3rd National Energy Efficiency Action Plan (NEEAP) 2014 for the Federal Republic of Germany

pursuant to Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency

Contents

List of Abbreviations

AGEB	Working Group on Energy Balances *[Arbeitsgemeinschaft Energiebilanzen]*
ASEW	Working Group for the Rational Use of Energy and Water *[Arbeitsgemeinschaft für sparsame Energie- und Wasserverwendung]*
AtG	Atomic Energy Act *[Atomgesetz]*
AVV-EnEff	General administrative regulation on the procurement of energy-efficient products and services *[Allgemeine Verwaltungsvorschrift zur Beschaffung energieeffizienter Produkte und Dienstleistungen]*
BAFA	Federal Office of Economics and Export Control *[Bundesamt für Wirtschaft und Ausfuhrkontrolle]*
BfEE	Federal Agency for Energy Efficiency *[Bundesstelle für Energieeffizienz]*
BImSchV	Regulation to implement the Federal Immission Control Act *[Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes]*
BIP/GDP	Gross domestic product *[Bruttoinlandsprodukt]*
BMUB	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety *[Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit]*
BMVI	Federal Ministry for Transport and Digital Infrastructure *[Bundesministerium für Verkehr und digitale Infrastruktur]*
BMWi	Federal Ministry for Economic Affairs and Energy *[Bundesministerium für Wirtschaft und Energie]*
DIHK	Association of German Chambers of Industry and Commerce *[Deutscher Industrie- und Handelskammertag]*
EDL-G	Act on Energy Services and other Energy Efficiency Measures *[Gesetz über Energiedienstleistungen und andere Energieeffizienzmaßnahmen]*
EDL-RL	Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services
EED	Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC
EEG	Renewable Energy Act *[Erneuerbare-EnergienGesetz]*
EEWärmeG	Renewable Thermal Energy Act *[Erneuerbare-Energien-Wärmegesetz]*
EC	European Community
EMAS	Eco-Management and Audit Scheme
EnEG	Energy Savings Act *[Energieeinsparungsgesetz]*
EnEG	Act on the Conservation of Energy in Buildings *[Gesetz zur Einsparung von*

	Energie in Gebäuden]
EnergieStG	Energy Tax Act *[Energiesteuergesetz]*
EnEV	Energy Savings Regulation *[Energieeinsparverordnung]*
EnStatG	Energy Statistics Act *[Energiestatistikgesetz]*
EnWG	Energy Management Act *[Energiewirtschaftsgesetz]*
ESB	Energy refurbishment roadmap for Federal Government properties *[Energetischer Sanierungsfahrplan Bundesliegenschaften]*
EU	European Union
GHD	Commerce, trade and services *[Gewerbe, Handel, Dienstleistungen]*
GWB	Unfair Competition Act *[Gesetz gegen Wettbewerbsbeschränkungen]*
IED	Industrial Emissions Directive
IREES	Institute for Resource Efficiency and Energy Strategies *[Institut für Ressourceneffizienz und Energiestrategien GmbH]*
KfW	Reconstruction Loan Corporation *[Kreditanstalt für Wiederaufbau]*
SMEs	Small and medium-sized enterprises
KrWG	Recycling Act *[Kreislaufwirtschaftsgesetz]*
kWh	Kilowatt-hour
CHP	Combined heat and power (cogeneration)
KWKG	Cogeneration Act *[Kraft-Wärme-Kopplungsgesetz]*
LEK	Building energy concept *[Liegenschaftsenergiekonzept]*
MAP	Market Incentive Programme for Renewable Energies *[Marktanreizprogramm zur Förderung der Nutzung Erneuerbarer Energien]*
MKS	Mobility and fuel strategy *[Mobilitäts- und Kraftstoffstrategie]*
Mtoe	Million tonnes crude oil equivalent
MW	Megawatt
MWh	Megawatt-hour
NEEAP	National Energy Efficiency Action Plan
NFA	Net floor area
PHH	Private households
PJ	Petajoule
Pkm	Person-kilometre
RL	Directive [Richtlinie]
SPA	Peak equalisation *[Spitzenausgleich]*
SpaEfV	Peak Equalisation Efficiency Systems Regulation *[Spitzenausgleichs-Effizienzsystemverordnung]*

I. Introduction

The European Union (EU) has set itself the goal of reducing EU primary energy consumption by 20 % by 2020, compared to current projections. A key instrument to help attain this goal is the EU Energy Efficiency Directive (2012/27/EU), or EED, which entered into force on 5 December 2012. The Directive included further cross-sectoral provisions to increase energy efficiency at European level, to be transposed into national law by 5 June 2014, or in some cases earlier.

When the new Directive was adopted, the EU Directives on energy efficiency and energy services (2006/32/EC – ESD) and cogeneration (2004/8/EC) were repealed and other Directives (2009/125/EC and 2010/30/EU) were amended.

In this National Energy Efficiency Action Plan (NEEAP) for 2014, the German Government is complying with its reporting obligations under Article 24(2) in conjunction with Annex XIV Part 2 of the Directive and also providing details of the present status and successes of energy efficiency policy in Germany. The NEEAP 2014 documents the efforts made and progress achieved in energy efficiency policy in Germany in the past few years.

Even before the Directive was adopted, Germany had a wide range of instruments for increasing energy efficiency and is one of the few industrialised countries to have managed a visible decoupling of energy consumption and economic growth. The intention is to build on this positive development in the future. The increase in energy efficiency, with the associated energy savings, is a key pillar of the ‘energy transition’ [Energiewende] in Germany.

In its communication of 11 June 2013, in application of Article 3 of the Directive, the German Government informed the European Commission of its indicative national energy efficiency target, referring also to the significant additional contribution towards the attainment of the European energy efficiency target being made by Germany in implementing the energy concept (reducing primary energy consumption by 20 % by 2020 and 50 % by 2050 compared to 2008).

It is therefore a major concern of the German Government to create the right incentives for citizens to save energy. This also opens up new markets and business areas for efficiency technologies and services.

The structure and content of the NEEAP 2014 are based on the template for drawing up an NEEAP, provided by the Commission as a guide, and on the reporting requirements set out in the EED.

Along with the indicative national energy efficiency target for 2020 already notified pursuant to Article 3 EED, Chapter II contains summaries of the primary and final energy savings that may be expected in Germany based on the position today. It also provides an updated overview of the results in relation to attainment of the savings targets for energy consumption set out in Article 4 of the Energy Services Directive (2006/32/EC). There is also a description of the alternative measures adopted under Article 7(9) EED.

Chapter III provides an overview of the current status and expected future development of the market for energy services in Germany. It notes that Germany has a vibrant and growing market for energy services and that this will continue to develop in the future. This market is made up of many different market segments (e.g. contracting, energy audits, energy management, building renovations, metering services) and providers (e.g. energy companies, engineering and architectural firms, trades people) and is characterised by lively competition.

Finally, Chapter IV is concerned with specific reporting requirements on other aspects of the EED, including the report on progress in assessing the potential for the application of high-efficiency cogeneration and efficient district heating and cooling.

II. Measures and energy savings in Germany

Even before the EED was adopted, Germany had a wide range of instruments for increasing energy efficiency, and is one of the few industrialised countries to have managed a visible decoupling of energy consumption from economic growth. By implementing the Directive and its national energy efficient targets, Germany is therefore making a significant contribution to achieving the European energy efficiency target as well. The following sections within Chapter II document the efforts made and progress achieved in Germany in the past few years.

Indicative national energy efficiency target for 2020 as required by Article 3(1) EED

According to Article 24(2) in conjunction with Annex XIV Part 2 no 1 EED, the NEEAP must include the indicative national energy efficiency target for 2020 as required by Article 3(1) EED.

In its letter of 27 October 2010 under the 'Europe 2020' strategy, the German Government sent the European Commission an indicative national energy efficiency target and noted that:

'The Federal Republic of Germany is assuming an average annual increase of 2.1 % in macroeconomic energy productivity from 2008 to 2020. Assuming an annual increase of 1.1 % in gross domestic product (GDP), this produces a reduction in the energy-related share of primary energy consumption from 314.3 million tonnes crude oil equivalent (Mtoe) in 2008 to 276.6 Mtoe in 2020. The attainability of this reduction depends inter alia on the actual development of GDP and other factors beyond our control, such as storms and changes in stock, along with the resulting composition of the German generation system in the market.' This corresponds to a reduction in final energy consumption from 220.7 Mtoe in 2008 to 194.3 Mtoe in 2020.

The Federal Government confirmed this report from 2010, which was produced on the basis of Eurostat figures, in a letter dated 11 June 2013. Furthermore, in line with its national energy concept and 2013 National Reform Programme, by implementing the ambitious national targets, i.e. reducing primary energy consumption from 2008 levels by 20 % by 2020 and by 50 % by 2050, Germany is contributing significantly to achieving the EU's efficiency targets.

Estimate of projected total primary energy demand pursuant to Article 24(2) in conjunction with Annex XIV Part 1 EED:

Article 24(2) sentence 2 EED states that the NEEAP should include updated estimates of projected total primary energy consumption in 2020, as well as the estimated total consumption in the sectors of Industry, Transport, Households and Trade.

For an estimate of the projected primary energy consumption in Germany in 2020, please refer to the ‘Energy scenarios 2011’ (Prognos/EWI/GWS 2011), which form the basis for the energy transition in Germany (base year: 2008). Based on the national energy statistics, this puts energy-related primary energy consumption (PEC) at 250.1 Mtoe in 2020 (PEC including non-energy-related consumption is 273.8 Mtoe). Based on the figures from the ‘Energy scenarios 2011’, final energy consumption by private households in 2020 is estimated at 52.8 Mtoe, for ‘Commerce, trade and services’ (GHD) at 27.2 Mtoe and for Industry at 54.2 Mtoe. Final energy consumption in the Transport sector in 2020 is put at 57.6 Mtoe. These scenarios do not provide differentiated figures for passenger and freight transport.

It should be noted that these estimates of energy consumption in 2020 are based on 2011 expectations of future changes in GDP, which are lower than current projections. The assumed development of prices for EUA emissions certificates is also ahead of the actual market development (2008: EUR 22/tonne, 2020: EUR 18.6–23.3/tonne). These changed expectations will be taken into account in future updates to the energy consumption estimates.

Updated overview of results with regard to the fulfilment of the savings targets for final energy consumption set out in Article 4(1) and (2) of Directive 2006/32/EC

In accordance with Article 24(2) in conjunction with Annex XIV Part 2 no 2(b) EED, the NEEAP 2014 contains an updated overview of results with regard to the fulfilment of the savings targets for final energy consumption set out in Article 4(1) and (2) of Directive 2006/32/EC (ESD) compared to the NEEAP 2011. The required evidence that these indicative savings figures according to Article 4 ESD will still be achieved based on the current status bears no relation to the binding energy saving target under Article 7 EED or other provisions of the EED.

For the specifications on defining the indicative energy-saving values and how to achieve them, please refer to Article 4 in conjunction with Annexes I, III and IV ESD and to the recommendations from the European Commission on measurement and testing methods under the ESD. For a detailed description of the approach to implementing these specifications in Germany, please refer to the NEEAP 2011 and to the methodological accompanying document to the NEEAP 2011.

In the NEEAP 2011, the indicative energy-saving value to be reported for Germany was set by the Federal Government at 748 petajoules (PJ) for 2016, with a power coefficient of 1 (power coefficient 2.5: 995 PJ). These two indicative energy saving values were significantly exceeded in the NEEAP 2011 by the calculated energy savings from implementing the methodological

standards in the ESD.

In the present NEEAP 2014 the results and savings reported in the NEEAP 2011 have been reviewed and updated where necessary. The German Government has availed itself of scientific support from well-known independent institutes (Prognos/Fraunhofer ISI 2014). As a result, Germany will clearly continue to surpass the indicative final energy-saving figure from the ESD.

Overall, with the top-down calculations updated in the NEEAP 2014, energy savings of 2 246 PJ can be made by 2016 with a power coefficient of 1, and 2 688 PJ with a power coefficient of 2.5. For the period 2008–2016, the energy savings amount to 1 253 PJ and for the 'early action' period from 1995–2007 (also attributable), they come to 993 PJ. The calculated savings are three times higher than the indicative energy-saving value from the ESD, which would be attained even without considering the savings from the 'early action' period.

In assessing these results, it should be borne in mind as before that the savings calculated by the top-down method are theoretical values representing relative energy savings. They are also not attributable to politically inspired instruments and programmes alone, but also to mainly market-induced technical progress. It is also clear from this that market and technical progress as well as policy instruments have a major bearing on increased energy efficiency.

By way of comparison, the updated calculation for energy savings estimated by bottom-up methods for the individual spheres of action up to 2016 in parallel with the top-down indicators gives 810 PJ with a power coefficient of 1 and 1 041 PJ with a power coefficient of 2.5. So, as before, the bottom-up savings alone surpass the indicative energy-saving value and also cover around a third of all top-down savings.

This result underlines the undiminished efforts at government level to increase energy efficiency in Germany, particularly as the many independent measures by regional and municipal bodies and private operators are hardly considered, if at all.

The Federal Government regards these positive findings as an endorsement of its existing energy efficiency policy. They are an important basis for defining far-reaching measures to attain the challenging targets in the national energy concept.

The detailed results regarding the indicative energy saving value under the ESD, with a breakdown of results by sectors and spheres of action, are listed in Annex I.

Significant measures and actions taken towards primary energy savings

Along with an updated overview of the results in terms of attaining the savings targets for energy consumption set out in the ESD, the NEEAP 2014 also contains significant measures and actions undertaken to make primary energy savings in accordance with Article 24(2) in conjunction with Annex XIV Part 2 no 2(a) EED.

This section provides an overview of measures with a major bearing on the development of primary energy consumption in Germany. A distinction is made between measures whereby final energy savings lead to savings in primary energy and other measures that address issues such as distribution losses and efficiency and internal consumption within the transformation sector.

For the measures or packages of measures/actions, estimates of expected savings for 2020 and savings achieved by the time of reporting are provided where available. Also where available, details are listed of other effects/benefits of the measures.

Measures to reduce final energy consumption and the resulting primary energy savings

Every saving in consumption on the final energy side ultimately produces a saving in primary energy as well. Reducing final energy consumption is the goal of a number of policy measures in Germany. A number of these measures are described below, with details of the primary energy savings. The choice of measures is based on a summary opinion from Prognos AG commissioned by the BMWi and the BfEE (Prognos 2013).

The final energy savings are converted into primary energy savings with the aid of energy source-dependent primary energy factors and are based on an opinion from Prognos AG and the Fraunhofer Institute for Systems and Innovation Research (ISI) commissioned by the BfEE (Prognos/Fraunhofer ISI 2014). The calculations have to make assumptions about the proportions of energy saved from the different sources. For the sake of simplicity, we distinguish here between electricity and fuel savings. For simplicity, fuel savings are assessed using a primary energy factor of 1 and electricity savings with a primary energy factor of 2.5. The specifics of renewable energies, district and local heating and the transformation costs for fuels (e.g. refineries, briquette factories) are ignored here. We also assume a constant average efficiency of 40 % across all power stations. This approach is consistent with the use of a power coefficient of 2.5.

To calculate each measure, we have also determined the proportion of electricity in the mix of energy sources saved. Where this was not derivable from the type of measure or an evaluation,

the national usage balances from the Working Group on Energy Balances (AGEB 2014) were used.

These measures can ultimately produce primary energy savings of around 3 099 PJ in the period 2014–2020. For the 'early action' period from 2009 to 2013, the primary energy savings are 1 313 PJ. The detailed results of these calculations, broken down across the individual measures, are listed in Annex II.

Other measures and spheres of action for primary energy savings

There is great potential for savings in primary energy in relation to the efficiency of the transformation sector, which also covers internal consumption within the sector itself. In Germany, a number of policy measures have been in place for some time here; these have combined with ongoing technological innovations in the past to produce substantial savings in primary energy, and will continue to do so in the future. A number of these measures are briefly described below. These are examples, not an exhaustive list.

The European emissions trading system is a measure that addresses thermal power stations with an output of 20 MW_{el} and above and a number of industrial facilities in the transformation sector, including coking plants, refineries and crackers. On the principle of 'cap and trade', the level of greenhouse emissions is restricted at the plant level, while also enabling trading in emission rights. Assigning a monetary value to greenhouse gas emissions – and hence to energy consumption – creates an incentive to increase transformation efficiency. The market-oriented design of the instrument allows a targeted allocation of investments to prevent emissions.

Along with the market-oriented instrument of emissions trading, power stations and industrial facilities in the transformation sector are also subject to regulatory limits laid down in Directive 2010/75/EU on industrial emissions (the IED). Among other things, this governs the approval, operation and cessation of industrial facilities and provides for binding fact sheets on the best available technologies for granting permits for new plants while setting limits for emissions from power stations and large combustion plants. In this way, minimum standards are defined for the efficiency of energy use. In Germany, the IED has been transposed by the amendments to the Federal Immission Control Act *[Bundesimmissionsschutzgesetz – BImSchG]*, the Water Management Act *[Wasserhaushaltsgesetz – WHG]*, the Recycling Act *[Kreislaufwirtschaftsgesetz – KrWG]* and two sets of regulations containing a number of emission limits.

The promotion of cogeneration (combined heat and power – CHP) is another package of measures to increase energy efficiency. A differentiated system of measures addresses CHP at various levels. Among other things, this covers the following areas:

- From a regulatory standpoint, combined heat and power generation is usually
- required for a permit for some industrial facilities (such as waste incineration plants; 17th Federal Immission Control Regulation [BImSchV]) and plants of a certain size (from 50 MW heat output; 13th BImSchV). The conditions for using local and district heating are also created on the demand side (EEWärmeG, tenancy law, EnEV);
- The cost side is affected by exemption from energy tax for high-efficiency CHP plants (Section 53a EnergieStG). There are also funding programmes for various types of investment, such as the KfW programmes 'IKK/IKU energy-related urban renewal — district supply' in the public sector, the market incentive programme to promote measures for using renewable energies in the heating market (MAP), the Mini-CHP programme for small/micro plants and heat networks and the investment support under the CHP Act [KWKG] for heat networks and heat stores;
- On the revenue side, the attractiveness of CHP is improved, for example, by paying a surcharge for electricity generated from CHP and exempting locally generated electricity from the EEG allocation.

With the energy concept from 2010 and the decisions to speed up the energy transition taken in June 2011, the German Government has given a major impetus to the future structure of energy generation, particularly through the decisions to pull out of nuclear power and expand the use of renewable energies. In practical terms, the 2011 amendment to the Atomic Energy Act (AtG) caused eight nuclear power plants to be shut down immediately (or not started up again after the moratorium of 14 March 2011) and reduced the lifetimes of the remaining nuclear plants. From 2022 onwards, no more electricity will be generated from nuclear power. At the same time, the German Government is forcing the expansion of renewable energies with an extensive package of measures, including the Renewable Energy Act (EEG), the KfW programmes 'Offshore wind energy' and 'Renewable energies – standard/premium', the market incentive programme to promote the use of renewable energies in the heating market and accompanying regulatory measures. Because of the theoretical efficiency of 100 % attributed to generation facilities using renewable energy sources, squeezing out plants with lower efficiency levels (nuclear power stations, for example, have a theoretical efficiency of 33 %), the policy decisions underlying this development also lead directly to significant primary energy savings.

There is further potential for savings in primary energy by reducing distribution losses, for

example. In the context of the energy balance, these distribution losses relate to flue and pipe losses with electricity, gas and district heating.[1] Any decrease in these distribution losses also helps to reduce primary energy consumption.

The networks of the pipe and cable-based energy providers are state-regulated under the Energy Management Act (EnWG, Part 3 'Regulation of network operation'). This also lays down rules for the production of network development plans. As well as meeting the goal of an adequate, technically secure and stable expansion of the networks, cost/benefit requirements for investment and operation also play a major role in these plans. However, profitable operation of the networks also implies a responsible approach to distribution losses.

In this area, one example of ways of addressing distribution losses through state regulation is the fee structure laid down in the Electricity Network Fees Regulation *[Stromnetzentgeltverordnung – StromNEV]*. Section 10 StromNEV stipulates that distribution losses should be posted to a separate cost item. This makes the costs of distribution losses visible to all,[2] so there is an incentive to reduce this cost item further. Section 18 StromNEV also creates a financial incentive for local generation plants to avoid feeding into downstream networks where they are not already receiving payments under the EEG or the KWKG. Where local producers feed into a distribution network, they receive a fee from the operator equivalent to the network charges at upstream network or transformation levels avoided by the feed-in. This prevents unnecessary losses from voltage changes etc.

Description of the national scheme referred to in Article 7(1) EED or the alternative measures adopted in application of Article 7(9) EED

In accordance with Article 24(2) in conjunction with Annex XIV Part 2 no 3.2 EED, the NEEAP 2014 contains a brief description of the national scheme referred to in Article 7(1) EED or the alternative measures adopted in application of Article 7(9) EED.

In order to achieve the savings target in Article 7(1) EED, Germany is making use of the possibility set out in Article 7(9) EED of taking particular strategy measures. To this end, Germany reported in its communication to the European Commission of 5 June 2014 on various strategic measures and packages that count towards the savings target in Article 7(1) EED.

[1] For the other energy sources, the distribution losses are not shown directly, but instead reported together with other calculation differences in the energy balance under 'statistical differences'

[2] There is a requirement to publish the average losses and the costs of procuring the lost energy

These include both standard-setting measures such as the Renewable Thermal Energy Act, measures to promote investment in energy efficiency such as the funding programmes of the Kreditanstalt für Wiederaufbau (KfW) for energy-efficiency building and renovation and also various programmes to promote investment in energy-efficient technologies by undertakings and measures to increase energy efficiency through information and advice, including the various programmes run by the Federal Government in the field of energy consulting. The Federal Government will also gather together goals, instruments and the responsibilities of the individual operators in a 'National Energy Efficiency Action Plan' (see communication from the German Government of 5 June 2014 for a detailed list and description of the measures).

The planned implementation may be subject to change as a result of future decisions by the Federal Government and the *Bundestag* [Lower House of Parliament]. The Federal Government will shortly inform the European Commission of other instruments and measures that are relevant to achieving the savings target in Article 7(1) EED and intends in this way to ensure that Germany achieves the savings target. These instruments and measures may consist, *inter alia*, of other existing strategic measures to improve energy efficiency. They may also include the notification of additional measures introduced or implemented by the Federal Government.

On this basis, the Federal Government will also keep the European Commission informed of any future changes as part of its annual reporting obligations pursuant to Article 24(1) in conjunction with Annex XIV Part 1(e) EED.

III. The market for energy services in Germany

The market for energy services has a major bearing on the attainment of the goals of German and European energy efficiency policy, as energy services are a very efficient and market-oriented way of exploiting the existing potential for energy efficiency. Both the ESD and the EED stress the importance of energy services in several places.

According to Article 18(1)(e) EED, the NEEAP 2014 should include a review of the current and future development of the market for energy services. The NEEAP 2014 also contains a number of other reporting requirements relating to the market for energy services.

Germany has long been one of the largest and most developed markets for energy services in the EU (European Commission 2010). A diverse, competitively organised and transparent energy services market is particularly suited to boosting the available potential for energy efficiency. This vibrant and growing market for energy services in Germany has grown further even in the last few years. The market for energy services is made up of many different segments (e.g. contracting, energy audits/energy consultations, energy management, building renovations, metering services) and providers (e.g. energy companies, engineering and architectural firms, trades people) and is characterised by lively competition.

When it comes to the total volume of the energy services market and its future development, most studies assume that there will be substantial short and medium-term growth, even after the high historical growth rates. These statements are based on reliable quantitative estimates for the focused sectoral markets. The projected growth of the energy services market and its resulting increased importance are likely to generate an additional need for more detailed market data and information. In light of this, the Federal Agency for Energy Efficiency (BfEE) was tasked under the Act on Energy Services and other Energy Efficiency Measures (EDL-G) with observing and analysing the energy services market and submitting proposals for its future development to the Federal Government.

As this market is extremely multi-layered and complex, the description below focuses on its central elements. It is hard to monitor and describe the whole energy services market with all its sub-segments because of the heterogeneity of the players within it and particularly because of the services and products provided. Figures for the size of the market vary between the existing studies, as these are in turn based on different surveys and analyses of the available statistical data, such as figures from the associations and from state funding programmes, and different areas are not equally well covered. To obtain reliable data for the three key market segments of contracting, energy audits and energy management, a study was commissioned by the BfEE to

look at these areas. Studies and data on other relevant sub-markets such as energy-related building renovations and metering and measurement services do exist, but because of their specific aims, they are often less well-suited to providing the required representative overview of the market concerned. For these sub-markets, this report is therefore restricted to the most meaningful subset of the relevant sub-market.

1.1. Energy audits/energy consultations

An energy audit within the meaning of the Energy Savings Act is a systematic procedure to obtain adequate information about the existing energy consumption profile of a building or group of buildings, of an industrial operation and/or installation or of a private and/or public service, to identify and quantify cost-effective energy savings opportunities and to report the findings. Energy audits are a precondition for introducing and certifying an energy management system; details of energy audits can be found in DIN EN 16247-1.

Energy consulting services form a very diverse market with different players and types of consultation. The available energy consultations range from household-related services such as on-site energy consultations from consumer bodies or the comparatively straightforward issuing of building energy certificates, of which there has been a high volume, to detailed energy advice provided on-site over one or more days, for example for buildings and/or production facilities in enterprises, or the creation of complex energy concepts. In the area of the market with more in-depth and more complex consultations, a number of surveys have been carried out in recent years, including a study commissioned by the BfEE to analyse and evaluate the market for selected energy services (Prognos/Ifeu/HRW 2013). This section focuses on these more in-depth consultations.

On the supply side, the competition is characterised by a large number of small and micro-enterprises. Around half of the energy consultancies are one-person operations and over three-quarters employ no more than five people. Architects' and civil engineers' offices and other engineering firms are particularly well represented, making up around three-quarters of the providers. Craft businesses and energy agencies are also relevant, but play a much smaller role. The exact breakdown of professional groups also depends on the subject area: for example, architects' and engineers' offices are over-represented in building consultancy and under-represented in consulting on industrial production processes. It should also be noted that the energy companies, which are not included in this analysis, are also very active in energy consulting. This is particularly true of the large cross-regional energy suppliers and a number of public services, which offer energy consultations on residential buildings either themselves (in

customer centres, for example) or through cooperation partners (e.g. engineering or architects' offices or craft businesses) (ASEW 2011). The energy companies also act as important channels for information on the subject of energy efficiency, as they have direct access to the end-consumer.

As Germany has no central register of energy consultants, we have to estimate their number from various available figures such as those authorised to apply for the on-site consulting programme (around 12 700 consultants) or the 'Energieberatung Mittelstand' funding programme for medium-sized enterprises. The former can be found on the list of energy-efficiency experts for funding programmes run by the Federal Government and managed by the German Energy Agency [Deutsche Energie-Agentur – dena].[3] Almost 8 000 energy consultants, planners and trades people are currently listed and the numbers are rising fast. For the funding programme for medium-sized enterprises run by the KfW, eligible energy consultants can register with the KfW 'consultants exchange'.[4] All providers of energy services, energy audits and other energy efficiency measures can also go on the list of providers from the BfEE and so advertise their services and present their qualifications. The list of providers is maintained by the BfEE in accordance with Section 9(2) no 11 in conjunction with Section 7 EDL-G, and is publicly accessible. Registration is free and open to all providers.[5] In this way, the Federal Government also complies with its implementation and reporting obligation under Article 18(1)(c) in conjunction with Annex XIV Part 2 no 3.8 EED.

From the available information, experts put the number of providers of energy consulting services in Germany at 12 500 to 14 000. Based on the number of energy consultants, the market volume for energy consulting may be estimated at 370 000–410 000 consultations in 2011, generating total revenues of EUR 264–457 million. Broken down by subject area, surveys suggest that something under half of the revenue comes from private residential buildings. Energy consulting in industry is in second place with just under 20 % of the revenue, followed by housing management and the public sector (Prognos/Ifeu/HRW 2013).

The overall trend in the number of energy consultations given has been rising: in the period from 2007–2011, the number of energy consultations grew along with the number of providers, increasing by 34 % to 2009 and by 39 % to 2011 compared to the base year of 2007. There was thus continued growth in the second period, but at a much lower rate than in the preceding years. The figures for the largest energy consultations funded by federal and regional

[3] available from www.energie-effizienz-experten.de
[4] available from https://beraterboerse.kfw.de
[5] Available from www.anbieterliste.info

programmes broadly match these findings. A comparable trend can also be seen in the revenue generated by energy consulting. In parallel with the increase in the number of energy advisors and consultations, a sometimes sharp increase in revenues has been seen in recent years (Prognos/Ifeu/HRW 2013, DENEFF 2013, Prognos 2014).

In summary, Germany has a well-developed and competitive energy consulting market, with various providers of energy consulting services operating within it. As the great majority of providers of energy consultations expect the market to grow – perhaps very strongly – in the future, we can probably assume continued positive growth in this market in the future (Prognos/Ifeu/HRW 2013).

Energy consultations are an important instrument for increasing energy efficiency in the EU Member States in the longer term. Article 8 EED focuses especially on energy audits, which are defined in Annex VI to the EED in terms of minimum criteria.

Energy audits as defined in the EED are not recorded centrally in Germany, nor are energy consultations. We can therefore only estimate the number of energy audits carried out from other available information and only within an approximate range. The best information relates to the number of completed energy audits funded by the Federal Government. In the ‘on-site programme’, for example, funding from the BMWi supported 18 249 consultations in 2011, 16 247 in 2012 and 11 982 in 2013 on energy-related measures in residential buildings. The energy consulting programme for medium-sized enterprises, which supports SMEs with annual energy costs in excess of EUR 5 000 by providing an energy consultation from independent experts, delivered 1 022 detailed sessions in 2011, 833 in 2012 and 1 242 in 2013.

If we assume that certified energy management systems and environmental management systems covered by the European Eco-Audit Regulation (EC) No 1221/2009 (EMAS) also involve an energy audit as defined by the EED, we also have information on certified energy management systems notified by energy-intensive undertakings in manufacturing industry to make use of the special equalisation scheme provided for in Sections 40 ff. EEG. For the 2014 exemption period, 1 135 energy management systems certified according to DIN EN 16001 or DIN EN ISO 50001 were notified, including 1 069 certified systems in undertakings that are legally required to have them as a condition for claiming the special equalisation payments. Around 1 800 locations in Germany are currently running an EMAS-compliant environmental management system (cf. www.emas-register.de).

Based on applications from undertakings in manufacturing industry for partial exemption from

energy and electricity tax in special cases under Section 55 EnergieStG and Section 10 StromStG in conjunction with the Peak Equalisation Efficiency Systems Regulation [Spitzenausgleich-Effizienzsystemverordnung] of 31 July 2013, we also know that around 2 100 undertakings passed an DIN EN ISO 50001 audit in connection with deploying and operating an energy-management system and were certified under that standard. According to information from the competent committee within the German Standards Institute (DIN), a total of 3 240 German companies and organisations had been certified under DIN EN ISO 50001 by March 2014 (NAGUS 2014).

These figures relate to all undertakings. The information currently to hand does not allow a breakdown into SMEs and non-SMEs. We can assume, however, that a majority of the non-SMEs have already taken similar measures where it is possible to do so in a cost-efficient manner.

Figures for the number of large corporations based in Germany are currently available from the Federal Statistics Office up to 2011. The details are only reported for a subset of the economic sectors – excluding agriculture and forestry, financial services and insurance and including only some of the ‘other services’. According to this analysis, there were 15 975 large corporations in these economic sectors in 2011 (Destatis 2014).

In the absence of voluntary agreements between organisations of affected parties and an office appointed by the Federal Government, there are currently no undertakings covered by Article 8(5) EED.

1.2. Energy-management services

There is as yet no generally accepted definition of the term ‘energy management’ in Germany. According to Article 2 no 11 EED, ‘energy management system’ means a set of interrelated or interacting elements of a plan, which sets an energy efficiency objective and a strategy to achieve that objective. This is based on the definition in DIN EN ISO 50001 from 2011 on energy management. On the other hand, VDI Guideline 4602 also takes in the economic dimension, in that it describes energy management as the forward-looking, organised and systematic coordination of the procurement, transformation, distribution and use of energy to cover the requirements while taking account of ecological and economic objectives.

Energy management service providers offer various types of service: these can be grouped under the headings of ‘capturing and analysing energy-related data’, ‘energy management services for building systems and automation’, ‘software production’ and ‘consulting, planning

and installation of energy management systems and certification schemes' (Prognos/Ifeu/HRW 2013). Alongside pure providers of energy management services, energy consultants and contractors are also frequently present as market operators on the supply side. On the demand side, energy management services are sought by private customers, the public sector and industry and trade, with a clear emphasis on manufacturing industry. If we look at the progress in implementing energy management and the use of energy management services in industry and trade, one survey shows that more than half of respondents have deployed an energy management system, followed by an energy monitoring/controlling function. Roughly a third of providers have implemented a certified energy management system, while a much smaller number say that they have introduced an energy management process for building systems. A key deciding factor here is the size of the undertaking: smaller companies, for example, tend to engage in less costly energy management activities than larger undertakings (Prognos/Ifeu/HRW 2013).

Because of the difficulty in defining energy management services and frankly limited data, we have to estimate the market volume from indicators such as the number of establishments and the incidence of energy management systems: for 2012, one study estimated the market volume at around EUR 250 to 500 million (Prognos/Ifeu/HRW 2013). This puts the market for energy management services in the same order of magnitude as the energy consulting market. The future potential of the market for energy management services can be assumed to be very large. This can already be seen, for example, from the fact that the large number of some 3.6 million companies in Germany as of March 2014 compares with 3 240 energy management systems so far certified according to DIN EN ISO 50001 (NAGUS 2014).

The potential for development is seen as equally positive: the majority of contractors and energy consultants questioned believe that there will be distinct growth in this market segment, maintaining the trend of the last few years. A comparable growth curve can be seen among the certified energy management systems and almost all the software firms questioned report a steady growth in the number of energy management software licences sold (Prognos/Ifeu/HRW 2013).

The increasing spread of energy management systems helps companies to identify existing economic opportunities for increasing energy efficiency and take suitable measures to exploit this potential. That is why this trend is being further boosted by the Federal Government with a variety of incentives.

For example, the guidelines on the funding of energy management systems provide for funding

to cover 80 % of the eligible expenditure, up to EUR 8 000, for the initial certification of a fully established energy management system for undertakings in accordance with DIN EN ISO 50001.

The ‘peak equalisation’ rules for energy and electricity tax also provide incentives both to certify energy management systems and to set up environmental management systems pursuant to the EMAS Regulation. Under Section 10(3) of the Electricity Tax Act [StromStG] and Section 55(4) of the Energy Tax Act [EnergieStG], undertakings in manufacturing industry can benefit from peak equalisation with respect to energy and electricity tax if they can show that they have a certified energy management system according to DIN EN ISO 50001 or a certified environmental management system according to the EMAS Regulation for the year of the application.

Energy-intensive undertakings can also benefit from exemption from the EEG allocation under Sections 40 and 41 EEG if they have, or set up, an energy management system.

1.3. Contracting

The term ‘contracting’ is defined in DIN 8930 – Part 5 as the ‘delegation of energy provision and supply tasks for a limited time and within a limited area to a third party acting in its own name and on its own account’ (DIN 2003). In the market for energy contracting there are four basic products or contracting models:

Energy supply contracting: the contractor plans, builds, finances and maintains an installation for the supply of energy. The contracting recipient purchases the energy under stipulated conditions. The subject of the contract is the supply of energy. The efficiency measures of the contractor are thus targeted as the optimisation of the installation itself (e.g. optimisation of the heating system, production of electricity from cogeneration plants).

Energy saving contracting: the contractor takes over the financing, planning, implementation and management of energy-saving measures (as defined in Article 2 no 27 EED). The subject of the contract is an energy cost saving for the contracting recipient guaranteed by the contractor. The contractor accordingly carries out energy-saving measures, which relate in total to the reduction of the energy requirement, i.e. to energy supply (e.g. optimisation of the heating system) and energy consumption (e.g. installation of energy-efficient systems, optimisation of heat distribution, etc.). The contractor receives a share of the saved energy costs as a reward.

Management contracting: this differs from energy supply contracting only in the sense that the

contractor takes over and optimises the management an existing plant for the supply of energy.

Financing contracting: the contractor plans, finances and constructs a plant for the supply of energy. The contracting recipient operates, supervises and repairs it. The installation costs are amortised over the term of the contract. The provision of financial services in conjunction with the professional selection of the energy plant is of primary importance here.

For the entire contracting market, current studies are based on annual total revenues of approx. EUR 3 to 4 billion (Prognos/Ifeu/HRW 2013). In 2010 the market volume was estimated at EUR 1.6 to 2 billion (Prognos 2010). These figures reflect the fact that there has been very rapid growth in recent years, with annual rates of around 8–14 %. Many market operators expect this growth to be sustained in the coming years (Prognos/Ifeu/HRW 2013, VfW 2014). By far the greatest revenues in the contracting market are generated by energy supply contracting. For example, according to the Association of Heating Suppliers [Verband für Wärmelieferung – VfW], 86 % of all contracting agreements in 2012 were for energy supply contracting, 9 % for energy-saving contracting, 2 % for financing contracting and 3 % for management contracting (VfW 2013).

There are some 500 companies (contractors) in Germany offering energy contracting services. However, there are large differences between contractors, both in terms of the services offered and with regard to the size of company and the number of contracts. A clear majority of contractors are engaged in energy supply contracting: approx. 55–60 % of the providers are energy supply companies (including public services), around 30–35 % are ‘original energy service providers’ and 10 % are ‘other providers’[6] (Prognos/Ifeu/HRW 2013). About two thirds of the companies are SMEs with fewer than 250 employees. The results of the market study also show that contracting is only the/a main element of the business of a quarter of the providers questioned (i.e. contributing more than 30 % of their revenue), while it accounts for no more than 5 % of the total revenue for 60–70 % of companies. The numbers of contracting agreements held by these companies, and hence the revenue in this area, also display a very wide spread: while around half of the original contractors earn less than EUR 500 000 a year from contracting, a few large providers make tens or hundreds of millions. On average, contractors earned approx. EUR 10–12 million a year from contracting in 2011 and held around 200 contracts. While some

[6] The companies classed as ‘original energy service providers’ are mostly offshoots of building and exhibition service providers or providers of technical building equipment. The other providers are primarily engineering firms, craft businesses and planners (BMWi 2011).

companies had several hundred contracts, others had just one in 2011. Overall, then, we can assume a large number and great variety of providers in the German contracting market, with widely differing areas of concentration.

The most widespread types of contracting, such as energy supply and energy-saving contracting are particularly suited to larger and complex properties. One study looked at the minimum energy costs for existing public-sector contracting projects, above which contracting projects tend to arise in the first place: the 21 energy supply contracting projects examined report costs of EUR 38 000 per year, while those of the 29 energy-saving contracting projects analysed run to at least EUR 180 000 (Prognos/Energetic Solutions 2012) a year.

Major demand segments for energy supply contracting are housing management, the public sector and industry and trade. However, private residential buildings are an increasingly relevant target group, at least for the energy suppliers (Prognos/Ifeu/HRW 2013). Unlike energy supply contracting, which allows for relatively standardised products and so may represent a business model for customers with more limited energy consumption, energy-saving contracting projects focus mainly on larger and more complex building structures. The most important demand segments for energysaving contracting are the public sector, industry and trade and hospitals. For one- and two-family houses, mini-contracting offers a further contracting variant, although its use in these buildings still occupies a small niche position (BEI 2011).

To address the legal obstacles to contracting, the Tenancy Law Amendment Act [*Mietrechtsänderungsgesetz*] of 2013 revised Section 556c of the German Civil Code [*Bürgerliches Gesetzbuch – BGB*]. Under this provision, the tenant has to bear the costs of heat supplies as operating costs when the heat supplies for the rented accommodation are switched to contracting, where the heat is delivered with greater efficiency either from a new plant erected by the contractor or from a heat network and the costs of heat supplies after the switch to contracting do not exceed the operating costs for the previous independent supplies of heat or hot water. If the annual utilisation of the old system before the switch to contracting was at least 80 %, conversion to management contracting is also possible. Measures such as modernising heat-generation plants including the systems for producing hot water, more efficient operation or a change of fuel supply (e.g. switch to district heating) are good ways to achieve significant efficiency gains and hence to save energy. This is a measure taken pursuant to Article 19(1)(a) EED.

The rapid growth of the contracting market in the last few years and the existing potential for growth along with positive expectations for the future show that contracting is an important

means of exploiting the existing potential for energy efficiency through market mechanisms. A planned guideline from the BMWi on the funding of contracting consultations should further support and reinforce the forecast development of energy-saving contracting in particular. However, the providers themselves are also urged to persuade potential customers of the added value from contracting, to expand their portfolio of efficiency measures that can be implemented through contracting and to reduce the transaction costs further (e.g. through greater standardisation and dissemination), so more of the existing economic potential for savings can be exploited by this instrument.

1.4. Other energy services

The EED gives a very wide definition of an ‘energy service’, which is mainly characterised by the fact that it is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvements or primary energy savings (see Article 2 no 7 EED). This broad wording means that it is not easy to obtain and reproduce an overview of the other market segments that also fall within the wide definition of an energy service. This section therefore focuses on just a few selected areas of the market.

In the field of energy-related building renovations, strenuous efforts are already being made in Germany to modernise the building stock. There have been numerous state, regional and municipal funding programmes in place for many years now. The International Energy Agency still places Germany among the world leaders in energy efficiency in the construction sector (IEA 2013). The Federal CO_2 building renovation programme, along with the KfW programmes for energy-efficient building and renovation, which provides loans and grants in the residential area, is the highest-volume funding instrument in Germany. Within this framework, the KfW initiated investments running to just under EUR 162 billion on behalf of the Government between 2006 and the end of March 2014. These funds were used to renovate more than 3.5 million homes or to build particularly energy-efficient new homes and to renovate over 1 940 buildings for municipal or social bodies. As well as significant energy savings and huge reductions in CO_2 emissions, energy-related building renovation also creates growth and employment in Germany. The construction contracts particularly benefit medium-sized local craft businesses. In 2013 alone, some 440 000 jobs were secured or created for a year. The German Government is providing EUR 1.8 billion in funding for the CO_2 building renovation programme in 2014. The coalition agreement provides for the CO_2 building renovation programme to be maintained and stepped up.

Intelligent measurement systems (smart meters) may also push some consumers (e.g. industry

and larger households) towards energy-saving behaviour and provide for variable tariffs to offer financial incentives to move their consumption to balance the generation and consumption of energy. A diverse market in measurement and metering services has already developed, covering a range of services such as local and remote meter reading, testing and replacement of meters and more far-reaching services such as account management, energy data management and energy controlling for larger customers. Given the difficulties of properly analysing the smart meter service market, however, it is impossible to draw any more definite conclusions at this time.

The biggest customer for goods and services in Germany, with a total value of around EUR 300 billion a year (around 13 % of GDP), is the public sector (UBA 2014). It can therefore provide a major impetus for greater market penetration by energy-efficient products and services, particularly as both energy consumption and the potential for increased energy efficiency in the public sector are substantial (McKinsey 2008). Article 6 EED calls upon Member States – with a few narrow exceptions – to procure only products, services and buildings that offer high energy-efficiency. Regulations and Acts have therefore been passed in recent years to promote and fund energy-efficient procurement:

Section 4(4) to (6) of the Public Procurement Regulation [*Vergabeverordnung – VgV*], which has to be observed by all public contracting authorities in Europe-wide calls for tender, state that the highest level of energy efficiency and, where available, the highest energy-efficiency class should be demanded when procuring goods that have a bearing on energy consumption or are necessary to the provision of a service. Moreover, bidders generally have to provide specific details of energy consumption and, in appropriate cases, an analysis of minimised lifecycle costs or similar information. Energy efficiency must also be used as an evaluation criterion when determining the most economical bid.

The General Administrative Regulation on the procurement of energy-efficient products and services [AVV-EnEff] obliges all Federal Government departments carrying out a requirements analysis to examine the aspect of the most energy-efficient system solution and to consider energy consumption in the usage phase when producing the procurement documents (UBA 2014). Where possible and appropriate, contractual provisions relating to the environment and energy efficiency should also be demanded. The final determination of the most economical bid should take account not only of the costs of acquisition, but also of the foreseeable operating costs throughout the service life and the costs of depreciation and disposal (life-cycle costs principle).

Over and above these obligations, the Unfair Competition Act [*Gesetz gegen Wettbewerbsbeschränkungen – GWB*], the Public Procurement Rules for Services – Part A [VOL/A] and for Construction – Part A [VOB/A] and the Procurement Rules for Defence and Security [*Vergabeordnung Verteidigung and Sicherheit – VSVgV*] also call for this type of procurement. The BfEE also publishes lists of energy efficiency criteria for various product categories as an additional aid to contracting authorities.

To support the increased incorporation of sustainability (and hence also energy efficiency aspects), the Federal Government, Länder and municipalities have been collaborating since 2010 in the 'Alliance for sustainable procurement'. This is intended to help increase the proportion of sustainable products and services purchased in the public sector. The Alliance provides for a systematic exchange of experience between the major public procurement bodies and should contribute to greater use of uniform national and international sustainability standards at all three levels – national, regional and municipal. Energy efficiency aspects are also taken into account here. The Alliance is supported by the 'Competence centre for sustainable public procurement' [Kompetenzstelle für Nachhaltige Beschaffung – KNB], set up as a department within the Procurement Office of the Federal Ministry of the Interior. The competence centre assists public contracting authorities with specific issues through a comprehensive web site, a telephone and e-mail hotline and on-site training. There is no reason to think that German public procurement law imposes specific legal or other barriers to considerations of energy efficiency, even within the meaning of Article 19(b) EED.

However, energy-efficient procurement is not a matter for the public sector only, but has an increasingly important role to play in companies and households also. According to a study by the GfK, Germany also plays a leading role on the market for energy-efficient domestic appliances: with sales of products in classes A+++ and A++ in the four product groups covering washing machines and dishwashers, fridges and freezers averaging 16 % and 30 % respectively, Germany is among the frontrunners in the EU (GfK 2013). To help low-income households to save electricity too, the German Government has also launched a refrigerator exchange programme: if they exchange a fridge with a high electricity consumption for a more economical appliance, they can receive a voucher for EUR 150. This should ensure that up to 16 000 appliances with high electricity consumption are replaced with energy-saving fridges within two years, saving around 5 million kWh per year.

1.5. Education and training

Education and training for energy service providers are also closely linked to energy services

and are of fundamental importance to the energy services market. We will therefore provide a brief overview of systems for quality assurance as stipulated by Article 16 EED, for example.

With its dual system, Germany has a well-regarded system for training energy service providers, particularly in the construction sector. The core of this sophisticated staff training system is a three or three-and-a-half year dual vocational course in which the practical training in businesses alternates with theoretical teaching in vocational colleges. Standardised national testing schemes and curriculum plans in the relevant trades ensure that people complete the training with comparable skills all over the country. The vocational training thus builds up comprehensive professional competence, enabling graduates to plan and handle technical tasks in a complex and changing field of work. Apprentices are then highly qualified in their trade to handle both known and as yet unknown or new requirements. Many apprentices also continue on courses with up to 1 700 teaching hours to become masters of their trades, expanding their technical knowledge of all matters relating to building or for their specific building, development or technical trade.

With regard to the necessary qualifications for energy-related building renovation and energy-efficient building, the EU project ‘BUILD UP Skills’ has shown for Germany that the necessary sets of qualifications are widely established in the training and masters’ examination schemes for the relevant occupations and that the relevant technologies and processes are well covered.

Germany also has a very extensive education and training system for building workers. For the areas of energy efficiency and renewable energies alone, a survey of training providers in craft and industry identified around 315 courses (excluding advanced and masters’ courses and ignoring product training from industry and the wholesale sector). These include the advanced training to become a building energy consultant, which has been available for almost 20 years. These qualification and training systems have been well-established for several decades; they are reliable and transparent to consumers. They lay the foundations for attaining the national energy efficiency targets. Germany is constantly enhancing these tried and tested qualification and training systems.

Alongside them, Germany also offers special accreditation systems for providers of energy services and certification systems for measures to improve energy efficiency.

Deutsche Akkreditierungsstelle GmbH (DAkkS) is the appointed national accreditation body for Germany. DAkkS provides accreditation to certification bodies for management systems, products/services and people and to verification bodies for emissions trading. Under the Peak

Equalisation Efficiency Systems Regulation [*Spitzenausgleichs-Effizienzsystemverordnung – SpaEfV*], DAkkS is also responsible for monitoring the 44 currently accredited certification bodies for energy management systems, which currently have around 280 technical auditors/experts. Efforts are being made to expand the auditing capacity further, as the scale of the audits is increasing in 2014–2015.

One can also apply to Deutsche Akkreditierungs- and Zulassungsgesellschaft für Umweltgutachter mbH (Dau GmbH), the German accreditation and licensing company for environmental consultants, for authorisation to act as an environmental expert. They confirm that organisations (industrial and service companies and other business) are meeting the requirements of the European eco-audit system (EMAS). For this, environmental consultants and/or organisations pass through a special authorisation procedure. The authorisation procedure follows an examination of the specialist knowledge required for an industry-specific licence, i.e. for particular sectors based on NACE codes. Authorised environmental consultants can certify according to the EMAS and also hold a licence to certify under ISO 500001 and alternative systems (e.g. for energy and electricity tax).

For quality assurance purposes and to help to locate qualified and tested experts in this market segment, the German Government has created the list of energy efficiency experts mentioned in section 3.1, together with the BAFA and the KfW. The aim is to provide quality assurance for funded on-site energy consultations and high-efficiency renovations and new builds funded by the KfW. This is achieved with standardised specifications for the required qualifications, regular training courses and evidence of practical work done, with spot-checks on this evidence. Overall, therefore, the national level of technical competence, objectivity and reliability among energy service providers in Germany may be considered sufficient.

1.6. Future challenges

Contracting, energy audits/energy consultations and energy management as well as the other energy services constitute a large, active and growing energy services market in Germany. Compared to the rest of Europe, the German market stands out not only because of its size, but also its agility and the large number of undertakings that have developed profitable business models out of energy efficiency services. However, this market also has various problems, which pose a challenge to the players in business, politics and administration if they are to be addressed.

Need for more information

Despite various efforts at different levels and among various players to provide information and so raise awareness of energy efficiency, there is still a lack of knowledge among end-consumers of the (economic) potential for energy savings available to them, of possible improvements to their processes and procedures and of the many options and products available to exploit this potential. Because they lack information on their energy consumption and the complex relationships involved, many players find it difficult to recognise opportunities for energy savings or the need to increase energy efficiency at all. Cost-effective measuring and metering systems for energy consumption may be helpful here, or specialised staff who concern themselves with energy savings in the undertaking or organisation. Once the basic awareness is there, the second step is to provide targeted information on potential energy efficiency measures. A qualified energy consultation may be the answer here. Concrete advice on implementing the measures is then needed. For this, details of qualified providers of energy efficiency measures have to be available.

Lack of incentives or insufficient priority given

Apart from a lack of information in some areas, there is often no incentive to invest in energy efficiency measures. One reason for this may be that the savings that can be achieved are insufficient incentive in themselves. Companies generally budget for energy costs under overhead cost centres, so that decisions on investments only consider energy consumption as a secondary issue. The implementation of energy efficiency measures, particularly in businesses and the public sector is also impeded where no responsibility for energy matters has been defined. The often cited pressure of time on managers is a factor here, and with it, the lack of importance attached to energy efficiency in the business (Prognos 2014).

Financing risks

The implementation of measures is often blocked by a lack of financing options or (what the players see) an over-long return on investment.

Capital restrictions may exist for various reasons. For example, investors might not have sufficient capital and would be forced to draw on their lines of credit in order to invest in energy efficiency measures. This may only be possible at comparatively high capital costs. Internal policies and international financing rules may also restrict the flexible use of equity and loan capital. Where there is limited capital available and priority is not given to energy efficiency measures, companies are more likely to use the funds for other investments, particularly within

the company's core competence. The procurement of energy technologies generally results in added investment costs, which are re-financed through energy cost savings in the business. Looking only at the total investment cost of efficiency measures then often leads to sub-optimal decisions. If one takes a wider view, instead of looking at internal yields, the amortisation period is often chosen as a basis for decisions in practice. It provides a simple indicator, but is often unsuitable for use as the sole basis for investment decisions. In corporate practice, however, more complex economic analyses such as lifecycle costs are only carried out for investments in core processes.

Transaction costs

Many energy services are generally very complex offerings, especially for private customers with no prior knowledge, but also for commercial or public contracting bodies.

This is true, for example, of contracting, and particularly of energy-saving contracting. This entails relatively high transaction costs to obtain and compile the information and to identify technically, financially and contractually attractive solutions. Further transaction costs are incurred in preparing projects, from arranging the financing, issuing the request for tender and implementing the measure, and from drawing up the contract. For this reason, contracting is often seen as an option for relatively large projects only. Reducing the transaction costs could help to exploit further market potential. The same basic barrier exists for other energy services: in many energy-saving programmes, energy management systems and efficiency services, third-party specialists (consultants, providers, contractors) may bring great benefit and realise a lot of potential energy savings in the course of their market activities. However, involving these experts entails transaction costs that cannot be re-financed from the savings made in small properties in particular.

Uncertainty about future developments

Uncertainty about future developments may also be a hindrance to implementing energy efficiency measures. Volatile energy prices and the accompanying expectations may have a major influence on the deployment of energy efficiency measures. Low price expectations prolong the period until the differential investments in efficiency technologies pay for themselves by comparison with the baseline technologies. There are also technical risks, particularly with complex technical solutions, and operational risks such as adverse effects of processes of changes in product attributes. Hidden costs, such an unexpected maintenance or training needs, may also arise, reducing the savings from efficiency measures.

Legal problems

Alongside the challenges described above, there are legal aspects such as the tenancy regulation of energy-related modernisation projects in balancing financial incentives for landlords against protection of social housing tenants, planning laws and energy management conditions affecting the generation and distribution of energy.

In summary, Germany can claim to have an active and functioning market for energy services, in which end-consumers have access to a variety of high-quality energy services. Compared to the rest of Europe, the German market stands out not only because of its size, but also the large number of undertakings and products and the lively competition. In the future we shall need to remove the obstacles that still exist, assure quality and further improve transparency and the conditions for growing the market. The aim will be to make the greatest possible amount of economically feasible savings by means of market-oriented energy services.

IV. Other specific reporting requirements under the EED

Along with the requirements to report on the measures and savings made (Chapter II) and the development of the market for energy services in Germany (Chapter III), the NEEAP 2014 is also required to report on a variety of other specific information relating to the EED.

List of public bodies that have developed an energy efficiency plan in accordance with Article 5(7) EED.

According to Annex XIV Part 2 no 3.1 EED, the NEEAP must include a list of public bodies that have developed an energy efficiency plan in accordance with Article 5(7).

The German Government is taking action at the regional and local levels by way of public communication and presentation of its energy targets and its approach to establishing the national 'Energy refurbishment roadmap for Federal Government properties' [Energetischer Sanierungsfahrplan Bundesliegenschaften – ESB]. The approach developed by the ESB and the conditions put in place also encourage other public institutions to plan and implement energy efficiency measures in buildings and properties in their care. So far, the federal states of Baden-Württemberg, Hessen and Thuringia have drawn up energy refurbishment plans for their properties. A refurbishment plan is currently being produced for properties in the federal state of Brandenburg.

There are currently 54 German municipalities involved in the 'Covenant of mayors for sustainable energy'.[7] This is an official European movement in which the cities and municipalities involved voluntarily undertake to increase energy efficiency and to use renewable sources of energy. The target that the signatories to the Covenant have set themselves is to surpass the energy policy targets of the European Union to reduce CO_2 emissions by 20 % by 2020.

Report on progress in assessing the potential for the application of high-efficiency cogeneration and efficient district heating and cooling.

Article 14(1) EED states that, by the end of 2015, Member States must carry out a comprehensive assessment and cost-benefit analysis of the potential application of high-efficiency cogeneration. According to Annex XIV Part 2 no 3.4 EED, the NEEAP will report on the progress of this comprehensive assessment.

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[7] http://www.konventderbuergermeister.eu/about/covenant-step-by-step_en.htm

The Combined Heat and Power Act *[Kraft-Wärme-Kopplungs-Gesetz — KWKG]* is the key incentive programme in Germany for extending the use of CHP and must be evaluated in 2014 (Section 12 KWKG). The Federal Government has therefore decided to bring the potential and cost-benefit analysis forward to 2014 and combine it with the evaluation of the CHP that is required by law.

An in-depth study was commissioned in the winter of 2013 to serve as a basis for the Government's decisions on CHP. This study will be in three parts:

The first part (potential and cost-benefit analysis) includes a comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling in Germany pursuant to Article 14(1) and Annex VIII and an accompanying cost-benefit analysis as required by Article 14(3) and Annex IX Part 1 EED. The following aspects need to be taken into account here:

- The potential and cost-benefit analysis should focus on the period up to 2030. The view out to 2050 should be included, to highlight any potential longer-term trends;
- In terms of the potential (heating/electricity), future potentially limiting factors such as a decline in heating needs resulting from improved insulation and restricted potential for deployment in the electricity market with a rising proportion of renewable energy need to be specifically taken into account;
- The analyses should at least distinguish between residential and non-residential buildings and industry. If possible, other categories should be covered (differences based on the specific type of use, sector concerned, etc.). With regard to the potential deployment of CHP, there should be a differentiation between plant output classes;
- The cost-benefit analysis should include a thorough examination of the options for the provision of heating and cooling that would compete with CHP (boilers, heat pumps etc.), and particularly the potential for improved heat insulation in the construction sector;
- Where possible, the analyses should also consider the possibility of using industrial waste heat and 'power-to-heat' and smaller, possibly local CHP plants to generate electricity. Apart from the economic aspects, they should also assess the energy management implications (reduced load on the networks, flexibility, system services, control, etc.).

The second part of the study will use the potential and cost-benefit analysis to examine the possible role of CHP in the future electricity and heating supply system. The following aspects in particular need to be taken into account here, to the extent that they are not already covered by

the potential or cost-benefit analysis:

- Description of the key factors influencing the expansion of CHP plants and their ranking in terms of the future role of CHP (development of heating needs, effect of wholesale electricity prices and their volatility on the profitability of CHP plants; CO_2 trading; expansion of renewable energies etc.);
- Possible contributions of CHP to the security of systems and supply, particularly with power-driven operation and the increased use of thermal stores and 'power-to-heat';
- Importance of additional revenue streams for CHP, e.g. from the provision of system services through CHP plants;
- The future role of CHP in the heating market.

The third part of the study will build on the findings from the other two parts to arrive at an interim evaluation in accordance with Section 12 KWKG. This section of the study will mainly consider the following points:

- Proportion of total power generation in Germany coming from CHP plants;
- Profitability of operating CHP plants broken down by classes of plants and types of use and taking account of revenue from power and heat generation;
- Assessment of the contracts awarded under the KWKG (plant categories, heating/cooling networks, heat/cold stores) to determine how reasonable they are, taking account of all possible income streams and economic conditions;
- Forecast growth of the CHP portion and the costs of the CHP allocation.

The intention is to complete the study in the autumn of 2014. The German Government will decide on the next steps in light of the results of the study.

Reporting requirements under Article 15 EED – Energy transformation, transmission and distribution

Article 15(2) EED requires the Member States to undertake an assessment of the energy efficiency potential of their gas and electricity infrastructure and identify concrete measures and investments for the introduction of cost-effective energy efficiency improvements by 30June 2015. Germany is still preparing to implement this requirement. We cannot comment in more detail on the forthcoming assessment and the measures to be derived from it at this time.

Moreover, the legal and regulatory conditions in Germany are not opposed to the use of load management measures as outlined in Article 15 EED.

Controllable loads can therefore form part of the balancing energy market. Balancing energy is procured by means of a non-discriminatory and transparent tendering process, governed by specifications from the Federal Network Agency for the procurement of primary and secondary balancing power and minute reserves. These specifications enable providers of controllable loads to enter the markets for balancing power. It is also possible to group plants into a pool and to change the composition of this pool over time.

Another statutory load management tool is provided by the Regulation on interruptible loads [*Verordnung zu abschaltbaren Lasten – AbLaV*]. This allows large consumer units connected to the high and very high voltage grid to undertake to throttle supplies in return for a charge, in the interests of network and system security.

The foundations for network-efficient load management in the low-voltage grid are provided by Section 14a of the Energy Management Act (EnWG). This provision provides for relief from network charges for controllable consumer installations such as heat pumps, electric storage heaters and, in the long term, electric cars. The provision only requires practical implementation by way of a Regulation.

V. Bibliography

Abbreviation	*Source*
AGEB 2010	Working Group on Energy Balances 2010: Energy balances for the Federal Republic of Germany 1990–2008 and analysis tables 1990–2010 (date: July 2010)
AGEB/BDEW 2010	AGEB, BDEW; Final energy consumption in Germany by sector, energy source and use. 2008 and earlier years. Estimates based on analysis tables for the energy balances (with internal information from the Working Group on Energy Balances)
AGEB 2013	Working Group on Energy Balances: Energy balances for the Federal Republic of Germany 1990–2011 and analysis tables 1990–2012 (date: July 2013). DIW Berlin, EEFA, Cologne and provisional energy balance 2012 (forthcoming)
AGEB 2014	Working Group on Energy Balances: Usage balances for the final energy sectors 2010–2012 and back to 2008. (date: February 2014). Berlin, Cologne.
ASEW 2011	Working Group for the Rational Use of Energy and Water in the Association of Local Utilities [VKU] (ASEW). 2011 Results of the ASEW-VKU member survey on the provision of energy efficiency measures and energy services.
BEI 2011	Clausnitzer, K.-D.; Fette, M.; Gabriel, J.: Evaluation of the KfW programmes 'KfW municipal loan – energy-efficient renovation of buildings', 'Energy-efficient renovation – municipalities' and 'Social investment – energy-efficient renovation of buildings' from 2007 to 2010. Study commissioned by the KfW, November 2011
BEI 2011a	Bremen Energy Institute. 2011 Mini-Contracting. Enhancement of contracting services for single-family houses using renewable energies and with efficiency commitments. Final report.
BMVBS/DIW 2009	Federal Ministry of Transport, Building and Urban Development (BMVBS), German Institute for Economic Research (DIW): Transport in Figures 2009/2010 (and provisional figures from Transport in Figures 2011/2011)
BMVBS/DIW 2013	Federal Ministry of Transport, Building and Urban Development (BMVBS), German Institute for Economic Research (DIW):

Abbreviation	Source
	Transport in Figures 2012/2013
BMWi 2013	Federal Ministry for Economic Affairs and Technology 2013. Smart metering in Germany. The road to a made-to-measure roll-out of intelligent metering systems.
DENEFF 2013	Deutsche Unternehmensinitiative Energieeffizienz e.V. (DENEFF). 2013. Industry monitor of energy-efficiency 2013 [Branchenmonitor Energieeffizienz 2013].
Destatis 2014	Federal Statistical Office [Statistisches Bundesamt — Destatis]: 2014. The economic importance of small and medium-sized enterprises in Germany. https://www.destatis.de/DE/Publikationen/WirtschaftStatistik/UnternehmenGewerbeanzeigen/BedeutungKleinerMittlererUnternehmen_12014.pdf?_blob=publicationFile. (accessed 16.04.2014).
DIN 2003	German Standards Institute [Deutsches Institut für Normung – DIN]. 2003. DIN 8930-5 - Refrigerating Systems And Heat Pumps. Terminology Part 5 - Contracting.
European Commission 2010	European Commission (Joint Research Centre, Institute for Energy). 2010. Energy Service Companies Market in Europe. Status report 2010.
FhISI/IfE/GfK/IREES2010	Schlomann, B. et. al.: Energy consumption in commerce, trade and services [GHD] for the period 2011–2013. Interim report to the Federal Ministry for Economic Affairs and Technology (BMWi), Karlsruhe, Munich, Nuremberg, March 2014
GfK 2013	Society for Consumer Research [GfK SE]. 2013 (unpublished). Does the Energy Label support sales of highly efficient products? Presentation by the GfK to the Final Come-On Label conference on 15 March 2013 in Brussels.
IEA 2013	International Energy Agency (IEA). 2013. Energy policies of IEA Countries. Germany 2013 review.
IWU; IFAM 2013	Diefenbach, N.; Gabriel, J.: *Monitoring of the KfW programmes 'Energy-efficient renovation' and 'Energy-efficient construction' in 2012.* Study commissioned by KfW, November 2013
McKinsey 2008	McKinsey 2008: Potential of public procurement for ecological industrial policy and climate protection.
NAGUS 2014	Standards committee on the basis for environmental protection (NAGUS) of the German Standards Institute (DIN). 2014. Current list of ISO 50001 certified organisations dated 18.03.2014. http://www.nagus.din.de/cmd?cmsrubid=167405&2=&menurubricid=167405&level=tpl-artikel&menuid=47224&languageid=de&cmstextid=167397&cmsareaid=47224 (accessed 16.04.2014).

Abbreviation	*Source*
Prognos 2010	Prognos AG 2010: Promotion of energy service offerings in the energy market (unpublished).
Prognos 2013	Seefeldt, F.; Weinert, K.: *Final energy-savings target pursuant to Article 7 EED and estimated energy savings achievable through policy measures.* Study commissioned by the BfEE. Eschborn/Berlin, February 2013
Prognos 2014	Thamlinq, N.; Weinert,K.: *Study of the effects of the KfW energy efficiency programme for the 2012 funding year.* Commissioned by the KfW, April 2014
Prognos 2014a	Prognos AG. 2014. Potential for and constraints on energy services in selected segments in Germany.
Prognos/Energetic Solutions 2012	Prognos AG and Energetic Solutions. 2012. Energy contracting in practice. An evaluation of 55 public-sector contracting projects as viewed by customers.
Prognos/Ifeu/HRW 2013	Prognos AG, Institute for Energy and Environmental Research, Heidelberg [Institut für Energie- und Umweltforschunq Heidelberg GmbH – Ifeu] and Ruhr-West University of Applied Sciences [Hochschule Ruhr-West]. 2013. Market analysis and evaluation and production of a plan for market observation of selected services in the energy efficiency field. Final report (revised version).
Prognos/EWI/GWS 2010	Schlesinger, M.; Lindenberqer, D.; Lutz, Ch.: *Energy scenarios for a federal energy concept.* Project-no 12/10. Study commissioned by the BMWi. Basel/Cologne/Osnabrück, August 2010
Prognos/EWI/GWS 2011	Schlesinger, M.; Lindenberqer, D.; Lutz, Ch.: *Energy scenarios 2011* Project-no 12/10. Study commissioned by the BMWi. Basel/Cologne/Osnabrück, July 2011
Prognos/OekoInst 2009	Kirchner, A., Matthes, F. Chr.: *German model. Climate protection up to 2050: keeping the goal in mind.* Commissioned by WWF Germany. Basel/Berlin, October 2009
UBA 2014	Federal Environment Agency [Umweltbundesamt – UBA]. 2014. Energy-efficient public procurement.

Abbreviation	*Source*
VfW 2013	Verband für Wärmelieferung e.V. (VfW). 2013. Impressive figures mark the work of the VfW and its members.http://www.energiecontracting.de/6-verband/wir-ueber-uns/vfw-in-zahlen.php. (accessed 28.11.2013)
VfW 2014	Verband für Wärmelieferung e.V. (VfW). 2014. 'In 20 years' time, almost all buildings will be using contracting'.http://www.energiecontracting.de/0-presse/contracting-news/doc/81-Contracting-News.pdf. (accessed 26.02.2014)

Annex I:
Additional information on the updated overview of the results in relation to attainment of the savings targets for final energy consumption set out in Article 4(1) and (2) of Directive 2006/32/EC

This section examines the general findings set out in Chapter II regarding the indicative energy saving value under the ESD in more detail, particularly in terms of the breakdown by sectors and spheres of action. In order to update the evidence for the indicative energy saving value, the German Government has once again availed itself of scientific support from well-known independent institutes (Prognos/Fraunhofer ISI 2014). This work forms the essential basis for the updated evidence for the indicative energy saving value, particularly for the top-down and bottom-up calculations that have been carried out.

1. Top-down: trend

1.1. Preliminary methodological notes / base data and sources

The NEEAP 2011 contained the calculated top-down energy savings both for the 'early action' period (1995–2007) and for the period 2008–2016 (with a report on the intermediate years of 2010 and 2013), both separately for the sectors of private households, commerce, trade and services, industry and transport and for final energy consumption overall. The calculation applied the methodological recommendations of the European Commission and also used the preferred detailed indicators (P1–14). Significantly tougher data requirements are attached to these than to the alternative highly aggregated minimum indicators (M1–M8) that have been proposed. The 'P' indicators are able to model the overall improvement in energy efficiency more precisely than the 'M' indicators. Almost all of the necessary base data were available for the NEEAP 2011 up to the 2009 reporting year (and some only up to 2008) from official statistics.[8] For all future reporting years up to 2016, use was made of data from available forecasts of energy consumption for Germany, each referring to the last year for which statistics are available (Prognos/EWI/GWS 2010; Prognos/OekoInst 2009).

These calculations given in the NEEAP 2011 have now been updated for the NEEAP 2014. For the sake of consistency, the same method of calculation and the same statistical data sources have been used as in the NEEAP 2011. There is now statistical data for almost all indicators up to the 2012 reporting year (for the transport sector, only up to 2011 in some cases). The table below shows the data sources used to update the final 'top-down' energy savings in the NEEAP

[8] Along with data from the Federal Statistical Office (DESTATIS), in particular the energy and usage balances for Germany (AGEB 2010; AGEB/BDEW 2010) and figures for the transport sector from (BMVBS/DIW 2009).

2014.

Sector:	*Data source*
Private households Final energy consumption by energy sources Final energy consumption by usage Living areas, homes, population	AGEB 2013 AGEB 2014 DESTATIS 2013
Commerce, trade and services [GHD] Final energy consumption, total Final energy consumption by sub-sector Employed people, other activities	AGEB 2013 FhISI/IfE/GfK/IREES 2014 DESTATIS 2013
Industry Final energy consumption by industry Production index	AGEB 2013 DESTATIS 2013
Transport and mobility Final energy consumption by mode of transport Fuel consumption by vehicle type Transport services	AGEB 2013 BMVBS/DIW 2013 BMVBS/DIW 2013
Forecasts for the period 2012/13 - 2016 all sectors	Prognos/EWI/GWS 2010; Prognos/OekoInst 2009

Table A.I-1.1-1; data sources used to update the energy savings in the individual consumption sectors and spheres of activity

The figures for the reporting period 2012/13 to 2016, which was no longer covered by the statistics, were again extrapolated on the same principle as in the NEEAP 2011 (Prognos;EWI;GWS 2010; Prognos;OekoInst 2009). A new reference forecast for Germany was not yet available at the time of the calculations (March 2014).

1.2. Results: Summary of energy savings from top-down calculations

In all consumption sectors, significant top-down energy savings were achieved in the ‘early action’ period (1995 to 2007) (Table A.I-1.2-1). The biggest savings were made in the Industry and Transport sectors. The total savings made in the ‘early action’ period were already well above the national indicative savings value of 748 PJ (power coefficient 1) or 995 PJ (power coefficient 2.5). There are some slight differences from the savings calculated in the NEEAP 2011. These are mainly due to the revision of the national energy balances for Germany carried

out in October 2012 but back-dated to 2003 (particularly affecting the Industry sector) and a review of the data in the 'Commerce, trade and services' sector.

Energy savings		**2007**	**2010**	**2013**	**2016**	**Total**
Unit		**PJ/year**				
Top-down		rel. to 1995	rel. to 2007			rel. to 1995
Total	**Power coefficient 1**	**993**	**683**	**940**	**1 253**	**2 246**
	Power coefficient 2.5	**1 198**	**802**	**1 080**	**1 490**	**2 688**
Private households	Power coefficient 1	238	547	671	805	1 043
	Power coefficient 2.5	332	638	754	927	1 259
GHD	Power coefficient 1	51	202	221	244	295
	Power coefficient 2.5	49	220	252	282	331
Industry	Power coefficient 1	288	-66	-55	-13	275
	Power coefficient 2.5	351	-58	-40	45	396
Transport	Power coefficient 1	416	-0.5	103	217	633
	Power coefficient 2.5	466	2	114	236	702

[9]

Table A.I-1.2-1 Summary of total top-down savings in the different sectors[i] with power coefficient 1 and power coefficient 2.5

Further substantial top-down savings may also be expected in the period to 2016. The differences from the NEEAP 2011 are attributable to the statistical developments up to the 2012 report year, which differ from the forecasts in the NEEAP 2011 (see also next section).

1.3. Results: sectors and spheres of activity

Space heating and hot water

Energy savings	**2007**	**2010**	**2013**	**2016**	**Total**
Unit	**PJ/year (power coefficient 1)**				
Top-down	rel. to 1995	rel. to 2007			rel. to 1995
Space heating and hot water	**164.3**	**527.9**	**639.6**	**752.8**	**917.1**
Space heating	230.6	451.6	643.9	752.9	983.5
Hot water	-66.3	76.3	-4.3	0.1	-66.2

Table A.I-1.3-1: Top-down savings in space heating and hot water

For Germany, top-down savings of 231 PJ were made for space heating in the 'early action'

period. For the indicator for hot water, on the other hand, an increased energy consumption of 66 PJ was observed, owing to a slight rise in the specific hot water consumption per inhabitant. In the 2008–2016 survey period, the saving made in the area of space heating will increase significantly compared to the NEEAP 2011. The reason for this is the sharp decline in final energy consumption for space heating from 2011 shown in the results of the new usage balances (AGEB 2014), which is mainly attributed to the decommissioning of night storage heaters. For hot water too, final energy savings have been made from 2008 onwards, but for the whole reporting period to 2016, this indicator shows a constant trend.

Appliances and lighting

Energy savings	2007	2010	2013	2016	Total
Unit	PJ/year (power coefficient 1)				
Top-down	rel. to 1995	rel. to 2007			rel. to 1995
Total appliances and lighting	**71.1**	**19.3**	**31.3**	**51.7**	**122.8**
Appliances	75.7	14.0	26.5	39.9	115.6
Lighting	-4.6	5.3	4.8	11.8	7.2

Table A.I-1.3-2: Top-down savings in appliances and lighting

As in the NEEAP 2011, the indicator for electrical household appliances is calculated from model data from Prognos AG, so it has not been updated.

For lighting, there was a slight increase in consumption in the ‘early action’ period, as the figures in the usage balances (AGEB/BDEW 2010) showed a slight rise in electricity consumption for lighting per home between 1995 and 2007. However, the result is mainly affected by the higher proportion of final energy consumption accounted for by lighting in 2007. For the reporting period up to the interim target year of 2010 and the target year of 2016, the calculation was based on the new usage balances (AGEB 2014) and, from 2013, on forecast data with moderate electricity savings in the area of lighting.

From the data currently available, it is not possible to calculate any energy efficiency indicator for space cooling for Germany.

Industry and trade

Saving	2007	2010	2013	2016	Total
Unit	PJ/year (power coefficient 1)				
Top-down	rel. to 1995 (GHD rel. to 2001)	rel. to 2007			rel. to 1995

Total industry and trade	**339.4**	**127.1**	**150.7**	**212.4**	**551.8**
GHD (fuels)	51.5	190.1	200.3	218.7	270.2
GHD (electricity)	-0.2	3.3	5.7	7.0	6.8
Industry (fuels)	246.0	-71.6	-65.4	-51.9	194.1
Industry (electricity)	42.0	5.3	10.1	38.6	80.6

Table A.I-1.3-3: Top-down savings overall in the Industry and 'Commerce, trade and services' sectors

For the 'Commerce, trade and services' sector (incl. agriculture, construction, but excl. fuels for the armed forces), the efficiency indicators are based on the specific fuel and electricity consumption in the individual sub-sectors. Energy consumption figures at the sub-sectoral level are available for Germany from the regular consumption survey in the 'Commerce, trade and services' sector up to the period 2001–2012 (FhISI/IfE/GfK/IREES 2014). The 'early action' period can therefore only be calculated from 2001 onwards. For this abbreviated 'early action' period, the updated calculations in the area of fuels showed a saving, but a very small increase in consumption for the electricity indicator. For the period 2008–2016, there were comparatively large savings in fuels, while the electricity indicator showed a rather insignificant saving.

In the 'early action' period from 1995–2007, savings were made in the Industry sector both in fuels and in electricity. However, these were slightly below the savings calculated in the NEEAP 2011. The reasons for this were the retroactive revisions of the national energy balance up to 2003 and minor revisions to data on activity sizes (conversion of the production index to the WZ2008, revisions of figures that were still provisional at the time of the calculations in the NEEAP 2011).

For the reporting period 2008–2016, the calculation results also differ from those in the NEEAP 2011. This reflects the effects of the economic and financial crisis on the development of energy efficiency in industry, which were not taken into account in the NEEAP 2011. In the years 2008 to 2010, energy consumption decreased much less than industrial production, mainly because of a relatively high base consumption, which does not react to decreases in production. Overall, this effect was less pronounced with regard to electricity than fuels.

Transport and mobility

Saving	2007	2010	2013	2016	Total

Unit	**PJ/year (power coefficient 1)**				
Top-down	rel. to 1995	rel. to 2007			rel. to 1995
Total transport and mobility	**415.8**	**-0.5**	**51.3**	**217.5**	**633.3**
Motorised private transport	183.4	-6.2	51.1	115.6	299.0
Road freight	217.1	0.8	52.0	97.9	315.0
Rail passenger transport	15.3	0.4	6.1	9.8	25.1
Rail freight	27.6	1.5	3.2	5.7	33.3
Public transport as a percentage of total passenger transport on land	2.5	6.9	3.4	2.5	5.0
Rail and inland waterways as a percentage of total freight transport	-30.1	-3.9	-12.6	-14.0	-44.1

Table A.I-1.3-4: *Summary of total top-down savings in the 'Transport and mobility' sector with power coefficient 1*

In the period 2008–2016, the savings in the Transport sector for all indicators (apart from the indicator for public transport) are lower than estimated in the NEEAP 2011. As a result of the economic crisis, energy intensity rose in 2008 and 2009 in the transport sector, as it did in Industry. This is particularly true of the indicators for motorised private transport and all indicators for freight transport, which reacted more strongly to the economic crisis than passenger transport. This effect was partly, but not completely, offset in the estimates up to 2016.

2. Bottom-up: quantified measures

2.1 Preliminary methodological notes / base data and sources

The NEEAP 2011 calculated and displayed the savings from over 50 individual measures by the bottom-up method. For the sake of consistency with the results of the NEEAP 2011, the updates to the savings in the NEEAP 2014 are limited only to those measures already described in the NEEAP 2011. Any new or additional measures are therefore excluded from this view. It follows that this is not a complete account of the final energy savings resulting from policy measures. The individual measures from the NEEAP 2011 were reviewed to determine whether they are still effective and whether there are fresh data. The calculations were then updated for measures for which more up-to-date information was available. An overview of bottom-up results for the relevant spheres of activity is given below. For a description of the individual measures and the calculation methods and base data used, please refer to the NEEAP 2011 and to the methodological accompanying document to the NEEAP 2011.

2.2 Results: Summary of energy savings from bottom-up calculations

The energy savings estimated by bottom-up methods for the individual spheres of action in 2016, and still relevant if we take a lifecycle approach, come to 810 PJ with a power coefficient of 1 and 1 041 PJ with a power coefficient of 2.5 (cf. Table A.I-2.2-1). These updates have caused only minor changes compared to the NEEAP 2011.

It should be noted that these energy savings calculated in the context of Article 4 ESD bear no relation to the evidence to support the binding energy saving target under Article 7 EED or other provisions of the EED. Nevertheless, the bottom-up energy savings that have been achieved clearly highlight the intensive efforts made at government level to increase energy efficiency in Germany. The bottom-up assessment of individual government measures alone produced energy savings in excess of the indicative energy-saving value for both power coefficient 1 and power coefficient 2.5. However, the many activities at regional and municipal level and by private operators are hardly taken into account (if at all), and by no means are all measures at federal level included.

In particular, the instruments and programmes in the area of ‘Buildings and systems’ are making a substantial contribution (475 PJ) to the reported savings. But the other spheres of activity are also showing significant energy savings up to 2016.

Energy saving (power coefficient = 1 and 2.5)[9]		**2007**	**2010**	**2013**	**2016**	**Total**
Unit		**PJ/year**				
Bottom-up		1995–2007	2008–2010	2008–2013	2008–2016	1995–2016
Total[10]	**Power coefficient 1**	460.0	191.0	316.6	458.1	809.7
	Power coefficient 2.5	544.8	232.3	416.9	631.2	1 041.4
Buildings and installations	Power coefficient 1	247.8	72.8	148.3	227.4	475.2
	Power coefficient 2.5	278.2	86.1	171.6	261.0	539.1
Appliances and lighting	Power coefficient 1	8.2	5.2	33.4	68.7	76.9
	Power coefficient 2.5	19.4	12.4	82.6	170.3	189.7
Public sector	Power coefficient 1	1.1	8.9	14.2	16.2	16.8
	Power coefficient 2.5	1.4	10.3	17.0	19.6	21.0
Industry and trade	Power coefficient 1	40.4	2.5	16.8	32.2	72.7
	Power coefficient 2.5	53.6	-1.6	21.7	46.9	100.5
Transport and mobility	Power coefficient 1	59.4	2.6	10.6	20.8	75.6
	Power coefficient 2.5	62.6	3.4	12.2	23.3	81.3
Cross-sector	Power coefficient 1	103.2	95.0	88.9	87.8	87.6
	Power coefficient 2.5	129.6	121.8	111.8	110.1	109.9

Table A.I-2.2-1 *Summary of bottom-up savings from selected measures by sector, for power coefficient 1 and 2.5*

[9] Because the service lives have been taken into account, the sum of the savings from the 'early action' period and the implementation phase (2008–2016) may differ from the ESD.

[10] These totals are produced by adding the calculated total savings for each usage area. Because of rounding differences, there may be slight but insignificant discrepancies from the sum of all individual measures.

Annex II:
Summary of primary energy savings achieved

As described and presented in Chapter II, the table below summarises the primary energy savings from selected energy efficiency measures.

Measure	Primary energy	Primary energy saving (PJ)		Final energy saving (PJ)		Source for primary energy factor
		2009–2013	2014–2020	2009–2013	2014–2020	
Standard-setting measures						
Energy Savings Regulation (stock)	1.07	363	290	338	270	(AGEB 2014), RW+WW PHH 2012
Energy Savings Regulation (new build)	1.07	154	47	144	44	(AGEB 2014), RW+WW PHH 2012
Renewable Thermal Energy Act (EnEV-15%)	1.07	32	22	30	20	(AGEB 2014), RW+WW PHH 2012
Measures affecting prices						
HGV toll	1	0	21	0	21	(Prognos 2013)
Energy and electricity tax	1.11	0	569	0	511	(Prognos 2013)
Air traffic tax	1	0	29	0	29	(Prognos 2013)
EEG reallocation	2.5	0	480	0	192	(Prognos 2013)
Emissions trading	2.5	0	104	0	41	(Prognos 2013)
Network usage charges	2.5	0	466	0	186	(Prognos 2013)
Concession charges	2.5	0	88	0	35	(Prognos 2013)
CHP reallocation	2.5	0	15	0	6	(Prognos 2013)
VAT on energy providers	1.04	0	150	0	145	(Prognos 2013)
Investment support						
Tax relief on energy renovations	1.07	0	82	0	76	(AGEB 2014), RW+WW PHH 2012
Market incentive programme, BAFA portion	1.07	51	25	48	24	(AGEB 2014), RW+WW PHH 2012
Market incentive programme, KfW portion (renewable energy premium)	1.10	0	0	0	0	(AGEB 2014), Heat GHD 2012
National Climate Initiative [NKI], general promotion	2.5	11	8	4	3	(Prognos 2013)
CO_2 building renovation programme (covering the following programme elements):						
- KfW Energy-efficient renovation	1.14	249	199	219	175	(IWU/IFAM 2013)
- KfW Energy-efficient construction	1.38	37	30	27	22	(IWU/IFAM 2013)
- KfW IKK Energy-related urban renewal – energy-efficient renovation (until end 2012 'Energy-efficient renovation – municipalities'	1.30	9	7	7	6	(BEI 2011)
- KfW IKK Energy-related urban renewal – energy-efficient renovation (until end 2012 'Social investment –	1.30	3	2	2	2	(BEI 2011)

Measure	Primary energy coefficient	Primary energy saving (PJ)		Final energy savings (PJ)		Source for primary energy factor
		2009–2013	2014–2020	2009–2013	2014–2020	
Energy-related building renovation')						
- KfW CO_2 building renovation programme (previous version, so 'early action' only)	1.07	13	0	12	0	(AGEB 2014), RW+WW PHH 2012
- Replenishment of KfW building programmes (from 2013)	1.07	6	24	6	23	(AGEB 2014), RW+WW PHH 2012
KfW programmes for energy-efficient street lighting	2.5	1	2	1	1	(Prognos 2013)
KfW energy-efficiency programme / KfW environmental programme	1.58	96	164	61	104	(Prognos 2014)
Efficiency Fund: Energy-efficient cross-cutting technologies / energy-efficient and climate-friendly production processes	1.21	6	23	5	19	(Prognos 2014), Machinery
Investment pact, energy-related renewal of the social infrastructure	1.30	6	0	4	0	(BEI 2011)
Future Investments Act [*Zukunftsinvestitionsgesetz — ZuInvG*]	1.30	63	0	48	0	(BEI 2011)
Environmental premium	1	26	0	26	0	(Prognos 2013)
KfW municipal loans – energy-related building renovation	1.30	0	0	0	0	(BEI 2011)
ERP environment and energy efficiency programmes A + B	1.58	61	0	39	0	(Prognos 2014)
Contracting in government properties	1.30	1	0	1	0	(BEI 2011)
Energy savings programme, government buildings (120-million prog.)	1.30	10	0	7	0	(BEI 2011)
Green IT initiative for government properties	2.5	9	0	4	0	(Prognos 2013)
Consulting and labelling programmes						
Mission E - BMVg	1.54	1	0	1	0	(AGEB 2014), GHD total 2012
Mission E - BImA	1.54	0.5	3			BImA internal projections
BAFA on-site consultation	1.14	9	7	8	6	(IWU/IFAM 2013)
Energy consultations at the premises of the consumer	1.30	5	4	4	3	(AGEB 2014), PHH total 2012
KfW energy consultations for SMEs	1.58	85	65	54	41	(Prognos 2014)
Caritas energy efficiency check	2.5	4	3	2	1	(Prognos 2013)
Energy Efficiency Fund: Energy and electricity savings checks in private households	1.30	0	1	0	1	(AGEB 2014), PHH total 2012
Peak equalisation for energy and electricity tax	1.47	0	169	0	115	(AGEB 2014), IND total 2012
Energy Efficiency Fund: energy management systems	1.47	0	1	0	1	(AGEB 2014), IND total 2012
Energy Efficiency Fund: municipal networks	1.30	0	0	0	0	(BEI 2011)
Climate protection concepts under the NKI	1.30	1	1	1	1	(BEI 2011)

Measure	Primary energy coefficient	rimary energy saving (PJ)		Final energy saving (PJ)		Source for primary energy factor
		2009–2013	2014–2020	2009–2013	2014–2020	
IKK/IKU Energy-related urban renewal – local provision (for municipalities and municipal companies)	1.30	1	1	1	1	(BEI 2011)

Table A.II-1.1-1: Primary energy savings from measures addressing energy efficiency

Annex III:
Annual report for 2014 pursuant to Article 24(1) EED (for information)

For the 2014 annual report on progress in meeting the national energy efficiency targets pursuant to Article 24(1) in conjunction with Annex XIV Part 1 of the Energy Efficiency Directive 2012/27/EU, the German Government is pleased to provide the following information:

(a) Estimate of following indicators in the year before last (year X - 2)

			2011	2012	Source
i	Primary energy consumption	PJ	13 599.3	13 447.1	AGEB
ii	Total final energy consumption	PJ	8 881.4	8 918.5	AGEB
iii	Final energy consumption by sector				
-	Industry	PJ	2 634.0	2 587.1	AGEB
-	Transport	PJ	2 567.8	2 558.6	AGEB
-	Households	PJ	2 333.4	2 427.5	AGEB
-	Services	PJ	1 346.1	1 345.4	AGEB
iv	Gross value-added by sector (2005 prices)				
-	Industry	€ bn	571.0	568.5	Destatis
-	Services	€ bn	1 653.4	1 673.6	Destatis
v	Disposable income of households	€ bn	1 641.5	1 679.9	Destatis
vi	Gross domestic product (2005 prices)	€ bn	2 454.8	2 471.8	Destatis
vii	Electricity generation from thermal power generation	TWh	521.1	505.4	AGEB
viii	Electricity generation from combined heat and power	TWh	97.6 ****	102.0	AGEB
ix	Heat generation from thermal power generation	PJ	679.8****	699.8	AGEB
x	Heat generation from combined heat and power plants, including industrial waste heat *				
xi	Fuel consumption in CHP plants	PJ	4 452.1	4 431.0	AGEB
xii	Passenger-kilometres (pkm)	billion	1 130.5	1 134.2	BMVI
xiii	Tonne-kilometres (tkm) ***	billion	643.1	633.2	BMVI
xiv	Combined kilometres (pkm + tkm) ****	billion			
xv	Population	million	81.8	81.9	Destatis

* not reportable until the amendment to the Energy Statistics Act [*Energiestatistikgesetz – EnStatG*]
** the 2013 annual report contains figures for public supply plants only; base data only now includes all CHP plants including micro-CHP
*** domestic transport
**** no report required, as figures for pkm and tkm available separately

Sources: Working Group on Energy Balances (AGEB), date: April 2014 Federal Ministry for Transport and Digital Infrastructure (BMVI); Destatis, date: March 2014

The slight increase in the indicators for ‘Total final energy consumption’ and ‘Final energy consumption in the household sector’ and the stable consumption shown by the indicator for ‘Final energy consumption, services’ are attributable to weather-related factors. For example, the daily temperature figure of 3 743 for 2012 was slightly higher than in 2011, when it was just 3 489 (source: German National Meteorological Service [Deutscher Wetterdienst]).

The values for 2011 reported by the German Government in the previous annual report for 2013 have changed slightly as a result of statistical adjustments made after last year’s report. The values for 2011 shown at the top of the table now provide an updated summary of the indicators for that year.

(b) Updates on major legislative and non-legislative energy efficiency measures adopted in the previous year

A diverse mix of different instruments has proved its worth in increasing energy efficiency in Germany. Last year, the Government also initiated and approved further measures to increase energy efficiency and adapted them to the latest developments. These include regulatory conditions, fiscal policy provisions as well as actual funding programmes and the provision of information and advice. In accordance with Annex XIV Part 1(b) EED, this section lists a selection of major legislative and non-legislative measures implemented in 2013, which contribute towards the overall national energy efficiency targets for 2020.

Additional funding for energy-related building renovation (CO_2 building renovation programme)

The KfW funding programmes for energy-efficient construction and renovation established under the CO_2 building renovation programme support comprehensive renovation work on the existing stock and new builds to ‘KfW-Effizienzhaus’ standards and energy-efficient individual measures to increase energy efficiency and savings. The funding takes the form of low-interest loans, repayment grants or investment grants, particularly for owner-occupiers. For this, EUR 1.5 billion a year were provided from the Energy and Climate Fund. From 2013 onwards, the German Government has also established an additional programme of grants totalling EUR 300 million to supplement the existing CO_2 building renovation programme over an eight-year period.

Programme to promote energy management systems in businesses:

In August 2013, the BMWi launched the programme to promote energy management systems. The purpose of an energy management system is to display the energy situation in an undertaking. This enables measures to be taken to reduce energy consumption. Companies can apply for a grant for the initial certification of either an energy management system to DIN EN

ISO 500001 or an energy monitoring system. In addition, there is the option of applying for grants for the purchase of measurement technology and software for energy management systems. The programme is administered by the BAFA.

Programme to promote energy-efficient and climate-friendly production processes

Since December 2013, the BMWi has been supporting the introduction of energy-efficient and climate-friendly production processes. With this programme, the BMWi hopes to assist companies when making investments to decide on the most energy-efficient and hence environmentally friendly solutions when designing their production processes. Companies can obtain a grant for investments to increase energy efficiency in manufacturing and industrial production processes. These relate particularly to converting production processes and procedures to energy-efficient technologies. The programme is administered by the project sponsor, Karlsruhe.

SME initiative for energy transition:

The SME initiative for energy transition, jointly sponsored by the BMWi, BMUB, DIHK and ZDH , was launched on 1 January 2013. This is intended to help German SMEs to bring about the energy transition. The aim is to exploit further potential for energy savings in businesses and improve their energy efficiency. The SME initiative provides companies with practical help by way of dialogue, information and training, and arranges local contacts.

Reform of the ‘peak equalisation’ scheme in the Energy Tax and Electricity Tax Acts

The Act amending the Energy Tax and Electricity Tax Acts and the Air Traffic Tax Act of 5 December 2012, which entered into force on 1 January 2013, reformed the ‘peak equalisation’ scheme to 2022. This scheme allows undertakings in manufacturing industry to claim relief on up to 90 % of their energy and electricity tax, to safeguard their international competitiveness. The Act is accompanied by an agreement between the Federal Government and German industry to increase energy efficiency, entered into on 1 August 2012. From 2013 onwards, equalisation payments will only be made where the undertakings applying for the relief introduce and operate energy and environmental management systems. In small and medium-sized enterprises, these may also be alternative systems for increasing energy efficiency (e.g. energy audits). Moreover, in the application years from 2015 onwards, equalisation payments will only be made where the energy intensity of manufacturing industry decreases by an annual target value fixed by statute and this is established by the Government on the basis of a report from an independent scientific institute. For the reference years 2013 to 2015, this target value was set at 1.3 % per year. After this, the annual increase is expected to be around 1.35 %, while the target values for the

reference years 2017 to 2020 will be reviewed in the course of an evaluation in 2017. If the target is not attained, companies will obtain reduced tax relief during the year at 60 % of the full amount for 92 % target attainment and 80 % for 96 % target attainment.

Amendment of the Energy Savings Regulation (EnEV)

The amended Energy Savings Regulation (EnEV) entered into force on 1 May 2014. The key element of the revision is a one-off 25 % increase in the energy efficiency requirements for new builds from 1 January 2016. Existing buildings are excepted from these tighter standards. The required level for new builds is thus being enhanced within the bounds of cost-effectiveness, taking account of the cost to owner-occupiers, landlords and tenants. The importance of the energy performance certificate as a source of information to consumers is also being extended. Energy efficiency classes for buildings are being introduced into energy performance certificates and property ads to improve transparency in the real estate market further. From 2015, 'constant temperature' boilers (standard boilers that, unlike newer boilers, cannot adjust their temperature to the required heat output) will be decommissioned after 30 years' use. Some owner-occupied single and two-family houses will continue to be exempted from the decommissioning requirement.

Amendment of the Energy Savings Act (EnEG)

In the Fourth Act amending the Energy Savings Act of 4 July 2013, Germany made the requirements for nearly zero-energy buildings into a basic obligation in application of the wording to this effect in EU Directive 2010/31/EU on the energy performance of buildings. This implementation does not entail any immediate quantitative requirements. They may be added later.

This is to take account of the fact that the ratio between the costs and benefits of energy-saving measures over the economic lifetime of the buildings concerned is constantly improving, mainly as innovative technologies penetrate the market. Setting the required level for 1 January 2021 or 1 January 2019 on the basis of today's technologies and costs would have allowed much less scope in terms of the technical and economic feasibility of minimum requirements for nearly zero-energy buildings. In light of this, the Act commits Germany to enact a Regulation introducing a standard for public buildings by the end of 2016 and for other buildings by the end of 2018.

Mobility and fuel strategy (MKS)

On 12 July 2013, the German Government approved a 'Mobility and fuel strategy' drawn up

under the auspices of the Federal Ministry of Transport, Building and Urban Development (BMVBS). This is a contribution by the transport sector towards implementing the targets laid down in the German Government's energy concept for that sector. The essential conditions for achieving these targets are a diversification of the energy base for transport to take in alternative fuels combined with innovative drive technologies, further improvements to the energy efficiency of combustion engines and optimisation of traffic flows. The strategy thus provides a comprehensive overview of the energy and fuel options for the different modes of transport. It also sets out to help broaden the knowledge base on energy and technology issues in the transport sector, to analyse the general conditions and prioritise goals. The mobility and fuel strategy is conceived as a continuous 'learning' strategy to foster a sustainable and forward-looking policy. Recommendations for action can then be reviewed and future developments taken into account.

c) Total area of buildings to be renovated under Article 5 EED

In accordance with Annex XIV Part 1(c) EED, the 2014 annual report contains details of the total area of buildings with a total useful floor area over 500 m^2 owned and occupied by the Member State's central government that, on 1 January 2014, did not meet the energy performance requirements referred to in Article 5(1).

Based on the terms 'owned and occupied by central government' and 'owned and occupied by administrative departments at a level below central government' used in Article 5(1) EED, the buildings belonging to the following organisations are used to define the balance area for the application of Article 5 EED:

- All Federal Government buildings except for social security institutions (Federal Employment Agency, Deutsche Rentenversicherung etc.), which provide public services.
- All administrative entities in the material sense (government buildings and other buildings used for administrative purposes, i.e. executive buildings in the material sense, which are empowered to adopt nationally binding regulations, generally under public law, including single living quarters or office buildings for the armed forces (see Article 5(2)(b)).

The initial basis for implementation will be the 'Energy refurbishment roadmap for Federal Government properties' (ESB) developed in recent years. The extent to which other properties will have to be included in order to meet the requirements of Article 5 will be reviewed at the appropriate time.

From this balance area for the relevant organisations, we can estimate a net floor area of heated

and/or cooled buildings of around 4.8 million m^2. To determine the renovation rate of 3 % per year, the following sub-areas can be subtracted from the total surface area:

- Article 5(2)(a) of the Directive leaves Member States free not to set or apply the requirements for energy-related renovation of some building types. These also include buildings listed for conservation, which account for around 10 % of the building area.
- Some 23 % of the buildings covered that are not listed for conservation were built after 1995 in accordance with the provisions of the 1995 Heat Conservation Regulation [*Wärmeschutzverordnung*] and the associated Heating Systems Regulation [*Heizungsanlagenverordnung*] and so meet the minimum requirement for total energy performance laid down in the EU Buildings Directive.
- Of the remaining buildings, around 8.5 % have a useful area of less than 500 m2.

The total area of buildings with a total useful floor area of over 500 m^2 in the above balance area that, on 1 January 2014, did not meet the energy performance requirements referred to in Article 5(1) EED is around 3 million.

The summary below shows the derivation of the total area used to determine the renovation rate of 3 % per year:

Total area (NFA) of the relevant organisations approx. 4.8 million m2

	Share	Reference area	Sub-area
minus buildings listed for conservation	approx. 10.0 %	of 4.8 million m^2	~ 0.5 million m^2
minus built since 1995	approx. 23.0 %	of 4.3 million m^2	~ 1.0 million m^2
minus buildings < 500 m^2 NFA	approx. 8.5 %	of 3.3 million m^2	~ 0.2 million m^2

Total area (NFA) used to calculate the 3 % renovation rate ~ 3.0 million m^2

The area of around 3.0 million m^2 quoted above thus relates to:

- heated and/or cooled buildings occupied by the central government with a net floor area of over 500 m2,
- which were built before 1995,
- are not listed for conservation and
- do not meet the minimum requirements for total energy performance laid down in the EU Buildings Directive.

This does not necessarily mean that these buildings do not meet the national minimum requirements for total energy performance. If energy-related renovation measures have been carried out since they were built, this could reduce the area quoted. The necessary information on this is currently being assembled (see notes in section (d) below).

d) Total savings achieved in the previous year pursuant to Article 5 EED

According to Annex XIV Part 1(d) EED, the annual report should contain details of the total area of heated and/or cooled buildings owned and occupied by the Member State's central government that was renovated in the previous year pursuant to Article 5(1) or the amount of energy savings in eligible buildings owned by its central government as referred to in Article 5(6).

In its communication to the European Commission of 20 December, the Federal Government reported that, in implementing Article 5 EED, Germany was making use of the option to proceed according to Article 5(6) rather than Article 5(1) to (5) EED and to take other cost-efficient measures, including extensive renovations and measures to change the behaviour of building users in order to achieve energy savings by 2020.

Work began as early as 2011 on developing a national 'Energy refurbishment roadmap for Federal Government properties' (ESB), picking up the Federal Government's energy objectives to develop a climate-neutral building stock. To achieve these objectives, we need measures that go well beyond the national minimum requirements for the energy-related renovation of existing buildings, but which are cost-effective at the same time. The ESB lists the properties in terms of their potential for energy efficiency improvements. Properties with great potential for renovation take precedence over those with a lower energy potential for renovation and should accordingly be examined earlier. In the next few years, the energy efficiency of the building stock will thus be systematically improved on the basis of the order of priority shown. The first step towards this will be to produce uniform building energy concepts for the individual buildings within a property. These concepts have a standard format, so the necessary data can be collected and processed consistently.

The call for tenders for the production of these building energy concepts was launched in 2013 as part of a two-phase Europe-wide tendering process. This procedure has now been completed and the contracts with the successful bidders have been signed. The relevant engineering firms are now available to assist the federal planning offices. The initial building renovation concepts are now being drawn up.

Because of the timing and organisational process of implementing the ESB, including

compliance with the time limits for the procurement process, no building projects pursuant to Article 5(1) EED were carried out last year in heated and/or cooled buildings owned and occupied by the central government of the Member State concerned.

Nevertheless, a number of measures to increase energy efficiency have already been implemented within an energy savings programme for government buildings. From reports received to date on measures completed in 2013, we may expect to see energy savings of at least 220 MWh (based on final energy). As not all of the planned measures have been implemented, or reports of completion are still outstanding, we may assume that this amount will rise sharply. All of the measures planned for implementation in 2013 should ultimately lead to energy savings of the order of 90 000 MWh.

(e) Energy savings achieved through the alternative measures adopted under Article 7(9) EED

The annual reports pursuant to the EED also contain, in accordance with Annex XIV Part 1(e), details of energy savings achieved through the national energy efficiency obligation schemes referred to in Article 7(1) EED or the alternative measures adopted pursuant to Article 7(9).

In order to achieve the savings target pursuant to Article 7(1) EED, Germany is making use of the possibility set out in Article 7(9) EED of taking particular policy measures. To this end, Germany reported in its communication to the European Commission of 4 December 2013 on various strategic measures and packages that it currently plans to use. These include both standard-setting measures such as the Renewable Thermal Energy Act, measures to promote investment in the construction sector (such as renewable heat energy) through the aid programmes of the Kreditanstalt für Wiederaufbau (KfW) for energy-efficient building and renovation, and also various programmes to promote investment in energy-efficient technologies by undertakings and measures to increase energy efficiency through information and advice, including the various programmes run by the Federal Government in the field of energy consulting.

Based on current estimates, these strategic measures should produce cumulative final energy savings of 459 PJ in the period 2014–2020 and at least 1 121 PJ from ‘early action’ in the period 2009–2013 (cf. communication from the Federal Government of 4 December 2013 for a detailed list and description of the measures and an estimate of the cumulative final energy savings up to 2020).

The planned implementation may be subject to change as a result of future decisions by the

Federal Government and the *Bundestag* [Lower House of Parliament]. The Federal Government will therefore briefly inform the European Commission of other instruments and measures that are relevant to achieving the savings target in Article 7(1) EED and in this way ensure that Germany achieves the savings target. These instruments and measures may consist, *inter alia*, of additional existing strategic measures to increase energy efficiency. These may also include notification of additional measures to be re-introduced or implemented by the German Government.

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[i] The sections below present the top-down calculations broken down by spheres of activity. This type of presentation was not possible in the summary table A.I-1.2-1, as the top-down indicators are not always available in the same breakdown by spheres of activity. That is why the conventional sectoral breakdown has been chosen for the overall summary – as in the NEEAP 2011.