 2015, and then the level of savings for the 2014–2020 period will be clarified. • We expect the projects, and hence savings, to come to an end in 2015 and 2020. The 2012 annual report only states that the savings of CO_2 emissions in 2007 were 2 133 t CO_2.

Approach to the calculation of savings for future years	This programme will be succeeded by the Operational Programme Transport 2014+, running at the Ministry of Transport without major derogations between 2014 and 2020. The absolute financial amount is not yet known. For 2016 and beyond, we anticipate the same annual savings as in the period between 2007 and 2016.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.696	0.696	0.696	0.928

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation				

process commenced				
New measures – implementation process not commenced				

Service life	This is a measure with a service life of 30 or more years.

Monitoring of the benefits of the measure	The benefits of the measure are published in the annual reports of the Operational Programme Transport.

Measure number	2.17

TITLE OF THE MEASURE	Benefits of implementing the recommendations of mandatory energy audits

Sector	cross-cutting measures

Brief summary	The obligation of energy auditing at selected entities with higher energy consumption, and the obligation for some of them (especially in the public sector) to implement the proposed measures.

Description of the measure	Compulsory energy auditing at entities exceeding set limits related to energy consumption and the surface area of buildings. The obligation to implement proposed measures applies to most entities in the public sector and entities who make use of subsidies for auditing.

Regional application	This measure can be implemented throughout the Czech Republic.

Target group	all sectors

Projects targeted at end users	The production of energy audits with measures recommended for energy savings. The obligation to implement measures at selected entities.

Effectiveness	The measure is effective because it makes certain entities implement the proposed savings, while giving other entities, at the very least, an overview of those energy-saving measures which could be effective for them.

Basis of calculation	The calculation is based on an expert estimate and empirical calculations carried out in certain studies (City of Prague Regional Energy Policy, Zlín Regional Energy Policy) as no statistics exist on the number of energy audits conducted. The evaluation of the National Programme in the years 2002 to 2005 was also used. The basis of the calculation was the consumption of energy and fuels in public sectors. Their share of consumption was determined based on Prague's energy balance, drawn up according to NACE. The public sector share is 35.2% of non-manufacturing consumption. In the case of the Czech Republic, if we keep to a similar share, public sector consumption is approximately 38 PJ. The majority of public sector bodies have a legal obligation to implement

	the recommendations of energy audits. Total savings recommended by energy audits offer saving potential in these sectors. Based on an analysis of energy audits in many cities and in Prague, the potential for energy savings in buildings used for education, health care, social care, etc., stood at around 30% in 2004. Measures recommended by energy audits have already been partially implemented (especially low- and medium-cost measures). Other measures, particularly in construction, are also gradually being implemented, depending on the conditions of buildings and the availability of funding. Nevertheless, we estimate the potential savings in the public sector to be about 25% of total consumption, i.e. just under 25% of 38 PJ, or about 9.5 PJ. We expect that these potential savings will also be made thanks to many other proposed and ongoing measures, and therefore the benefits of this measure are estimated at 50% of the total potential, at 4 500 TJ for the period as a whole.

Annual energy savings expected in 2016	The estimated savings of 4 500 TJ/year in 2016 are based on the consideration that most of the measures are construction measures with a life longer than the period of validity +NEEAP (i.e. longer than 9 years). In the first three years of the AP, we assume the realisation of 7.5% of the savings potential per year (i.e. not quite 700 TJ per year); in the second period, we anticipate 5% of the potential (approximately 475 TJ per year) and, in the third period, 3.5% of the savings potential (333 TJ per year). The expected emergence of energy savings is presented in the following table:

Year	Share of 9.5 PJ [%]	Savings [TJ]
2008	7.5%	713
2009	7.5%	713
2010	7.5%	713
2011	5.0%	475
2012	5.0%	475
2013	5.0%	475
2014	3.5%	333
2015	3.5%	333
2016	3.5%	333
2017	0.0%	0
2018	0.0%	0
2019	0.0%	0
2020	0.0%	0

Approach to the calculation of savings for future	In the period from 2017 to 2020, we did not expect further energy savings on the basis of previously conducted energy audits.

years	

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	2.138	1.425	0.998	

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	These are predominantly construction measures with a service life of 15 or more years.

Monitoring of the benefits of the measure	The benefits of the measure can only be monitored by referring to expert estimates.

Measure number	2.18

TITLE OF THE MEASURE	Obligation to produce energy performance certificates for buildings (building certification)

Sector	cross-cutting measures

Brief summary	The labelling of buildings to provide information on their energy performance in order to motivate improvements therein.

Description of the measure	Building energy performance certificates as a motivational and informative instrument, intended for greater information and awareness of energy consumption in a building, and the public display thereof as an incentive to improve.

Regional application	This measure can be implemented throughout the Czech Republic.

Target group	Public sector, services, households, housing cooperatives and associations of unit owners.

Projects targeted at end users	The obligation to draw up building energy performance certificates for buildings in the public sector and service. The obligation to draw up building energy performance certificates when renting and selling residential buildings and flats.

Effectiveness	This measure has, if anything, a token impact on energy consumption.

Basis of calculation	It is very difficult to prepare statistics which could form the basis for a qualified estimate of the benefits of introducing building energy certificates. We addressed only the benefits of certificates that will be produced in public sectors (based on Section 6a(6) of Act No 406/2006 on energy management). Other certificates are proof that construction requirements have been met and their benefits are already included in the other measures. We do not anticipate an obligation to implement the measures proposed on the basis of a certificate – we consider energy performance certificates for buildings to be motivational and informative, intended for greater awareness of energy consumption in a building, and regard public display of a certificate as an incentive to improve. Although the estimate was made only symbolically, we feel it necessary to include this measure in the NEEAP.

Annual energy	The symbolic contribution of the certification of public buildings is

savings expected in 2016	calculated as 0.001% of energy consumption in the tertiary sector. In 2008, the contribution remains at zero because the regulation does not enter into force until 1 January 2009. In 2011–2013, the contribution of the certification of public buildings is calculated as 0.001% of energy consumption in the tertiary sector. In 2014–2016, the contribution of certification is calculated as 0.0013% of the tertiary sector's consumption in 2006. The expected benefits of the measure are presented in the following table:

Year	Share from tertiary consumption 116 869 TJ [%]	Savings [TJ]
2008	0%	0
2009	0.0010%	1.17
2010	0.0010%	1.17
2011	0.0010%	1.17
2012	0.0010%	1.17
2013	0.0010%	1.17
2014	0.0013%	1.52
2015	0.0013%	1.52
2016	0.0013%	1.52
2017	0.0015%	1.75
2018	0.0015%	1.75
2019	0.0015%	1.75
2020	0.0015%	1.75

Approach to the calculation of savings for future years	In 2014–2016, the contribution of certification is calculated as 0.0015% of the tertiary sector's consumption in 2006.

Energy savings forecast [PJ]	2008-2010	2011-2013	2014-2016	2017-2020
	0.002	0.004	0.005	0.007

Status of implementation and precise time frame	2008-2010	2011-2013	2014-2016	2017-2020
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	If, as a result of the building energy performance certificates drawn up,

	certain measures are implemented, these will generally be measures related to the structural parts of buildings with a service life of 15 or more years.
Monitoring of the benefits of the measure	Energy savings achieved as a result of building energy performance certificates can be difficult to quantify, and, considering that the benefit of the measure is only symbolic, there is little point.

Measure number	2.19

TITLE OF THE MEASURE	Support for the dissemination of information and the promotion of energy savings by the state

Sector	cross-cutting measures

Brief summary	Support of information for professionals and the general public regarding the possibilities of energy savings.

Description of the measure	The aim of the measure is to increase energy savings by providing information to professionals and the general public in all sectors about the economic management of energy and possibilities for making energy savings.

Regional application	This measure can be implemented throughout the Czech Republic.

Target group	professionals and general public from all sectors

Projects targeted at end users	• the holding of information campaigns • industry publications • the organisation of information centres • the holding of expert seminars and conferences

Effectiveness	This measure is quite clearly effective because it helps to raise energy savings while reducing energy intensity, and relatively low costs are involved.

Basis of calculation	In the framework of the State Programme on the Promotion of Energy Savings and the Utilisation of Renewable Energy Sources for 2008 – Part A (EFEKT Programme), funds were regularly spent in the areas of intervention of energy consultancy and promotion of the economical use of energy to improve the environment. The Energy Consulting and Information Centre (EKIS) Network, training (seminars, conferences, etc.) and the production of educational materials to support consulting activities have been assisted. The calculation was based on data presented by the Czech Energy Agency and the State Environmental Fund in their annual reports for the periods from 2000 to 2005. These reports show that the annual benefit of both programmes in 2005 was defined by the evaluation report as 0.141 PJ/year (SP A) and 0.126 PJ/year (SP B). As is evident from the calculated benefits of the programmes, the benefit depends directly on the amount of funds allocated and therefore reports a downward trend in 2005. The

	benefits of the measure (Parts A and B) in 2008 were estimated to total 233 TJ/year. In 2008, almost CZK 39 million was spent under the EFEKT Programme on projects with direct energy savings. This amount resulted in a total annual saving of almost 95 TJ. Average specific subsidies per 1 GJ in savings were CZK 167. In 2011, CZK 8.4 million was spent under the EFEKT Programme on projects with direct energy savings. This amount resulted in a total saving of almost 7.5 TJ. Average investment costs per 1 GJ in savings were CZK 1 120. The calculations anticipate that the State Programme will continue to be regularly announced even after 2014 with the same allocation of CZK 30 million and the same distribution of support for direct projects and support for an increase in greater public awareness.

Annual energy savings expected in 2016	For projects with indirect energy savings – i.e. for the support of advice and promotion, the given resources will be used to address a larger number of energy consumers through the activities; on the other hand, the effect of information on specific entities will be lower than in the case of direct capital grants. Therefore, we assume that, on average, the ratio of funds expended to energy savings made will be similar. In this case, we calculate annual savings achieved in each year of the 2008–2010 period at approximately 11 TJ.

Approach to the calculation of savings for future years	Between 2013 and 2020, we estimate that there will be annual expenditure on information amount to approximately CZK 20 million, delivering efficiency of CZK 1 500 per GJ of savings, i.e. annual savings of about 30 TJ.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.033	0.039	0.039	0.052

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	The service life of information dissemination can be difficult to estimate – it encompasses events with a longer life, such as the purchasing of more efficient appliances and the implementation of certain physical measures,

	but also fleeting effects, such as a change in the behaviour of energy consumers.

Monitoring of the benefits of the measure	Benefits can be monitored indirectly based on the resources spent on disseminating information about the possibilities of energy savings within the EFEKT programme.

Measure number	2.20

TITLE OF THE MEASURE	Application of the Ecodesign Directive

Sector	cross-cutting measures

Brief summary	Eco-design is a method for the design and development of a product which, besides conventional properties such as functionality, economic viability, safety, ergonomics, technical feasibility, aesthetics, etc., also places a major emphasis on achieving a minimum negative impact by the product on the environment (including energy consumption from the perspective of the product's entire life cycle).

Description of the measure	The subject of this measure is a set of requirements imposed on products which must be met before the products can be marketed and which, among other things, ensures the energy efficiency of products during manufacture, use, and disposal after they have reached the end of their life.

Regional application	This measure can be implemented throughout the Czech Republic.

Target group	all manufacturers of equipment having an influence on energy consumption (whether during manufacture or use of the equipment)

Projects targeted at end users	The establishment of binding parameters which manufacturers of products falling within the scope of the Eco-design Directive must respect.

Effectiveness	This measure is effective because it can result in a situation where only products complying with the requirements of the Eco-design Directive are marketed.

Basis of calculation	Teams of experts, under the guidance of the Commission, have drawn up ecodesign requirements for selected types of energy-using products. The revised Ecodesign Directive (Directive 2009/125/EC), associated with electrical appliances, must also be taken into account. In the last few months of 2009, regulations concerning external power supplies, set-top boxes and fluorescent lamps or bulbs, for example, entered into effect. Measures enter into force 20 days after publication, but the obligation to comply with prescribed parameters does not arise until later, e.g. as of 1 July 2010 for fluorescent lamps and bulbs and devices maintaining appliances in standby mode (1 W consumption). Guidelines for the various types of products are supplemented on an ongoing basis.

Annual energy savings expected in 2016	In the underlying EU materials on the Energy Efficiency Action Plan, the benefits of ecodesign up to 2016 were determined at approximately 1% of the total programmed savings. Based on the assumption that this appraisal is also applicable to the Czech Republic, savings up to 2016 could be as much as 0.7 PJ. Of this, in the first two three-year periods, we expect only relatively low benefits during the start-up period.

Approach to the calculation of savings for future years	In the upcoming period we project an increase in savings at the same rate as in the 2014–2016 period.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
		0.300	0.400	0.530

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	Eco-design requirements generally concern electrical appliances with a shorter service life. However, the benefits of the measure do not cease when the products reach the end of their life because new appliances will also have to comply with these requirements.

Monitoring of the benefits of the measure	The benefits of the measure can only be monitored indirectly by referring to sales of products falling within the scope of the Directive.

Measure number	2.21

TITLE OF THE MEASURE	Effect of the introduction of environmental tax reform on energy savings

Sector	cross-cutting measures

Brief summary	The introduction of additional excise duty on selected energy-generating products for selected groups of energy users with a view to initiating the transition to environmentally friendlier energy-generating products and reducing energy consumption.

Description of the measure	The introduction of a minimum excise duty on energy in accordance with Directive (EC) No 2003/96/EC of 27 October 2003.

Regional application	This measure can be implemented throughout the Czech Republic.

Target group	energy consumers

Projects targeted at end users	Additional excise duty on selected energy-generating products for selected groups of energy users.

Effectiveness	Making energy more expensive will ultimately lead to a reduction in consumption.

Basis of calculation	Under Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity, the taxation of energy products was introduced in the Czech Republic at the beginning of 2008. The draft of the second stage of ecological tax reform is currently being prepared. To estimate the reduction in consumption, a study by Ščasný and Brůha (Ščasný, M., J. Brůha, Predikce sociálních a ekonomických dopadů návrhu první fáze ekologické daňové reformy České republiky, COŽP UK, April 2007) was used which models the expected effects of introducing the first stage of ecological tax reform with the above rates applicable until 2011, and the liberation of the use of natural gas for households. It resulted in the following expected changes in consumption: • a reduction in coal consumption by 1.1% • an increase in natural gas consumption by 0.1 % • a reduction in heat consumption by 2.7% • a reduction in electricity consumption by 1.2% Besides the above-mentioned low tax rates, the authors justify the relatively low impact of ETR by the removal of sectors with the largest consumption from the tax base. They argue that a significant portion of

	fossil fuels is consumed by sectors whose consumption will be overwhelmingly excluded from taxation (power generation, metallurgical processes) – these sectors consume almost 95% of all fossil fuels in the manufacturing sectors of the national economy. Similarly, more than 50% of natural gas is consumed in the sectors of chemistry, metallurgy and energy – sectors largely excluded from taxation.

Annual energy savings expected in 2016	The total average annual energy consumption for the 2002–2006 benchmark period in all sectors (except for companies involved in the emissions trading scheme and the armed forces) was approximately 530 TWh (excluding transport). In the calculation of annual savings, it was assumed that changes in consumer behaviour would be gradual, and the above percentage changes would not be achieved until 2010. After the application of the percentage changes to the benchmark consumption of 2002–2006 in the various categories of fuels, the calculation arrived at a rough estimate of consumption decline by 1.7 PJ in 2010.

Approach to the calculation of savings for future years	The task imposed on the Minister for Finance in cooperation with the Minister for Industry and Trade and the Minister for the Environment to increase the rates of relevant taxes by an emission component (Government Resolution No 702/2011 and 361/2012) was cancelled by Government Resolution No 221/2013. Therefore, further stages of ecological tax reform are not being considered.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	1.700	0	0	0

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	X
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	An increased tax on energy has a permanent effect, even if the effect of pushing up the prices of energy usually fades over time.

Monitoring of the benefits of the measure	The benefits of the measure can only be monitored indirectly by referring to macroeconomic modelling.

Measure number	2.22

TITLE OF THE MEASURE	Increase in the efficiency of heat supply systems

Sector	industry

Brief summary	Investment aid to increase the efficiency of heat supply systems

Description of the measure	The specific objective of increasing the efficiency of heat supply systems is part of priority axis 3, 'Efficient energy management, development of energy infrastructure and renewable sources of energy, support for the introduction of new technology in energy management and secondary raw materials', of Operational Programme Enterprise and Innovation for Competitiveness 2014–2020. The Czech Republic has extensive heat supply systems, but these days they frequently fall short of the required parameters. The Czech Republic also has untapped cogeneration potential. Many heat supply systems are fed by sources of heat mono-production, and heat from the production of electricity is not used. The objectives of the measure are: • To achieve primary energy savings by using low-potential heat from electricity production that would otherwise be discharged into the surrounding area, and to introduce cogeneration in heat supply systems where demand for heat was satisfied only by the mono-production of heat. • To upgrade heat supply systems, optimise their operation and reduce heat losses in distribution systems. In the reconstruction of heat networks, losses will be reduced due to better insulating parameters and a change in the temperature of the operating medium, and the system will be dimensioned to the current and future consumption of heat. In some cases, the controlled transition of certain large systems to a large number of smaller systems using smaller cogeneration units will be necessary.

Regional application	Support will be provided in all regions of the Czech Republic, except the

	City of Prague.

Target group	The main target group comprises large enterprises, but also medium-sized and, where appropriate, small enterprises that focus on the production and supply of heat from cogeneration to the heat supply system.

Projects targeted at end users	The activities supported include: • The installation of cogeneration units (with the exception of cogeneration units running on biomass and biogas) in heat supply systems where, so far, only heat has been produced, or where it is possible to increase the quantity of heat originating in high-efficiency cogeneration, including the development and interconnection of existing systems in order to increase the use of cogeneration so that primary energy savings are made. • The reconstruction of existing installations with cogeneration in order to achieve primary energy savings courtesy of improved technical parameters of such installations. • The building of new and the development of existing heat supplies systems, including transfer stations, with a view to the maximum exploitation of heat from high-efficiency cogeneration, including waste heat from industrial processes, and primary energy savings. • The reconstruction of existing heat networks, including transfer stations, with a view to reducing heat losses and making primary energy savings. A typical example of this is a change in the temperature of the heat-carrying medium from steam to hot water, as this makes it easier to regulate the supply of thermal energy to final customers and delivers significant reductions in heat loss in the distribution system. The extensive reconstruction of heat networks could also include the building of parts of new networks on new routes with a view to optimising the topology of the heat network and reducing heat losses.

Effectiveness	This measure is highly effective because investments are channelled into increasing energy efficiency.

Basis of calculation	The total allocation and benefits have been broken down into the years 2015–2023, where the target value of the indicator of primary energy savings should be 6900 TJ. Assuming savings start to emerge in 2015, the

	annual constant primary energy saving is calculated to be 767 TJ.

Annual primary energy savings expected in 2016	767 TJ

Approach to the calculation of savings for future years	For 2016 and beyond, we anticipate the same annual savings as in the period between 2015 and 2020.

Primary energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
			1.533	3.067

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations				
New measures – implementation process commenced				
New measures – implementation process not commenced			X	X

Service life	This is a measure with a service life of 10 or more years.

Monitoring, verification, methodology for establishing energy	The Operational Programme Enterprise and Innovation for Competitiveness will follow up on the Operational Programme Enterprise and Innovation 2007–2013. At present, individual support schemes have yet to be produced and approved. However, in the implementation of

savings and additionality	calls for investment subsidies, we will methodologically follow up on the previous programme (see measure 1.13). The programme also anticipates the introduction of financial engineering instruments. Monitoring within the scope of these instruments will be both ex-ante and ex-post.

Measure number	2.23

TITLE OF THE MEASURE	Targeted greening of pollution sources

Sector	cross-cutting measures

Brief summary	An increase in the efficiency of heat production by means of gasification.

Description of the measure	Support for the blanket gasification of municipalities in order to reduce the emission load and increase the efficiency of heat production.

Regional application	This measure can be applied throughout the Czech Republic.

Target group	municipalities

Projects targeted at end users	subsidy-based support for the blanket gasification of municipalities

Effectiveness	As the efficiency of gas boilers is much higher than that of solid-fuel boilers, the measure is effective.

Basis of calculation	The basis was an evaluation of the benefits of across-the-board gasification by the State Environmental Fund, and the statistical yearbook on developments in solid fuel consumption in each year by source category. (SEF and CHMI articles – Contribution of the gas industry to reduced emissions of pollutants in the Czech Republic in the 1990s.) The replacement of solid fuels and the expansion of gasification in the years 1995–2004 delivered a difference of approximately eight million tonnes of coal (lignite) between lignite consumption and natural gas consumption, especially in REZZO 2 sources. The annual savings made by the replacement of fuels and increased efficiency were manifested as a result of SEF resources in 2004, according to our calculations, based on the difference in combustion efficiency savings of approximately 1 662.5 TJ/year. This represents savings due to improved efficiency of approximately 170 TJ/year. This effect will not be repeated in the 2008–2016 period. Nevertheless, annual savings over the duration of the Action Plan are expected at approximately 1/5 to 1/10 of this level, i.e. 32 to 16 TJ/year – due to the ongoing greening and gasification of sources, in particular with regard to air quality. In addition, this measure makes a decreasing contribution to savings of fuel and energy – the number of new measures as at 2016 decreases.

Annual energy savings expected in 2016	Benefits will arise from the ongoing replacement of solid fuels with gas (drawing on knowledge of statistics on fuel and energy consumption and an analysis of boiler management, there is still considerable room here for continued gasification). Annual benefits in the years 2011 to 1013 are expected to stand at 27 TJ/year, and at a level of 1/10 of the benefits of 1995-2004 in 2014–2016, i.e. 16 TJ/year.

Approach to the calculation of savings for future years	The benefits of the measure after 2016 will be negligible.

Energy savings forecast [PJ]	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
	0.096	0.096	0.096	0

Status of implementation and precise time frame	**2008-2010**	**2011-2013**	**2014-2016**	**2017-2020**
Measures implemented before 2009 and still active in 2010 (or 2016) without major adaptations	X	X	X	
New measures – implementation process commenced				
New measures – implementation process not commenced				

Service life	The service life of the measure is 17 years.

Monitoring of the benefits of the measure	The benefits of the measure can be monitored by referring to information from the State Environmental Funds on blanket gasification.

ANNEX 5

SECOND REPORT ON PROGRESS ACHIEVED TOWARDS NATIONAL ENERGY EFFICIENCY TARGETS IN THE CZECH REPUBLIC

(pursuant to Article 24(1) of Directive 2012/27/EU on energy efficiency)

Introduction

Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC ('the Directive') establishes a common framework of measures for the promotion of energy efficiency within the Union in order to ensure achievement of the Union's 20 % headline target for energy efficiency by 2020 and to pave the way for further energy efficiency improvements beyond that date. It lays down rules designed to remove barriers in the energy market and overcome market failures that impede efficiency in the supply and use of energy, and provides for the establishment of indicative national energy efficiency targets for 2020.

Most of the detailed information is presented in the National Energy Efficiency Action Plan itself.

Transposition of the Energy Efficiency Directive

After the Directive was adopted, the Czech Republic began the process of transposing it into Czech legislation, which it is required to do by 5 June 2014.

The scope of the Directive is very wide-ranging, and its transposition into Czech law therefore involves the amendment of three acts, namely Act No 458/2000 on business conditions and the performance of state administration in the energy sectors and amending certain acts, Act No 406/2000 on energy management, and Act No 165/2012 on subsidised energy sources. They will be submitted to the government for approval by the end of June 2014. Their progress will then depend on the speed of the legislative process. However, the date of entry into force proposed for all three acts is 1 January 2015. In addition to these three acts, transposition affects a number of implementing provisions, for which the date of entry into force is the same.

The specific distribution of the provisions of the Directive amongst the acts is explained in the various chapters of the National Energy Efficiency Action Plan.

Many of the Directive's provisions are of a non-legislative nature and will therefore be implemented by non-legislative means. These are:

Article 4

The long-term building renovation strategy is part of this National Act Plan. The strategy analyses the potential for savings in Czech buildings and focuses on normally inhabited single-family, multi-family and other buildings. Given the varied properties of buildings across the housing stock, stochastic modelling of buildings was used to calculate possible savings; this made possible mass simulation of energy performance for the entire set of buildings. For the purposes of assessment, buildings are

classified according to type, age and size on the basis of the statistical data provided by the Czech Statistical Office (2011 Population and Housing Census). The calculation model evaluates for each category selected 1000 different buildings on the basis of the variable parameters set. The required input geometric parameters of the model and their limits are set so that the resulting calculated values correspond to the statistical data provided (dimensional characteristics of the housing stock). The results are therefore expected to exhibit a lower error rate than would be the case if the calculation were based on just one representative building from each category. Based on available information on final energy consumption, the model's other input parameters are then adjusted so that consumption as calculated for the entire housing stock in its current state corresponds overall to the actual situation (the available statistics); the model is therefore calibrated.

The purpose of the strategy is to determine possible final energy consumption savings for the Czech housing stock and the investment required to achieve those savings. The model for buildings in their current state is therefore then used to test savings measures in the form of the total renovation of a building to different energy standards.

Consequently, the strategy describes 4 possible scenarios, highlighting the one which fits in best with achievement of the target set under Article 7.

Article 5

As it informed the Commission in December 2015, the Czech Republic opted for an alternative approach to Article 5. Following discussions, the central government authorities were identified for the purposes of the Directive in line with the Commission's recommended approach, using Annex IV to the Public Procurement Directive (2004/18/EC), which includes a list of central government authorities in the Czech Republic. These are:

Ministry of Transport
Ministry of Finance
Ministry of Culture
Ministry of Defence
Ministry of Regional Development
Ministry of Labour and Social Affairs
Ministry of Industry and Trade
Ministry of Justice
Ministry of Education, Youth and Sport
Ministry of the Interior
Ministry of Foreign Affairs
Ministry of Health
Ministry of Agriculture
Ministry of the Environment
Chamber of Deputies of the Parliament of the Czech Republic
Senate of the Parliament of the Czech Republic

Office of the President
Czech Statistical Office
Czech Land Survey, Mapping and Cadastral Office (ČÚZK)
Industrial Property Office
Personal Data Protection Office
Security Information Service (BIS)
National Security Authority (NBÚ)
Czech Academy of Sciences
Prison Service
Czech Mining Authority
Office for the Protection of Competition
State Material Reserves Administration (SSHR)
State Office for Nuclear Safety (SÚJB)
Czech National Bank
Energy Regulatory Office
Office of the Government of the Czech Republic
Constitutional Court
Supreme Court
Supreme Administrative Court
Supreme Public Prosecutor's Office
Supreme Audit Office
Ombudsman's Office
Czech Science Foundation (GAČR)
State Labour Inspectorate
Czech Telecommunications Office

The central government authorities subsequently drew up a list of buildings (even though this is not required where alternative means of complying with the article are used) which will be the subject of compliance with the article. This list has been published on the website of the Ministry of Industry and Trade (www.mpo.cz) and will also be communicated to the government in the near future.

The total floor area of all heated and/or cooled buildings owned and used by central government authorities with a useful floor area over 500 m^2 that did not meet the minimum national energy performance requirements on 1 January 2014 is provisionally estimated at 983 482 m^2.

The Czech Republic is currently analysing this figure in greater depth and is preparing material which describes in detail the various measures that the central government authorities will implement in order to make energy savings. This material should be approved by the government by 30 June 2014. It will also include a more accurate calculation for 2014.

It is also proposed that there be a statutory requirement to forward the required energy consumption data for the buildings included on the list each year to a monitoring system so that the Czech Republic can monitor developments and, on the basis of such monitoring, can determine what action to take next.

Article 7 (Article 3)

The Czech Republic also opted to use an alternative approach for Article 7, and this is described in the document entitled *'Politická opatření zaváděná za účelem dosažení úspor energie u konečných zákazníků v ČR*' [Policy measures introduced in order to achieve energy savings in the case of final customers], which was forwarded to the Commission in December 2013.

In that document, it is explained that the Czech Republic will use subsidies and financial engineering instruments to meet the target set under Article 7. The funding will come mainly from specific operational programmes and state programmes, including a programme using proceeds from emissions permit trading. As many of those programmes are geared towards energy saving measures in the buildings sector, savings in buildings will account for a significant proportion of compliance with Article 7. This is therefore also in line with a long-term building renovation strategy, and its implementation essentially corresponds to compliance with Article 7, including the provision of the necessary funding.

The individual measures used, and their expected contributions, are described in detail in the National Energy Efficiency Plan.

Work on meeting the target started on 1 January 2014, so the Czech Republic cannot yet provide any figures to show concrete progress, and the evaluation for 2014 will be included in the next progress report. The basis for meeting the target in the 2014-2016 period can be seen in the table below.

Measure	2014-2016
	TJ
Regeneration of high-rise pre-fabricated buildings – PANEL/NEW PANEL	486
Green Savings (*Zelená úsporám*)	0
New Green Savings (*Nová Zelená úsporám*) 2013	332
New Green Savings (*Nová Zelená úsporám*) 2014-2020	2 298
JESSICA programme	92
Integrated Regional Operational Programme	1 796
Joint Boiler Replacement Scheme (*Společný program pro výměnu kotlů*)	
OP Environment 2007-2013	1 385
OP Environment 2014-2020	1 161
State programmes for the promotion of energy savings and the use of RES – investment subsidies	20
OP Prague – Growth Pole (construction)	18
OP Enterprise and Innovation	3 600
OP Enterprise and Innovation for Competitiveness	8 571
Total	19 761

Statistical data required for 2012 and corrected data for 2011:

		2011	2012
Consumption of primary energy sources	TJ	1 805 543	1 776 255
Total final energy consumption	TJ	1 087 239	1 074 264
Final energy consumption by sector:			
industry	TJ	325 149	306 930
transport	TJ	248 969	239 614
homes	TJ	246 440	250 582
services	TJ	126 520	126 886
		MPO, ČSÚ, MD	
Gross value added by sector:			
Industry	CZK million	1 048 273	1 069 954
Services	CZK million	2 079 951	2 083 850
Household disposable income	CZK million	2 075	2 026
Gross domestic product (GDP)	CZK million	3 820 710	3 846 363
Electricity generation from thermal power plants	GWh	53 928	51 824
Electricity generation from combined heat and power	GWh	10 819	11 258
Heat generation from thermal power stations	TJ	97 780	98 668
Heat generation from combined heat and power plants, including industrial waste heat	TJ	118 590	118 484
Fuel input for thermal power generation	TJ	480 873	458 544
Number of passenger kilometres (pkm)	pkm millions	108 353	106 983
Number of tonne kilometres (tkm)	tkm millions	71 817	68 087

Number of inhabitants	person	10 496 672	10 516 125

Historically, the Czech Republic has compiled its energy balance using the International Energy Agency (IEA) methodology and this was also the basis for the Updated State Energy Concept; the above data are therefore also based on the IAE methodology. Methodological differences exist between the energy consumption data compiled using the IEA method and the data compiled using the Eurostat method.

Annex 6

BUILDING RENOVATION STRATEGY

under Article 4 of the Energy Efficiency Directive

Introduction

Energy-saving building renovation is an opportunity for the Czech construction industry and energy sector. The implementation of the strategy will generate new jobs, especially among small and medium-sized enterprises, across the country. It can also enhance the comfort of housing and use of buildings. Households, institutions and undertakings will have higher disposable resources to purchase non-energy services and goods. Energy-saving construction has a high multiplier effect on the Czech economy and, in this respect, makes a sizeable contribution to economic growth. It also makes energy savings and reduces the need for fossil fuels, thus cutting down on local pollution, reducing greenhouse gas emissions and increasing energy security.

This strategy seeks out opportunities for a cost-effective approach to building renovation. Typically, it encompasses economically advantageous measures that also deliver long-term returns. A balance needs to be found between necessary initial investment costs and the benefits obtained, both on a microeconomic level (the building owner) and on a macroeconomic level (the state).

The document examines the building stock and opportunities for energy savings therein. It studies various scenarios for the renovation of the building stock, the costs and benefits thereof, and proposes policy, legislative and economic instruments to implement them. It focuses in detail on residential buildings. It has been possible to obtain high-quality statistics on this building stock and to classify measures leading to energy savings by type. It also supplements estimates for non-residential buildings; these need further clarification.

Economic context

Promoting energy savings in buildings can have significant positive effects on the economy. A central government investment of CZK 1 billion in support programmes can generate between CZK 0.97 and 1.21 billion for public budgets in tax from the income of companies, their employees, social and health insurance, and social benefits that would otherwise be paid to unemployed persons. It can also engender GDP growth of between CZK 2.13 and 3.59 billion.

There are two main reasons for these benefits: a) the multiplier effect of building renovation (building construction) on the Czech economy thanks to the high

percentage of domestic work and goods; and b) the leverage that a central government investment has on private investments, as the degree of incentive that this support gives to private entities can be quantified at 25% of investment costs, or 50% for public entities. The aid intensity will depend on the financial instrument used.

Where the overall investment in building renovation is CZK 35 to 40 billion per year, such being the estimated absorption capacity of the construction industry for this type of activity, the contribution to GDP would be +1% and approximately 35 000 jobs would be created.

Background research for studies into the potential energy savings in buildings

Czech, European and global studies are carried out to determine potential energy savings. Each study presents several various scenarios of future consumption, each with a prediction for different years.

List of available studies:

– World Energy Outlook 2012, IEA

– EU energy trends to 2030, update 2007, DG Energy

– EU energy trends to 2030, update 2009, DG Energy

– Outline of scenarios for the development of the Czech economy's energy demands, SEVEn – for the Independent Energy Commission, 2008

– Potential energy savings in buildings in the Czech Republic, Porsenna, 2013

– Study of potential energy savings in habitable buildings up to 2050, Porsenna, 2007

– Study of potential energy savings in the tertiary sector up to 2050, Porsenna, 2007

A background study (Opportunity for Buildings) defines potential energy savings for several selected scenarios relative to a baseline (benchmark) scenario. For example, the Efficient World scenario (WEO study, 2012) reports potential savings for the Czech Republic of 53 PJ in 2020 compared to the Current Policies scenario. Likewise, the Efficient World scenario reports potential of 87 PJ compared to the Baseline scenario (Energy trends to 2030, 2007). The low scenario E (NEK study, 2008) reports potential of 52 PJ. The EKO scenario (Porsenna 2013) reports potential of 48 PJ and the TECH scenario (Porsenna 2013) reports potential of 74 PJ.

Therefore, we can conclude that it will be possible to save more than 50 PJ in final consumption in buildings in the residential and tertiary sector by 2020. However, it should also be noted that all these studies anticipated that energy-saving measures would be implemented before 2014.

Overview of building stock

This text reflects the requirement of the Energy Efficiency Directive under Article 4(a).

The basic source of building stock statistics is the Czech Statistical Office. In particular, information obtained from the 2011 Population and Housing Census has been used.

Single-family buildings

The following tables present the numbers of buildings, flats and floor area of inhabited single-family buildings in the Czech Republic.

Table 1: *Total number of single-family buildings in each category*

Number of building floors	Number of buildings total	single-family buildings detached	single-family buildings semi-detached	single-family buildings terraced
	[-]	[-]	[-]	[-]
Total	**1 554 794**	1 163 655	133 877	257 262
	100.0%	74.8%	8.6%	16.5%
1	**584 075**	456 426	38 885	88 764
2	**861 774**	630 737	86 757	144 280
3	**45 995**	24 753	4 783	16 459
not determined	**62 950**	51 739	3 452	7 759

Table 2: *Total number of dwellings in single-family buildings in each category*

Number of building floors	Total number of dwellings	single-family buildings detached	single-family buildings semi-detached	single-family buildings terraced
	[-]	[-]	[-]	[-]
Total	**1 896 931**	1 417 272	170 847	308 812
	100.0%	74.7%	9.0%	16.3%
1	**638 573**	496 998	45 605	95 970
2	**1 115 606**	823 789	113 086	178 731
3	**72 404**	39 216	7 918	25 270
not determined	**70 348**	57 269	4 238	8 841

Table 3: *Total interior floor area of single-family buildings in each category*

Number of building floors	Total internal area of single-family building	single-family buildings detached	single-family buildings semi-detached	single-family buildings terraced
	[m^2]	[m^2]	[m^2]	[m^2]
Total	**194 957 505**	146 673 210	16 405 534	31 878 760
	100.0%	75.2%	8.4%	16.4%
1	**59 426 442**	46 791 207	3 843 967	8 791 268
2	**122 834 323**	91 633 017	11 428 145	19 773 160
3	**7 941 825**	4 398 222	831 822	2 711 781
not determined	**4 754 915**	3 850 763	301 600	602 551

The method used to present the total internal floor area should be noted. The Czech Statistical Office's terminology distinguishes between 'total area of dwellings' and

'habitable area'. The habitable area is the sum of areas of in habitable rooms, while the total area is the sum of areas of all rooms in the dwelling. Therefore, in relation to the total internal floor area used as a matter of standard in calculations of the energy performance of buildings, the total area indicated in the statistics on the Czech Republic's housing stock is always smaller. In single-family buildings, the difference is the floor area taken up by partitions or shafts, and in multi-family buildings this difference also includes communal areas (corridors and staircases). The total internal floor area indicated in the tables is obtained for single-family buildings by adding 10% to the total area of inhabited dwellings (an estimate based on a survey carried out by the author of the background study). The energy evaluation pursuant to Implementing Decree No 78/2013 also includes the energy reference area. This area has not been taken into account in this strategy.

Multi-family buildings

The following tables present the numbers of buildings, flats and floor area of inhabited multi-family buildings in the Czech Republic.

Table 4: *Total number of multi-family buildings in each category*

NUMBER OF BUILDINGS [-]	construction period							
number of floors	total	1919 or earlier	1920-1945	1946-1960	1961-1980	1981-2000	2001-2011	not determined
	211 252	**26 077**	**27 775**	**30 573**	**71 429**	**38 042**	**12 674**	**4 682**
one floor	**3 910**	1 199	612	473	556	526	488	56
two floors	**37 708**	7 939	5 700	6 867	9 734	4 892	2 350	226
three floors	**49 888**	7 714	8 909	11 226	12 154	6 209	3 420	256
four floors	**48 000**	4 777	5 360	7 313	19 079	8 154	3 084	233
five floors	**23 354**	3 175	3 905	2 916	8 573	3 203	1 452	130
six floors	**10 192**	598	1 351	827	4 100	2 570	712	34
seven floors	**5 716**	138	838	272	2 780	1 337	330	21
eight floors	**15 259**	32	160	81	7 394	7 163	390	39
nine floors	**3 216**	0	16	12	1 852	1 226	101	9
10 floors	**700**	0	1	8	504	155	32	0
11 or more floors	**3 660**	0	15	21	2 397	1 134	88	5
not determined	**9 649**	505	908	557	2 306	1 473	227	3 673

Table 5: *Total number of dwellings in multi-family buildings in each category*

NUMBER OF DWELLINGS [-]	construction period							
number of floors	total	2019 or earlier	1920-1945	1946-1960	1961-1980	1981-2000	2001-2011	not determined
	2 416 033	**166 271**	**230 420**	**250 141**	**989 462**	**569 804**	**153 527**	**56 408**
one floor	**18 466**	4 887	2 570	1 937	3 165	2 820	2 788	299

two floors	**174 915**	34 391	25 014	31 127	45 086	24 281	13 697	1 319
three floors	**324 604**	41 925	50 146	75 511	85 448	40 571	29 445	1 558
four floors	**489 745**	37 579	46 586	70 586	204 713	89 104	39 189	1 988
five floors	**310 593**	32 943	50 087	40 176	116 594	44 050	24 975	1 768
six floors	**174 383**	7 365	22 427	14 894	69 256	44 733	15 209	499
seven floors	**115 119**	1 847	16 118	5 441	55 718	27 738	7 833	424
eight floors	**358 531**	468	3 279	1 671	174 960	167 842	9 475	836
nine floors	**81 354**	0	252	268	46 468	31 505	2 649	212
10 floors	**23 602**	0	8	276	16 536	5 570	1 212	0
11 or more floors	**183 950**	0	311	1 035	120 563	57 790	4 129	122
not determined	**160 771**	4 866	13 622	7 219	50 955	33 800	2 926	47 383

Table 6: *Total interior floor area of multi-family buildings in each category*

FLOOR AREA [m^2 thousands]	construction period							
number of floors	total	2019 or earlier	1920-1945	1946-1960	1961-1980	1981-2000	2001-2011	not determined
	156 226	**10 161**	**14 202**	**15 657**	**64 518**	**38 943**	**9 435**	**3 310**
one floor	**869**	227	112	90	159	132	138	11
two floors	**10 516**	1 904	1 388	1 899	3 009	1 510	759	49
three floors	**20 365**	2 495	3 080	4 636	5 723	2 639	1 716	76
four floors	**31 535**	2 356	2 838	4 391	13 393	6 004	2 442	112
five floors	**20 276**	2 191	3 146	2 649	7 627	2 961	1 613	90
six floors	**11 691**	521	1 471	977	4 589	3 117	983	33
seven floors	**7 682**	136	1 121	362	3 587	1 940	508	28
eight floors	**24 517**	29	225	114	11 590	11 881	623	56
nine floors	**5 494**	0	17	18	3 046	2 238	161	13
10 floors	**1 534**	0	0	20	1 069	364	81	0
11 or more floors	**11 698**	0	20	62	7 492	3 877	240	8
not determined	**10 051**	303	783	441	3 236	2 282	172	2 834

The total internal floor area for multi-family buildings is determined by adding 15% to the total area of inhabited dwellings in multi-family buildings.

Other buildings

The Czech Statistical Office keeps records of buildings in the service sector, in industry and in agriculture only if they have been assigned a building number. The numbers of such buildings are presented in the following table. The percentage of buildings in each category which are heated is also estimated. Based on the average floor area of buildings, where this is known, the total floor area of all buildings and of heated

buildings is estimated. This information shows a much higher derogation than the information for the residential sector.

Table 7: *Method of use of other buildings, estimated number of heated buildings and floor area*

building utilisation	number of buildings	estimate of percentage of heated buildings	average floor area of buildings, where known	estimated area of all buildings	estimated area of heated buildings
all categories	**600 567**	-	**1 257**	**263 311 949**	**130 771 743**
Industrial production and warehouse management structure	6 760	25%	3 462	23 402 067	5 850 517
Agricultural holding	18 138	25%	310	5 620 131	1 405 033
Residential building	8 355	90%	368	3 076 154	2 768 539
Forestry structure	1 433	50%	298	427 213	213 607
Public administration and management facility, educational facility, cultural facility, sports facility, healthcare facility, social facility, retail facility	43 727	90%	919	40 168 000	36 151 200
Structure used for housing in which the housing function is predominant	359	90%	1 195	428 830	385 947
Structure used for housing which, in its structural layout, is consistent with requirements for family housing	5 162	90%	239	1 234 787	1 111 309
Structure intended for family recreation	278 472	0%	74	20 726 768	0
Structure with at least one room intended for the assembly of at least 200 persons	222	90%	1 548	343 698	309 328
Structure with shops and other commercial premises, wholesalers, shopping centres, department stores	6 479	90%	2 462	15 949 844	14 354 859
Structure or part thereof where the public is provided with temporary accommodation and related services	3 540	90%	1 056	3 737 809	3 364 029
Structure intended for industrial, craft or other production, and for the storage of products, substances and materials	11 160	25%	2 441	27 241 734	6 810 434
Structure for keeping livestock, cultivating plants	10 138	25%	324	3 280 569	820 142
Structure for the administrative and management units of undertakings and organisations, multipurpose structure for administrative purposes, building of a body of state administration or local government	7 462	90%	2 918	21 775 795	19 598 215
Structure for services, physical exercise and recreation, culture, health and social care, preschool	167 34 621	90%	1 146	39 666 035	35 699 431

facility, educational facility and vocational training facility, including boarding facilities, science and research					
Structure which is part of a network of technical equipment, i.e. an energy, water, sewage, telecommunication network	6 390	0%	502	3 207 731	0
Structure for the provision of transport services	3 165	25%	392	1 240 747	310 187
Structure or premises intended for the parking of road vehicles	90 770	0%	101	9 139 630	0
Structure intended for a method of use not specified above	51 927	0%	720	37 365 023	0
Structure intended for multiple purposes (e.g. commercial, administrative, housing, recreation)	1 203	90%	1 495	1 798 854	1 618 968
Glasshouse constituting a building	11	0%	2 750	30 254	0
Not determined	45	0%	3 900	175 500	0
No value given	11 028	0%	297	3 274 777	0

Opportunities for energy savings in the building stock

This text reflects the requirement of the Energy Efficiency Directive under Article 4(b).

Calculation methodology

A detailed description of the procedure is provided in the background study. The following steps have been taken:

a) For a matrix of 72 categories of buildings by age and size, the thermal insulation properties of the building envelope were estimated (the thermal transmittance coefficient for the main structures). The baseline document was the Tabula[1] project study, and the values were verified and clarified by reference to information from experts and companies based on experience. The percentage-based distribution of individual structures on the building envelope was estimated based on the author's survey of approximately 50 in habitable buildings. The efficiency of heat sources, by fuel, was also considered to a certain degree in the calculations, again on the basis of expert estimates.

b) The proportion of buildings already renovated was also estimated. For single-family buildings, this is 25%; for multi-family buildings it is 40% (55% of prefabricated multi-family buildings have been reconstructed). This was based on the author's own survey, estimates by consulting companies, the statistics of support programmes, the quantity of ETICS (contact insulation system) sold, and, for multi-family buildings, the

[1] Guide to the typology of habitable buildings, Tabula project output, STÚ-K, 2011

PanelScan study.[2] Most of the renovated buildings have been considered in relation to the required values of thermal transmittance coefficients; for a smaller part, the recommended values under ČSN 730540 (2011) were considered.

c) The next step was to make use of the study author's own unique model[3] based on the stochastic principle. For each of the 72 categories, he creates 1 000 hypothetical buildings differing, within a set range, in their geometry, orientation, size and the thermal insulation properties of the building envelope. This method of modelling reduces the degree of derogation in the result compared to a procedure where there would only be one representative building for each category.

The model was calibrated for the calculation so that the resultant values of final consumption (or the energy supplied at building level) were consistent with the actual statistics kept by the Ministry of Industry and Trade.

d) Two standards were defined as cost-effective standards for the renovation of buildings. The first is based on the recommended values of the thermal transmittance coefficient for structures under ČSN 730540 (2011) and the slightly improved efficiency of sources. Put simply, this entails a medium energy-saving renovation to a standard approaching the low-energy standard.[4]

The second is based on the lower threshold of the range of passive values of the thermal transmittance coefficient according to the same standard; it achieves peak efficiency of heat sources and uses mechanical ventilation with waste heat recuperation. Put simply, this entails the thorough general renovation of a building to a standard approaching the passive standard.[5]

For reference purposes, a shallow standard of renovation was also taken into consideration, for required thermal transmittance coefficient values with no improvement in the efficiency of sources.[6]

e) For the calculation of opportunities to save energy on space heating, the above-mentioned model was applied. For calculations of opportunities to save energy on the production of hot water and on lighting, simpler methods of calculation were applied, based on an investigation into opportunities throughout the building stock at the same time (i.e. not stochastically for all building categories).

[2] Study into the condition of the prefabricated housing stock in the Czech Republic, CERPAD for the Ministry of Regional Development, 2009

[3] http://optimalizacebudovy.fsv.cvut.cz

[4] In the documents of the Buildings Performance Institute Europe (BPIE), the corresponding term is 'moderate renovation'.

[5] 'Deep renovation'.

[6] 'Shallow renovation'.

Outputs of modelling for space heating

The resultant energy consumption and potential savings compared to the current consumption of the residential building stock can be found in the following tables.

Table 8: *Model condition of building stock (current and after renovation), heat consumed on space heating*

State of buildings	Indoor temperature considered	Single-family building	Multi-family building	Total
	[°C]	[GWh]	[GWh]	[GWh]
original state of buildings – model	temperature estimate*	38 492	20 023	**58 516**
consumption on space heating – statistics from the Ministry of Industry and Trade	n/a			**47 798**
new state/standard of renovation considered:				
shallow renovation, required values considered	18	30 836	13 666	**44 503**
moderate renovation, recommended values considered	19	18 334	8 168	**26 502**
deep renovation, passive values considered	20	6 083	2 812	**8 895**

* For buildings in their original state, a lower average indoor temperature at the time of space heating is taken into account compared to the 20 °C considered as standard. The indoor design temperature is considered differently for each age category and increases as the insulation standard rises. For buildings in the 'required values' standard, a temperature of 18 °C is taken into consideration, for buildings in the 'recommended values' standard, the temperature is 19 °C, and in the 'passive standard', the temperature is 20 °C. Therefore, if anything, the estimates of opportunities to make energy savings are approached conservatively.

Table 9: *Model condition of building stock (current and after renovation), heat consumed on space heating, saving*

		Data of the Ministry of Industry and Trade, 2011	Renovation to recommended values	Renovation to passive values
Heat required for space heating	[GWh]	38 189	23 852	8 450
Total efficiency (production, distribution, sharing)		80%	90%	95%
Heat consumed on space heating	[GWh]	47 798	26 502	8 895
	[PJ]	172.1	95.4	32.0
Saving in the heat consumed on space heating	[GWh]		**21 296**	**38 903**
	[PJ]		**76.7**	**140.1**
Saving on actual consumption – percentage	[%]		**45%**	**81%**

Therefore, the potential space heating energy savings for residential buildings are 77 PJ for moderate energy-saving renovation (45% of the original consumption) and 140 PJ for the deep renovation of the entire building stock to a passive standard (81% of the original consumption). This is the technical energy-saving potential. The relevant part of this technical potential that can be implemented on buildings that have not yet undergone energy-saving renovation is the economic potential. However, the full

harnessing of this potential is hampered by numerous factors (the initial high investment costs, lack of information about suitable measures for the different types of buildings, etc.). In other words, it is not the market potential. The degree to which energy savings are implemented is discussed below together with the various building renovations scenarios.

Savings of energy on the production of hot water and on lighting

Much less information about the current situation is available for systems designed for the production of hot water and artificial lighting in residential buildings. However, as consumption here is lower in absolute terms than consumption on space heating, we can work with a lower level of accuracy.

Further to expert estimates based on the procedure set out in the background study, the following summary can be put forward:

The estimated potential savings in energy on the production of hot water are 12 PJ, i.e. approximately 30% of current consumption. Nevertheless, we can assume that less of this potential will be exploited if reconstruction is carried out to a poorer quality. In contrast, this potential may actually be exceeded following deep energy-saving renovation. It is then included in the calculation of investment costs together with the cost of replacing the source of heat used for space heating.

The estimated potential savings in energy on artificial lighting are 3.4 PJ, i.e. approximately 60% of current consumption. The whole of this potential is related to electricity consumption. The replacement of lighting is not included in the calculation of investment costs because this is treated as routine maintenance of dwellings and, furthermore, the price of the most efficient lighting is rapidly falling.

Consumption and total potential energy savings in the residential sector

For 2011, final consumption in households (the residential sector) was between 246 and 252 PJ (depending on the methodology), and approximately 40 PJ of that was energy consumed on domestic appliances.

The total potential energy saving in residential buildings is 92 PJ for moderate energy-saving renovation of the housing stock, and 155 PJ for deep building renovation. This estimate draws on the type of energy consumption included in the calculation of the energy performance of buildings in accordance with the Energy Management Act (Act No 406/2000) and the Implementing Decree on the energy performance of buildings (Implementing Decree No 78/2013). Therefore, this does not include energy consumed on domestic appliances.

It should be noted, again, that this is the economic rather than the market potential and as such it is only the hypothetically achievable potential of energy savings. Requirements to achieve a certain level of such potential and the scenario for the start-up of the implementation thereof are discussed in the text below.

Energy savings in other buildings

For 2011, final consumption was roughly 126 PJ in the service sector and 23 PJ in agriculture. Based on an analysis of consumption statistics, consumption outside buildings (e.g. the internal consumption requirement of heating plants and incinerators, as well as agricultural machinery) was deducted from these values, as were types of consumption not specified in the evaluation of the energy performance of buildings pursuant to the Energy Management Act (e.g. data centres and servers or the technological equipment of shops). The final consumption on the operation of buildings in both of these sectors is estimated at 124 PJ.

Based on the author's survey of a sample of 85 buildings in the service sector, the share of each type of energy consumption in service-sector buildings was established. This is presented below:

- Space heating 84.5%
- Cooling 1.1%
- Ventilation 1.2%
- Hot water 6.1%
- Lighting 7.1%

It can be inferred from this that 105 PJ is used on the space heating of buildings in both of the sectors considered here, while 19 PJ can be attributed to other types of consumption.

The opportunity for energy savings will differ considerably for each building category and for each individual building. Experience of conducting energy audits suggests that potential savings in energy on space heating can be expected at 50%, with savings in energy on other types of consumption at between 10% and 15%. The potential overall savings in the operation of buildings in the service sector and in agriculture are quantified at 55 PJ. However, it should be pointed out that this figure is highly imprecise.

As it is impossible to determine with any reliability the share of energy in industry which is consumed on building operation, that sector is not considered at all in this document. Nevertheless, we can say, based on the experience of support programmes (e.g. the Eco-energy scheme under the Operational Programme Enterprise and Innovation), that there is significant energy-saving potential here too.

Investment costs required for renovation

Investment in the renovation of the building envelopes of residential stock

The estimate of investment costs of renovating buildings to the various standards is based on the total cost per unit area of structure (perimeter walls, flat/sloping roof, windows and doors, flooring underground and/or above ground). In the model applied, the areas of the individual parts of the envelope are known for the entire building stock (indicated in the table separately for single-family and for multi-family buildings).

Costs are presented exclusive of VAT, but even so they are total costs including not only materials and labour, but also design work, the erection of scaffolding, the disposal of waste, etc. Some of these costs would have to be expended even in the absence of energy-saving renovation; this is neglected maintenance. However, these costs cannot be reliably broken down and therefore they are presented below as total costs that need to be spent by the property owner.

Table 10: *Total investment in the renovation of the envelopes of single-family and multi-family buildings (recommended values), exclusive of VAT*

RECOMMENDED STANDARD						
		PERIMETER WALLS	ROOFS	FLOORS	WINDOWS AND DOORS	TOTAL ENVELOPE
area	[mil. m^2]	279.0	217.4	192.8	84.9	774.1
specific cost of single-family buildings	[CZK/m^2]	1 470	1 330	864	6 300	-
specific cost of multi-family buildings	[CZK/m^2]	1 746	1 298	864	6 300	-
cost of single-family buildings	[CZK billions]	285.4	240.5	134.9	305.9	967
cost of multi-family buildings	[CZK billions]	148.2	47.5	31.6	229.2	457
cost of single-family + multi-family buildings	[CZK billions]	433.6	288.0	166.6	535.1	1 423
cannot be insulated – single-family buildings	[%]	5%	0%	60%	0%	-
cannot be insulated – multi-family buildings	[%]	10%	0%	20%	0%	-
essential investment – single-family buildings	[CZK billions]	271.1	240.5	54.0	305.9	871.4
essential investment – multi-family buildings	[CZK billions]	133.4	47.5	25.3	229.2	435.5
essential investment – single-family + multi-family buildings	[CZK billions]	404.5	288.0	79.3	535.1	1 306.9
specific investment – single-family buildings	[CZK/m^2]					4470
specific investment – multi-family buildings	[CZK/m^2]					2788
deduction of already renovated single-family buildings	[%]	25%				
deduction of already renovated multi-family buildings	[%]	40%				
investment after the deduction of single-family buildings	[CZK billions]	203.3	180.4	40.5	229.4	**653.6**
investment after the deduction of multi-family buildings	[CZK billions]	80.0	28.5	15.2	137.5	**261.3**
investment after the deduction of single-family + multi-family buildings	[CZK billions]	283.4	208.9	55.7	367.0	**914.8**

Table 11: *Resultant investment in the renovation of the envelopes of single-family and multi-family buildings (passive values), exclusive of VAT*

PASSIVE STANDARD						
		PERIMETER WALLS	ROOFS	FLOORS	WINDOWS AND DOORS	TOTAL ENVELOPE
area	[mil. m^2]	279.0	217.4	192.8	84.9	774.1
specific cost of single-family buildings	[CZK/m^2]	1 660	1 780	1 094	7 000	-
specific cost of multi-family buildings	[CZK/m^2]	2 011	1 798	1 094	7 000	-
cost of single-family buildings	[CZK billions]	322.2	321.8	170.9	339.9	1 155
cost of multi-family buildings	[CZK billions]	170.7	65.8	40.0	254.7	531
cost of single-family + multi-family buildings	[CZK billions]	493.0	387.6	210.9	594.6	1 686
cannot be insulated – single-family buildings	[%]	5%	0%	60%	0%	-
cannot be insulated – multi-family buildings	[%]	10%	0%	20%	0%	-
essential investment – single-family buildings	[CZK billions]	306.1	321.8	68.3	339.9	1 036.2
essential investment – multi-family buildings	[CZK billions]	153.7	65.8	32.0	254.7	506.2
essential investment – single-family + multi-family buildings	[CZK billions]	459.8	387.6	100.4	594.6	1 542.4
specific investment – single-family buildings	[CZK/m^2]					5315
specific investment – multi-family buildings	[CZK/m^2]					3240
deduction of already renovated single-family buildings	[%]	25%				
deduction of already renovated multi-family buildings	[%]	40%				
investment after the deduction of single-family buildings	[CZK billions]	229.6	241.4	51.3	254.9	**777.1**
investment after the deduction of multi-family buildings	[CZK billions]	92.2	39.5	19.2	152.8	**303.7**
investment after the deduction of single-family + multi-family buildings	[CZK billions]	321.8	280.9	70.5	407.7	**1 080.8**

Total investment required in the renovation of the envelopes of single-family buildings is estimated at CZK 654 billion for the recommended standard and CZK 777 billion for the passive standard.

Total investment required in the renovation of the envelopes of multi-family buildings is estimated at CZK 261 billion for the recommended standard and CZK 304 billion for the passive standard.

These costs are less energy-saving renovations (put simply, insulation work) already carried out on single-family and multi-family buildings. Nevertheless, presumably even those buildings already insulated will need new renovation in the longer term (up to 2050). Although the investment costs of renovation are the same (or very similar) as for the renovation of a building that has not been insulated, the energy saving would be much lower. It is debatable whether such renovation would be cost-effective. This matter is discussed below in the scenario modelling.

Investment in the replacement of technology in the residential stock

The estimate of the investment cost required to renovate the technological facilities of buildings up to the recommended or passive standard is also based on unit costs. These include variable costs depending on the installed capacity of the technology, and fixed costs of the single-family or multi-family building. Again, the estimated costs are exclusive of VAT, but overall include all necessary action.

A certain mix of fuels and, hence, types of sources is also anticipated for each level of renovation. Considering that the financial cost of the different technologies varies, this is a major factor influencing the overall cost. In this slide, it should be treated merely as an estimate and as approximate.

Table 12: *Determination of the total investment cost of renovating the technological facilities of a building, exclusive of VAT*

Investment in the renovation of the technological facilities of a building (only the source of heat and hot water)								
type of heat source	recommended standard				passive standard			
	Single-family building		Multi-family building		Single-family building		Multi-family building	
	share	investment	share	investment	share	investment	share	investment
		[CZK billions]		[CZK billions]		[CZK billions]		[CZK billions]
heating oil	0%	0.0	0%	0.0	0%	0.0	0%	0.0
natural gas	45%	136.0	35%	84.7	40%	152.4	30%	83.6
coal and solid fossil fuels	5%	244.0	0%	0.0	0%	0.0	0%	0.0
biomass	30%	244.0	5%	108.8	30%	231.7	10%	103.8
district heat	5%	0.0	55%	0.0	5%	0.0	50%	0.0
electricity from the grid	5%	0.0	0%	0.0	5%	0.0	0%	0.0
other (solar collectors, heat pumps)	10%	305.0	5%	122.8	20%	280.4	10%	121.3
total [CZK billions]	100%	**177.1**	100%	**41.2**	100%	**186.6**	100%	**47.6**
floor area [m^2 millions]	194.96		156.23		194.96		156.23	
specific investment [CZK/m^2]	908		264		957		304	
total single-family + multi-family buildings [CZK billions]	**218.3**				**234.2**			
Investment in the installation of mechanical ventilation to meet the passive standard								
					Single-family building		Multi-family building	
mechanical ventilation with recuperation						200.30		157.00
total [CZK billions]					100%	**386.9**	100%	**204.6**
total specific investment [CZK/m^2]					1 984		1 310	
total single-family + multi-family buildings [CZK billions]	175				**591.5**			

Total investment required in the replacement of the technology of single-family buildings is estimated at CZK 177 billion for the recommended standard and CZK 387 billion for the passive standard (including mechanical ventilation with recuperation).

Total investment required in the replacement of the technology of multi-family buildings is estimated at CZK 41 billion for the recommended standard and CZK 205 billion for the passive standard (including mechanical ventilation with recuperation).

Investment in other buildings

At a very rough estimate, investment required for the renovation of buildings in the service sector and agriculture is placed at CZK 400 billion. This estimate is derived from the presumption of conformity of specific investment intensity for the floor area, and is analogous to the renovation of multi-family buildings to the recommended standard. However, this presumption applies only to buildings which, by type, are similar to multi-family buildings (schools, offices), and is not applicable to buildings which, by type, are shopping centres or logistics halls.

Total investment required in buildings

The table sums up the necessary theoretical and maximum investments for the energy-saving renovation of all buildings to a given energy standard. As mentioned above, these are comprehensive costs. Estimates of investment required in the implementation of the various renovation scenarios are provided below.

Table 13: *Estimated maximum investment in the renovation of holdings and the corresponding energy savings*

	recommended standard	passive standard
single-family buildings – envelope	CZK 654 billion	CZK 777 billion
single-family buildings – technology	CZK 177 billion	CZK 387 billion
multi-family buildings – envelope	CZK 261 billion	CZK 304 billion
multi-family buildings – technology	CZK 41 billion	CZK 205 billion
total for residential buildings	CZK 1133 billion	CZK 1673 billion
of which arrangements for sufficient ventilation (single-family and multi-family buildings)	*CZK 200 billion*	*CZK 157 billion*
energy savings in residential build	92 PJ	155 PJ

services and agriculture, including public and commercial buildings	CZK 400 billion	
energy savings in services and agriculture	55 PJ	
buildings in industry	statistics missing	
total	**approx. CZK 1.5 trillion**	**approx. CZK 2.1 trillion**

Scenarios for the renovation of the residential building stock

This text reflects the requirement of the Energy Efficiency Directive under Article 4(d) and (e).

Scenarios for the renovation of the building stock in the Czech Republic were drawn up on the basis of outputs under the preceding chapters of this report by Buildings Performance Institute Europe (BPIE) using its own model. This chapter aims to assess the energy and economic impacts of the different scenarios for the renovation of the building stock in the Czech Republic.

Definition of scenarios

Five scenarios have been defined:

Scenario 1: Business as usual, with no new policy measures

Scenario 2: Fast but shallow renovation of the building stock

Scenario 3: Slow but, for energy purposes, deep renovation of the building stock

Scenario 4: Fast and deep renovation of the building stock

Scenario 5: Ideal hypothetical (3% deeply renovated buildings from tomorrow)

A description of the parameters of individual scenarios can be found in the following table.

Table 14: *Description of model scenarios*

Description of the scenario	**2014-2020**	**2020-2030**	**2030-2050**
Scenario 1: Business as usual			
with no new policy measures			
percentage of buildings renovated per year	1.2%	1.5%	1.5%
share of shallow renovation	45%	30%	20%
share of moderate energy-saving renovation	50%	55%	55%
share of deep renovation	5%	15%	25%
Scenario 2: Fast but shallow renovation of the building stock			

a higher percentage of renovated buildings, without progressive energy criteria			
percentage of buildings renovated per year	2.0%	2.5%	3.0%
share of shallow renovation	45%	30%	20%
share of moderate energy-saving renovation	50%	55%	55%
share of deep renovation	5%	15%	25%
Scenario 3: Slow but, for energy purposes, deep renovation of the building stock			
the existing percentage of renovated buildings, criteria of energy-related deep renovation			
percentage of buildings renovated per year	1.0%	1.5%	1.5%
share of shallow renovation	15%	10%	5%
share of moderate energy-saving renovation	50%	30%	10%
share of deep renovation	35%	60%	85%
Scenario 4: Fast and deep renovation of the building stock			
higher percentage of renovated buildings, criteria of energy-related deep renovation			
percentage of buildings renovated per year	2.0%	2.5%	3.0%
share of shallow renovation	15%	10%	5%
share of moderate energy-saving renovation	50%	30%	10%
share of deep renovation	35%	60%	85%
Scenario 5: Ideal hypothetical			
3% deeply renovated buildings from tomorrow			
percentage of buildings renovated per year	3.0%	3.0%	3.0%
share of shallow renovation	5%	5%	5%
share of moderate energy-saving renovation	10%	10%	10%
share of deep renovation	85%	85%	85%

The scenarios are modelled only for residential buildings because good-quality and detailed statistics are available for this stock and, at the same time, potential measures for the implementation of energy savings, and the costs and benefits thereof, can be defined very well. For other buildings, it will be necessary to make a rough estimate and to increase all values by 37%, which is the estimated share of the floor area of other heated buildings and the floor area of residential buildings.

All scenarios anticipate an increase in the floor area of new buildings by 0.85% and the demolition of buildings accounting for 0.20% of the floor area per year. Therefore, over the period up to 2050, there will be an increase in floor area in all scenarios by approximately 25% compared to the situation today.

Up to 2020, new buildings are considered in the cost-optimal standard (with energy consumption of 125 kWh/m2.year for single-family buildings, or 100 kWh/m2.year for multi-family buildings); after 2020, they are considered in the nearly-zero consumption standard (55 kWh/m2.year for single-family buildings and 40 kWh/m2.year for multi-family buildings). Both levels are consistent with the requirements of the Energy Management Act (Act No 406/2000) and are in line with the definitions laid down in the Implementing Decree on the energy performance of buildings (Implementing Decree No 78/2013).

For existing buildings, renovation of 92% of the floor area of buildings is anticipated; others are treated as structures that cannot be reconstructed (for various reasons, but mainly from the perspective of the owner's decision, i.e. on market rather than technical grounds). The renovation of historical buildings is factored in by the fact that, in the progressive scenarios 4 and 5, a certain percentage of shallow and moderate energy-saving renovation is being considered.

The renovation of buildings that have not been renovated for energy-saving purposes yet (75% of single-family buildings and 60% of multi-family buildings, see chapter 5) is incorporated into the scenarios first. Once this area of renovation has been exhausted, it makes way for the second type of renovation, i.e. of buildings which have already been renovated (in about 2050 for those in scenario 1, and in about 2035 for those in scenarios 4 and 5). The assumption that 65% have undergone shallow innovation, 30% moderate and 5% is taken from the background study. Based on the same investment costs, the energy savings are roughly half of those achieved in the renovation of buildings not previously renovated.

The essential investment costs of renovation are taken from the results of chapter 6. A learning curve is factored in overtime, i.e. a gradual reduction in investment costs at current prices due to falling prices in certain technologies, the refinement of procedures, routine work and improvements in the quality thereof, and consequently lower repair requirements. This outweighs the trend of a gradual rise in labour force costs in construction and the growth in prices of ordinary building materials. Annual decreases are considered to be 0.3% for shallow innovation, 0.6% for moderate energy-saving renovation and 4.9% for deeper innovation.

In the evaluation of economic costs, the discounting of future investments and savings, on the one hand, or a rise in energy prices and construction works, on the other, is not factored in. Trying to establish such trends would be speculation. For the purposes of further analysis, a 3% discount rate could be taken into account (for households, alternative investment has a return of approximately 1% to 2% in a savings account, or from a government bond, and interest rates on mortgages are 3%, and even lower for multi-family buildings). Energy prices for final customers have risen by between 3% and 6% per year, net of any tax changes, over the past few decades. In contrast, the crisis has pushed down construction work prices in the past five years.

Modelling outputs

The outputs of the modelling are presented in four graphs. These describe:

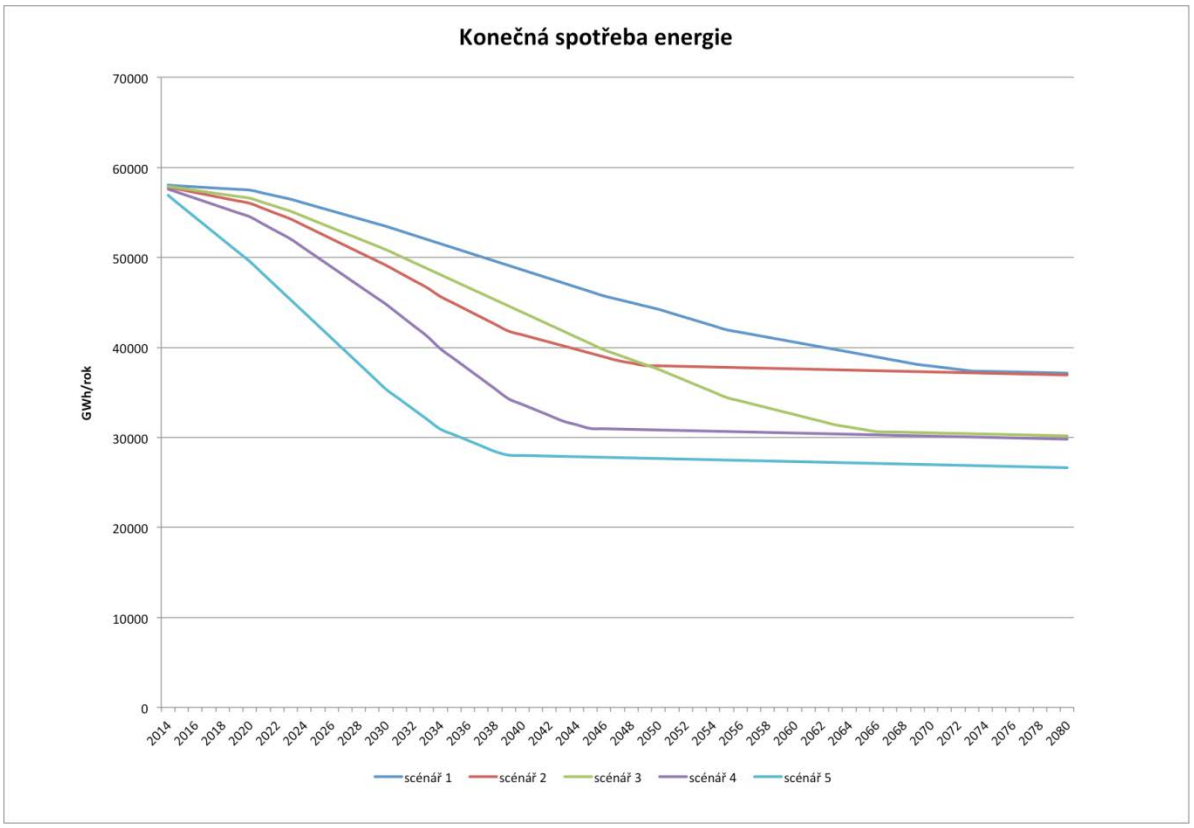
a) Trends in energy consumption in the residential sector for the types of consumption being considered in the evaluation of the energy performance of buildings in accordance with the Energy Management Act (i.e. excluding appliances). The

baseline is 209 PJ (approximately 58 000 GWh), which is the statistic filed by the Ministry of Industry and Trade for 2011.

b) Trends in energy savings compared to a situation without the energy-saving renovation of buildings, but including an increase in the number of new buildings and demolition of old ones.

c) Trends in annual investment costs required to implement the individual renovation scenarios. These include all necessary costs, including the preparation of design documentation, arrangements for building supervision, the removal and disposal of waste, and, for example, the erection of scaffolding. These costs are presented net of VAT. For values in EUR, a fixed conversion rate of 27 CZK per EUR has been considered for the duration of the modelling.

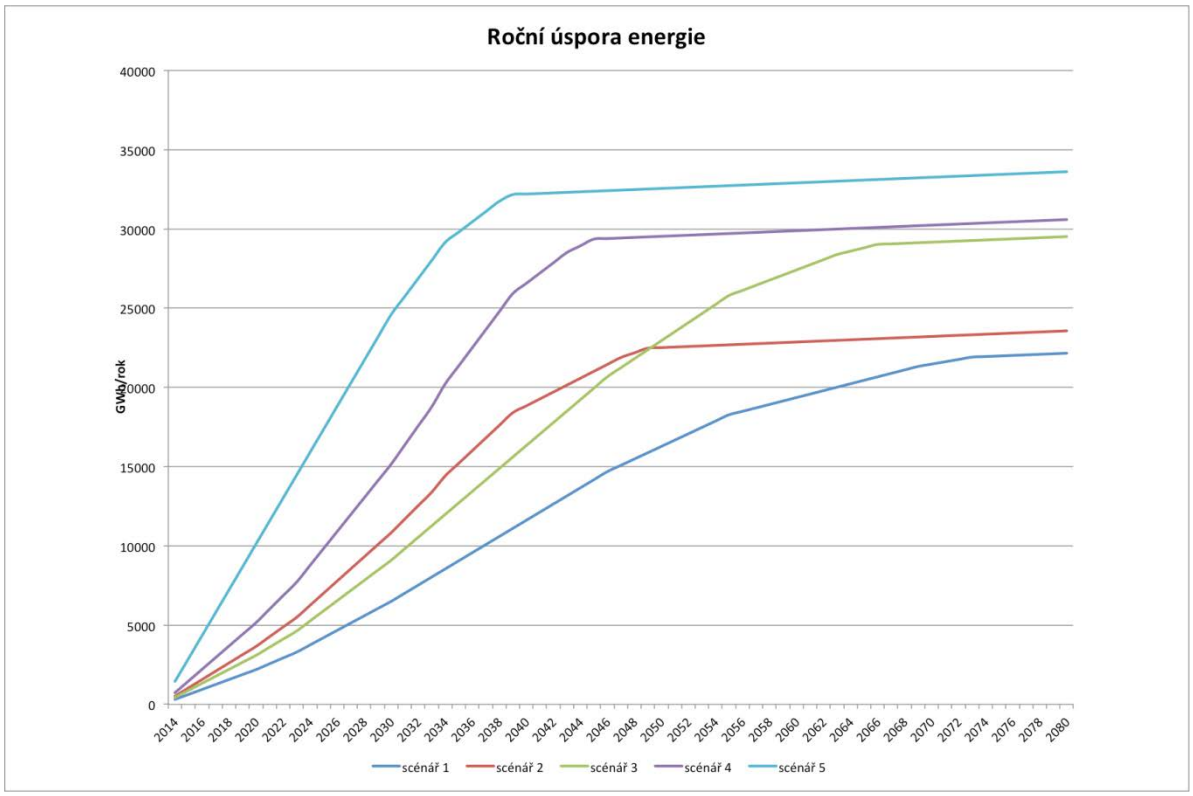
d) Trends in annual energy cost savings in the operation of buildings as a result of the measures taken. To determine this indicator, an average price of saved energy of EUR 70 per MWh is applied. Again, these values are net of VAT.



Final energy consumption

GWh/year

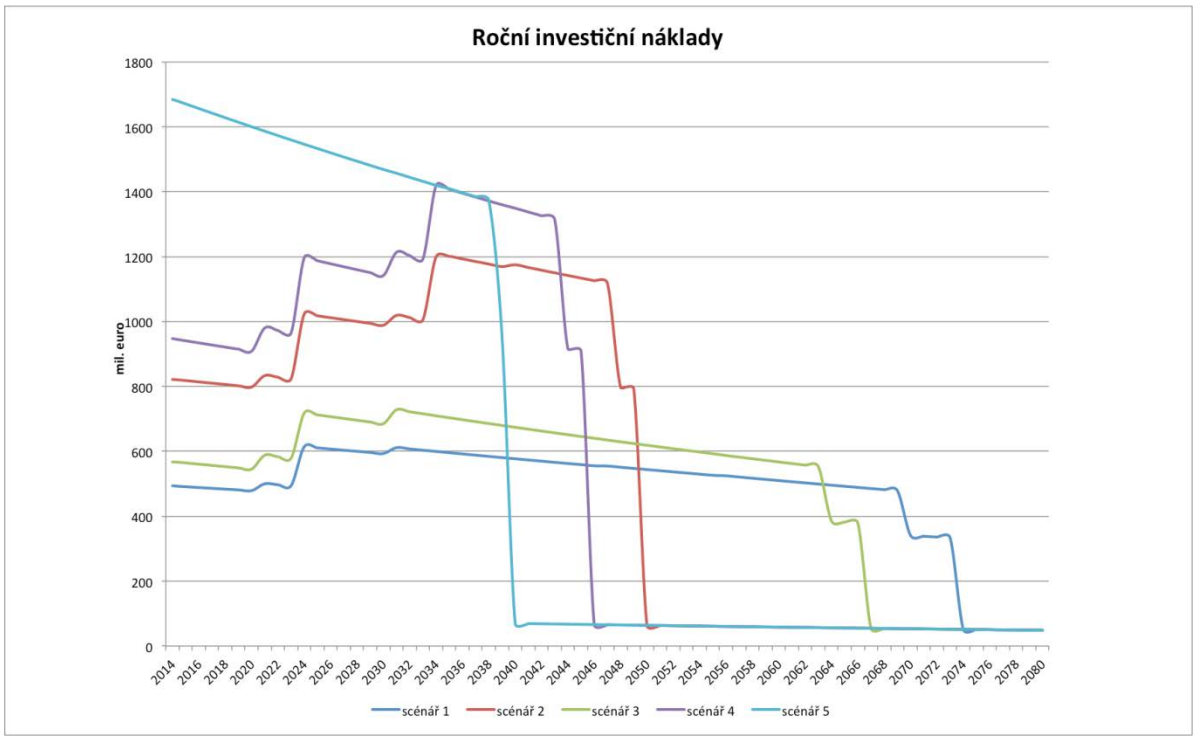
Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5



Annual energy saving

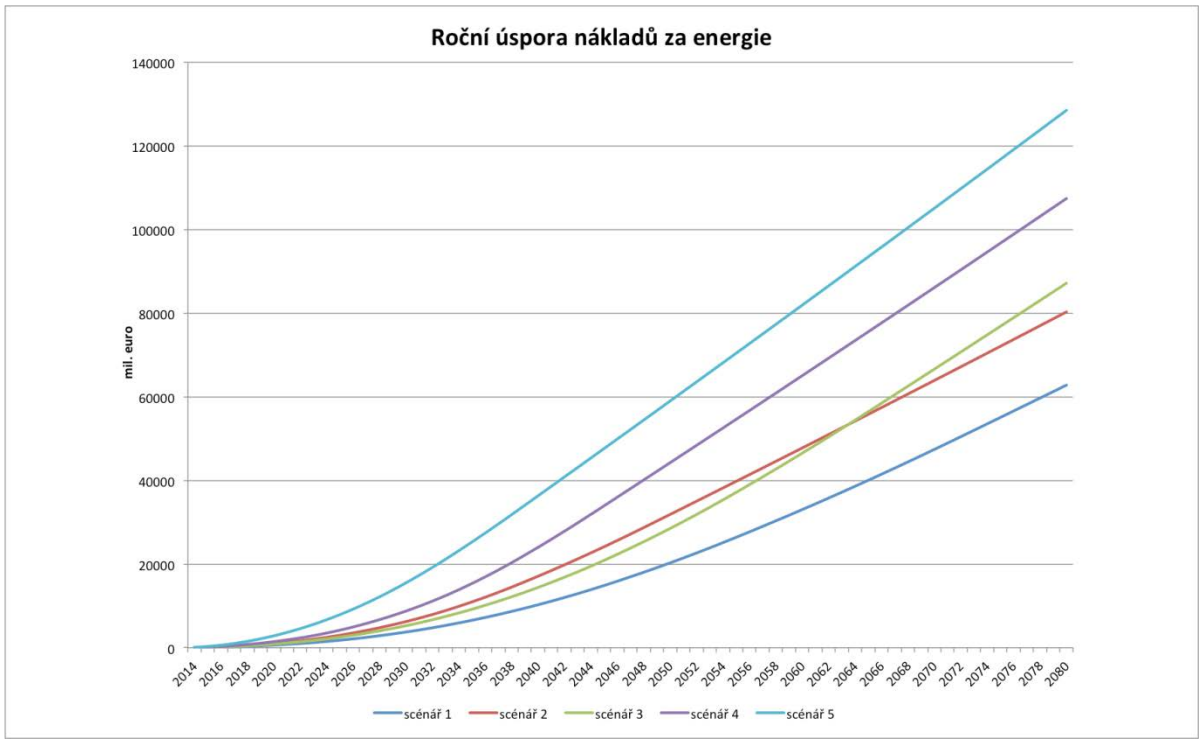
GWh/year

Scenario 1 Scenario 2 Scenario 3 Scenario 4 Scenario 5



Annual investment costs

Scenario 1 Scenario 2 Scenario 3 Scenario 4 Scenario 5



Annual energy cost savings

Scenario 1 Scenario 2 Scenario 3 Scenario 4 Scenario 5

Evaluation and comparison of individual scenarios

The business as usual scenario (1), not counting on state intervention, will see the renovation of 92% of those buildings not yet renovated by 2055 (single-family buildings) or 2045 (multi-family buildings), with a cut in energy consumption by roughly 50 PJ in 2050 compared to the current situation. Buildings renovated since the 1990s will not be renovated again until the second half of this century. Cumulative essential investment costs up to 2050 stand at EUR 20.6 billion for the implementation of this scenario.

The hypothetical scenario (5), on the other hand, envisaging major state intervention leading to the use of the full absorption capacity of energy-saving construction, will cover the renovation of all non-renovated building stock and the high-quality renovation of buildings that in the past have only undergone shallow renovation (have only had their windows replaced, or insulation installed to the required values, etc.) by 2039. This will prevent buildings from becoming dilapidated and will ensure that much of the energy-saving potential is harnessed. As at 2050, it will reduce energy consumption in residential buildings by roughly 110 PJ. Cumulative essential investment costs up to 2050 stand at EUR 39.8 billion for the implementation of this scenario.

The realistic scenarios (2, 3 and 4) are situated between the two extremes above. Their influence on energy consumption reductions in residential buildings, and their economic costs and benefits, are set out in the graphs. The attainment of the various levels of energy savings depends in particular on how effectively the measures have been configured. For financial support instruments, it depends on the allocation and ability to encourage additional private investment (i.e. financial leverage).

The setting of energy criteria, such as the terms and conditions of support schemes, is equally important. A comparison of scenarios 2 (fast but shallow) and 3 (slow but deep) shows that, in the initial stage of the scenario it is possible to obtain larger energy savings through faster, shallow renovation, but in the longer term the shallow renovation blocks part of the economically effective potential of the savings, and then deep renovation that is slower to take effect records, in absolute terms, a lower possible achievable level of energy consumption. The outputs of the ground study also show that deep renovation has a slightly shorter period of return than moderate energy-saving building renovation (by two or three years). It could be recommended that moderate energy-saving building renovation be the minimum requirement of support schemes, with building owners receiving a bonus, in the form of higher aid intensity, if they opt for deep renovation.

The various scenarios naturally make different contributions to the pursuit of the Czech objective up to 2020 in accordance with the Energy Efficiency Directive. Scenario 5 will save 36.4 PJ with total costs of EUR 11.5 billion on model buildings (residential stock) alone; if we were to add to this, in the manner described above, the potential savings in other buildings, the saving could be as much as 49.9 PJ. In contrast, in the pursuit of the Czech objective, Scenario 1 would contribute a mere 12.3 PJ for the residential stock with the costs of EUR 3.4 billion, and 16.8 PJ for all types of buildings outside industry.

A summary of this information for all scenarios is provided in the following table:

Table 15: *Selected outputs of scenarios as at 2020*

	2020
Scenario 1: Business as usual	
final energy consumption [GWh/year]	57485
energy saving in the given year [GWh/year]	2196
cumulative investment costs [EUR millions]	3401
investment costs in the given year [EUR millions]	479
energy cost savings in the given year [EUR millions]	615
Scenario 2: Fast but shallow renovation of the building stock	
final energy consumption [GWh/year]	56020
energy saving in the given year [GWh/year]	3661
cumulative investment costs [EUR millions]	5669
investment costs in the given year [EUR millions]	798
energy cost savings in the given year [EUR millions]	1025
Scenario 3: Slow but, for energy purposes, deep renovation of the building stock	
final energy consumption [GWh/year]	56584
energy saving in the given year [GWh/year]	3097
cumulative investment costs [EUR millions]	3896
investment costs in the given year [EUR millions]	545
energy cost savings in the given year [EUR millions]	867

Scenario 4: Fast and deep renovation of the building stock	
final energy consumption [GWh/year]	54520
energy saving in the given year [GWh/year]	5161
cumulative investment costs [EUR millions]	6493
investment costs in the given year [EUR millions]	908
energy cost savings in the given year [EUR millions]	1445
Scenario 5: Ideal hypothetical	
final energy consumption [GWh/year]	49552
energy saving in the given year [GWh/year]	10129
cumulative investment costs [EUR millions]	11495
investment costs in the given year [EUR millions]	1600
energy cost savings in the given year [EUR millions]	2836

The modelling indicates that the best solution would be to implement at least scenario 4 (fast and deep) which would contribute savings of 18.6 PJ in the residential sector (25.4 PJ including other buildings outside industry). Total costs are estimated at EUR 6.5 billion for residential buildings and EUR 8.9 billion for all buildings.

The amount of investment costs needed will require further examination and will be verified by reference to practical experience (e.g. the difference between the standard price of work and the price ultimately implemented by the company with the best bid should be taken into account).

However, it should be added that the selected scenario No 4 models the most appropriate scenario for the rate of building renovation but is not binding as regards compliance with Article 7 of the Energy Efficiency Directive. This target will be met not only by applying measures in buildings, but also by deploying technologies in industry, where, having regard to the sustainability of public finances and the consolidation of public budgets, compliance with the Directive has to be achieved in a cost-effective manner.

Primary energy savings

This strategy considers only energy savings in final consumption. This is in keeping with the Czech Republic's proposed objectives under Article 3 and Article 7 of the Energy Efficiency Directive.

However, a reduction in final consumption in buildings will also be reflected in a reduction in primary energy consumption (both in terms of total and non-renewable energy). This is a consequence of the fall in the actual need for energy and an increase in technological efficiency. This is achieved by using better quality new technology, or, in the future, microgeneration units.

Some technologies of local renewable sources in/on buildings or in the vicinity thereof also directly reduce the consumption of non-renewable primary energy, even though such use will not appear in the balance of final consumption and total primary energy, or will be not be manifested much, because of the high efficiency thereof. These technologies are heat pumps, biomass installations, solar thermic collectors, photovoltaic installations, and high-potential geothermal sources and mini wind turbines.

An important role in reducing primary energy consumption in buildings is also played by the shift of non-renewable energy factors towards lower values among energy carriers which, as a result of energy transformation, are outside buildings, i.e. electricity from the grid and district heat. In response to gradual increases in the share of renewable sources and increases in the efficiency of production and distribution, the primary energy consumption needed to safeguard the quality use of buildings will contract.

Although these factors have not been discussed in this document, they merit attention because, as a result, primary energy consumption will better reflect the load placed by building use on the environment.

Measures for the implementation of the renovation scenarios

This chapter reflects the requirement of the Energy Efficiency Directive under Article 4(c).

General description of the measures being contemplated

Policy measures

In the implementation of energy savings in buildings, policy support is important to foster trust in a predictable and stable approach by the state. It is a sign to property

owners and to the implementing companies and their subcontractors, as well as for manufacturers of materials and technologies.

For private property owners, a stable environment is important in the planning of their investments and the timing thereof, based on the availability of financial resources and the exploitation of synergy in the implementation of energy-saving renovation at the time the building needs to be renovated.

For energy-saving construction, a stable environment is important in the planning of business, whether this takes the form of investment in the construction of new production capacities, or in the training of existing and newly recruited workers.

MEASURE 1: INCLUSION OF THE OUTPUTS OF SCENARIOS (A SELECTED SCENARIO) IN THE STATE ENERGY CONCEPT (SEK) UNDER THE CZECH NEEAP

The SEK is a high-level strategy document of the state covering energy management. Its role is to communicate the state's medium-term and long-term plans in this area to the public and to businesses. The SEK must be consistent with the targets set out in the NEEAP which are to be met mainly by measures aimed at increasing energy efficiency in technologies, in industry and in buildings in all sectors. However, it should be added that the selected scenario No 4 models the most appropriate scenario for the building renovation rate but is not binding as regards compliance with Article 7 of the Energy Efficiency Directive. This target will be met not only by applying measures in buildings, but also by deploying technologies in industry, where, having regard to the sustainability of public finances and the consolidation of public budgets, compliance with the Directive has to be achieved in a cost-effective manner. If economic growth results in an increase in the absorption capacity of industry, priority should be given to supporting industry over and above its currently predicted absorption capacity. Ensuring the stability of the construction sector is important but cannot be linked mainly to the meeting of the target laid down in Article 7.

MEASURE 2: INCORPORATION OF THE POINTS OF THIS STRATEGY INTO OTHER STATE POLICY DOCUMENTS

Building renovation has an effect on many areas of the economy and society. This includes energy security, air protection, climate protection and adaption to climate change, housing development, the health of the population of employees, social cohesion, regional and local development, the business of small and medium-sized enterprises, and, in general, the economic policy of state. To ensure that the state adopts a consistent approach in all areas, the building renovation scenarios will be discussed and the relevant points of this strategy will be incorporated into sectoral policies. This is also important for good interdepartmental coordination.

Economic measures

The high initial investment costs of the energy-saving renovation of buildings are one of the main barriers to the implementation thereof. The Czech Republic has roughly 10 years' experience of offering support schemes, which help various groups of property owners to achieve energy savings in the operation of their properties. It is worth mentioning the Panel and the New Panel programmes, controlled and administered by the Ministry of Regional Development, the Green Savings and New Green Savings programmes at the Ministry of the Environment, the Efekt programme at the Ministry of Industry and Trade, and the operational programmes in the 2007–2013 programming period (the Operational Programme Enterprise and Innovation, the Operational Programme Environment, the Integrated Operational Programme and the Regional Operational Programme). Experience can be gained from all of these programmes and statistics can be obtained on their impact.

To cultivate the trust of property owners and to prevent fluctuations in the construction market, the programmes should be conceived as long-term schemes with an outlook at least to 2020, should have stable financing, and should maintain stable conditions of support. As it sets up its new operational programmes, the Czech Republic will also reduce the administrative burden on applicants and beneficiaries of support to the minimum possible level.

MEASURE 3: NEW GREEN SAVINGS

The New Green Savings Programme, managed by the Ministry of the Environment and administered by the State Environmental Fund, is financed from revenues generated by auctions of emission allowances within the EU ETS. Section 4 of the Act on the Conditions of Trading in Greenhouse Gas Emission Allowances (Act No 383/2012) purposefully links at least half of the revenue from auctions to measures reducing emissions of greenhouse gases. Of that amount, roughly two thirds of the revenue will be channelled into the budgetary heading of the Ministry of the Environment and one third will make its way to the budgetary heading of the Ministry of Industry and Trade in the period between 2013 and 2020.

Revenue for the heading of the Ministry of the Environment up to 2020 is estimated at CZK 27 billion. These resources have been declared for use in the New Green Savings Programme. In 2030, that programme was financed with CZK 1 billion from the national resources of the State Environmental Fund (before income was generated from emission allowances); the allocation planned for 2014 is CZK 1.9 billion. It will be necessary to make arrangements for continual financing in 2015 when, because of a

combination of backloading and derogations, there is expected to be a gap in revenue from auctions of emission allowances.

The New Green Savings Programme focuses on single-family buildings (energy-saving renovation and construction to the passive energy standard) because this area cannot be covered with European Structural and Investment Funds. It may also be used to finance other types of buildings that cannot be supported under the new operational programmes (e.g. the new construction of multi-family buildings to a passive standard, energy-saving renovation of multi-family buildings in Prague).

MEASURE 4: EUROPEAN STRUCTURAL AND INVESTMENT FUNDS 2014–2020

The new European Structural and Investment Funds in the 2014–2020 programming period are a major opportunity for the financing of energy savings in buildings. In this period, the Czech Republic may receive up to EUR 20.5 billion, i.e. more than CZK 560 billion, from the European Union. The new regulations on the European Structural and Investment Funds promote the use of resources to improve the energy performance of buildings. In fact, for the European Regional Development Fund, they demand a minimum allocation for the thematic objective of the transition to a low-carbon economy (which includes building renovations).

In the new programming period, the support of energy savings in buildings is mentioned in four draft programme documents for the new operational programmes: OP Enterprise and Innovation for Competitiveness, OP Environment, Integrated Regional Operational Programme and OP Prague – Growth Pole. In the way they have been provisionally configured, the OP Enterprise and Innovation for Competitiveness will promote energy savings in buildings in the business sphere, while the OP Environment will focus on public buildings, the Integrated Regional Operational Programme on multi-family buildings, and the OP Prague – Growth Pole on selected public buildings in the capital.

MEASURE 5: ENERGY PERFORMANCE CONTRACTING METHOD

Energy Performance Contracting (EPC or 'guaranteed energy services') can be used to commercially finance energy savings with a short period of return (up to 8–10 years in the public sector, up to 5-7 years in the commercial sector, with lighting replacement possible even under three years), and may be applied in those situations where it is possible to guarantee a certain method of building use (in particular, administrative buildings, whether public or commercial, schools, hospitals, etc.). This method is typically appropriate for technological measures, but may also be used in combination with the renovation of building envelopes, if this is financed in another way. A

combination of state aid and the EPC method guarantees the efficient use of public resources with additional effect.

To develop this method, arrangements must be made so that it can be used in parallel with support from the ESIF, based on the configuration of the new operational programmes, and methodological and legislative arrangements should be made so that it can be used in a way that does not formally increase the state of public debt.

MEASURE 6: OTHER FINANCIAL INSTRUMENTS

An analysis of potential energy savings and essential investment resources indicates that the overall renovation of buildings is a measure that takes a long time to pay for itself (typically about 20 years), but this also means that the return on the investment is roughly 5% per annum. Considering other comparable investment opportunities, this is an attractive proposition (perhaps not for the business sphere, but definitely for investment funds and banks).

We will have to analyse which of the barriers preventing massive investment in building renovation are pivotal and which can be removed. It is necessary to analyse market failures deriving, among other things, from the structure of building ownership, the necessary co-financing by owners, the expected benefits of renovation, the high diversity and relatively small (financial) size of projects, and the high transaction costs of implementation. This will serve as a platform for a discussion on the possible use of innovative financial instruments to make energy savings in buildings.

MEASURE 7: BUILDING RENOVATION IN ACCORDANCE WITH ARTICLE 5 OF THE ENERGY EFFICIENCY DIRECTIVE

The Energy Efficiency Directive requires Member States to carry out the energy-saving renovation of at least 3% of the floor area of buildings used by the central state administration. In the Czech Republic. 498 structures fall within this category. During 2014, the Government will decide how selected structures are to be renovated (essentially it will proceed by starting with those that report the highest energy intensity) and how to finance such renovation.

MEASURE 8: SCOPE FOR IMPLEMENTING OBLIGATION MEASURES

Should it become evident that the Czech Republic is not on track to meet the energy efficiency target by 2020 using alternative measures alone, other ways of meeting the target will be sought. In the first instance, the cost-effectiveness of alternative measures will be reviewed and, where possible, adjusting them to improving their effectiveness will be examined. In accordance with Government Resolution No 923/2013, consideration may also be given to introducing an obligation scheme as provided for in Article 7 of the Directive.

MEASURE 9: ENERGY-SAVING SOCIAL HOUSING

The housing of socially vulnerable citizens and the housing of senior citizens are specific areas. Rental housing has generally been declining in the Czech Republic, but there is a place for it and, according to the position adopted by the Ministry of Regional Development, it will be developed. Social housing should not only be a low-cost venture as regards initial investment in equipment, but should also be low-cost to run. The conditions of state aid for this type of building must necessarily include progressive energy criteria. As demographic changes advance, the matter of housing for seniors will become increasingly important.

Legislative and administrative measures

MEASURE 10: REQUIREMENTS REGARDING MINIMUM ENERGY STANDARDS FOR RENOVATION AND NEW CONSTRUCTION

Measures that have already been implemented include an amendment to the Energy Management Act in order to transpose the Directive on the Energy Performance of Buildings (the amendment was approved under number 318/2012). This law, in line with the Directive, defines the minimum requirements concerning the energy performance of new buildings, major changes to completed buildings, and non-major changes to completed buildings. These requirements are defined at a cost-optimal level. For the purposes of publicly financed support schemes, the criteria should be more progressive, but should still be defined at a cost-optimal level.

MEASURE 11: BUILDING ENERGY PERFORMANCE CERTIFICATES

With a view to the clear measurability of the energy performance of buildings, the above-mentioned amendment to the Energy Management Act established clear methodology for this calculation and for the issuance of building energy performance certificates. The use of building energy performance certificates as proof of compliance with conditions concerning energy intensity has been established in every day practices. The use of building energy performance certificates to compare the energy quality of properties on the property market is still in its infancy. The inspection body for compliance with the quality of building energy performance certificates and compliance with other obligations under the Energy Management Act is the State Energy Inspectorate. The role of the inspection body will be strengthened so that these certificates consolidate their reliability as an instrument of certified quality.

The Ministry of Industry and Trade supported the preparation of the information portal www.prukaznadum.cz, which contains all important facts about building energy performance certificates. This site should continue to be promoted.

MEASURE 12: REDUCTION IN THE ADMINISTRATION BURDEN FOR APPLICANTS SEEKING SUPPORT

An amendment to the Energy Management Act (Act No 406/2000) has been proposed which will enable those who provide financial support to define their own terms and conditions for the method in which the projected energy savings are to be demonstrated by applicants, i.e. building owners. Therefore, it will not be compulsory to have an energy assessment from an energy specialist/auditor, as is the case now.

In cooperation with other ministries (the Ministry of Regional Development, the Ministry of the Environment), efforts will also be made to harmonise and reduce the administrative burden in the granting of subsidies from European funds in the new programming period.

MEASURE 13: COHERENT REQUIREMENTS OF BUILDING LEGISLATION

The Energy Management Act is a special piece of legislation linked to the Building Act (Act No 183/2006). At present, however, the building authorities do not always have a sufficient insight into the requirements of the Energy Management Act. The Building Act also empowers the Ministry of Regional Development to issue an implementing decree on the technical requirements of construction (268/2009) and Prague City Hall to issue a regulation with similar content (this institution is preparing 'Prague Construction Regulations').

It would be advisable to harmonise requirements in the Czech Republic as a whole and in Prague (either by removing structural technical requirements from the Prague Construction Regulations or by introducing the same requirements in both pieces of secondary legislation). Building authorities also require methodological guidance to ensure that the same administrative requirements apply throughout the country.

A specific requirement associated with energy savings in buildings (in particular the installation of new airtight windows) is the safeguarding of sufficient ventilation. Here, the requirements under the aforementioned regulations are inadequate, and it would be advisable, after expert debate, to finalise them so that hygiene standards and the quality of the indoor climate are respected at all times.

MEASURE 14: INTRODUCTION OF A SYSTEM FOR THE REPORTING AND EVALUATION OF ENERGY SAVINGS

It is important to reinforce the system for the reporting of the energy savings made in order to evaluate the effectiveness of the individual measures. This could then form a basis for the ongoing revision of the parameters of auxiliary measures and support schemes. It should also provide a coherent picture of the state of the energy performance of buildings and improvements in these conditions.

In addition to evaluations of the applications supported under programmes, data will be collected via the reporting of energy audits, energy performance certificates and direct reporting by public institutions.

Measures in the field of training and consultancy

MEASURE 15: REINFORCEMENT OF THE ROLE OF STATE-GUARANTEED CONSULTANCY

Ignorance of specific appropriate measures to improve the energy performance of a particular building, the investment demands thereof, and potential savings, increases the transaction cost of renovating buildings. This barrier can be tackled to a certain extent by reinforcing the role of state-guaranteed consultancy at Energy Consulting and Information Centres. It is also important, for common types of buildings, to prepare model projects quantifying the investment costs and the savings achieved.

It is important to raise awareness among property owners that the preparation of renovation is a complex activity, and that they will need contributions from an energy specialist, a designer or an architect, and a civil engineer. They should have realistic expectations about how long the process will take, and about the benefits of managing it to a high standard. It is also necessary to highlight the role played by the structural and technical supervisor of the client in order to ensure that the work and details are executed to a good quality. Special attention should be paid to awareness in ensuring sufficient quality of the indoor climate by means of a supply of fresh air.

MEASURE 16: TRAINING AT ALL LEVELS

Energy-saving construction requires major advances in the quality of work. There needs to be an emphasis on quality throughout the chain, encompassing the designer, the energy specialist, the construction company, any subcontractors, and the client's structural and technical supervisor.

To ensure that the construction work is prepared and executed to the necessary quality, the existing levels of training in energy-saving construction will be evaluated, and proposals may be made to reinforce certain areas. The analysis will encompass the training and lifelong learning of chartered engineers and technicians active in construction, architects, and energy specialists, as well as apprenticeships and secondary vocational education and, not least, higher-education institutions and research centres. Sectoral unions and professional chambers will play a major role in this task. Work will be coordinated with them.

MEASURE 17: RESEARCH AND DEVELOPMENT

Barriers hampering reductions in energy consumption in buildings tend to be of a nature that is not technical or structural. Nevertheless, the development of new materials, technologies and procedures could significantly reduce the cost of

implementing energy-saving measures. With this in mind, opportunities will be sought for the targeted support of research and development in energy-saving construction.