

Communication from the German Federal Government to the European Commission pursuant to Article 7 of Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency

I. Introduction

The German Federal Government hereby sends the European Commission a communication on the planned implementation of Article 7 of 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 (EED).

The communication contains a provisional savings target figure for the Federal Republic of Germany pursuant to Article 7(1) in conjunction with point 4c of Annex V (Section II.) and a provisional list of specific policy measures and combinations thereof pursuant to Article 7(9) EED, including the assessment of the cumulative final energy savings to be achieved by these measures during the period 2014–2020 and a more detailed explanation of this assessment and the relevant calculation method (Section III.). The relevant requirements in Article 7 and Annex V EED were taken into account when assessing the cumulative final energy savings resulting from 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]. Once the government has been formed, the Federal Government will therefore issue prompt notifications about other instruments and measures that are relevant for compliance with Article 7(1) EED and in this way ensure that the Federal Republic of Germany achieves the savings target pursuant to Article 7 EED. These instruments and measures may consist, *inter alia*, of additional existing policy measures to improve energy efficiency. Furthermore, this may also include the notification of additional measures resulting from a coalition agreement for the 18th legislative period. The Federal Government will also inform the European Commission of any changes as part of its reporting obligations under Annex XIV Part 1(e) EED.

II. Determination of the savings target in accordance with Article 7(1) to (3) EED

The German Federal Government provisionally puts the savings target referred to in Article 7(1) to (3) EED at 2 046.5 PJ.

1. Calculation in accordance with Article 7(1) EED

Alternatively, the average annual final energy consumption in the Federal Republic of Germany during the period 2010–2012 based on the national energy balance (9 063 PJ) is provisionally used as a basis for calculating the savings target pursuant to Article 7(1) EED. This is because at present statistics are still being calculated concerning average annual own consumption in the Federal Republic of Germany. Once the amount of own consumption can be estimated, this figure can be deducted from the final energy consumption to give the amount of energy sold, which represents the actual basis for calculating the savings target pursuant to Article 7(1) EED. The Federal Government therefore reserves the right to adjust the savings target again once the amount of energy sold is available as a basis for the calculation. The values for the final energy consumption of the Federal Republic of Germany for 2012 as provided by the Working Group on Energy Balances [*Arbeitsgemeinschaft Energiebilanzen — AGEB*] (as at July 2013) are provisional.

The Federal Government also makes use of the possibility (provided for in the second sentence of the second subparagraph of Article 7(1) EED) of totally disregarding the final energy consumption of the transport sector (2 566 PJ) when determining the target.

The bases for calculation described above produce an average annual final energy consumption figure (excluding transport) for the Federal Republic of Germany during the period 2010–2012 of 6 497 PJ. On this basis, the application of Article 7(1) EED gives as value of 2 728.7 PJ as an interim result.

2. Reduction of the savings target by 25 % in accordance with Article 7(2) and (3) EED

The Federal Government makes use of the possibility provided for in Article 7(2) in conjunction with (3) EED, to reduce the value calculated in accordance with Article 7(1) EED of 2 728.7 PJ by 25 % (682.2 PJ) to a total of 2 046.5 PJ using the measures described in Article 7(2)(a) to (d) EED in conjunction with Article 7(3) EED. The measures counted here are mainly those in Article 7(2)(b) and (d).

Article 7(2)(b) EED states that all of the sales, by volume, of energy used in industrial activities listed in Annex I to Directive 2003/87/EC may be excluded from the calculation when defining the savings target in accordance with Article 7(1) EED. Given the requirements for defining the savings target set out in Article 7(1) EED, this amount of energy represents a further cumulative reduction of the target by 359 PJ for the period 2014–2020.

Article 7(2)(d) EED states that energy savings resulting from individual actions newly implemented since 31 December 2008 that continue to have an impact in 2020 and that can be measured and verified (early action), may be counted towards the amount of energy savings to be achieved pursuant to Article 7(1) EED. Overall, the measures already taken in the Federal Republic of Germany to achieve final energy savings produce cumulative final energy savings resulting from early action of at least 1 121 PJ (cf. detailed description in Section III.).

The savings target for the Federal Republic of Germany pursuant to Article 7(1) EED can therefore ultimately be reduced by 682.2 PJ applying Article 7(2)(b) and (d) EED in conjunction with Article 7(3) EED. On that basis, according to provisional estimates, further cumulative final energy savings of 2 046.5 PJ are to be provided pursuant to Article 7(1) EED for the period from 1 January 2014 to 31 December 2020.

III. Cumulative final energy savings resulting from policy measures

To enable it to achieve the provisional savings target of 2 046.5 PJ, the Federal Republic of Germany makes use of the possibility set out in Article 7(9) EED of counting particular policy measures towards the fulfilment of the savings target pursuant to Article 7(1) EED. Various policy measures or combinations thereof should be used for this. The policy measures described in detail below and the eligible savings resulting from these are subject to the reservation to make amendments contained in Section I.

1. Regulatory measures

M 01: Renewable Energies Heat Act [<i>Erneuerbare Energien Wärme-Gesetz — EEWärmeG</i>]				
Note: Figures may be subject to updates based on current legislation				
Regulative law	Start: 2009	End: not planned	Linked to the amendment of the Energy Saving Ordinance [<i>Energieeinsparverordnung — EnEV</i>]:	
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
EEWärmeG	0.8 PJ; 0.6 PJ (from 2016)	7 PJ	20 PJ	30 PJ
Focus of the measure:				
Short description of the measure	The Renewable Energies Heat Act (EEWärmeG) lays down the obligation to use renewable energy sources in the construction of new buildings. The connection to final energy is provided, <i>inter alia</i> , by the fact that this Act allows for over-fulfilment of the Energy Saving Ordinance (EnEV) as a replacement measure for the use of renewable energies. Final energy savings under the EEWärmeG are thus linked to the amendments to the EnEV in the area of new buildings. The effects of the measure in terms of final energy savings are presented here.			
Sector:	Private households; commerce, trade and services; industry	Target group:	Building owners and property developers	
Body responsible for the measure(s):	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety [<i>Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit — BMU</i>]	Application:	Building envelope, building services	
Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049 (depending on the individual measure)	
Methodological details:				
Calculation formula	Cf. Annex (on the basis of: European Commission 2010: Section 2.3 [Procedure for new building standards]; Prognos 2013)			
Methodological parameters and additional methodological explanations	Cf. Annex; the relevant version of the EnEV is applied as the reference (<i>baseline</i>). A 15 % reduction in final energy consumption is set as the target. When updating the energy performance indicators, the required level as of 2016 set out in the 2013 amendment to the EnEV is used as a basis and it is assumed that the target values in the EEWärmeG will be adjusted in line with the EnEV. The resulting savings are still the subject of calculations — based on current legislation. The Federal Government therefore explicitly reserves the right to amend the notification. When updating the area covered by new buildings, the average for the last three years is used. Different parameters are used based on the type of building. One and two-family houses, apartment blocks and non-residential buildings are considered. The reference values are the living area for residential buildings and the useful area for non-residential buildings. The building completion statistics issued by the Federal Statistical Office [<i>Statistisches Bundesamt — Destatis</i>] are used as a basis for the area covered by new buildings (2012: Volume 5, Series 1). The saving is based on the average heating energy demand and system efficiency levels across one square metre of living area or useful area. The heating energy demand and the system efficiency levels are shown as a quotient (final energy demand). Assumptions are made about the surface area to volume ratio (A/V ratio) for the categories of building considered in order to calculate the energy performance indicators. For one and two-family houses, an A/V ratio of 0.7 is assumed; for apartment blocks and non-residential buildings, a value of 0.4 is assumed. The proportion (by area) of new buildings where the replacement measure 'EnEV -15 %' was implemented on the basis of the EEWärmeG is determined using the progress report on the EEWärmeG. Based on this legal requirement, for the purpose of simplification a mean reduction in the final energy consumption of 15 % (compared to the EnEV) is applied for the corresponding area. In principle, the other measures under the EEWärmeG may also make a contribution to reducing the final energy consumption. However, it is assumed that the savings effect provided by these measures is already included in the EnEV.			
Sources/references:	Prognos 2013; European Commission 2010; BMU 2012; Federal Statistical Office 2012; BMWi 2011			

2. Investment support

M 02: KfW [German government-owned development bank] support programmes for energy-efficient construction and renovation (CO₂ Building Renovation Programme):				
<ul style="list-style-type: none"> - KfW Energy-Efficient Construction - KfW Energy-Efficient Renovation - Replenishment of the KfW programmes for energy-efficient construction and renovation 				
Funding		Start: 2009		End: not specified
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
KfW energy-efficient construction	6.2 PJ	62 PJ	175 PJ	219 PJ
KfW energy-efficient renovation	0.8 PJ	8 PJ	22 PJ	27 PJ
KfW replenishment	0.8 PJ	8 PJ	23 PJ	6 PJ
Total	7.8 PJ	78 PJ	220 PJ	252 PJ
Focus of the measures:				
Short description of the measures	<p>In the area of energy-efficient construction, support is provided for new buildings that surpass the applicable building standard: KfW Energy-Efficient House 70, 55 and 40, and the Passive House Standard. EUR 50 000 is the maximum amount of funding provided per housing unit, which corresponds to a maximum of 100 % of the eligible costs. The funding is provided through long-term soft loans. The measure has continued the KfW 'Ecological Construction' programme since 2009.</p> <p>In the area of energy-efficient renovation, the programmes include the provision of support for renovations of existing buildings where the applicable building standard is surpassed (KfW Efficient House Standards 55, 70, 85, 100 and 115) and individual measures that meet defined minimum requirements. Support is provided in the form of a soft loan (combined with a redemption loan), or alternatively in the form of an investment grant. Depending on the KfW Efficient House Standard achieved, the grant may be a maximum of EUR 18 750 per housing unit. For individual measures, the grant may be a maximum of EUR 5 000 per housing unit. The measure continues the KfW 'CO₂ Building Renovation Programme'.</p> <p>In December 2012, the Federal Government approved the further replenishment of KfW's building renovation programmes in the order of an additional EUR 300 million per annum for grants.</p>			
Sector:	Private households	Target group:	Home and property owners; owners and developers of new buildings	
Body responsible for the measure(s):	Federal Ministry of Transport, Building and Urban Development [<i>Bundesministerium für Verkehr, Bau und Stadtentwicklung</i> — <i>BMVBS</i>] / KfW	Application:	Building envelope, building services	
Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049 (depending on the individual measure)	
Methodological details:				
Calculation formulae	Cf. Annex (for the 'Energy-Efficient Building and Renovation' programmes on the basis of the programme evaluations produced on behalf of KfW and the BMVBS [cf. BEI/IWU 2012, 2011] and Prognos 2013; for the replenishment of the KfW building renovation programmes on the basis of: European Commission 2010: Section 2.1 [Procedure for renovation measures] and Prognos 2013).			
Methodological parameters and additional methodological explanations	<p>With regard to the 'Energy-Efficient Building and Renovation' programmes (CO₂ Building Renovation Programme), the number of housing units for which funding is provided is taken as the driving variable for the forward projection. The mean for the period 2009–2011 is used for both the number of housing units and for the saving per housing unit. In specific terms, an annual saving of 6.9 MWh per year and housing unit (HU) across 278 000 HUs is assumed in the 'Energy-Efficient Renovation' programme; an annual saving of 4.1 MWh and HU across 77 000 housing units is used as a basis in the 'Energy-Efficient Construction' programme.</p> <p>With regard to the replenishment of the KfW building renovation programmes, 200 kWh per m² living area is assumed as a reference value for the existing building stock. The reference property is a one/two-family house whose energy performance indicator (as stipulated for the existing building stock by EnEV) is exceeded by 15 % following the renovation. Where an A/V ratio of 0.7 is applied, this produces a target value of 111 kWh per m² living area. The level of grant awarded is between 10 % and 25 % of the total investment depending on the purpose of the funding. It is assumed that this will trigger an investment volume of EUR 1.5 billion per annum when the scheme enters into force in 2013.</p>			
Sources/references:	Prognos 2013, 2012; European Commission 2010; BEI/IWU 2012, 2011, 2010; dena 2011; KfW 2012 (data delivery)			

M 03: KfW investment programmes in municipalities and social facilities (in part CO₂ Building Renovation Programme):				
<ul style="list-style-type: none"> - IKK — Energy-Related Urban Renewal — Energy-Efficient Renovation - IKU — Energy-Related Urban Renewal — Energy-Efficient Renovation - IKK/IKU — Energy-Related Urban Renewal — Energy-Efficient Renovation - IKK — Energy-Related Urban Renewal — Urban Lighting - KfW Premium Investment Loan for Municipalities / Premium Municipal Investments 				
Funding		Start: 2007, 2009, 2012	End: not specified	
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
IKK Energy-Efficient Renovation	0.2 PJ	2 PJ	5.6 PJ	7.0 PJ
IKU Energy-Efficient Renovation	0.1 PJ	0.6 PJ	1.6 PJ	2.0 PJ
IKK/IKU Energy-Efficient Renovation	0.00 PJ	0.02 PJ	0.05 PJ	0.03 PJ
IKK Urban Lighting	0.0 PJ	0.3 PJ	0.8 PJ	0.6 PJ
Total	0.3 PJ	2.92 PJ	8.05 PJ	9.63 PJ
Focus of the measures:				
Short description of the measures	<p>As part of the various support possibilities for municipalities in the area of energy efficiency, through the CO₂ Building Renovation Programme KfW offers (on behalf of BMVBS) direct loans and sub-loans for the renovation of schools, school sports halls, day nurseries and buildings used for work with children or young people to create energy savings.</p> <p>Funding is provided, <i>inter alia</i>, for renovation work at the level of new builds (programme part A) to the KfW Efficient House Standard 100 and 85, 70 and 55, and for energy-efficient individual measures through the 'IKK — Energy-Related Urban Renewal — Energy-Efficient Renovation' and 'IKU — Energy-Related Urban Renewal — Energy-Efficient Renovation' programmes under the CO₂ Building Renovation Programme. This renovation work may include heat insulation, the replacement of heating or windows (programme part B) or the energy efficiency of public urban lighting.</p> <p>The 'Energy-Related Urban Renewal — Grants for Integrated District Concepts and Renovation Managers' programme does not directly support investments in energy-efficient measures and is therefore included in a different section.</p> <p>Investment measures for the sustained improvement of the energy efficiency of the municipal supply systems (district-related heat supply and energy-efficient water supply and sewage disposal) have been supported through the KfW programme 'Energy-Related Urban Renewal — District Supply' in the form of soft loans on behalf of BMVBS since February 2012 (evaluation is still outstanding).</p> <p>In addition, KfW offers other programmes for municipalities (for instance the 'Municipal Energy Supply' programme) which are not included here as they focus primarily on investments concerning conversion.</p>			
Sector:	Public authorities	Target group:	Municipalities	
Body responsible for the measure(s):	Federal Ministry of Transport, Building and Urban Development [<i>Bundesministerium für Verkehr, Bau und Stadtentwicklung — BMVBS</i>] / KfW	Application:	Building envelope, building services, lighting	
Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049 (depending on the individual measure)	
Methodological details:				
Calculation formulae	Cf. Annex.			
Methodological parameters and additional methodological explanations	The evaluation by [BEI 2011] and the data delivered by KfW are used as a basis for calculating the savings. Reference is made to the information provided by the Baden-Württemberg State Ministry of the Environment in the form of a study on the 2nd NEEAP [Prognos, Difu 2011] when determining the saving per euro invested for the urban lighting programmes. For the forward projection, the investment volume triggered by the measure is taken as the driving variable for the final energy saving. The average saving for 2009–2010 and the mean investment volume for 2009–2011 are used here.			
Sources/references:	Prognos 2013; BEI 2011; Prognos/Difu 2011; KfW 2012 (data delivery)			

M 04: Investment support in companies				
<ul style="list-style-type: none"> - KfW Energy Efficiency Programme - KfW Renewable Energies Standard / Premium - BMWi Efficiency Fund: Promotion of energy-efficient cross-cutting technologies in SMEs / promotion of energy-efficient and climate-friendly production processes 				
Funding		Start: 2009/2012	End: not specified	
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
KfW Energy Efficiency	3.7 PJ	37 PJ	104 PJ	61 PJ
KfW Renewable	0.01 PJ	0.1 PJ	0.2 PJ	0.2 PJ
Cross-cutting technologies / processes	0.7 PJ	6.8 PJ	19 PJ	4.8 PJ
Total	4.41 PJ	43.9 PJ	123.2 PJ	66 PJ
Focus of the measures:				
Short description of the measures	<p>The KfW energy efficiency programme provides financing for energy efficiency measures, for example in the areas of building and energy technology; building envelopes; machinery; process cooling and heating; heat recovery/waste heat utilisation; measurement, regulation and control technology; information and communication technology; procurement of low-emission commercial vehicles, including the associated costs for planning and implementation support for SMEs. The anticipated energy savings must be calculated before the application is filed; minimum requirements exist with regard to the level of saving (for new investments: 15% less than the average for the industry; for replacement investments: 30 % less than the mean consumption for the last three years).</p> <p>Under the KfW Renewable Energies (Standard/Premium) programme, funding is provided for projects where renewable energies are used to generate electricity and where electricity/heat is generated in combined heat and power installations in the form of soft loans and partly also through redemption loans. The effects of the programme in terms of final energy savings are examined here.</p> <p>The two programmes, 'Promotion of high efficiency cross-cutting technologies in SMEs' (funding is provided for e.g. energy-efficient pumps, drives or compressed-air systems in the form of investments grants) and 'Promotion of energy-efficient and climate-friendly production processes in the manufacturing sector', were launched under the Energy Efficiency Fund of the Federal Ministry of Economics and Technology [<i>Bundesministerium für Wirtschaft und Technologie — BMWi</i>].</p>			
Sector:	Commerce, trade and services; industry	Target group:	Companies	
Body responsible for the measure(s):	KfW, BMWi, Federal Office of Economics and Export Control [<i>Bundesamt für Wirtschaft und Ausfuhrkontrolle — BAFA</i>]	Application:	Building envelope, building services, lighting, stationary drives, thermal cross-cutting technologies, processes	
Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049 (depending on the individual measure)	
Methodological details:				
Calculation formulae	Cf. Annex.			
Methodological parameters and additional methodological explanations	<p>To calculate the saving, an energy saving per euro employed is estimated for each type of use. For the forward projection, the investment volume triggered by the measure is taken as the driving variable for the final energy saving. For the purpose of projecting the investment volume, it is assumed that the programmes will trigger annual investments in the order of EUR 3.5 billion (cf. Annex: Methodological parameters for investment support in companies). The range of the saving in question varies considerably, not least because of the variety of application systems used. The studies referred to contain values of between 0.02 and 5 kWh/a per euro invested. In the area of cross-cutting technologies and production processes, a value of 0.75 kWh/(a*€) was estimated as a realistic value.</p>			
Sources/references:	Prognos 2013, 2012; KfW 2012 (data delivery); BfEE 2012 (data delivery); Deloitte 2011; ZSW (various years); CWA 2007			

M 05: Combined Heat and Power Act [Kraft-Wärme-Kopplungs-Gesetz — KWK-G]				
Funding	Start: 2002	End: not specified	Amendments: 2009 and 2012	
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
KWK-G	0.4 PJ (2014); 0.1 PJ (2015–2020);	2.1 PJ	4.6 PJ	-
Focus of the measure:				
Short description of the measure	The purpose of the KWK-G is to make a contribution towards increasing the amount of electricity generated from combined heat and power in the Federal Republic of Germany to 25 % by 2020 by promoting the modernisation of CHP installations and the construction of new CHP installations, supporting the market launch of the fuel cell and promoting the setting up and expansion of heat and refrigeration networks, and the setting up and expansion of heat and cold accumulators into which heat or cooling energy from CHP installations is fed in the interest of saving energy, protecting the environment and achieving the climate protection targets of the Federal Government. The final energy savings resulting from the Combined Heat and Power Act are presented here.			
Sector:	Commerce, trade and services; industry; private households	Target group:	Operators of combined heat and power installations	
Body responsible for the measure(s):	BMW	Application:	Building services	
Lifetime	1 year	Savings by	2020	
Methodological details:				
Calculation formulae	Cf. Annex.			
Methodological parameters and additional methodological explanations	<p>The methodological approach selected is based on the methodology selected in the interim review of the KWK-G. This involves comparing the conversion of final energy into useful energy through CHP against non-combined conversion. For the purpose of the forward projection, it is assumed that the CHP electricity generated will be the same as in the 'Atomic Energy Act [Atomgesetz] 2002' scenario of the interim review of the KWK-G. Only CHP that is included in the final energy section of the national energy balance is considered here. This involves CHP installations with an electrical capacity smaller than 1 MW. For the calculation, a distinction is made between seven capacity categories based on the categories of remuneration in the KWK-G:</p> <ul style="list-style-type: none"> - up to 10 kW_{el}, - up to 10 kW_{el}, high efficiency, - 10–50 kW_{el}, - 10–50 kW_{el}, high efficiency, - 50 kW_{el}–2 MW_{el}, - 50 kW_{el}–2 MW_{el}, high efficiency, - fuel cell. <p>Only the high efficiency capacity categories and the fuel cell are included in the calculation of the saving. 92.5 % efficiency is assumed as the reference efficiency for the generation of heat. 100 % efficiency is assumed here as the reference efficiency for the generation of electricity. This is substantiated in the analysis of final energy. The generation of electricity and therefore the efficiency of the generation of electricity are shown in the conversion section of the national energy balance. With the selected approach, the saving is calculated on the basis of the annual amount generated and not on the basis of the CHP installations. For that reason, one year should be set as the 'lifetime' of the saving and no early savings are therefore eligible. Generally speaking, the impact of CHP is determined by looking at the primary energy. For reasons of consistency, the impact on final energy consumption is evaluated at this point (power factor = 1). In the energy balance, only CHP installations with an electrical capacity smaller than 1 MW are included under final energy consumption. However, CHP installations up to 2 MW_{el} are considered in this document. This inaccuracy can be attributed to the current data for this segment in the Federal Republic of Germany. A moderate overestimate of the saving in the area of CHP should therefore be assumed.</p>			
Sources/references:	Prognos 2013, 2012; Prognos/BEA 2011; Dielmann 2008; Gailfuß 2002, 2000; Prognos/ifeu/BHKW 2013			

M 06: National Climate Protection Initiative — market incentive programme to promote the use of renewable energies in the heating market (BAFA part)				
Funding		Start: 1999	End: not specified	Amendments: 2009 and 2012
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
Market incentive programme (BAFA part)	0.8 PJ	8.4 PJ	24 PJ	48 PJ
Focus of the measure:				
Short description of the measure	The objective of the programme is to strengthen sales of renewable energy technologies through investment incentives and to improve their economic viability. Funding is provided in the form of a grant from BAFA. Funding is provided, <i>inter alia</i> , for efficient heat pumps and solar thermal installations. Where a solar thermal installation and a heat pump are set up at the same time, funding is provided for this in the form of a combination bonus. Since 2010, the target of the funding has almost solely been the existing stock of buildings. The measure is evaluated here in terms of its impact on final energy consumption.			
Sector:	Cross-cutting technologies	Target group:	Property owners and property developers	
Body responsible for the measure(s):	BMU, BAFA	Application:	Building services	
Lifetime	10–20 years (depending on the individual measure)	Savings by	2029–2039 (depending on the individual measure)	
Methodological details:				
Calculation formulae	Cf. Annex (for the programme part 'Heat pump' on the basis of: European Commission 2010: Section 2.4 [Procedure for heating replacement] and Prognos 2013; for the programme part 'Solar thermal technology' on the basis of: European Commission 2010: Section 2.7 [Procedure for solar thermal installations] and Prognos 2013).			
Methodological parameters and additional methodological explanations	For the purpose of the forward projection, a funding volume the same as the average for 2010–2011 is assumed. In specific terms, this means an increase of 436 000 m ² collector area and an increase or conversion of 991 000 m ² living/useful area supplied by heat pumps per annum. Assumptions regarding the average living/useful area supplied in each funding case, the heating energy demand per m ² , the system efficiency of the existing system and the heat pump, and the heat yield of 1 m ² collector area are taken from the 2nd National Energy Efficiency Action Plan for 2011. The specific saving is 460 kWh per m ² of collector area, or 136 kWh per m ² living/useful area supplied by heat pumps.			
Sources/references:	Prognos 2013; European Commission 2010; BMWi 2011; BAFA 2012 (data delivery)			

M 07: National Climate Protection Initiative — further programmes at national level to promote investments in energy efficiency:				
<ul style="list-style-type: none"> - Incentive programme to promote climate protection measures with regard to commercial refrigeration systems - Incentive programme to promote micro-CHP installations - Electricity projects under the policy for municipalities of the National Climate Protection Initiative 				
Funding		Start: 2009	End: not specified	
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
General promotion under National Climate Protection Initiative programmes	0.1 PJ	1.0 PJ	3.1 PJ	4.4 PJ
Focus of the measures:				
Short description of the measures	<p>Under the incentive programme to promote climate protection measures with regard to commercial refrigeration systems, funding is provided for a status check for refrigeration systems (above a certain size) in operation, the modernisation of refrigeration systems and the construction of new efficient refrigeration systems (basic funding), and waste heat utilisation measures (bonus funding).</p> <p>The objective of the funding provided under the incentive programme to promote micro-CHP installations is to boost the use of micro-CHP installations within the capacity range up to 50 kW in the heating market through investment incentives.</p> <p>Funding is provided for various projects targeting the efficient use of energy in the municipalities under the policy for municipalities of the National Climate Protection Initiative.</p>			
Sector:	Commerce, trade and services; industry; private households; public authorities	Target group:	Companies, building owners, municipalities	
Body responsible for the measure(s):	BMU, BAFA	Application:	Building envelope, building services, stationary drives, thermal cross-cutting technologies, processes	
Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049 (depending on the individual measure)	
Methodological details:				
Calculation formulae	Cf. Annex.			
Methodological parameters and additional methodological explanations	The basis used for determining the contribution by the National Climate Protection Initiative programmes to the general promotion of investments in energy efficiency is the evaluation of the National Climate Protection Initiative (Öko-Institut et al. 2012). As we must assume that all micro-CHP installations receive the CHP bonus, no saving is allocated here to avoid this measure being counted twice.			
Sources/references:	Prognos 2013; Öko-Institut et al. 2012; UBA 2012			

M 08: Other investment programmes to promote energy efficiency which will expire during the period 2009–2013 (can only be counted as ‘early action’):				
<ul style="list-style-type: none"> - Future Investments Act [<i>Zukunftsinvestitionsgesetz — ZulnvG</i>] - Investment pact between federal and state governments and municipalities to modernise the social infrastructure - Environmental premium - Predecessor of the CO₂ Building Renovation Programme (programme is continued in an altered form — see M 02) - Predecessor of the KfW Municipal Loan — Energy-Related Building Renovation (programme is continued in an altered form — see M 03) - ERP Environment and Energy Efficiency Programmes A + B 				
Funding		Start: 2009	End: not specified	
Forecast of (cumulative) final energy saving	New annual saving (‘Early action’ only)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	‘Early action’ saving Total (2009–2013)
ZulnvG	6.9 PJ	-	-	48 PJ
Investment pact	0.6 PJ	-	-	4.4 PJ
Environmental premium	3.7 PJ	-	-	26 PJ
CO ₂ Building	1.7 PJ	-	-	12 PJ
KfW Municipal Loan	0.04 PJ	-	-	0.3 PJ
ERP A + B	5.5 PJ	-	-	39 PJ
Total	18.44 PJ	-	-	129.7 PJ
Focus of the measures:				
Short description of the measures	<p>Under the Federal Government’s 2nd recovery package of January 2009, funds totalling EUR 10 billion were provided to the municipalities and federal states through the Future Investments Act [<i>Zukunftsinvestitionsgesetz — ZulnvG</i>]. The federal states and municipalities agreed to a cofinancing contribution of 25 %, which meant that a total of at least EUR 13.3 billion was provided for additional investments in the educational infrastructure and to improve other infrastructure. This funding was also used to carry out numerous projects and measures to improve energy efficiency.</p> <p>The ‘2008 Investment Pact’ between federal and state governments and municipalities to modernise the social infrastructure provided funding for planning and construction measures with regard to social infrastructure buildings in need of improvement in terms of energy efficiency. The financial contribution was provided in the form of a grant towards the investment costs. Funding was particularly provided to municipalities with a difficult budget situation, which therefore find it hard to finance energy-saving measures. They received funding of up to 90 % (compared to 66 %) of the investment costs. The investment pact enabled the implementation of measures that otherwise could not have been taken owing to existing obstacles to financing.</p> <p>The objective of the support programme granting an environmental bonus (scrapping bonus) was to replace old cars emitting high levels of traditional pollutants with new, more efficient vehicles. To this end, an environmental bonus of EUR 2 500 was awarded upon application to the BAFA as a one-off grant when a private vehicle owner bought a new car or nearly new car (previous year’s model) and could prove, at the same time, that their old car (at least nine years old) had been scrapped. The amount of funding was raised to EUR 5 billion owing to the extremely high level of demand. Funding was provided for approx. 2 million cars.</p> <p>Under the KfW Municipal Loan — Energy-Efficient Renovation of Buildings, financial support was provided for measures for the renovation of schools, school sports halls, day nurseries and buildings used for work with children or young people to create energy savings in the form of soft loans (programme is continued in an altered form — see M 03).</p> <p>The ERP Environment and Energy Efficiency Programmes A + B provided financing for energy efficiency measures, for example in the areas of building and energy technology; building envelopes; machinery; process cooling and heating; heat recovery installations; measurement, regulation and control technology; information and communication technology, including the associated costs for planning and implementation support for SMEs.</p>			
Sector:	Private households; commerce, trade and services; industry; public authorities; transport	Target group:	Depending on the programme or measure (cf. 2nd NEEAP 2011).	
Body responsible for the measure(s):	Depending on the programme or measure (cf. 2nd NEEAP 2011).	Application:	Building envelope, building services, stationary drives, thermal cross-cutting technologies, processes, mobile drives	

Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049 (depending on the individual measure)
Methodological details:			
Calculation formulae	Cf. 2nd NEEAP (BMW 2011).		
Methodological parameters and additional methodological explanations	The measures considered in this combination of measures will expire during the period from 2009 to 2013 but will provide final energy savings until 2020 (the values shown therefore relate to the saving during the period 2014–2020). These final energy savings therefore only count towards the target achievement as early savings (resulting from 'early action') in accordance with Article 7(2)(d) EED. The basis for determining the final energy savings is the 2nd NEEAP (BMW 2011). The methods of calculation are documented there, only the results are used in this notification. The measure 'KfW Municipal Loan — Energy-Efficient Renovation of Buildings' was evaluated following completion of the 2nd NEEAP; the results of this evaluation [BEI 2011] are used here.		
Sources/references:	BMW 2011, BEI 2011		

3. Measures to improve energy efficiency through information and advice

M 09: Federal Advisory Programmes:				
<ul style="list-style-type: none"> - On-site energy consultation (BAFA) - Energy consultation by consumer organisations (Federation of German Consumer Organisations [<i>Verbraucherzentrale Bundesverband</i> — <i>vzbv</i>]) - Energy checks (<i>vzbv</i>) - Energy efficiency checks for low-income households (Caritas) - Energy consultations for SMEs (KfW) 				
Information, motivation, communication		Start: between 1978 and 2012 (depending on the measure)	End: not planned	
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
On-site consultation	0.2 PJ	2.3 PJ	6.5 PJ	8.1 PJ
vzbv consultation	0.1 PJ	1.1 PJ	3.1 PJ	3.9 PJ
Energy consultations for SMEs (KfW)	1.5 PJ	15 PJ	41 PJ	54 PJ
vzbv energy checks	0.03 PJ	0.3 PJ	0.8 PJ	0.2 PJ
Energy efficiency checks (Caritas)	0.04 PJ	0.4 PJ	1.2 PJ	1.6 PJ
Total	1.87 PJ	19.1 PJ	52.6 PJ	67.8 PJ
Focus of the measures:				
Short description of the measures	<p>Any on-site consultation by a qualified energy advisor leading to complementary recommended measures which (even with gradual renovation) result in the building being regarded as permanently renovated in terms of energy savings in keeping with the efficiency principle is eligible for support from the BAFA. The financial contribution in the form of a non-repayable grant for 50 % of the consultancy costs is paid to the advisor.</p> <p>The energy consultations provided by consumer organisations at their premises generally consist of a 30-minute specialist consultation on energy-related topics (solar thermal power, photovoltaics, geothermal energy, biomass, CHP, energy-efficient renovation/construction of buildings, domestic appliances, energy-saving behaviour), which is offered at the advisory centres of the consumer organisations for an additional payment of EUR 5 by the consumer. Several topics are generally discussed at a consultation.</p> <p>In addition, on-site energy-related and energy efficiency checks have been offered to private consumers, and in particular also to tenants, by consumer organisations for a small EUR 10 contribution to the costs since 2012 (free of charge to low-income households). Under this programme, home owners can also have a building check carried out for a EUR 20 contribution to the costs or have their condensing boiler heating system inspected for a EUR 30 contribution to the costs.</p> <p>As a separate programme from the above, Caritas also offers free energy efficiency checks specifically for low-income households together with the Association of Energy and Climate Protection Agencies in Germany [<i>Bundesverband der Energie- und Klimaschutzagenturen Deutschlands</i> — <i>eaD</i>]. These checks are performed by 'energy-saving assistants'. Long-term unemployed people are trained as energy-saving assistants in this respect.</p> <p>The purpose of the KfW energy consultations for SMEs is to highlight weaknesses in the use of energy in SMEs, and provide proposals or specific action plans for improvements to save energy and costs. Grants are awarded for qualified and independent energy efficiency consultations in SMEs. SMEs can receive funding for an initial consultation and/or a detailed consultation lasting several days.</p>			
Sector:	Private households; commerce, trade and services; industry (depending on the measure)	Target group:	Home and property owners, private consumers, SMEs (depending on the measure)	
Body responsible for the measure(s):	BMW <i>i</i> ; for the energy efficiency checks provided by Caritas: BMU	Application:	Building envelope; building services (heating, ventilation, air conditioning); lighting; appliances (white goods, domestic appliances); appliances (brown goods, consumer electronics); appliances (grey goods, information and communication); mobile drives	
Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049 (depending on the individual measure)	
Methodological details:				
Calculation formula	Cf. Annex (on the basis of: BMW <i>i</i> 2011; Prognos 2013 and the corresponding programme evaluations)			
Methodological parameters and additional methodological explanations	Cf. Annex; the methodological approach is based on BMW <i>i</i> 2011, taking account of the individual independent programme evaluations. The savings are then quantified on the basis of the subsequent individual investment measures triggered by the consultations. In terms of the methodology, it should also be borne in mind that not every consultation results in the implementation of the individual measures proposed. With regard to the forward projection, the average of the last three available years is taken as a basis. For the energy-related and energy efficiency checks by the consumer organisations (which were not started until October 2012), an annual volume of 10 000 consultations and an annual saving identical to that for the			

	energy efficiency check by Caritas are assumed as an evaluation is not yet available for this measure.
Sources/references:	Prognos 2013; Ifeu/ISOE 2009; Öko-Institut et al. 2012; IREES/ FhG ISI 2010; Ifeu/TNS Emnid 2008, 2005; Kfw 2012 (data delivery); BAFA 2012 (data delivery)

M 10: Promotion of energy management systems (EMS) under the Energy Efficiency Fund				
Funding, information, motivation, communication		Start: 2013		End: not planned
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
EMS funding	0.03 PJ	0.3 PJ	0.9 PJ	0.2 PJ
Focus of the measure:				
Short description of the measure	With this BMWi programme under the Energy Efficiency Fund, since August 2013 companies have been able to apply to the BAFA for a grant for the initial certification of either an energy management system to DIN EN ISO 50001 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 total amount of funding can be up to EUR 20 000 per company.			
Sector:	Commerce, trade and services; industry	Target group:	Companies	
Body responsible for the measure(s):	BMWi	Application:	Building envelope; building services (heating, ventilation, air conditioning); lighting; appliances (white goods, domestic appliances); appliances (brown goods, consumer electronics); appliances (grey goods, information and communication); mobile drives	
Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049 (depending on the individual measure)	
Methodological details:				
Calculation formula	Cf. Annex (on the basis of: BMWi 2011; Prognos 2013)			
Methodological parameters and additional methodological explanations	Cf. Annex.; the number of participating companies is used as a basis for the calculation. An energy consumption figure and a potential saving resulting from the introduction of the EMS are assumed for each company. These figures can be used to work out the saving produced by the measure (cf. calculation formula in the Annex). For the purpose of the calculation, it is assumed that participating companies have energy costs of around EUR 150 000 per annum. With an assumed mixed price for energy of EUR 26.50 per GJ, this corresponds to energy consumption of 5.66 TJ. 1.3 % is assumed as the economic saving potential. For the purpose of the forward projection, a volume of 1 000 applications for funding per annum is estimated under the Energy Efficiency Fund.			
Sources/references:	Prognos 2013; BMWi 2011;			

M 11: Promotion of municipal concepts and networks:				
- Energy Efficiency Fund: Municipal networks				
- National Climate Protection Initiative: Municipal climate protection concepts				
- Energy-Related Urban Renewal — Grants for Integrated District Concepts and Renovation Managers				
Funding, information, motivation, communication		Start: 2014, 2009, 2011	End: not planned	
Forecast of (cumulative) final energy saving	New annual saving (from 2014)	Saving by the intermediate milestone (31.12.2017)	Saving Total (2014–2020)	'Early action' saving Total (2009–2013)
Municipal networks	0.02 PJ	0.1 PJ	0.1 PJ	-
Climate protection concepts	0.04 PJ	0.4 PJ	1.1 PJ	1.0 PJ
District concepts	0.04 PJ	0.4 PJ	1.1 PJ	0.9 PJ
Total	0.1 PJ	0.9 PJ	2.3 PJ	1.9 PJ
Focus of the measures:				
Short description of the measures	<p>The objective of the planned BMWi support programme for municipal networks is to create incentives for the setting up of municipal energy efficiency networks, and the setting up and operation of exemplary networks of municipalities. Within the framework of professionally managed, standardised network cooperation on the basis of high quality standards, a high quality energy controlling system with low transaction costs is to be introduced and a comprehensive transfer of experience and knowledge is to be facilitated.</p> <p>Under the National Climate Protection Initiative, the BMU promotes the creation and implementation of climate protection concepts covering all climate-related areas, and the creation and implementation of partial concepts relating to key priority areas or measures in the municipalities. In the implementation of municipal climate protection projects, financial support is provided for the setting up of a body for climate protection management, the implementation of a selected climate protection measure as part of climate protection management and the introduction or continuation of energy-saving models in schools.</p> <p>Under the 'Energy-Related Urban Renewal — Grants for Integrated District Concepts and Renovation Managers' programme supported by the BMVBS and enforced by the KfW, detailed integrated district concepts to improve the energy efficiency of buildings and infrastructure are created and financing is provided for a renovation manager who will prepare the renovation concept with the involvement of the owners and supervise the implementation of the energy-related renovation measures for a maximum of three years.</p>			
Sector:	Public authorities	Target group:	Municipalities	
Body responsible for the measure(s):	BMWi, BMU, BMVBS / KfW	Application:	Building envelope; building services (heating, ventilation, air conditioning); lighting; appliances (white goods, domestic appliances); appliances (brown goods, consumer electronics); appliances (grey goods, information and communication); mobile drives	
Lifetime	10–30 years (depending on the individual measure)	Savings by	2029–2049	
Methodological details:				
Calculation formula	Cf. Annex (on the basis of: BMWi 2011; Prognos 2013)			
Methodological parameters and additional methodological explanations	Cf. Annex; the energy consumption of municipal properties including street lighting is used as the reference value for the calculation. According to [Prognos, Difu 2010, Table 4-8], the municipalities with over 2 000 inhabitants consume a total of around 140 PJ per annum. With 5 412 municipalities in this size category, this produces a mean energy consumption figure of 26 TJ per municipality. Reference is made here to [Jaccard et al. 1997] for the potential saving compared to a municipality that does not have a municipal energy management system. A level of between 15 % and 30 % per municipality can therefore be achieved within 16 years. An annual saving of 1.25 % is estimated based on 20 %. Reference is made to the current funding provided to determine the number of cases. The total number of municipalities participating in the municipal energy networks pilot project is assumed to be 60. The annual number of climate protection concepts under the National Climate Protection Initiative is assumed to be 140. The annual number of acceptances under the 'Energy-Related Urban Renewal — Grants for Integrated District Concepts and Renovation Managers' KfW programme is also assumed to be 140.			
Sources/references:	Prognos 2013; BMWi 2011; Jaccard/Failing/Berry 1997; Prognos/Difu 2010; Öko-Institut et al. 2012; KfW 2012 (data delivery)			

Annex:**I. Formulae and methodological parameters for calculating the final energy savings resulting from policy measures or combinations thereof****1. Regulatory measures****M 01: Renewable Energies Heat Act [*Erneuerbare Energien Wärme-Gesetz — EEWärmeG*]**

Calculation formula:

$$\frac{\text{SHD}_{\text{init}}}{\eta_{\text{init}}} - \frac{\text{SHD}_{\text{new}}}{\eta_{\text{new}}} = \text{UFES}$$

$$\text{Increase in living area/useful area} \times \text{UFES} = \text{Saving from the measure [kWh / a]}$$

Abbreviation	Description	Data
SHD _{init}	Specific heating demand before [kWh / m ² a]	According to the previous building standard, corrected using the heating degree-days
η _{init}	Efficiency of the heating system before	
SHD _{new}	Specific heating demand after [kWh / m ² a]	According to the new building standard, corrected using the heating degree-days
η _{new}	Efficiency of the heating system after	

Methodological parameters:

Reference value (<i>baseline</i>) for the EEWärmeG					
	Reference	EnEV 2007	EnEV 2009	EnEV 2013	
				2014	2016
One and two-family houses	kWh / m ² LA	130	96	84	74
Apartment blocks and non-residential buildings	kWh / m ² LA	110	78	68	60
	kWh / m ² UA	90	65	57	50

Target value for the replacement measure 'EnEV -15 %'					
	Reference	EnEV 2007	EnEV 2009	EnEV 2013	
				2014	2016
One and two-family houses	kWh / m ² LA	111	82	71	63
Apartment blocks and non-residential buildings	kWh / m ² LA	94	66	58	51
	kWh / m ² UA	77	55	48	43

Type	Reference	Increase [in million m ²]	EnEV -15 % percentage
One and two-family houses	Living area	12	52 %
Apartment blocks and non-residential buildings	Living area	5	
	Useful area	28	

2. Investment support

M 02 (1): KfW support programmes for energy-efficient construction and renovation (CO₂ Building Renovation Programme)

Calculation formula:

$$\begin{array}{|c|} \hline \text{Funded housing} \\ \text{units} \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{UFES} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Saving from the} \\ \text{measure} \\ \text{[kWh / a]} \\ \hline \end{array}$$

Abbreviation	Description	Data
Living units for which funding is provided	Housing units for which funding is provided through the programme	
UFES	Average saving per year and housing unit (unitary final energy savings)	Programme evaluation

M 02 (2): Replenishment of the KfW building renovation programmes

Calculation formula:

$$\begin{array}{l}
 \text{Replenishment of volume of funding} \times \frac{1}{\text{Funding leverage ratio}} = \text{Investment volume [€]} \\
 \text{Investment volume [€]} \times \frac{1}{\text{Specific investment}} = \text{Renovated area [m}^2 \text{ living area]} \\
 \frac{\text{SHD}_{\text{init}}}{\eta_{\text{init}}} - \frac{\text{SHD}_{\text{new}}}{\eta_{\text{new}}} = \text{UFES [kWh / m}^2 \text{ living area]} \\
 \text{Renovated area} \times \text{UFES} = \text{Saving from the measure [kWh / a]}
 \end{array}$$

Abbreviation	Description	Data
	Replenishment of volume of funding: funding expected to be added to the existing programmes	
Funding leverage ratio	Ratio of funding to investment triggered	
Specific investment	Average investment spent in EUR per m ² living area to achieve the prescribed standard	
SHD _{init}	Specific heating demand — standard [kWh / m ² a]	Either 'individual' consumption before, or average for the existing building stock in the year of the measure, corrected using the heating degree-days
η _{init}	Efficiency of the heating system — standard	
SHD _{new}	Specific heating demand — funded [kWh / m ² a]	According to the new building standard, corrected using the heating degree-days
η _{new}	Efficiency of the heating system — funded	

M 03: KfW investment programmes in municipalities and social facilities

Calculation formula:

$$\text{Investment volume} \times \text{UFES} = \text{Saving from the measure [PJ / a]}$$

Abbreviation	Description	Data
UFES	Saving per euro invested	From evaluation
Investment volume	Investment volume co-financed by the programme	From evaluation or by the executing agency for the programme

Methodological parameters:

Programme/part of programme	Annual investment [€ million]	UFES [kWh / €]
KfW Energy-Efficient Renovation — Municipalities	158	0.50
KfW Social Investment — Energy-Efficient Renovation of Buildings	34	0.68
KfW Energy-Efficient District Supply — Municipalities	1.1	0.51
Street lighting (new lights)	0.7	0.59
Street lighting (replacement/retrofitting of lights)	8.4	0.98
Lighting in the case of light signalling devices	0.4	0.30

M 04: Investment support in companies

Calculation formula:

$$\text{Investment volume} \times \text{UFES} = \text{Saving from the measure [PJ / a]}$$

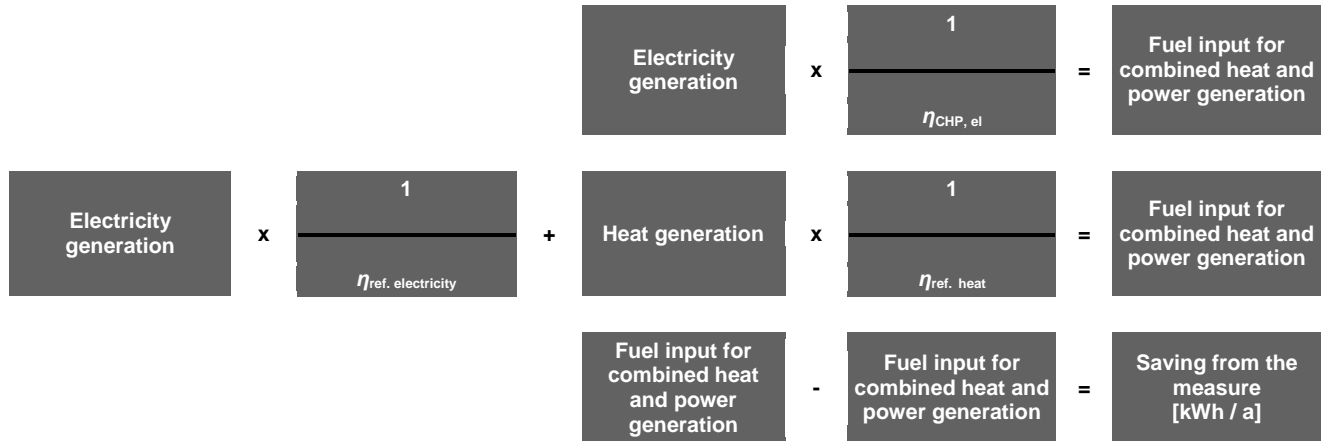
Abbreviation	Description	Data
UFES	Saving per euro invested	From evaluation
Investment volume	Investment volume co-financed by the programme	From evaluation or by the executing agency for the programme

Methodological parameters:

Programme/part of programme	Annual investment [€ million]	UFES [kWh / €]
KfW Energy Efficiency Programme / KfW Environment Programme		
Energy-efficient new buildings	1 590	0.015
Building and energy technology / building envelope / renovation of buildings at EnEV new building level	60	0.68
Environmentally-friendly retail	(2011 only:) 210	0.06
Machinery incl. cross-cutting technology / heat recovery, waste heat utilisation / measurement, regulation and control technology / process cooling, process heating	1 440	0.75
Efficiency Fund: Energy-efficient cross-cutting technologies / energy-efficient and climate-friendly production processes		
Cross-cutting technologies	200	0.75
Production processes	80	0.75

M 05: Combined Heat and Power Act [*Kraft-Wärme-Kopplungs-Gesetz — KWK-G*]

Calculation formula:



Abbreviation	Description	Data
Electricity generation	Amount of electricity fed in under the KWK-G	
Heat generation	Generation of heat associated with CHP generation of electricity, shown in the power to heat ratio	
$\eta_{\text{CHP, el}}$	(Electrical) efficiency of the CHP installation	
$\eta_{\text{ref, electricity}}$	Reference efficiency for non-combined generation of electricity	100 % if based solely on final energy.
$\eta_{\text{ref, heat}}$	Reference efficiency for non-combined generation of heat	

Methodological parameters:

	Development of CHP electricity generation [GWh]											
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<10 kW _{el}	324	324	324	321	319	316	314	311	308	305	302	298
<10 kW _{el, eff}	99	99	156	212	267	321	374	440	504	566	627	686
10–50 kW _{el}	381	381	380	378	375	372	369	366	362	359	355	351
10–50 kW _{el, eff}	171	171	269	365	460	553	644	758	868	976	1 081	1 184
50 kW to 2 MW	3 874	3 874	3 867	3 838	3 809	3 780	3 751	3 721	3 682	3 644	3 605	3 566
50 kW to 2 MW, eff	556	556	812	1 061	1 306	1 547	1 785	2 138	2 479	2 813	3 139	3 457
Fuel cell	7	7	7	7	7	7	7	7	7	7	7	7

	Electr. efficiency	Power to heat ratio	Reference	
			Power factor	Therm. efficiency
<10 kW _{el}	26 %	0.40	100 %	92.5 %
<10 kW _{el, eff}	28 %	0.42		
10–50 kW _{el}	30 %	0.48		
10–50 kW _{el, eff}	33 %	0.50		
50 kW to 2 MW	37 %	0.64		
50 kW to 2 MW, eff	40 %	0.69		
Fuel cell	35 %	0.57		

M 06: National Climate Protection Initiative — market incentive programme to promote the use of renewable energies in the heating market (BAFA part)

Calculation formula (heat pump programme part):

$$\left(\frac{1}{\eta_{\text{old}}} - \frac{1}{\eta_{\text{new}}} \right) \times \text{SHD} = \text{UFES} \quad [\text{kWh} / \text{m}^2]$$

$$\text{UFES} \times A \times \text{Number of heating systems replaced} = \text{Saving from the measure} \quad [\text{kWh} / \text{a}]$$

Abbreviation	Description	Data
η_{old}	Efficiency of the old heating system	Average efficiency of existing systems
η_{new}	Efficiency of the new heating system	
SHD	Specific heating demand [$\text{kWh} / \text{m}^2 \text{ a}$]	
A	Average area heated by the heating system [m^2]	

Calculation formula (solar thermal technology programme part):

$$\frac{\text{USAVE}}{\eta_{\text{existing system}}} = \text{UFES} \quad [\text{kWh} / \text{m}^2 \text{ collector area a}]$$

$$\text{Installed collector area} \times \text{UFES} = \text{Saving from the measure} \quad [\text{kWh} / \text{a}]$$

Abbreviation	Description	Data
USAVE	Average annual saving per m^2 of collector area, i.e. the average heat production per m^2 of collector area [$\text{kWh} / \text{m}^2 \text{ a}$]	
$\eta_{\text{existing system}}$	Efficiency of an average water heating system	Average efficiency of existing water heating systems

M 07: National Climate Protection Initiative — further programmes at national level to promote investments in energy efficiency

Methodological parameters:

Programme	Average annual saving	
	Greenhouse gases [t CO ₂ e]	Final energy [GWh]
Commercial refrigeration systems	17 860	24
Policy for municipalities — electricity projects	8 460	15
Programme to promote micro-CHP installations	67 680	See KWK-G

3. Measures to improve energy efficiency through information and advice

M 09: Federal Advisory Programmes

Calculation formula:

$$\begin{array}{|c|} \hline \text{Number of} \\ \text{consultations} \\ \hline \end{array} \times \begin{array}{|c|} \hline \text{UFES} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Saving from the} \\ \text{measure} \\ \text{[kWh / a]} \\ \hline \end{array}$$

Abbreviation	Description	Data
UFES	Average saving p.a.	Programme evaluation

Methodological parameters:

Programme	Consultations p.a. [in thousands]	UFES [MWh / consultation]
BAFA on-site consultation	23	6.2
Energy consultations at the premises of consumer organisations	52	1.3
KfW energy consultations for SMEs	5	189
Caritas energy efficiency check	15	0.8
Energy Efficiency Fund: Energy-related and energy efficiency checks in private households	10	0.8

M 10: Promotion of energy management systems (EMS) under the Energy Efficiency Fund

Calculation formula:

Number of participating companies	x	Energy consumption per company	=	Energy consumption under management [PJ]
Energy consumption under management [PJ]	x	Saving compared with BAU	=	Saving from the measure [PJ / a]

M 11: Promotion of municipal concepts and networks

Calculation formula:

Number of participating municipalities	x	Energy consumption per municipality	=	Energy consumption under management [PJ]
Energy consumption under management [PJ]	x	Saving compared with BAU	=	Saving from the measure [PJ / a]

II. List of sources

Abbreviation	Source
AGEB 2011	Working Group on Energy Balances [<i>Arbeitsgemeinschaft Energiebilanzen — AGEB</i>] 2011: Review of application for the final energy sectors in Germany in 2009 and 2010 (as at November 2011).
AGEB 2012	Working Group on Energy Balances 2012: Energy balance of the Federal Republic of Germany for 2010.
AGEB 2013	Working Group on Energy Balances 2013: Evaluation tables for the energy balance of the Federal Republic of Germany from 1990 to 2012 (as at July 2013).
BAFA 2012	Federal Office of Economics and Export Control [<i>Bundesamt für Wirtschaft und Ausfuhrkontrolle — BAFA</i>] 2012: Statistics on the market incentive programme and on 2012 on-site consultations (unpublished data).
BEI 2011	Bremer Energie Institut 2011: 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.
BEI/IWU 2010	Bremer Energie Institut, Institute for Housing and Environment [<i>Institut Wohnen und Umwelt — IWU</i>] 2010: Effects of the 2009 funding cases under the KfW CO ₂ Building Renovation Programme and the 'Energy-Efficient Renovation' programme.
BEI/IWU 2011	Bremer Energie Institut, Institute for Housing and Environment 2011: Monitoring of the KfW programmes 'Energy-Efficient Renovation' in 2010 and 'Ecological/Energy-Efficient Construction' from 2006 to 2010.
BEI/IWU 2012	Bremer Energie Institut, Institute for Housing and Environment 2012: Monitoring of the KfW programmes 'Energy-Efficient Renovation' and 'Energy-Efficient Construction' in 2011.
BfEE 2012	Federal Energy Efficiency Centre [<i>Bundesstelle für Energieeffizienz — BfEE</i>] 2012: Statistics on support scheme guidelines under the Energy Efficiency Fund in 2012 (unpublished data).
BMF 2011	Federal Ministry of Finance [<i>Bundesministerium der Finanzen — BMF</i>] 2011: 23rd report on subsidies. Report by the Federal Government on the development of federal grants and tax incentives for the period from 2009 to 2012.
BMU 2012	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety [<i>Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit — BMU</i>] 2012: Progress report on the Renewable Energies Heat Act [<i>Erneuerbare Energien Wärme-Gesetz — EEWärmeG</i>] pursuant to Section 18 EEWärmeG (submitted to the <i>Bundestag</i> on 19 December 2012).
BMVBS 2011	Federal Ministry of Transport, Building and Urban Development [<i>Bundesministerium für Verkehr, Bau und Stadtentwicklung — BMVBS</i>] (ed.) 2011: Types and existing stock of heated non-residential buildings in Germany. BMVBS online publication 16/2011.
BMW i 2011	Federal Ministry of Economics and Technology [<i>Bundesministerium für Wirtschaft und Technologie — BMWi</i>] (ed.) 2011: Second National Energy Efficiency Action Plan (NEEAP) of the Federal Republic of Germany, including accompanying methodology document.

Abbreviation	Source
BReg 2012	Federal Government [<i>Bundesregierung — BReg</i>] 2012: Draft of a Second Act Amending the Energy and Electricity Tax Act [<i>Entwurf eines Zweiten Gesetzes zur Änderung des Energiesteuer- und des Stromsteuergesetzes</i>].
CWA 2007	'CEN Workshop Agreement on Saving Lifetimes of Energy Efficiency Improvement Measures in Bottom-Up Calculations 2007' (here: value for 'public lighting' and 'behavioural/social measures')
Deloitte 2011	Deloitte&Touche GmbH 2011: Support measures to improve energy efficiency in small and medium-sized enterprises (SMEs) and industry
dena 2011	German Energy Agency [<i>Deutsche Energie-Agentur</i>] 2011: dena renovation study — part 2. Economic viability of energy-efficient renovation in owner-occupied residential buildings.
Dielmann 2008	Prof. Dielmann 2008: Combined heat and power I. Skript WS 2008/2009, Aachen University of Applied Sciences [<i>FH Aachen</i>], Jülich Campus.
European Commission 2010	European Commission (Directorate-General for Energy, Directorate C, Unit C.4 Energy Efficiency) 2010: Recommendations on measurement and verification methods in the framework of Directive 2006/32/EC on energy end-use efficiency and energy services (preliminary draft excerpt of 2 July 2010, unpublished).
Fraunhofer ISI et al. 2009	Fraunhofer Institute for Systems and Innovation [<i>Fraunhofer ISI</i>]/Technical University of Munich [<i>TU München</i>] (Chair of Energy Economy and Application Technology [<i>Lehrstuhl für Energiewirtschaft und Anwendungstechnik</i>])/ GfK 2009: Energy consumption of the sector: Commerce, trade and services for the period 2004–2006
Gailfuß 2000	Gailfuß, M. 2000: Market survey: CHP installations up to 100 KW electrical output Heat engineering/supply engineering, 12/2000, p. 46–57.
Gailfuß 2002	Gailfuß, M. 2002: Micro-CHP installations — module overview by the CHP Information Centre [<i>BHKW Infozentrum</i>] in Rastatt.
ifeu/ISOE 2009	Institute for Energy and Environmental Research [<i>Institut für Energie und Umweltforschung — ifeu</i>] in Heidelberg, Institute for Social-Ecological Research [<i>Institut für sozial-ökologische Forschung — ISOE</i>] in Frankfurt am Main 2009: Evaluation of the Cariteam Energy Saving Service in Frankfurt am Main.
ifeu/TNS Emnid 2005	Institute for Energy and Environmental Research in Heidelberg/TNS Emnid 2005: Evaluation of the energy consultations provided at their premises by the consumer organisations, the German Association of Housewives of Lower Saxony [<i>Deutsche Hausfrauenbund Niedersachsen</i>] and the Bavarian Consumer Service [<i>Verbraucherservice Bayern</i>].
ifeu/TNS Emnid 2008	Institute for Energy and Environmental Research in Heidelberg/TNS Emnid 2008: Evaluation of the 'On-Site Energy-Saving Consultation' support programme.
IREES/Fraunhofer ISI 2010	Institute for Resource Efficiency and Energy Strategies [<i>Institut für Ressourceneffizienz und Energiestrategien — IREES</i>], Fraunhofer ISI 2010: Evaluation of the 'Energy Efficiency Consultation' funding programme as a component of the Special Fund for Energy Efficiency in Small and Medium-Sized Enterprises (SMEs).
Jaccard/Failing/Berry 1997	Mark Jaccard, Lee Failing and Trent Berry 1997: 'From equipment to infrastructure: community energy management and greenhouse gas emission reduction'. <i>Energy Policy</i> Vol. 25, No 13, 1065-1074, 1997.

Abbreviation	Source
KfW 2012 (data delivery)	KfW [German government-owned development bank] 2012: Statistics on the KfW programmes 'Energy-Efficient Renovation', 'Energy Efficient Renovation — Municipalities', 'Energy consultations for SMEs' and 'KfW Special Energy Efficiency Fund' (unpublished data).
Öko-Institut et al. 2012	Institute for Applied Ecology [<i>Öko-Institut</i>], Arepo-Consult, Environmental Policy Research Centre (FFU), Ecologic Institute, FiFo Institute for Public Economics, University of Cologne [<i>Fifo Köln</i>], Ziesing, H.-J. 2012: Evaluation of the national part of the climate protection initiative of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.
Prognos 2011	Prognos AG 2011: Development of the electricity prices for selected commercial consumer categories and analysis of the energy intensity figures for selected industries.
Prognos 2012	Prognos AG 2012: Determination of the impact of KfW support programmes for energy-efficient construction and renovation in terms of promoting growth. Commissioned by KfW.
Prognos 2013	Prognos AG 2013: Final energy savings target pursuant to Article 7 EED and estimate of the energy savings that can be achieved through policy measures.
Prognos/BEA 2011	Prognos AG, Berliner Energieagentur 2011: Interim review of the Combined Heat and Power Act (KWK-G).
Prognos/Difu 2010 and 2011	Prognos AG, German Institute of Urban Affairs [<i>Deutsches Institut für Urbanistik — Difu</i>] 2010 and 2011: Final energy savings in federal states and municipalities resulting from actions by the public sector to improve energy efficiency in the context of the EU Energy Services Directive.
Prognos/EWI/GWS 2010	Prognos AG, Institute of Energy Economics at the University of Cologne [<i>Energiewirtschaftliches Institut an der Universität zu Köln — EW</i>], Gesellschaft für Wirtschaftliche Strukturforchung 2010: Energy scenarios for a federal energy concept.
Prognos/GWS 2009	Prognos AG, Gesellschaft für Wirtschaftliche Strukturforchung 2009. Analysis and modelling of energy consumption development.
Prognos/lfeu/BHKW 2013	Prognos AG, Institute for Energy and Environmental Research in Heidelberg, BHKW-Consult 2013: Accompanying scientific research as part of the renewal of the incentive programme to promote micro-CHP installations. Analysis of the position of the micro-CHP installation in the electricity and heat market.
Federal Statistical Office (various years and sources)	Federal Statistical Office [<i>Statistisches Bundesamt — Destatis</i>]: → Volume 5 (Construction Activity and Accommodation), Series 1 (FS5, R1) → Volume 5 (Construction Activity and Accommodation), Series 1, supplementary survey on the microcensus (FS5, R1-Z2010)
TU Braunschweig 2012	Braunschweig University of Technology [<i>Technische Universität Braunschweig</i>] 2012: Comparative figures for consumption in residential buildings.
UBA 2012	Federal Environment Agency [<i>Umweltbundesamt — UBA</i>] 2012: Development of the specific carbon dioxide emissions of the German electricity mix from 1990 to 2010 and initial estimates for 2011.
ZSW (various years)	Baden-Württemberg Centre for Solar Energy and Hydrogen Research [<i>Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg — ZSW</i>] Evaluation of the KfW programmes to promote the use of renewable energies.