List of measures

TITLE OF THE MEASURE	1.1 Support for the modernization of housing stock by means of building society savings schemes

Basis of calculation	The figures were taken from a report of the Association of Czech Building Societies, published in 2009. Discussions and consultations ensued with representatives of lawyers, economists, and technical and financial advisers involved in areas including housing in the Czech Republic. Further data were taken from the 2001 Population and Housing Census.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The data used as the basis for the calculation were: • The financial share apportioned to the repair and reconstruction of existing residential buildings (based on the current state, approximately 32%). • % of the interest expected in building society savings schemes compared to 2006; • Number of financial sources available in the given year • The number of dwellings where we expect repairs to commence in the given year (number of reconstructed, modernized flats and the floor area of those flats). The sizes of the heated surface areas of existing dwellings were obtained from the 2001 Population and Housing Census. • Energy savings per m^2 of floor area (Population and Housing Census) achieved in the given period as a result of repairs. The resulting savings express the difference in specific energy consumption between non-repaired and modernized residential buildings. • The calculation was made separately for apartment buildings and houses.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	119 GWh (in 2008–2010: 364 GWh) 430 TJ (in 2011–2013: 1 310 TJ)

Approach to the calculation of savings for future years	The dwellings repaired up to 2016 were estimated for each year. The number of dwellings in the given year was divided into individual construction periods in the computational model. Number of repaired dwellings supported with building society savings schemes:

	2001–2006		**2007**							
008	2009	**2010**	2011	2012	**2013**	2014	2015	**2016**		
Houses	38 263	7 946	7 795	8 29						
	8 173	7 946	7 719	7 565	7 414	7 265	7 120			
Apartment buildings	66 959	13 906	13 641	14 051	14 304	13 906	13 509	13 239	12 974	
	12 714	12 460								
PANEL	86 091	17 879	17 539	18 065	18 390	17 879	17 369	17 021	16 681	16 347
	16 020									

	The difference in specific consumption was determined by the period of construction of the modernized houses and flats and the corresponding requirements of standards and legislation for the period concerned. A detailed calculation is contained in a separate Excel file.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	1 179 GWh 4 244 TJ

TITLE OF THE MEASURE	1.2 Regeneration of high-rise pre-fabricated buildings – PANEL/NEW PANEL Programme

Basis of calculation	Annual reports: ▪ State Housing Development Fund ▪ Českomoravská záruční a rozvojová banka ▪ Union of Bohemian and Moravian Housing Cooperatives ▪ New Panel Programme and Green Savings Programme 2001 Population and Housing Census Normative requirements and legislation

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	Annual allocated funds are expected in a minimum amount of CZK 5 billion/year. Energy savings for heating were calculated – heat savings were determined separately depending on the implementation period and energy performance requirements – at the present time and the outlook up to 2016. (See detailed calculations), The calculation was also based on the expected number of reconstructed, modernized dwellings (based on the number of supported applications and corresponding expected amount of financial guarantees and subsidies provided), and their floor area (the sizes of the heated surface areas of the existing dwellings were obtained from the 2001 Population and Housing Census).

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	47 GWh/year (in 2008–2010: **144 GWh**) 172 GWh/year (in 2008–2010: **517 TJ**)

Approach to the calculation of savings for future years	Annual allocated funds are expected throughout the duration of the AP in a minimum amount of CZK 5 billion/year. We expect the programme to continue until 2015; we assume that interest in this programme will continue to grow until 2010. After that, we expect lower interest and a search for other alternatives to finance the implementation of measures that will result in the modernization of the current structural condition and reduced energy consumption. The average annual increase in modernized dwellings supported under the Panel Programme is 16 700 dwellings per year (2 024 projects supported in 2008); the increases expected in each year of the AP are as follows:

	2								
01 - 2006		**2007**	2008	2009	**2010**	2011	2012	**201**	
	2014	2015	**2016**						
PANEL	65 000	17 063	16 738	17 240	17 550	17 199	16 900	16 562	16 231	15 906
	15 588								

The model calculation included the expected tightening of normative requirements concerning the heat transfer coefficient

	between the years 2010 and 2013, which will directly affect the specific energy performance of buildings. This will be reflected in specific heat consumption for the heating of pre-fabricated dwellings and in the amount of heat savings achieved in relation to heating in future periods.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	544 GWh/year 1 957 TJ/year

TITLE OF THE MEASURE	1.3 State Housing Development Fund grant for the repair of apartment buildings - repairs are part of the NEW PANEL Programme as of 2010

Basis of calculation	Annual reports: ▪ State Housing Development Fund ▪ Ministry for Regional Development Funds allocated to the reconstruction of dwellings Specific heat consumption for heating (on the basis of normative requirements and legislative requirements) Number of dwellings repaired

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	Up to 2006 inclusive, approximately 114 000 housing units were reconstructed and modernized by the Fund – this estimate is calculated from the amount actually allocated and an additional calculation of the supplemented amount of CZK 2.34 billion in total for the period from 1998 to 2006. On average, 12 732 housing units are repaired per year. We estimate an amount of CZK 180 000 per housing unit (the same value as in 2006 – see the detailed calculation). We do not expect an increase in allocated funds; if anything, they will decline. The energy savings achieved in heating were quantified based on the average specific values of existing pre-fabricated buildings and the average savings achieved in the reconstruction of pre-fabricated buildings. Since the founding of the programme, the State aid granted and the number of reconstructed and modernized dwellings have decreased every year.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	24 GWh/year (in 2008–2010: **72 GWh/year** 86.7 TJ/year (in 2008–2010: **260 TJ/year**)

Approach to the calculation of savings for future years	We assume that during the years 2008 to 2016 there will be an annual decline in interest due to the administrative requirements of the programme and the availability of other grant schemes for this type of repair (Green Savings, NEW PANEL). For data, see the detailed calculations – the number of reconstructed and modernized dwellings is shown in the following table:

	2007	2008	2009	**201**					
	2011	2012	**2013**	2014	2015	**2016**			
Panel repairs	8 522	8 360	8 117	7 711	7 954	7 630	7 477	7 327	7 181
	7 037								

We expect a constant volume of funds per housing unit of CZK 180 000. The initial expectations of the model calculation included the expected tightening of normative requirements concerning the heat transfer coefficient between the years 2010 and 2013, which will directly affect the specific energy performance of buildings. The energy savings achieved in heating were calculated

	based on the difference in specific energy intensity and the number of dwellings repaired in the given year.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	261 GWh/year 940 TJ/year

TITLE OF THE MEASURE	1.4 Loans to municipalities to upgrade housing

Basis of calculation	Data on the amount of financial assistance and the number of projects supported were drawn from the annual reports of the: ▪ State Housing Development Fund ▪ Ministry for Regional Development Further data were taken from the 2001 Population and Housing Census and legislative and normative requirements. Resources are allocated for this purpose in 2010 under the State Housing Development Fund budget.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The number of reconstructed or modernized dwellings was calculated according to the funds allocated in a given year, assuming a financial cost of reconstruction of CZK 180 000 per housing unit. The reason for this calculation is the absence of any evaluation of grants or a database from which the number of repaired dwellings can be accurately determined. In 2008, 179 dwellings were repaired according to our calculation. This number was broken down by the time of construction – estimate (see the detailed calculation in the attached file). The calculation of energy savings was made from the difference in specific values of energy consumption for heating, broken down by construction period, and from the average floor area of those dwellings (2001 Population and Housing Census). The specific values of non-insulated buildings and the specific values of energy consumed by the modernized buildings were derived from a sample of the energy audits conducted.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	0.79 GWh (in 2008–2010: **2 GWh**) 2.67 TJ (in 2008–2010: **8 TJ**)

Approach to the calculation of savings for future years	The basis of the calculation is the number of reconstructed or modernized dwellings we estimate will be assisted in the monitored period – assumptions are shown in the following table. **2007** 2008 2009 **2010** 2011 2012 **2013** 2014 2015 **2016** Loans to municipalities 176 179 176 174 151 204 214 217 210 216 The model calculation of energy savings in relation to heating included the expected tightening of normative requirements concerning the heat transfer coefficient between the years 2010 and 2013, which will directly affect the specific energy performance of buildings. The energy savings achieved in heating were calculated based on the difference in specific energy intensity and the number of dwellings repaired in the given year.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	9 GWh/year 31 TJ/year

TITLE OF THE MEASURE	1.5 Awareness of the energy savings in heat consumption in households

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

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	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.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	6 GWh/year 21 TJ/year

Approach to the calculation of savings for future years	The anticipated benefit of awareness in households includes the expected 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.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	81 GWh 292 TJ

TITLE OF THE MEASURE	1.6 Energy labelling of household appliances – support of implementation

Basis of calculation	The calculation is based on statistical data (CSO) concerning total electricity consumption in households. The share of electrical appliances in this consumption was expertly estimated based on estimates 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.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	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 263 TJ/year.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	The total impact of labelling on energy consumption in the Czech Republic is expected to be **263 TJ** per year. This means that in the period from 2011 to 2016 a total of 1 578 TJ could be saved.

Description of the calculation and approach to the calculation for future years (2009–2016)

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.

Value of annual energy savings expected in 2016	438 GWh in total, or 73 GWh per year.

Service life	These measures, carried out as part of the activities of the SEI and Czech Trade Inspectorate (ČTI), can be implemented immediately or in connection with the second Action Plan.

TITLE OF THE MEASURE	1.7 Electricity savings in household lighting

Basis of calculation	The estimate is based on the total electricity consumption of households and the proportion of lighting in such consumption. The potential savings were calculated as the possible replacement of average incandescent bulbs with energy saving lamps and other efficient light sources, with an expert estimate of the number of light sources replaced as a result of the measure described and individual activities.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The total electricity consumed in the lighting of households in the Czech Republic is approximately 39.08 GWh/year (depending on the number of households, the light sources fitted and their daily use). If the above-mentioned activities halve the number of incandescent light bulbs (from 8 to 4 per household) and adequate increase the introduction of energy saving light sources (from 3 to 6 energy saving lamps and from 1 to 2 LED sources), overall the saving will be **7.94 GWh** of electricity in the Czech Republic/year, or 0.2% of electricity consumption in households. Of this, 5.8 GWh will be achieved via existing (mainly European) measures, and 2.1 GWh per year can be saved by additional national activities. Note: although the energy saving light sources already exist on the market even without the measure in question, the benefit up to 2010 is thought to be minimal because their market application lacked coordinated domestic support.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	7.94 GWh 28.584 TJ

Approach to the calculation of savings for future years	When the described measure is introduced, approximately the same annual contribution to energy savings is expected – based on the regular (but accelerated) replacement of light sources in households. After the market has become saturated with compact fluorescent bulbs, we can expect wider application via other energy efficient technologies, such as energy saving halogen sources or LEDs, which will have a market position and application are not always suitable for compact fluorescent lamps.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	55.6 GWh 200.16 TJ

TITLE OF THE MEASURE	1.8 Green Savings Programme

Brief summary	Under the Kyoto Protocol, in the 2008–2012 period the Czech Republic has an estimated emissions surplus of about 165 million tonnes of CO_2 eq. (or AAUs – Assigned Amount Units). Of this, approximately 130 million AAUs can be traded under the IET (International Emission Trading) mechanism pursuant to Article 17 of the Protocol. It is estimated that the revenue from the sale of AAUs will be in excess of CZK 20 billion. 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 programme aims to promote selected measures to increase energy efficiency, implemented in residential buildings by individuals and other entities owning residential buildings, which will lead to an immediate reduction in emissions of carbon dioxide, and thus launch a long-term trend of sustainable construction. The State Environmental Fund is responsible for the administration of the Green Savings Programme. Programme funds may be drawn over the entire programming period from 1 April 2009 to 31 December 2012. The programme is continuously monitored. The acceptance of new applications was stopped on 29 October 2010. Under the programme, a total of approximately 79 000 applications were received seeking aid of almost CZK 23 billion.

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 grant for selected combinations of measures Since a change was made in the conditions of the Green Savings grant programme on 10 August 2009, it has also been possible to assist the complete insulation of pre-fabricated apartment buildings under the A.1 area of intervention. The acceptance of new applications was stopped on 24 August 2010.

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

Target group	Eligible aid applicants are owners of houses and apartment buildings, i.e. natural persons, associations of housing unit owners, housing cooperatives, towns and municipalities (including boroughs) or businesses. The maximum total amount of aid per entity (i.e. per entity with a unique registration number) under the programme is CZK 30 million for the whole programming period. Aid will also be governed by the rules of the European Union on the granting of State aid.

Projects targeted at end users	A.1 – complete insulation: (Eligible grant under this measure per m^2 of floor area) ✓ complete insulation of houses to 70 kWh/m^2 1 550 CZK/m^2 ✓ complete insulation of houses to 40 kWh/m^2 2 200 CZK/m^2 ✓ complete insulation of apartment buildings (pre-fabricated or not) to 55 kWh/m^2 1 050 CZK/m^2 ✓ complete insulation of apartment buildings (pre-fabricated or not) to 30 kWh/m^2 500 CZK/m^2 The only requirement under Measure A2 – partial insulation – is to reduce the value of 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%: ✓ houses 650 CZK/m^2 of floor area ✓ apartment buildings 450 CZK/m^2 of floor area The following values are defined for reductions in the value of specific heat demand by 30%: ✓ houses 850 CZK/m^2 of floor area ✓ apartment 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 house at nearly zero energy standard with annual specific demand of up to 20 kWh per m^2 and CZK 150 000 per flat in an apartment building with annual heat demand for 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: Houses: C. 1 – biomass source CZK 50 000 to CZK 95 000 depending on the type C. 1 – heat pump CZK 45 000 to CZK 85 000 depending on the type C. 2 – for new buildings, the same as grants 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) Apartment buildings (per housing unit): C. 1 – biomass source CZK 25 000 C. 1 – heat pump CZK 15 000 to CZK 24 000 depending on the type C. 2 – for new buildings, the same as grants 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 grant Combinations of selected measures may result in a bonus grant of CZK 20 000 per house or CZK 50 000 per apartment building. E. Grants for the preparation and implementation of measures supported under the Programme Houses CZK 5 000 to CZK 20 000 depending on the type of measure, and apartment buildings CZK 15 000 (+ CZK 2 000 per housing unit) to CZK 40 000 depending on the type of measure.

Efficiency	The 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, a measure may be regarded as very effective.

EXPECTED SAVINGS AND CALCULATION PROCEDURE

Basis of calculation	The expected annual savings in final consumption for heating and hot water are based on a quantification of the forecast annual number of projects implemented under the various measures in the programme, as mentioned in the Green Savings programme document of April 2009. Forecasts of average annual energy savings and initial heat consumption of the measures supported under Chapter 2.1.3 (Analysis of the reductive potential of the programme) of the programme document are also taken into account. Under Directive 2006/32/EC, domestic production from renewable energy sources, which reduces the amount of energy purchased, may be included among measures to increase energy efficiency. For this reason, it is possible to regard such energy production as an energy saving. We also expect 12.5% of the forecast annual savings under the Green Savings Programme to be saved in 2010, 25% in 2011, 50% in 2012 and 100% in 2013. It is advisable to conduct an ex-post evaluation of the Green Savings Programme at the end of the programme in 2013, based on the number of projects supported and the results of the verified annual reduction in CO_2 emissions under the programme.

Annual energy savings expected in 2016	In view of the average service life of these measures (15 to 30 years), based on the above-mentioned ex-ante evaluation of the binding energy savings indicators, annual energy savings of approximately 8 708 TJ (2 419 GWh) in final consumption can be expected in 2016.

Approach to the calculation of savings for future years	The average service life of these measures is 15 to 30 years. The Action Plan assumes that these annual energy savings will be achieved continuously over the estimated service life of the measures.

Value of annual energy savings expected in 2016	8 708 TJ (2 419 GWh) per year. This value of annual energy savings is equivalent to approximately 12.2% of the indicative savings target for the Czech Republic based on the First Energy Efficiency Action Plan pursuant to Directive 2006/32/EC.

Status of implementation and the precise time frame	2008–2010	2011-2013	2014-2016
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	1 088 TJ	4 354 TJ	8 708 TJ

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

TITLE OF THE MEASURE	2.1 Expansion of the role of the public sector in demonstrating new technologies

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

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.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Calculation method	At present, there is no legal obligation in the Czech Republic to use green shopping, nor are there any binding legal standards in this area. 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.

Value of annual energy savings expected in 2008	0 GWh/year 0 TJ/year

Description of the calculation and approach to the calculation for future years (2009–2016)

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.

Value of annual energy savings expected in 2016	480 GWh 1,728 TJ

TITLE OF THE MEASURE	2.2 Electricity savings in tertiary sector lighting and in public street lighting

Basis of calculation	**Public street lighting:** Aggregate data on the number of light sources in the Czech Republic and their average energy consumption and daily use are known. The technologies and their potential for savings, which could gradually replace existing sources of light, are also known. The probable contribution of the proposed measures to the application of efficient light sources in practice was estimated. It will also be possible to check the resulting energy savings by comparing them with the special rate for electricity consumption in the sector of public street lighting. **Office lighting:** The total consumption of electricity in the service sector was reduced to the proportion of lighting. The technological potential for energy savings was also reduced by the likely contribution of the proposed measure to the energy savings made.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	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.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	0 GWh 0 TJ

Approach to the calculation of savings for future years	**Public street lighting:** Taking into account that there are 800 000 lampposts, with an average power 150 W, average potential savings of 20% per piece, and daily lighting of 8 hours/year, the total power consumption is 350 GWh. The 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). **Office lighting:** With 10% of electricity from the service sector used for lighting (4 203 GWh), 30% potential for energy savings, 30% of the market with the need for renovation with energy-saving sources, and a 5% contribution by the measure to the implementation thereof, 18.9 GWh of electricity can be saved annually.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	Therefore, this measure can achieve annual electricity savings of **22.4 GWh per year**, or 80.6 TJ, as of 2010.

TITLE OF THE MEASURE	2.3 Application of the Energy Star Agreement on office equipment

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.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	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 After 2017: 13 GWh.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	Savings will begin to accrue after 2011.

Approach to the calculation of savings for future years	In subsequent years, a stable contribution to energy savings is 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 and office equipment will grow.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	93 GWh 335 TJ

TITLE OF THE MEASURE	3.1 Promotion of energy efficiency under the Operational Programme Industry and Enterprise

Basis of calculation	The benefits of the Operational Programme Industry and Enterprise were assessed. The principle of n +2 applies to investment, i.e. the last possible year of implementation is 2008. Therefore, only the benefits of 2008 were determined. The calculation drew on data from the Czech Energy Agency and CzechInvest, the agency to promote business and investment, their annual reports, questionnaires and the document "Updated projections of greenhouse gas emissions", published by the Ministry of the Environment.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The Evaluation of the Operational Programme Industry and Enterprise indicates that the total allocation in 2004–2006 at SMEs in the Czech Republic was CZK 111.068 million for energy saving projects. On average, project aid amounted to 35% of total investment costs, so total investments amounted to around CZK 340 million in 2004–2006. We assume that some of these funds (**CZK 100 million**) will be invested in 2007–2008 (the principle of n +2 applies to investments, i.e. the last year of possible implementation is 2008). Estimated energy savings are based on average investment costs to achieve a saving of 1 GJ at industrial enterprises, which varies widely, according to the findings of energy audits, in a range from 200 to 5 000 000 CZK/GJ, but reports an average of 1 000 CZK/GJ. OPIE contributions to energy saving projects were therefore estimated at 100 TJ/year.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	27.8 GWh 100 TJ

Approach to the calculation of savings for future years	In subsequent years (2009–2016), further investment is impossible under this measure. However, the service life of the measure (as a set of technological measures in undertakings) is sufficient for savings of 100 TJ to be credited even in 2016.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	27.8 GWh/year 100.0 TJ/year

TITLE OF THE MEASURE	3.2 Promotion of energy efficiency under the Operational Programme Enterprise and Innovation – Eco-energy

Basis of calculation	The basis of the calculation is the expected allocation of funds from the OPEI of CZK 3 million to promote energy efficiency and RES use. The investment required to achieve savings of 1 GJ is estimated at CZK 2 000. It is assumed that the OPEI aid intensity is a third of the total investment costs (eligible expenses) and therefore total investments in the implementation of energy saving measures will amount to CZK 9 billion.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The total allocation and its benefits were simply broken down into the nine years of the Action Plan. We assume that these funds make up one third of total investment costs (a leverage of 3). We assume that an investment of CZK 2 000 is required to achieve a saving of 1 GJ. The share of total investments and the investment required to save 1 GJ is the resulting saving achieved by the Operational Programme Enterprise and Innovations in the promotion of fuel and energy savings in industry. The total savings are 4 500 TJ; the annual contribution is calculated at 500 TJ (over the nine years of the Action Plan).

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	139 GWh 500 TJ

Approach to the calculation of savings for future years	Savings were assumed to be the same in all years of the AP; the benefits as at 2016 are a multiple of the annual savings in each year.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	1249 GWh 4500 TJ

TITLE OF THE MEASURE	3.3 Promotion of voluntary energy saving commitments

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 2002–2006 period – data from the Czech Statistical Office (2007). 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 conservation agreements – progress review 2005, Motiva 2006 • Long-term agreements on energy efficiency in the Netherlands – results for 2005, SenterNovem 2006

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The measure will start to be implemented, according to our forecasts, as of 2013.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	0 GWh 0 TJ

Approach to the calculation of savings for future years	The average energy consumption in industry (companies not included in the emission trading scheme) in the period from 2002 to 2006 stands at about 166 840 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 a high level of savings is not expected in the SME sector. The expert estimate of coverage here is 50% – 83 576 TJ. The introduction of this measure places relatively high demands on administration, so we cannot expect the measure to begin before the second period of the AP (2011–2013). Due to the slow implementation of specific efficiency measures in situ, energy savings will not be generated until between 2013 and 2016. 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. Energy consumption in the sector increased minimally between 2002 and 2006 (0% to 1% over the entire period). However, due to economic growth there may subsequently have been an increase in energy consumption (up to 1% per year). A reduction in energy intensity by 2% translates into an absolute reduction in energy consumption by 1% per year as of 2012. The total contribution for the 2013–2016 period will be **3 067 TJ** (**852 GWh**).

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	852 GWh 3067 TJ

TITLE OF THE MEASURE	4.1 Reduction in the emission and energy intensity of passenger vehicles placed on the market

Basis of calculation	The essence of the measure is to support the achievement of targets in the emissions and, by extension, the energy consumption of new passenger cars placed on the domestic market, as defined by recently adopted EU legislation (Regulation 443/2009). The measure assumes the use of information, financial and voluntary instruments and, where appropriate, (statutory) regulation, so that, in the years 2012 [...]. Thanks to the technological improvement of engines, by 2012 the average value should be 130 or 120 g/km for new vehicles. 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.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	**The savings below can be achieved in the period monitored by (gradually) implementing the proposed measures.** The following assumptions serve as a basis when structuring the level of energy savings: ▪ The reference scenario of trends in the emission intensity of new cars in the years 2011-2019 will mirror existing developments (i.e. an approximately 12.4% improvement between the base year 2011 and the end year 2019). ▪ The proposed scenario will allow for a reduction to a limit of 130 g/km by 2012 and 100 g/km by 2019. ▪ Annual sales of cars will gradually rise from the current average (approximately 165 000/year) by 2% annually; diesel engines will become increasingly popular (7% year-on-year growth). ▪ Annual mileage will show a similar trend – the initial value proposed for 2011 (15 000 km/year), which reflects a significant proportion of customers from the ranks of businesses with higher annual mileage, will grow by 2.5% per year.

Rok	2011	2012	2013	2014	2015	2016	2017	2018	2019
BAU scénář ($g CO_2/km$)	**150**	**147**	**145**	**142**	**140**	**138**	**135**	**133**	**131**
Navrhovaný scénář ($g CO_2/km$)	**150**	**145**	**140**	**135**	**130**	**122,5**	**115**	**107,5**	**100**
Prodej vozů (ks)	165000	167475	169987	172537	175125	177752	180418	183124	185871
z toho se:									
zážehovým motorem	0.67	0.65	0.62	0.60	0.57	0.54	0.50	0.47	0.43
vznětovým motorem	0.33	0.35	0.38	0.40	0.43	0.46	0.50	0.53	0.57
Roční projezd	15000	15375	15759	16153	16557	16971	17395	17830	18276

Úspora energie u vozového parku uvedeného do provozu v letech 2011-2019 v GWh

2011	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2012		23,92	23,92	23,92	23,92	23,92	23,92	23,92	23,92
2013			50,39	50,39	50,39	50,39	50,39	50,39	50,39
2014				79,18	79,18	79,18	79,18	79,18	79,18
2015					110,57	110,57	110,57	110,57	110,57
2016						173,25	173,25	173,25	173,25
2017							241,02	241,02	241,02
2018								314,17	314,17
2019									392,97
Celkem v GWh	0,00	23,92	74,31	153,49	264,05	437,30	678,32	992,49	1385,45
Celkem v PJ	**0,000**	**0,086**	**0,268**	**0,553**	**0,951**	**1,574**	**2,442**	**3,573**	**4,988**

Year
BAU scenario (g CO^2/km)
Proposed scenario BAU scenario (g CO^2/km)
of which:
petrol engine
diesel engine
Annual mileage
Energy savings for a fleet put into operation in 2011–2019 (GWh)
Total in GWh
Total in PJ

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	0 GWh (Savings will begin to accrue as of 2012.)

Approach to the calculation of savings for future years	The expected trends are reflected – a gradual increase in sales of new vehicles, a slight reduction in the average emission intensity (strengthened by the implementation of the measure), an increase in the share of cars with a diesel engine and a slight increase in annual mileage. Based on these assumptions, the implementation of the proposed measure will result in energy savings of 1 574 TJ as at 2016.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual	437 GWh

energy savings expected in 2016	1574 TJ

TITLE OF THE MEASURE	4.2 Promotion of public transport (urban tram services)

Basis of calculation	The Ministry of Transport has promoted (or continues to promote) energy efficiency in public transport under the following programmes. • State Programme on the Promotion of Energy Savings and the Utilization of Renewable Energy Sources (supports measures delivering energy savings through the increased energy efficiency of vehicles – particularly more efficient motors). This programme was completed in 2009. • Programme to Promote the Replacement of Public Transport Vehicles and Regular Public Bus Services • Integrated Transport Systems Exchanging the current electric equipment for modern equipment can result in major electricity savings for trams, running into tens of per cent. This can be achieved by making the transition from the original resistive to pulse control (this reduces intensity by an average of 15-25%) and introducing braking energy recovery (for further savings of 20-25%). Consequently, specific electricity consumption falls on shorter sections (in the order of a few hundred metres), which are typical for urban traffic, with frequent stopping and starting, from the usual 150–170 Wh/tkm to less than 100 Wh/tkm.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	Only the retrofitting of electric equipment in tramcars is included in the calculation of quantified energy savings under the support programmes above (State Public Transport Programme). The savings rate is quantified by the aid applicants themselves (various transport companies) and is verified by the administrator (the Ministry of Transport). Savings are achieved by the greater efficiency of modern equipment compared to the original resistive or thyristor equipment, and the absolute amount depends on the annual mileage. Based on the stated number of vehicles modernized, the post-review figure is a total of 3.8 GWh per year. From 2005 to 2008, this aid opportunity was used by transport companies to co-finance the modernization of electrical equipment for trams – in 2005, with the support of the programme, four tram units were restored; in 2006, the figure was 20 trams, followed in 2007 by 12 trams and, in 2008, the highest figure yet – 25 tram units (i.e. a total of more than 60 tram vehicles). The new electrical equipment is based on pulse control with possible energy recovery during braking (e.g. TV Europulse or TV Progress). Compared to the original resistive or thyristor control, the electricity demands of a

	tramcar can be reduced by several dozen per cent (usually between 20 and 50%).

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	3.8 GWh 13.7 TJ

Approach to the calculation of savings for future years	Further years have not been included. The modernization of the electrical equipment of trams has always been connected with the simultaneous general overhaul of vehicles, extending their service life by at least a further 10 to 15 years (i.e. in real terms until 2020).

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	The modernization of the tram stock of transport companies in selected cities (Ostrava, Brno, Plzeň, Liberec, etc.) with aid under the programme in the years 2005 to 2008 will therefore deliver annual electricity savings of 3.8 GWh (13.7 TJ) over the next 10 to 15 years.

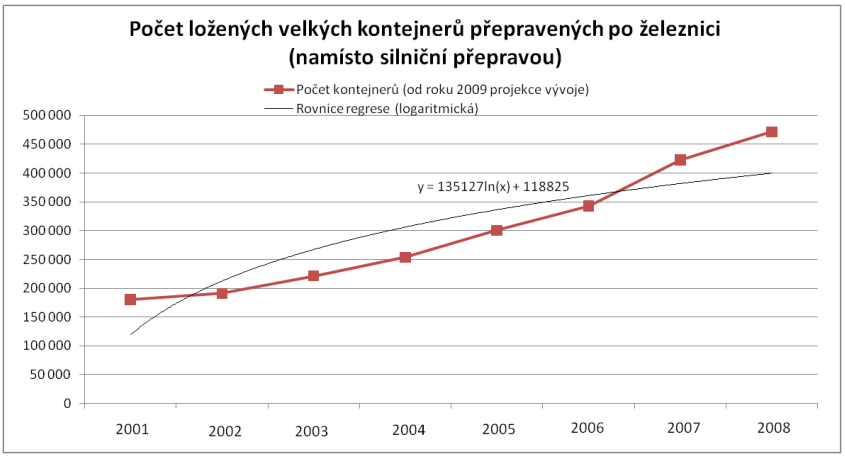
TITLE OF THE MEASURE	4.3 Promotion of combined transport

Basis of calculation	The promotion of combined transport, entailing the transportation of goods over longer distances. Transportation usually takes place between main logistics hubs. The share of transportation on roads is minimal; most transportation is by rail or by ship. This measure to promote combined transport is one of the priorities for the development of the Transport Policy of the Czech Republic for 2005–2013. This form of freight transport is demonstrably more energy efficient than road freight transport, particularly if goods are transported by unaccompanied (container) transport. The promotion of CT is also being considered in the upcoming "Operational Programme Transport", which will be implemented in the 2007–2013 period. It is expected that, in this framework, the new construction or reconstruction of existing private CT terminals serving for public use, public logistics centres, related technology, vehicles and transhipment mechanisms for CT and multimodal transportation, information technology, telematics, and more, will be supported. Assuming that there is growth in the number of containers transported by rail to the detriment of road freight transport, the measure to promote combined transport will deliver significant primary energy savings, quantified by the difference in energy consumed in the transport of goods by road and by rail. The calculation drew on statistics of the Ministry of Transport on the transport of goods (unaccompanied) via combined transport, and data of the Czech Statistical Office on rail freight published in statistical yearbooks or timelines[1], and expected development trends were reflected in the calculation.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The rate of energy savings to be monitored under this measure focuses, in the Action Plan, selectively only on the transportation of (laden) containers by rail instead of by road. The calculation of energy savings is based on the estimated number of laden containers shipped annually by rail instead of road over the average distance (approximately 250 km/container). However, the linear trend of growth in the number of containers transported, recorded by statistics from 2001 to 2008, needs to be corrected to reflect the financial crisis, since in 2009 and 2010 there was probably a significant decline, as reported by the freight sector as a whole. Therefore, for the entire period being monitored (2001–2016) the preference has been for a logarithmic regression curve, thanks to which the highest transport performance yet (in 2008) will not be achieved again until 2015/2016.

[1]) Transport Yearbook for 2008: http://www.sydos.cz/cs/rocenka-2008/rocenka/htm_cz/cz08_520710.html

	The last input in the calculation is specific consumption in the transportation of containers by road versus rail (35 litres of diesel per 100 kilometres, or approximately 3.5 kWh/km versus approximately 0.6 kWh of electricity per container per kilometre). Number of large laden containers transported by rail and the annual energy savings (in GWh) in selected years of the monitored period: Period 2001 2008 2016 Number of containers transported (units) 484,756 181,369 471,464 Annual energy savings (GWh) 132 346 356 

Number of laden large containers transported by rail (instead of by road) - Number of containers (projected for the period as of 2009) - Regression (logarithmic) equation

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	346 GWh 1245.6 TJ

Approach to the calculation of savings for future years	Assuming logarithmic developments in the number of containers transported by rail between 2001 and 2016, in 2016 nearly 485 000 containers would be transported by rail, representing savings of **more than 350 GWh of energy** (by means of a comparison of electricity consumption versus savings in fuel which would otherwise be used during road transport).

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	356 GWh 1282 TJ

TITLE OF THE MEASURE	4.4 Measures to improve energy efficiency in rail transport

Basis of calculation	Energy savings in rail transport can be divided into the following measures: • The replacement of passenger service units employing energy recovery • An increase in the proportion of electrified lines • Automatic traffic control • The creation of infrastructure conditions according to relevant standards • Tolls for use of transport routes. Energy savings in rail transport were determined separately for individual sub-measures: Electricity recovery, automatic train control system, reconstruction of propulsion systems, creation of line conditions according to relevant standards. <u>The replacement, retrofitting of passenger service trains employing energy recovery (and more efficient power units)</u> Savings made by energy were calculated for suburban train services on DC electrified lines, using 471 units. The calculation is based on a situation where 541-series units are replaced with new 471-series units facilitating the recovery of electricity. The optimistic scenario of the introduction of these vehicles is assumed (meaning that in 2016, 101 471-series units will be in operation at one time), with energy savings generated only by units acquired after 2008. The difference in energy intensity in identical daily transport performance then delivers targeted energy savings. Energy savings generated by the upgrading of train units with an internal combustion engine were taken from the evaluation of the State Programme on the Promotion of Energy Savings and the Utilization of Renewable Energy Sources, and were projected at the same amount in subsequent years, thanks to the anticipated implementation of other measures of this type in a similar range. <u>Automatic train control system</u> Energy savings generated by the introduction of an automatic train control system (TCS) are quantified by reference to a paper written by Pavel Šiman, an employee of Czech Railways DG: The possibility of making savings in traction electricity and diesel depends on the rail infrastructure. In the paper, annual energy consumption for 471-series units on a 102 km long section is estimated at 17 000 MWh. On this section, the theoretical electricity saving following the introduction of the TCS was estimated at 25%, which is an annual saving of 167 MWh of electricity per kilometre of track. The project team, having consulted experts, anticipates the introduction of an automatic train control system over 10 km of track per year. The amount of savings is directly consistent with that.

	The creation of line conditions according to relevant standards Energy savings generated by bring infrastructure up to conditions laid down in standards were quantified by reference to the paper written by Pavel Šiman: The possibility of making savings in traction electricity and diesel depends on the rail infrastructure. This paper offers four examples of significant energy savings in rail transport by creating line conditions in accordance with relevant standards. The calculation therefore included the energy savings realized only by those four cases in a time frame up to 2016. Further specific estimates of energy savings would have to be discussed with the Railway Infrastructure Administration, due to the dependence of this energy saving measure on the legislative framework, the concept and the financial cost.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The replacement, retrofitting of passenger service units employing energy recovery (and more efficient power units) The amount of energy savings achieved by developing the use of energy recovery is calculated as follows (the example is for an optimistic scenario): • A gradual rise in units with recovery capacity (series 471) from 32, of which 29 in daily operation (at one time), in 2008 to 112, of which 101 in daily operation (at one time), in 2016 (realistic scenario). • The daily mileage per unit in operation is estimated at 380 km. • The average energy saving, with the deployment of a unit facilitating recovery, is 4.5 kWh of electricity per kilometre travelled (expert estimate).

Year	Number of units capable of recovery (the current 471 series)		Annual electricity savings [GWh]
	total	daily in operation (at one time)	
2008	**32**	**29**	**18.1**
2009	**37**	**33**	**20.6**
2010	**42**	**38**	**23.7**
2011	**47**	**42**	**26.2**
2012	**52**	**47**	**29.3**
2013	**57**	**51**	**31.8**
2014	**62**	**56**	**35.0**
2015	**67**	**60**	**37.4**
2016	**72**	**65**	**40.6**

With regard to energy savings generated by the modernization of trains with combustion engines, drawing on aid from the State Programme on the Promotion of Energy Savings and the Utilization of Renewable Energy Sources, the calculated values of energy saved by the measures supported are taken from the statements of applicants, as verified by the administrator of the programme or grant scheme.

Below we set out the savings reported by projects supported up to 2008; the same annual level of savings is maintained until 2016 (the programme

was not made available for 2009 and its fate in future years hangs in the balance).

Year	2008–2016
Annual energy savings [GWh]	**0.1**

Automatic train control system

Energy savings calculated as follows:

- In 2008–2016, continuation of adjustments to the rail infrastructure (tracks) to accommodate the possibility of TCS (10 km per year).
- TCS-fitted vehicles operated on these tracks will be able to reduce energy consumption by 25%; this is consistent with energy savings of approximately 41.7 MWh/km/year.
- The introduction of the TCS over the targeted 90 km of railway tracks could thus deliver energy savings totalling 15 GWh/year in 2016.

Year	Energy savings [GWh/year]
2008	**1.7**
2009	**3.3**
2010	**5.0**
2011	**6.7**
2012	**8.3**
2013	**10.0**
2014	**11.7**
2015	**13.3**
2016	**15.0**

The creation of line conditions according to relevant standards

The energy savings are calculated for four selected lines which are known to place (removable) local speed limits on trains passing through. Two of them are electrified (examples 1 and 2), two are motorized (examples 3 and 4). Based on the prescribed restriction compared to the standard speed limit and the number of journeys undertaken, it is possible to make a calculation to determine the amount of feasible energy savings (in electricity or diesel), if the causes of the restriction can be fixed and trains will again be able to pass through the sections concerned at the original prescribed speed.

Example No	Year brought into line with prescribed conditions	Annual energy savings	Total energy savings in interim years [GWh]		
			2008	2010	2016
1	**2013**	**0.7 GWh electricity**		**-**	**-**
	0.7				
2	**2011**	**0.25 GWh electricity**		**-**	**-**
	0.25				
3	**2010**	**35,000 l diesel**	**-**	**0.3**	**0.3**
4	**2008**	**20,000 l diesel**	**0.2**	**0.2**	**0.2**
Total energy savings in GWh			0.2	0.5	1.45

	The table below shows the estimated levels of savings for all measures in the monitored years, summarized as follows: Measure — Energy saving in 2016 (GWh/year) **Vehicle replacement** ***- facilitating energy recovery 40.6*** ***- with more efficient engines 0.1*** **TCS 15** **Track brought into line with prescribed conditions 1.45** Total 57.15

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	20 GWh 72 TJ

Approach to the calculation of savings for future years	

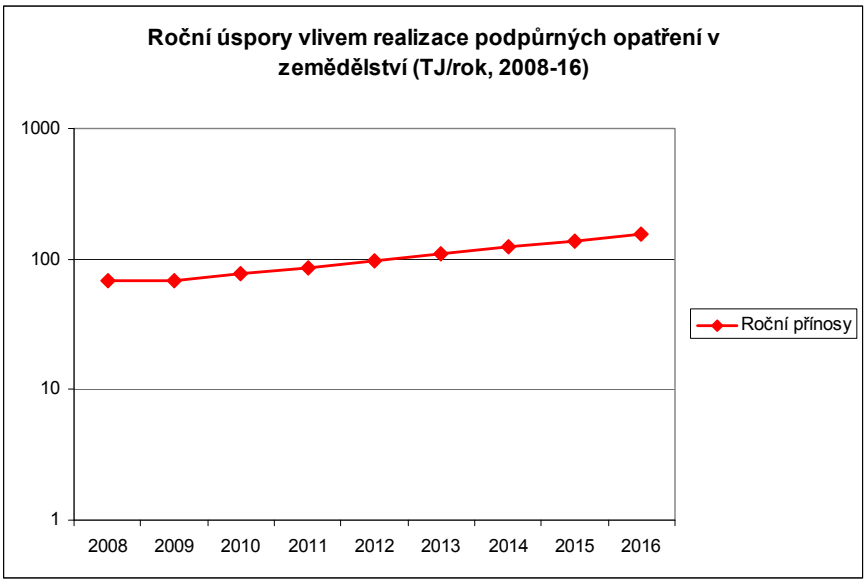
Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	Annual savings under the measure for 2016 are quantified at 57 GWh (205 TJ; this includes savings in both electricity and diesel used by trains with motorized vehicles)

TITLE OF THE MEASURE	5.1 Summary of measures to increase the energy efficiency of agricultural plants

Basis of calculation	The basis of calculation is the total consumption of fuels and energy in agriculture (the CSO table for target setting), The estimated annual savings achieved due to a combination of legislative measures and the influence of grant 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. Of the total consumption, we forecast savings of 4.78% as at 2016.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	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 support measures in agriculture (TJ/year, 2008–16)

- annual benefits

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	19.5 GWh 70 TJ

Approach to the calculation of savings for future years	The learning curve assumes that the influence of grants, legislation, and greater use of renewable energy sources and energy saving potential will result in savings of 4.7 per year over a period of nine years. See the detailed calculation – in 2008–2010 the figure is 210 TJ, in 2011–13 it is 300 TJ, and in 2014–16 it is 420 TJ per year.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	258 GWh 930 TJ

TITLE OF THE MEASURE	7.1 Offer of energy services by producers, distributors and suppliers of energy

Basis of calculation	The implementation of this measure is directly associated with the introduction of the Energy Services Directive (2006/32/EC) into practice. The calculation is based on statistical data (CSO) on the total annual energy consumption across the board for all sectors except transport, which is roughly 808 000 TJ.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The total average annual energy consumption outside the transport sector is approximately 808 000 TJ. It is necessary to calculate the publicity by distribution companies of energy services motivated only a section of end users to implement projects resulting in a reduction in energy consumption. According to an expert estimate, it is possible to anticipate an approximately 1.5% probability of impact on the implementation of energy saving measures among end users exposed to the promotion of energy services. In addition, savings of about 5% of final consumption can be expected among end users on whom the promotion of energy services has an influence.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	0 GWh 0 TJ

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 such projects. The year-on-year increase can be estimated at 3%. It follows that the annual value of energy savings in 2016 will amount to 4 037 TJ (1 122 GWh).

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	1122 GWh/year 4037.0 TJ/year

TITLE OF THE MEASURE	7.3 Benefits of implementing the recommendations of mandatory energy audits

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 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 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 over the full duration of the AP.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	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 realization 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).

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	185 GWh 670 TJ

Approach to the calculation of savings for future years	In the second period, realization of 5% of the potential (approximately 475 TJ per year) and, in the third period, 3.5% of the savings potential (333 TJ per year), based on total potential of approximately 9.5 PJ.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	1248 GWh/year 4500 TJ/year

TITLE OF THE MEASURE	7.4 The obligation to produce energy performance certificates for buildings (building certification)

Basis of calculation	In the time defined for the production of the NEEAP, it was not possible to prepare statistics which could form the basis for a qualified estimate of the benefits of introducing building energy certificates. Implementing legislation that be used for a responsible calculation of the number of energy performance certificates buildings has not yet been approved either. 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.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The symbolic contribution of the certification of public buildings is 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.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	0 GWh 0 TJ

Approach to the calculation of savings for future years	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.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	3 GWh/year 9 TJ/year

TITLE OF THE MEASURE	7.5 Requirements of minimum efficiency in the generation of electricity, thermal energy and cold

Basis of calculation	Detailed statistical documentation which could form the basis for the calculation of expected savings is not currently available (overview and efficiency of production facilities which are not covered by emissions trading, all types of fuel consumption, private consumption, network supply, an adequate share of losses in networks, and energy supplied to final consumers). Therefore, the amount of savings cannot be determined by calculation, only by an expert estimate by reference to certain literary works, energy audits, etc. In addition, part of the resulting savings will be included in other measures, as described in the chapter *Effect of measures on energy saving*.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	**<u>Electricity</u>** No major improvement in the efficiency of electricity generation (mainly) in industry can be expected in the next 10 to 15 years. For the most part, minor sources are new or upgraded, and generally meet the requirements of the relevant standard. **<u>Heat</u>** Unlike electricity sources, the boiler stock remains quite obsolete and neglected, and offers scope for improvements in the efficiency of heat production. - <u>Households</u> To estimate the savings in households, we use documentation prepared for the MURE database in the Indicators project. The requirements of the standard do not apply to small boilers, so houses are excluded from the calculation. The following table shows the estimated number of dwellings heated with unsuitable boilers, determined on the basis of age structure according to REZZO: Fuel — SF — LF — GF Share of unsuitable boilers in apartment buildings — 29.6 % — 36.1 % — 26.4 % SF, LF, GF – Solid fuels, liquid fuels and gaseous fuels The expected efficiency of boilers is: Fuel — SF — LF — GF Original efficiency [%] — 55 % — 65 % — 70 % Required efficiency [%] — 67 % — 80 % — 85 % Based on REZZO data, the average physical life of boilers can be estimated as 20 years. This means that each year approximately 5%

of boilers will be replaced. However, I assume that only 80% will be replaced, so the calculation is carried out only for 4% of the relevant capacity of boilers.

Apartment buildings account for approximately 45% of total household consumption. For simplicity, we disregard local heating and gas cooking, and we assume that the fuel is consumed in boilers. In this case, of the total fuel consumption of 148 030 TJ in 2006, apartment buildings account for about 66 615 TJ.
Fuel consumption in unsuitable boilers comprises:

Fuel	SF	LF	GF
Fuel consumption in unsuitable boilers [TJ]	15 012	469	25 345

By applying the expected efficiency, we are at fuel savings:

Fuel	SF	LF	GF
Fuel savings due to the replacement or upgrading of unsuitable boilers [TJ]	2 689	88	4 473

The total savings potential is therefore 7 249 TJ. If 4% of boilers are replaced every year, the annual energy saving is **290 TJ**.

– Services
For the services sector, we use the same basis as for households. The age structure of boilers and their efficiency will be considered in the same way as for households. We assume that 90% of fuel consumption is for heating and hot water, and the rest is for other purposes.

In these circumstances, we arrive at the following:

Fuel	SF	LF	GF
Fuel consumption in unsuitable boilers [TJ]	3 311	229	12 345

By applying the expected efficiency, we are at fuel savings:

Fuel	SF	LF	GF
Fuel savings due to the replacement or upgrading of unsuitable boilers [TJ]	593	43	2 179

The total savings potential is therefore 2 815 TJ. If 4% of boilers are replaced every year, the annual energy saving is approximately **110 TJ**.

- Industry
In industry, it is very difficult to obtain documentation on the potential for savings, partly because many boilers have already been replaced, partly because major changes have been made in fuel type following the switch to gas-fired boilers and, finally, because many facilities are part of the emissions trading scheme. At this stage of AP processing, the benefits of savings are thought to be close to zero.
Disregarding agriculture, the average annual energy savings under this measure can be quantified as
290 + 110 = **400 TJ.**

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	111 GWh/year 400 TJ/year.

Approach to the calculation of savings for future years	This calculation involves a multiple of annual benefits, which are the same in each year of the AP.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	1000 GWh/year 3600 TJ/year

TITLE OF THE MEASURE	7.6 Reduction of losses in the transmission and distribution of thermal energy and cold

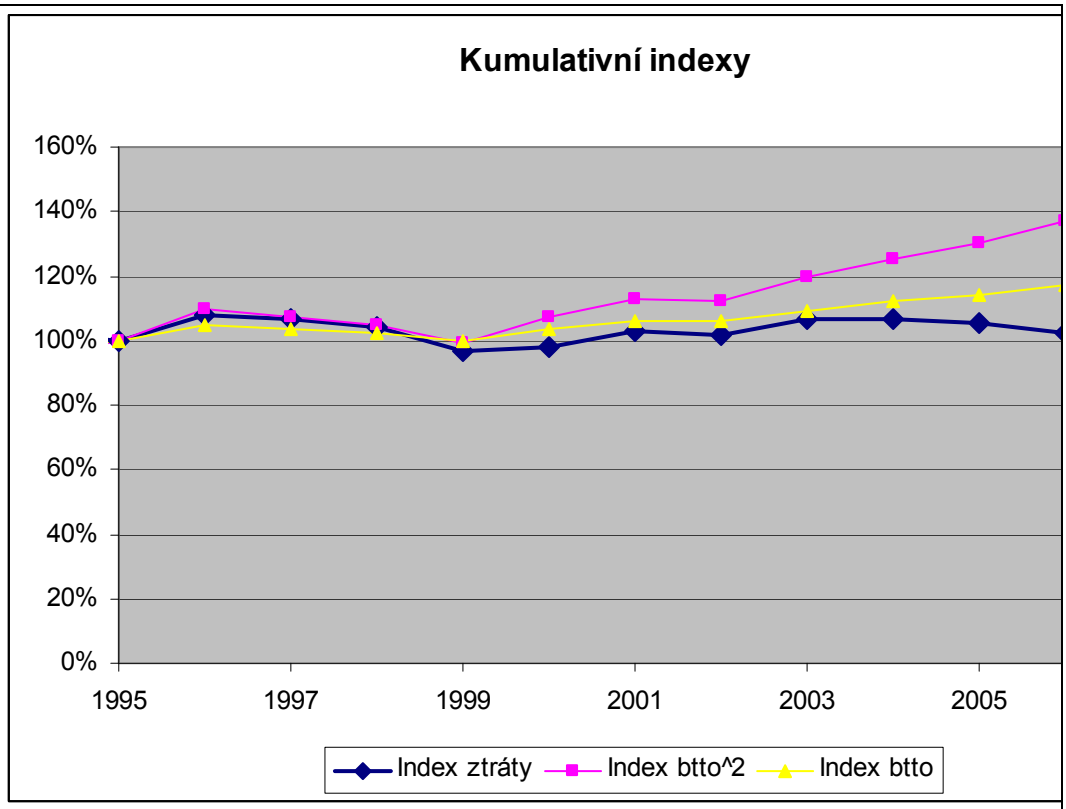
Basis of calculation	Detailed statistical documentation that could serve as a basis for the calculation of expected savings is not currently available. Therefore, the amount of savings cannot be determined by calculation, only by an expert estimate by reference to certain literary works, energy audits, etc. In addition, part of the resulting savings will be included in other measures. For example, with heat, savings from reduced losses in internal distribution systems are included in the measure relating to the energy performance of buildings, and considerable efforts have been channelled into improving the insulation of external heat piping recently. The contribution in the industry is included in Measure 3.2 on the OPEI. Therefore, at this stage of AP preparation, the contribution by this measure to energy savings in heat distribution is considered to be zero.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	In electricity distribution systems, there is savings potential in transmission and distribution networks because they are owned by organizations not covered by the emissions trading scheme.

From ERO statistics:

Year	Domestic gross consumption [GWh]	Losses [GWh]
1985	57 445	3 914
1986	58 787	3 942
1987	60 857	4 109
1988	61 518	4 062
1989	62 349	4 075
1990	61 866	3 996
1991	57 998	3 811
1992	56 257	3 860
1993	56 778	4 793
1994	58 260	4 660
1995	61 265	4 768
1996	64 254	5 154
1997	63 410	5 088
1998	62 651	4 953
1999	61 092	4 627
2000	63 450	4 683
2001	65 108	4 910
2002	64 872	4 858
2003	66 992	5 087
2004	68 616	5 084
2005	69 945	5 027
2006	71 657	4 885



Cumulative indices

- loss index
- gross2 index
- gross index

(The figures prior to 1995 are unusable.) Since 1999, the cumulative index of the growth in losses has consistently been lower than the index of the growth in gross consumption and its square. This means that electricity losses are rising at a slower pace than the growth in consumption.

Emissions trading excludes

- ČEZ
- major sources
- losses in transformers and distribution systems of excluded industrial enterprises

Not excluded!:

- ČEPS
- REAS

this means that savings apply to most losses in the EHV and HV networks (belonging to ČEPS and REAS). Estimated savings will cover **85%** of the total electricity losses.

Savings are estimated from fictitious losses – as though losses increased at the same rate as gross consumption (the square would be more correct, but then we would arrive at numbers that are too big).

[GWh]	1999	2000	2001	2002	2003	2004	2005	2006	Average
fictitious losses	4 627	4 806	4 931	4 913	5 074	5 197	5 298	5 427	
actual losses	4 627	4 683	4 910	4 858	5 087	5 084	5 027		

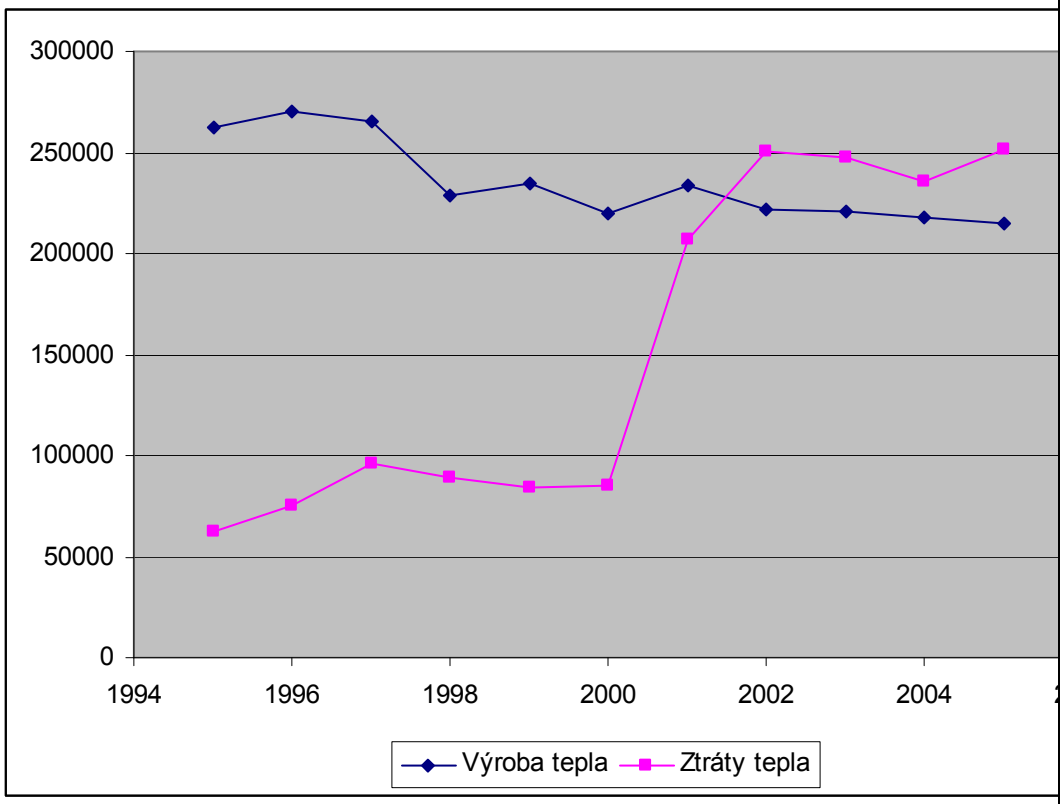
	4 885						
Difference (saving)	0	123	21	55	-13	113	271
	542						
Year-on-year gain in savings)			123	-101	34	-68	126
	158	271	77				
65% of year-on-year gain in savings							

The estimated annual savings are 50 GWh, i.e. **180 TJ**.

Heat

From CSO statistics:

[TJ]	1995	1996	1997	1998	1999	2000	2001	2002	2003
	2004	2005							
Heat production	262810	270258	264894	229183	234699	219783	234104	221495	
	220346	217708	215142						
Heat losses	5222	6232	8022	7407	7015	7115	17226	20901	20635
	19604	20992							



- Heat production
- Heat losses

Unlike electricity, most district heat distribution systems belong to companies excluded from the emissions trading scheme. Savings will be quantified by reference to losses in residential buildings, services, agriculture and certain industrial enterprises.
There is nothing to serve as a basis here. The statistics are quite meaningless and, moreover, apply only to losses at the base of the customer's building. They do not include losses in internal distribution systems. Nor is it possible to identify what parts of long-distance pipelines and distribution systems belong to the emissions trading scheme. The of the measure in relation to heat distribution systems in

	industry is included in Measure 3.2 on the OPEI. Therefore, at this stage of AP preparation, the contribution by this measure to energy savings in heat distribution is considered to be zero. **The benefits of Measure 7.5 can therefore be appraised by an expert estimate at approximately 180 TJ/year, and benefits in individual periods** Benefits in PJ 2008–2010 2011–2013 2014–2016 0.55 0.55 0.5

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	50 GWh/year 180 TJ/year.

Approach to the calculation of savings for future years	Benefits (in PJ) in individual periods are expected as follows: 2008–2010 2011–2013 2014–2016 0.55 0.55 0.5

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	444 GWh/year 1600 TJ/year

TITLE OF THE MEASURE	7.7 The MIT and ČSOB rotating fund for the financing of energy saving projects

Basis of calculation	The basis of the calculation is data from the periodic evaluation reports submitted, pursuant to a contract between ČSOB and the MIT, by the bank by reference to an ex-post evaluation. This evaluation was carried out until 2004 (2005) for completed projects, and data for the evaluation were drawn directly from borrowers, based on invoiced consumption, etc. Therefore, the savings achieved are evaluated by project type very reliably. Further information comprises the average rate of annual investment from the Phare fund in 2006 and 2007 and the potential turnover of funds when considering a maturity of 10 years. Fund resources account for a third of total loan amounts. In the Czech Republic, a detailed evaluation of the effectiveness of the Phare fund is carried out for the entire period from 1998 to 2009. The result will be known at the end of November 2010.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The estimate is based on the forecast annual amount of loans (loans of CZK 50 million/year) for investments in energy saving measures and the expected benefits of those investments (the capital intensity varies greatly depending on the type of projects and the sector, ranging from 1 190 CZK in industry to 8 000 CZK/GJ in households (insulation of prefabricated buildings). In recent years, the fund's resources have mainly been invested in the comprehensive thermal insulation of apartment buildings. In the calculation of the benefits, we considered an annual investment of CZK 50 million, with capital intensity to achieve savings of 3 400 CZK/GJ from 2008 to 2013, and with capital intensity of 3 000 CZK/GJ during the period from 2014 to 2016.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	4.3 GWh 15 TJ

Approach to the calculation of savings for future years	Annual investment of CZK 50 million in energy saving projects, the capital intensity to achieve a saving of 1 GJ in 2009–2013 is CZK 3 400; in the final (third) AP the intensity is 3 000 CZK/GJ (loans for EPC companies, for industry, not just the thermal insulation of apartment buildings).

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	40 GWh/year 140 TJ/year

TITLE OF THE MEASURE	7.8 Promotion of energy efficiency under other Operational Programmes (especially the OPE)

Basis of calculation	The expected total annual savings in 2016 are calculated from data on the potential benefits of investments under the Operational Programme Environment in areas of intervention 2.1, 2.2, 3.2, and under the Operational Programme Prague – Competitiveness. The benefits were calculated solely on the basis of investment costs, already available and expected in the future, to achieve savings under the OPE, area of intervention 2.3. The benefits of other programmes are a rough estimate.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	Based on the allocation for each area of intervention within the Operational Programme Environment, and other minor benefits under the Operational Programme Prague – Competitiveness. We assume that total allocations for projects with energy saving benefits will be EUR 740 million under the OPE and EUR 40 million under other programmes. The expected annual savings in 2016 are calculated from data on the potential benefits of investments under the Operational Programme Environment in area of intervention 3.2, where evaluations of specific projects are carried out. It is expected that a cost of CZK 14 000 is required to save 1 GJ, with a 40% grant. The benefits of other programmes are an estimate, which assumes IPO, OPPC and ROP allocations to energy efficiency projects amounting to EUR 40 million in the 2007–2013 programming period, with capital intensity of CZK 20 000 to save 1 GJ under these programmes. Savings achieved under the OPE are then calculated at 918 GWh, and 35 GWh under other programmes. This is a very conservative estimate.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	0 GWh 0 TJ The actual implementation of projects began in 2008, so the benefits are calculated only for the period after 2008.

Approach to the calculation of savings for future years	For three-year periods of the first and second APs – in 2013 the principle of N+2 is applied (i.e. funds for programme implementation will be used even in 2015). We expect the life of the measure to be longer than nine years.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	952 GWh/year 3,428 TJ/year

TITLE OF THE MEASURE	7.9 State programmes on the promotion of energy savings and the utilization of renewable energy sources

Basis of calculation	The estimate of the benefits of the measure – the continuation of the SP in 2008–2016 – was based on an evaluation of the benefits of programmes already implemented in the years 2000 to 2005. Only Parts A and B of the State programme were evaluated, without the benefits of programmes operated by other ministries. The calculation drew on data from the managers of both parts of the SP, i.e. the Czech Energy Agency and the State Environmental Fund, their annual reports, questionnaires and the document "Updated projections of greenhouse gas emissions", published by the Ministry of the Environment. Following the abolition of the CEA, the manager has been the MIT, the programme title is abbreviated to EFFECT.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The actual calculation was based on data presented by the CEA and SEF 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**. Following an evaluation of the benefits of only Part A of the programme in 2008, the saving was nearly 95 TJ, confirming the sufficient accuracy of the estimate originally made, which can continue to be used.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	64.7 GWh 233 TJ

Approach to the calculation of savings for future years	It is expected that the State programme will be regularly be announced in the coming years (2009–2016); the amount allocated to support investment measures will be reduced slightly every year – see the following table: 2009 2010 2011 2012 2013 2014 2015 190 221 211 204 198 194 192 191 190

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	509 GWh/year 1834 TJ/year

TITLE OF THE MEASURE	7.10 Support for the dissemination of information and the promotion of energy savings by the State

Basis of calculation	In the framework of State Programme on the Promotion of Energy Savings and the Utilization of Renewable Energy Sources for 2008 – Part A (EFFECT Programme), funds were spent in the areas of intervention energy advice 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 were assisted. The measure has an impact on all sectors (except for companies involved in the emissions trading scheme and the armed forces), with average annual energy consumption in 2002–2006 amounting to 220 462 TWh.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	According to the evaluation of the State Programme on the Promotion of Energy Savings and the Utilization of Renewable Energy Sources for 2008 – Part A (EFFECT Programme 2008), projects with direct energy savings reported a level of approximately 360 CZK/GJ in terms of grant expenditure to achieve an annual saving. 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 GWh.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	11 GWh 39.6 TJ

Approach to the calculation of savings for future years	We also assume that the strategy proposed for the 2011–2016 period will make the influence on savings so much more efficient that the same level of spending will result in up to 50% greater savings, i.e. 16 GWh per year.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	16 GWh/year 57.6 TJ/year

TITLE OF THE MEASURE	7.11 Application of the Ecodesign Directive

Basis of calculation	Teams of experts, under the guidance of the Commission, are currently drawing 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).

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	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. Benefits in PJ:		
	2008–2010	2011–2013	2014–2016
		300 TJ	400 TJ

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	Savings will begin to accrue in 2009.

Approach to the calculation of savings for future years	Benefits in PJ:		
	2008–2010	2011–2013	2014–2016
		300 TJ	400 TJ

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings	194 GWh 700 TJ

expected in 2016	

TITLE OF THE MEASURE	7.12 The effect of the introduction of environmental tax reform on energy savings

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. To estimate the reduction in consumption, a study by Ščasný and Brůha (2007) was used which models the expected effects[2] 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: o a reduction in coal consumption by 1.1% o an increase in natural gas consumption by 0.1% o a reduction in heat consumption by 2.7% o 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.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	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 1 530 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 TWh in 2010.

[2] Ščasný M, Brůha J (2007), Predikce sociálních a ekonomických dopadů návrhu první fáze ekologické daňové reformy České republiky, (Prediction of Economic And Social Impacts of the First Phase of Environmental Tax Reform in the Czech Republic.) COŽP UK, April 2007

	However, we do not include this contribution in the overall benefits because it is already included in other measures.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	0 GWh 0 TJ

Approach to the calculation of savings for future years	The calculation of savings for future years is based on the recommended target of achieving at least a fourfold effect compared to the first stage of environmental tax reform. A detailed evaluation will be possible after the submission of specific draft variations by the Ministry of the Environment. At present, we are waiting to see whether the revision of Directive 2003/96/EC on the taxation of energy products and electricity will be approved. However, this reduction, as with the first stage of ETR, is not included because it is already incorporated into other measures.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	GWh/year 4080 TJ/year

TITLE OF THE MEASURE	7.15 Use of ambient energy for heat supply and hot water supply via heat pumps

Basis of calculation	The calculation is based on a statistical survey conducted by the Ministry of Industry and Trade and a CEI survey on heat pumps. Source: Renewable Energy Sources – Heat Pumps in 2008, Survey Results, MIT, August 2009 Report on the potential of renewable sources in the Czech Republic and opportunities for the use thereof up to 2050. Final report on the implementation of project VaV/320/10/03 "Production of a forecast of RES use in the Czech Republic up to 2050", November 2004. The basis for the calculation was the information that approximately 1 800 heat pumps with an installed capacity of 25 MW were installed in 2005, corresponding to energy use of 120 TJ. The trend of heat pump installation accelerated; in 2008, there were approximately 4 000 new heat pumps with capacity of 55 MW.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The contribution of heat pumps is considered after the deduction of the input power. Future developments were characterized by the continued trend of heat pump installation up to 2005; a conservative estimate of 60% of the value of 2005 was made for 2008, bearing in mind changes in electricity prices for heat pumps, an increase in the VAT rate (from 5% to 9%) and the gradual onset of support programmes. It is expected that the number of newly installed heat pumps will approximately double every three years. The trend from 2005 to 2008 confirms this.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	20 GWh 72 TJ (i.e. 240 TJ in the 2008–2010 period)

Approach to the calculation of savings for future years	As of 2009, more significant annual growth is expected as programmes based on the Structural Funds enter into full swing and the requirements of the Directive on the Energy Performance of Buildings regarding RES use in buildings take effect. The total installed capacity of heat pumps for 2016 is 250 MW, which corresponds to a contribution of 1 680 TJ from the operation of heat pumps.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	467 GWh 1680 TJ

TITLE OF THE MEASURE	7.16 Use of solar thermal energy for heat supply and hot water supply

Basis of calculation	The calculation is based on a statistical survey conducted by the Ministry of Industry and Trade on solar collectors. Source: Renewable Energy Sources – Solar Collectors in 2008, Survey Results for 2005, International Comparison, MIT, August 2009. Report on the potential of renewable sources in the Czech Republic and opportunities for the use thereof up to 2050. Final report on the implementation of project VaV/320/10/03 "Production of a forecast of RES use in the Czech Republic up to 2050", November 2004. The base year for the calculation was the statistical value of the supply of solar collectors in 2005, i.e. 15 550 m^2, equivalent to annual heat supply of 27.9 TJ. Between 2003 and 2005, the surface area of collectors supplied increased by 50% each year.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The calculation of the value for 2008 envisaged the continuing pace of installation of collectors from 2003–2005, reaching an annual value of supplied surface area of 30 000 m^2, which corresponds to approximately 54 TJ. In 2009, this trend was confirmed. For the 2008–2016 period, increases in installed area by 70% are expected every three years.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	15 GWh 54 TJ (a total of 270 TJ in the 2008–2010 period)

Approach to the calculation of savings for future years	To determine the base and rate of penetration of solar collectors on the market, recent developments were used as a basis. In terms of future developments, the basis was the RES potential defined in the MoE R&D study on RES from 2004. It is expected that the measures will contribute 25% to the realization of this potential, in the amount of 6 500 TJ.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	400 GWh 1440 TJ

TITLE OF THE MEASURE	7.18 The impact of tightening standards in the thermal protection of buildings on their energy efficiency

Basis of calculation	▪ Czech technical regulation ČSN 73 0540 ▪ Decree No 150/2001 ▪ Decree No 151/2001 ▪ Decree No 152/2001 ▪ Decree No 194/2007 ▪ 2001 Population and Housing Census ▪ Expected increase in dwellings between 2008 and 2010 ▪ Expected developments in technical regulations and legislation

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The calculation takes into account the forecast increase in dwellings – see the table below (broken down into flats and houses), the estimated size of flats and houses (floor area) and average specific values of heat consumption for heating in flats and houses – these values are based on normative requirements and other general technical and legislative regulations – the values of the heat transfer coefficient of cooled structural elements reported in the Czech technical standard ČSN 73 0540 were last tightened in 2007, and the technical regulation was updated in 2005. The difference between the original standard of 1998 and the new standard, in terms of heat consumption per m^2 of floor area, was used to calculate the heat savings for heating in 2008 and subsequent years. We quantified the annual amount of savings achieved due to stricter requirements as 466 TJ.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	129.3 GWh (in 2008–2010: **388 GWh**) 466 TJ (in 2008–2010: **1398 TJ**)

Approach to the calculation of savings for future years	Based on the current annual increase in new housing in the past ten years, the forecast increase in dwellings and floor area up to 2010 was estimated; further tightening of technical regulations and legislative measures that have an impact on energy consumption in buildings is recommended. The heat savings achieved in heating correspond to the difference between the average specific values of energy consumption for heating purposes as reported for the second half of the 1990s and the specific values reported now. The forecast growth in dwellings, in the form of both houses and apartment buildings, is expressed in the following table. All other data used are provided in the attached calculation file.

	2008	2009	2010
Dwellings in houses	11 397	13 302	13 472
Dwellings in apartment buildings	7 720	10 722	11 526

	Dwellings in other buildings 15 730 18 966 19 391 The savings achieved in new housing construction (at 108.8) were augmented by savings achieved in other construction – as a percentage of the savings in new construction (7%), and savings due to the modernization of housing, calculated as 5% of the savings achieved in new housing construction.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	1 165 GWh 4 195 TJ

TITLE OF THE MEASURE	7.19 New requirements on the energy performance of buildings

Basis of calculation	▪ Expected increase in dwellings and their floor area between 2010 and 2016 ▪ Expected developments in technical regulations and legislation – impact on the energy performance of buildings ▪ Expected influence of other structures and modernization

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The calculation takes into account the increase in dwellings – see table

	2010	2011	2012	**2013**	2014	2015	**2016**
Dwellings in houses	13 627	12 965	11 775	11 246	10 849	10 981	11 378
Dwellings in apartment buildings		12 833	9 923	9 923	7 938	9 658	11 246
Dwellings in other buildings	7 006	7 414	7 229	7 631	7 527	7 760	8 000

This increase is based on construction developments in the past 10 years. New dwellings were divided into apartment buildings and houses. The sizes of the floor areas of dwellings (houses and apartment buildings) were determined and the average specific values of energy consumption (currently applicable requirements of standards and legislation) were set. The average specific energy consumption values valid from 2010, based on the tightening of existing values of the heat transfer coefficient to reflect the current recommended values.

The difference in the specific values (current as at 2005 and newly introduced in 2010) per m^2 was used to calculate the resulting energy savings.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	None expected. The measure will enter into force in 2011 and will also be valid in subsequent years.

Approach to the calculation of savings for future years	Based on experience to date, where the introduction of new standards and requirements is reflected after several years' delay. The calculation included the expected impact of new specific values for newly constructed apartment buildings. The calculation for 2011 does not anticipate a change in requirements; in 2012, the tightening of the requirement regarding specific values will be reflected in half of the dwellings built. In subsequent years, we anticipate the 100% impact of tighter requirements until 2016. The savings achieved due to the new requirements in new housing construction (apartment buildings and houses) were augmented by savings achieved in other construction – as a percentage of the savings achieved in new construction (5% for the period from 2011 to 2013, 8% for the period from 2014 to 2016). The influence of the modernization of residential buildings (apartment buildings and houses) was also taken into account. The benefits of modernization were calculated as a percentage of the

	savings achieved in the residential sector (6% of the savings for the period from 2011 to 2013, 5% for the period from 2014 to 2016).

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	737 GWh 2 654 TJ

TITLE OF THE MEASURE	7.20 The effect of distributed cogeneration

Calculation method	Since 2001, Act No 406/2000 on energy management, as amended, and its implementing legislation have been in force in the Czech Republic; since 2001, the Energy Act (Act No 458/2000), as amended, and its implementing legislation have been in force. They support both CHP and the achievement of minimum efficiency in the generation of power and heat. However, these measures do not yet include technology based on micro-production, which can be used both in households and in the tertiary sector. Existing regulations concern CHP with piston motors of an output exceeding 90 kW and, in respect of other technologies, with a capacity of over 200 kW. In the future, the supplementation of this system for the support of CHP and minimum energy efficiency to include technology based on micro-production is being considered. In the EU, such measures are expected to be adopted in the years 2007–2009; they should cover both the prescribed minimum level of efficiency and the promotion of priority network connections, permissible levels of emissions of methane, and fiscal support. In the Czech Republic, a time lag of one year is expected before they are adopted, which means that the benefits can be anticipated as of 2011.

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	The measure will enter into force in 2011 and will also be valid in subsequent years.

Approach to the calculation of savings for future years	Detailed statistical documentation which could form the basis for the calculation of expected savings is not currently available; the principles, technical parameters and support system under which the measures will be introduced in the EU and, subsequently, in the Czech Republic, are not known. Therefore, the amount of savings cannot be calculated or estimated, and the benefits will be determined in 2012 in connection with the adoption of the legislation and support system.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	None estimated.

TITLE OF THE MEASURE	7.21 The promotion of cogeneration

Basis of calculation	Detailed statistical documentation which could form the basis for the calculation of expected savings is not currently available (overview and efficiency of production facilities which are not covered by emissions trading, all types of fuel consumption, private consumption, network supply, an adequate share of losses in networks, and energy supplied to final consumers). Therefore, the amount of savings cannot be determined by calculation, only by an expert estimate by reference to certain literary works, energy audits, etc. It is estimated that the category of the generation of power and heat in CHP, which falls under these measures, includes sources with a capacity of up to 1 MW and a small proportion of sources up to 5 MW i.e. which do not fall under the ETS. An optimistic estimate based on statistics of installed capacity in the years 2000 to 2004 shows that the annual increase in newly installed capacity will be 3 MW. Assuming annual utilization of 3 500 hours and considering that, unlike the average 37% efficiency of electricity generation in system power stations, CHP generation will achieve efficiency of 70%, the expected annual savings are calculated at 50 TJ (rounded).

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	

Installed capacity [MW]		2000	2001	2002	2003	2
> 50 MW	SPP	3567.3	3567.3	3560	3629.5	3
	GCPP	68.7	68.7	68.7	68.7	6
	CCPP	535	535	539	537.7	5
5 - 50 MW	SPP	723.55	502.55	529.56	473.51	4
	GCPP	17.7	31.45	38.71	45.34	5
	CCPP	36	51.4	55.3	48.8	3
1 - 5 MW	SPP		0	22.25	17.9	2
	GCPP		8.86	64.33	36.73	4
	CCPP		0	0	0	0
< 1 MW	SPP				4.8	4
	GCPP				37	3
	CCPP				0	0
Year-on-year increase < 5 MW				8.86	77.72	9

SPP – steam power stations
GCPP – gas and combustion power plants
CCPP – gas-fired combined cycle power plants

Sources of up to 1 MW and a small proportion of sources up to 5 MW will not be in the emissions trading scheme. Based on the above table, an annual increase in installed capacity by 3 MW is estimated. We assume that increases in small sources will not entail the mono-production of electricity.
Assuming

	• annual source utilization of 3 500 hours • systemic efficiency of electricity production from fuel of 37% • the same heat production (cogeneration replaced a boiler) • cogeneration efficiency in the generation of electricity of 70% the annual savings of fuel in electricity production can be estimated at **50 TJ**. The calculation procedure is documented by the following two tables. Installed capacity [MW] 3 Annual utilization [h] 3,500 Annual generation of electricity [MWh] 3 ×3 500 =10 500 Annual generation of electricity [TJ] 10 500 × 3.6 = 37 800 Efficiency of the generation of electricity Consumption of heat in fuel [GJ] System 0.37 37 800 / 0.37 = 102 162 CHP 0.70 37 800 / 0.70 = 54 000 **Energy savings in fuel** **102 162 – 54 000 = 48 162 ≈ 50 000**

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	14 GWh/year 50 TJ/year

Approach to the calculation of savings for future years	The appraisal of savings for subsequent years is a simple multiple of annual savings and the number of years.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	126 GWh/year 450 TJ/year

TITLE OF THE MEASURE	7.22 Targeted greening of pollution sources

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.

Description of the sources on which the calculation is based; specification of the information source; indication of the calculation base value

Calculation method	The estimate is based on the existing benefits. Between 2008 and 2010, we expected to see the continuing benefits of source gasification at a level of 32 TJ/year, based on the calculated benefits of recent years (1/5 of the benefits as at 2004).

Definition of the calculation formula (or specification of the method of calculation), indicating the actual calculation values

Value of annual energy savings expected in 2008	9 GWh/year 32 TJ/year

Approach to the calculation of savings for future years	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.

Description of the calculation and approach to the calculation for future years (2009–2016)

Value of annual energy savings expected in 2016	62 GWh/year 224 TJ/year