



EUROPEAN COMMISSION  
EUROSTAT

Directorate E: Sectoral and regional statistics  
**Unit E.5: Energy**

# SHARES Tool Manual

Version 2020.101121

Note: The SHARES tool and the SHARES Tool Manual support the calculation of the share of energy from renewable sources. The current version of the tool and Manual apply to the calculation until 2020 (under Directive 2009/28/EC).

<b>Version</b>	<b>Description of change</b>
V2017.171218	Correction of the formula “from biogas blended in the grid” in OVERALL TARGET. Only year 2004 was accurate. Correct formula dragged for all future years.
V2017.171218	Clarification of the explanations concerning the calculation of the numerator and denominator of the share of renewables in transport
V2018.041019	Elimination of double counting in the formula for biogas injected in the grid.
	Modification of the default calorific values for biodiesel (use of Annex III calorific values when countries do not report these values).
V2018.121119	Correction of the default value of full load hours of operation for electrically driven exhaust air-water heat pumps in average climate from 600 to 660 h.
V2018.151119	Clarification in the template tables of the SHARES tool that wind sub-categories are not yet normalised and correction in the calculation of the new hydro sub-categories
V2018.281119	Extension to all years of the formula eliminating double counting for biogas injected in the grid (introduced on 01/09/2019, but accidentally not dragged to all years).
V2018.031219	Correction of the formula for electricity generation from bioliquids in the template tables (row 66) for 2004 to 2010
V2019.021020	Questionnaire made SDMX-compatible. Questionnaire offering more details per fuel. Possibility to allocate statistical transfers to transport sub-target.
V2020.150921	A new line to the TRANSPORT sheet to display the share of advanced biofuels and biogas from Annex IX Part A
V2020.230921	Addition of the share in electricity for the EU in 2019 and correction of a SDMX conversion error in TRANSPORT sheet
V2020.101121	Correction of a bug in cell protection in MAIN sheet preventing csv files to load

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## 1. INTRODUCTION

The SHARES tool focuses on the harmonised calculation of the share of energy from renewable sources among EU Member States. The legal basis for the implementation of all calculations and methodologies is based on Directive<sup>1</sup> 2009/28/EC (subsequently also referred to as the RES Directive) and also on Regulation<sup>2</sup> (EC) No 1099/2008, to which the Directive refers.

The acronym **SHARES** stands for **SH**ort **A**ssessment of **R**enewable **E**nergy **S**ources.

The SHARES tool is designed to collect and present the information — the energy data — that are needed for calculations as defined in Article 3 (transport target) and Article 5 (overall target) of the Directive. Consequently, additional calculations are needed for electricity in order to implement Article 3(4), as well as for heating and cooling as defined in the templates of the progress report on the website<sup>3</sup> of DG Energy.

Please note that the SHARES tool does not replace the legal obligations enacted by Article 22 and Article 23 of Directive 2009/28/EC — it only assists in reporting.

The main benefit derived from the SHARES tool is that Member States are engaged to go through the exact same method during the calculation of the desired values. Its application prevents any irregularities from varying parameters and rules used in different calculation methods and ensures harmonised and comparable results for all reporting countries. For this reason, the SHARES tool approach is deemed to be a more efficient approach than individual estimations/calculations performed by each EU Member State.

During year 2016 Eurostat developed SHARES tool version 2015 that takes into account specific calculation provisions as in place in *Directive 2009/28/EC* following its amendment by *Directive (EU) 2015/1513*<sup>4</sup>, in particular the detailed classification of the origin of liquid biofuels used in transport, in accordance with Annex IX of the RES Directive. In particular, for the transport target all provisions have been implemented in agreement with DG Energy and reporting countries. For the 2016 version of the SHARES tool, Eurostat implemented second paragraph of Article 3(1) referring to Article 4(d).

The SHARES tool is based on the methodological framework using the information gained through annual statistics on energy as covered under Regulation (EC) No 1099/2008. Five annual energy questionnaires are the necessary prerequisite for the use of the SHARES tool:

1. Coal (covers solid fossil fuels and manufactured gases)
2. Oil (covers crude oil and derived oil products)
3. Natural gas
4. Electricity & Heat
5. Renewables (also includes renewable and non-renewable wastes).

Energy data from the above-mentioned questionnaires are linked with formulas to calculate the various shares. Countries have to provide some additional information that is not covered by Regulation (EC) No 1099/2008 (in other words: additional information that cannot be derived from the five annual energy questionnaires referred to above).

This manual is the updated version of the second edition. The first version is available on: [http://ec.europa.eu/eurostat/documents/38154/41386/SHARES\\_2010.zip/f6bb560a-0b1d-4960-b8f0-bca469354448](http://ec.europa.eu/eurostat/documents/38154/41386/SHARES_2010.zip/f6bb560a-0b1d-4960-b8f0-bca469354448)

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<sup>1</sup> <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0028>

<sup>2</sup> <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32008R1099>

<sup>3</sup> <http://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports>

<sup>4</sup> Consolidated version: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02009L0028-20151005>

*Acknowledgements:* Eurostat would like to thank all those who provided comments and contributed to improve the SHARES tool and the Manual, in particular colleagues working in energy statistics in the different Member States (either for the relevant Ministry or Agency, or for the National Statistical Office), as well as other experts who have contributed to the detection and correction of errors in the tool.

### **1.1. Data publishing**

In order to increase the transparency of the calculation process, results from the SHARES tool and the SHARES tool itself will be published on the Eurostat website. If any reporting country considers that their national data in this tool should be treated as confidential, Eurostat should be notified and the justification of the necessity for confidentiality should be explained in detail.

## **2. PREREQUISITES**

### **2.1. Software Requirements**

The annual energy questionnaires and the SHARES tool itself were developed in the Microsoft Excel file format. Both use built-in Visual Basic macros. Therefore, users have to enable the use of Visual Basic macros. Security confirmations (to enable macro execution) might vary, depending on the version of Microsoft Excel installed.

The SHARES tool was developed using MS Excel 2010 (32-bit version). While there has not been exhaustive testing in different environments, compatibility with MS Excel 2007 and MS Excel 2013 is expected. The SHARES tool will not work properly with MS Excel 2003 or earlier versions.

### **2.2. Annual Energy Questionnaires**

Annual energy questionnaires are provided by countries to Eurostat in the MS Excel file format. These questionnaires are joint questionnaires of OECD/IEA, Eurostat and UNECE. The methodology for filling in the data is based on internationally agreed standards, methodologies<sup>5</sup> and conventions for energy statistics. From the legal perspective, these energy data are covered by Regulation (EC) No 1099/2008 on energy statistics.

The SHARES tool does not check the correctness of the annual energy questionnaires. It is assumed that all annual energy questionnaires are filled in completely with no mistakes and errors — the internal consistencies within each questionnaire as well as the cross questionnaire consistencies have to be respected.

This version of the SHARES tool will work only with the 'new' annual energy questionnaires (version to be used to submit data for 2012 and subsequent years). It is not possible to use the 'old' energy questionnaires. The previous version of the SHARES tool is compatible only with the 'old' annual energy questionnaires. Both versions of the questionnaires, as well as both versions of the SHARES tool, are available on Eurostat's website:

- <http://ec.europa.eu/eurostat/web/energy/methodology/annual>
- <http://ec.europa.eu/eurostat/web/energy/data/shares>

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<sup>5</sup> <http://www.iea.org/publications/freepublications/publication/energy-statistics-manual.html>

Energy data from the annual energy questionnaires must be exported to CSV format using the export function (built-in macro in the questionnaires). The data must be exported with IEA codes (option **No** has to be selected during exporting).



Subsequently, the data have to be imported into the SHARES tool using the inbuilt procedures (Visual Basic macros accessible from the sheet 'MAIN').

### **2.3. Additional data for calculations based on Directive 2009/28/EC**

Additional data that are not covered by Regulation (EC) No 1099/2008 are needed for the calculations as defined in Directive 2009/28/EC. Detailed data from the following domains are needed:

- Compliant (sustainable) biofuels and bioliquids
- Heat pumps
- Mixed hydro plants
- Cooperation mechanisms (statistical transfers)
- Biomethane injected in the grid to be accounted towards transport on the basis of the mass-balance system

These additional data have to be entered into the SHARES tool. The details are described in the following chapters in this manual for the respective shares (RES-T, RES-E, RES-H&C).

Eurostat recommends that Member States ensure the availability of reliable data from these domains, and advises them to put in place (preferably in advance) provisions for these data to be available for reporting in the SHARES tool.

### 3. DEFINITIONS & METHODOLOGY

This chapter includes some general concepts of definitions and methodologies on various topics that are crosscutting across several domains.

#### 3.1. Calorific values and conversions

Because of their diverse forms, the energy commodities included in the joint annual questionnaires are measured in a variety of units. For instance, heat is reported in TJ (terajoules), electricity in GWh (gigawatt-hours) and fossil fuels in  $10^3$  tonnes. In general, the SHARES tool converts the units of all products into ktoe in order for the energy products to be homogenous at every step of the target calculation procedure. The acronym 'ktoe' stands for 'one thousand tonnes of oil equivalent'. It is not a unit of mass but a unit of energy, as it expresses the amount of energy that would be released by burning one thousand tonnes of crude oil. For electricity, MW and GWh are used in some places, as those are deemed to be the most common units for expressing data for electricity.

The decision to use ktoe as the main calculation unit was made due to the choice of reporting units in the *Template for Member State progress reports under Directive 2009/28/EC*<sup>6</sup>.

The conversion of a fuel quantity from its initial energy units into ktoe requires conversion factors. The conversion factors are:

$$1 \text{ ktoe} = 41.868 \text{ TJ} \qquad 1 \text{ GWh} = 3.6 \text{ TJ}$$

The formulas above are equivalent to the following equations:

$$1 \text{ ktoe} = 41.868 \text{ TJ} = 11.63 \text{ GWh}$$

$$1 \text{ GWh} = 3.6 \text{ TJ} = 0.086 \text{ ktoe}$$

$$1 \text{ TJ} = 0.02388 \text{ ktoe} = 0.2778 \text{ GWh}$$

For reasons of consistency and in order to respect the actual unit definitions, as well as to prevent any unnecessary rounding errors, in the SHARES tool, only the figures 41.868 and 3.6 are used for conversion as either multiplication or division (depending on the nature of the conversion).

The SHARES tools convert all values for all products to their **net** calorific value basis.

For 'natural gas', 'coke oven gas' and 'gas works gas' the implemented relationship between gross and net calorific value is:  $1 \text{ NCV} = 0.9 \times \text{GCV}$

For 'Blast furnace gas' and 'Other recovered gases' it is assumed that net and gross calorific values are the same.

In order to convert mass or volume units to ktoe, average calorific values must be applied so as to form the appropriate conversion factors.

When calculating the energy amounts of fuels used in the transport sector, Directive 2009/28/EC, Annex III defines which calorific values are to be used.

To calculate the amounts of energy in fuels in all other sectors, calorific values as reported in the annual energy questionnaires are used. In cases where those are missing, default values for each fuel are automatically used for the calculations. Countries are encouraged to report updated calorific values in all joint annual energy questionnaires that are transmitted to Eurostat in the framework of Regulation (EC) No 1099/2008 on energy statistics.

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<sup>6</sup> <http://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports>

**Table 1:** Default net calorific values used by the SHARES tool for products reported in the renewables questionnaire

<b>Product</b>	<b>Default Net Calorific Value [MJ/t]</b>
Charcoal	29 500
Biogasoline (bio motor gasoline)	27 000
Bioethanol	27 000
Bio jet kerosene (bio kerosene-type jet fuel)	44 000
Biodiesels (bio road diesel)	37 000
Other liquid biofuels	27 400

**Table 2:** Default net calorific values used by the SHARES tool for products reported in the oil questionnaire

<b>Product</b>	<b>Default Net Calorific Value [MJ/t]</b>
Crude oil	42 300
Natural gas liquids	44 200
Refinery gas	49 500
Ethane	46 400
LPG	47 300
Naphtha	44 500
- Biogasoline	27 000
- Non-biogasoline	44 300
Aviation gasoline	44 300
Gasoline type jet fuel	44 300
- Bio jet kerosene	44 000
- Non-bio jet kerosene	44 100
Other kerosene	43 800
- Biodiesels	37 000
- Non-bio gas/diesel oil	43 000
Fuel oil	40 400
White spirit & SBP	40 200
Lubricants	40 200
Bitumen	40 200
Paraffin waxes	40 200
Petroleum coke	32 500
Other oil products	40 200

**Table 3:** Default net calorific values used by the SHARES tool for products reported in the coal questionnaire

<b>Product</b>	<b>Default Net Calorific Value [MJ/t]</b>
Anthracite	26 700
Coking coal	28 200
Other bituminous coal	25 800
Sub-bituminous coal	18 900
Lignite	11 900
Patent fuel	20 700
Coke Oven Coke	28 200
Gas Coke	28 200
Coal tar	28 000
BKB	19 000



Peat	9 760
Peat products	16 000
Oil shale and oil sands	8 900

These values are used only in the SHARES tool. While these values are consistent with the methodology for energy balances, some small discrepancies occur due to general approach of conservatism in order to avoid any overestimation for various shares of energy from renewable sources.

### 3.2. Criteria of compliance (aka sustainability criteria)

Some biofuels and bioliquids must comply with sustainability criteria defined in Directive 2009/28/EC in order to be counted towards a Member State's renewables share. This section describes how the compliance of biofuels and bioliquids with Articles 17 and 18 of Directive 2009/28/EC is applied in the calculations in the SHARES tool.

**For data for the period 2004–2010:** Directive 2009/28/EC did not then exist or had only very recently been adopted. In most European countries, it was not transposed into national legislation. Also, the values in these years are not used for any measurement of legislative compliance with indicative trajectory as defined in part B of Annex I of the Directive. It was decided that, for the years from 2004 to 2010, all biofuels and bioliquids would be counted towards the numerator of the share of energy from renewable sources.

**For data for 2011 and onwards:** Compliance with Article 17 ('Sustainability criteria for biofuels and bioliquids') has to be judged also with respect to Article 18 ('Verification of compliance with the sustainability criteria for biofuels and bioliquids'). As of data from 2011, countries should report as compliant only those biofuels and bioliquids for which compliance with Articles 17 and 18 can be fully demonstrated. If no additional country-specific information is entered or provided, no amounts of biofuels and bioliquids will be counted towards the numerator of the share of energy from renewable sources in the SHARES tool.

In detail, this approach in time series applies specifically to the following categories:

- biofuels in transport (liquid and gaseous)
- heat and electricity produced from bioliquids (liquid biofuels)
- final energy consumption of bioliquids (liquid biofuels used for energy purposes in industry, households, services, etc.).

The approach described above is implemented in the SHARES tool. The break in time series is marked with the symbol '||' in between the years 2010 and 2011.

Picture: Example of visual notation of break in series

0.0	0.0	0.0	0.0
744.6	805.8	812.92	875.10
28 913.45	27 011.05	30 440.63	26 780.56
<b>2.51%</b>	<b>2.90%</b>	<b>2.60%</b>	<b>3.16%</b>

During the first half of year 2016 Eurostat has developed the draft of the SHARES tool version 2015 that takes into account all specific calculation provisions as in place in Directive 2009/28/EC following its amendment by Directive (EU) 2015/1513. More concretely, one of the main modifications is the addition of Annex IX, which includes a new detailed list of feedstocks and fuels which are to be counted double towards the transport target. The complete list in Annex IX of the Directive includes the following feedstocks and fuels:

*" Part A. Feedstocks and fuels, the contribution of which towards the target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content:*

*(a) Algae if cultivated on land in ponds or photobioreactors.*

*(b) Biomass fraction of mixed municipal waste, but not separated household waste subject to recycling targets under point (a) of Article 11(2) of Directive 2008/98/EC.*

*(c) Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households subject to separate collection as defined in Article 3(11) of that Directive.*

*(d) Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in part B of this Annex.*

*(e) Straw.*

*(f) Animal manure and sewage sludge.*

*(g) Palm oil mill effluent and empty palm fruit bunches.*

*(h) Tall oil pitch.*

*(i) Crude glycerine.*

*(j) Bagasse.*

*(k) Grape marcs and wine lees.*

*(l) Nut shells.*

*(m) Husks.*

*(n) Cobs cleaned of kernels of corn.*

*(o) Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil.*

*(p) Other non-food cellulosic material as defined in point (s) of the second paragraph of Article 2.*

*(q) Other ligno-cellulosic material as defined in point (r) of the second paragraph of Article 2 except saw logs and veneer logs.*

*(r) Renewable liquid and gaseous transport fuels of non-biological origin.*

*(s) Carbon capture and utilisation for transport purposes, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2.*

*(t) Bacteria, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2.*

*Part B. Feedstocks, the contribution of which towards the target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content:*

*(a) Used cooking oil.*

*(b) Animal fats classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009 of the European Parliament and of the Council. "*

In the SHARES tool it is now possible to report more disaggregated categories, that were not possible to be reported in past. Depending on national availability of historic time series as well as on the actual implementation of the Directive at national level, some breaks in series might be presents in data for compliant biofuels and their disaggregation into categories listed above.

Other categories under compliant biofuels include those corresponding to Article 3(4)d first paragraph, 3(4)d third paragraph subsection (i) and (ii) and other compliant biofuels. Please note that quantities of compliant biofuels whose category is not known should be reported in row 68, under 3(4)d first paragraph.

As regards bioliquids, countries can report the amount of bioliquids which do not come from food sources. In other words and according to Article 3(1)2<sup>nd</sup> paragraph, compliant bioliquids other than those from cereal and other starch-rich crops, sugars and oil crops grown as main crops primarily for energy purposes on agricultural land.

Data on *compliant biofuels and bioliquids other than those from cereal and other starch-rich crops, sugars and oil crops grown as main crops primarily for energy purposes on agricultural land* is used for the calculation of the 7% limit, in accordance with the provisions of Article 3(1)2<sup>nd</sup> paragraph and Article 3(4)d of the Renewable Energy Directive. Results of the 7% calculation limit can be seen in the TRANSPORT and OVERALL TARGET sheets.

### 3.3. Allocation of biomethane injected in the gas grid

The proposal for the recast of the Renewable Energy Directive includes several provisions promoting sustainable biomethane, among others the following:

- a clarification of the rules to be applied for tracing biogas that is injected into the natural gas grid by mentioning explicitly that the mass balance system can be applied to fuels supplied via distribution infrastructures, such as the natural gas grid;
- a traceability requirement for trade operators who have to record into national databases the fuels counted to fulfil the low carbon fuels

The proposed traceability measures from above will **allow allocation** of the entire amount of **biomethane injected into the natural gas grid** towards the **transport sector**.

Although the current Renewable Energy Directive (Directive 2009/28/EC) does not set out detailed rules, the Court of Justice of the European Union confirmed in a recent judgement that the mass balance system can be applied for biomethane injected into the natural gas grid. Consequently, this approach should already be applied for accounting the contribution of biomethane **towards the 2020 renewable energy target in the transport sector**.

As a result, the reporting instructions for the **SHARES** tool was **adapted as from reference year 2017** to allow the allocation of biogas injected in the natural gas grid to the transport sector (based on certificates / mass-balance system). In particular, these quantities shall be reported in the SHARES tool in the sheet GAS in the row "Biomethane injected in the grid to be accounted towards transport". Furthermore, these quantities should be included also in sheet TRANSPORT, row "Gaseous biofuels in road transport", in addition to the already reported quantities of non-blended biogas consumed in road transport (biogas directly consumed through dedicated distribution system without injection in the natural gas grid). Member States shall take measures to avoid double counting of the contribution of biogas. In this regard, it is important to ensure that the amount of biogas consumed through dedicated distribution system without injection in the natural gas grid is not included in the amount of biogas injected in the natural gas grid.

The amount of biogas injected in the natural gas grid claimed to be consumed in the transport sector on the basis of the mass-balance system (with traceability requirements/measures) cannot exceed the total amount of biogas injected in the natural gas grid (as reported in the natural gas questionnaire under "Memo: Receipts from other sources – Renewables). Furthermore, this amount cannot exceed the total amount of methane (of all forms) consumed in transport (as reported in the natural gas questionnaire under "Total final consumption – Transport sector – Road").

## 4. ELECTRICITY (RES-E)

### 4.1. Definition of RES-E share

The ratio determining a Member State's RES-E share is not defined directly in the Directive, as such. Article 5 defines only what one could consider as the numerator of such ratio. However, footnote 5 in the *Template for Member State progress reports under Directive 2009/28/EC* provides additional information about how this ratio should be considered in Table 1: gross final consumption of electricity from renewable sources divided by gross final consumption of electricity.

The numerator 'gross final consumption of electricity from renewable sources' is, for the purpose of the calculations in the SHARES tool, defined as the sum of the following elements:

- Gross electricity production by hydropower in accordance with the normalisation rules set out in Annex II, excluding the production of electricity in pumped storage units from water that has previously been pumped uphill. Gross electricity production in mixed hydro plants<sup>7</sup> is included without its electricity production due to pumped storage.
- Gross electricity production by wind power, in accordance with the normalisation rules set out in Annex II.
- Gross electricity production from pure bioliquids — as of 2011 only the production from compliant (sustainable) bioliquids is counted.
- Gross electricity production from blended bioliquids, to be reported as of 2011 — only production from the compliant (sustainable) blended bioliquids is to be reported, and only the electricity generated corresponding to the blended part should be reported.
- Gross electricity production from biogases.
- Gross electricity production from biogases blended in the natural gas grid — only the proportion corresponding to the ratio of blended biogases into natural gas
- Gross electricity production of other renewable sources reported in the annual questionnaires: geothermal; solar (photovoltaic and thermal); tide, wave and ocean; renewable municipal waste; solid biofuels (solid biomass).

In multi-fuel plants using renewable and conventional sources, only the part of electricity produced from renewable energy sources is taken into account — this principle is respected by default due to the reporting methodology in the annual energy questionnaires.

The denominator 'gross final consumption of electricity' is, for the purpose of the calculations in the SHARES tool, defined as:

- Gross electricity production from all energy sources (actual production, no normalisation for hydro and wind), excluding the production of electricity in pumped storage units from water that has previously been pumped uphill
- plus total imports of electricity
- minus total exports of electricity.

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<sup>7</sup> Mixed hydro plants are those plants which can be used for two purposes: for pumped storage as well as to generate genuine additional electricity from hydro power.

If any statistical transfers, joint projects or joint support schemes for renewable electricity are put in place and reported (as defined in Articles 7–11 of Directive 2009/28/EC), only the overall RES share numerator is correspondingly adjusted; RES-E is not influenced.

#### 4.2. Reporting instructions

- **Normalisation rule: hydro & mixed plants**

Mixed plants have been added to the annual energy questionnaires for reference year 2012. The renewables questionnaire now collects data on the capacities of mixed plants and pure pumped storage plants. The reporting instructions for the electricity questionnaire also indicate how hydro production should be reported.

#### **Definitions related to hydro power for annual energy questionnaires**

ELECTRICITY questionnaire - Table 1 and Table 2:

"Hydro" report here all electricity generation in hydro stations including all electricity generation from pumped storage in all types of hydro plants.

"Pumped hydro" report here all electricity generated due to pumping in all types of pumped storage plants (pure + mixed); pure electricity generation in mixed plants should not be included here.

ELECTRICITY questionnaire - Table 3:

"Used for pumped storage" report here electricity consumed for pumping water in pumped storage plants (pure + mixed).

ELECTRICITY questionnaire - Table 7a:

"3 - Hydro" report here total capacity for electricity generation in hydro stations including all capacity for electricity generation of pure + mixed pumped storage plants

"4a – Mixed plants" report here the capacity for electricity generation in mixed pumped storage hydro plants.

"4b – Pure pumped storage" report here the capacity for electricity generation in pure pumped storage plants.

RENEWABLES questionnaire – Table 1:

"Hydro" report here a sum of "Hydro -1 MW" + "Hydro 1-10 MW" + "Hydro 10+ MW" + "Pumped hydro". The reported value has to be exactly the same as in the electricity questionnaire Table 1.

"Hydro -1 MW", "Hydro 1-10 MW", "Hydro 10+ MW" report here electricity generation in hydro stations including pure electricity generation from mixed pumped storage hydro plants. Electricity generation due to pumping should not be reported here.

"Pumped hydro" report here all electricity generated from pumped storage in all types of pumped storage plants (pure + mixed). Pure electricity generation in mixed plants should not be included here. The reported value has to be exactly the same as in the electricity questionnaire Table 1.

RENEWABLES questionnaire – Table 3:

Please report capacities for each plant category. The total for "Hydro" has to be the same in the renewable and electricity questionnaire, as well as the elements for "Mixed plants" and "Pure pumped storage".

Countries that do not operate mixed plants have to do nothing. Hydro normalisation is now automatically calculated on the sheet 'REN' in rows 184–188.

Countries that operate mixed plants have to report the actual electricity generation, without pumping, of these mixed plants on row 191 on the sheet 'REN' for all time periods (starting in 1990). Data for capacities of mixed plants are automatically taken from questionnaires.

The reported data should be consistent with other data in the annual energy questionnaires and a simple check is shown on row 198 on the sheet 'REN' to provide help.

Row 198: The reported total electricity generation without pumping in the electricity questionnaire is compared with electricity generated based on the data from the renewable questionnaire and the data for mixed plants. If the value is zero or very close to zero, there is a perfect match or small rounding error. If value is high, it indicates discrepancy between electricity and renewable questionnaire.

- **Gross electricity production from compliant (sustainable) bioliquids**

Countries should report the gross electricity generation from compliant bioliquids on the sheet 'OVERALL TARGET' in rows 6 to 9 for years from 2011 onwards.

Prior to 2011, all electricity generation from pure bioliquids is counted towards the numerator. While there is a break in series in methodology between 2010 and 2011, the electricity generation from bioliquids is, in general, very small when compared to all other types of electricity generation, so in practice no significant and visible break in series is expected.

Electricity from blended biofuels is to be reported only as of 2011. The actual reported values were zero for periods up to 2011. In practice, this use of blended bioliquids is expected to be negligible.

- **Normalisation rule: wind**

The use of  $n$  in the formula for wind normalisation is, from a mathematical perspective, inadequate and actually a value of 4 can be used without any effect on the actual result.

$$Q_N = \frac{C_N + C_{N-1}}{2} \times \frac{\sum_{i=N-n}^N Q_i}{\sum_{j=N-n}^N \left( \frac{C_j + C_{j-1}}{2} \right)} = \frac{C_N + C_{N-1}}{2} \times \frac{\sum_{i=N-4}^N Q_i}{\frac{C_{N-5}}{2} + C_{N-4} + C_{N-3} + C_{N-2} + C_{N-1} + \frac{C_N}{2}}$$

While the form on the left side is exactly as in the Annex II of the RES Directive, the form on the right side of the equation is implemented in the SHARES tool (as they are equivalent).

### 4.3. Maximum rule for RES-E

If calculation results lead to figures above 100%, for any subsequent calculation using RES-E share as input (for example for RES-T), 100% is used instead of the real calculated value.

## 5. TRANSPORT (RES-T)

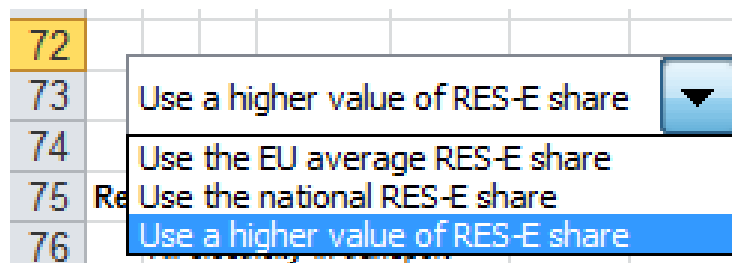
### 5.1. The choice of the appropriate RES-E share for electricity in transport

To calculate the amount of renewable electricity used in transport, the amount of electricity used in transport is multiplied with the RES-E share of year n-2. Regarding the used RES-E share, all countries have to make their own choice based on Article 3(4)(c) of Directive 2009/28/EC: *'Member States may choose to use either the average share of electricity from renewable energy sources in the Community or the share of electricity from renewable energy sources in their own country'*. This choice affects the calculation of the transport target and is the essential input parameter.

In the SHARES tool, the available options are:

- Use the EU average RES-E share
- Use the national RES-E share
- Use a higher value of RES-E (whichever of the above is higher)

The last option is selected as default value and can be changed on the sheet 'TRANSPORT' in row 73, in the combo box.



Reporting countries are requested to verify that the correct choice has been made for their country before sending the final version of the SHARES tool to Eurostat.

As mentioned in the chapter for RES-E, if the RES-E value is above 100%, the SHARES tool will use 100% instead of the real value for RES-T calculation.

### 5.2. Definition of RES-T share

Biofuels are defined in Article 2 of the RES Directive: *"biofuels" means liquid or gaseous fuel for transport produced from biomass'*. Biomass is defined in this article as well: *"biomass" means the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste'*.

The ratio determining a Member State's RES-T share is defined in the Article 3(4) of the RES Directive, as this Article defines both the numerator and the denominator.

*Article 3(4)(a) reads: 'for the calculation of the denominator, that is the total amount of energy consumed in transport for the purposes of the first subparagraph, only petrol, diesel, biofuels consumed in road and rail transport, and electricity, including electricity used for the production of renewable liquid and gaseous transport fuels of non-biological origin, shall be taken into account;'*

The explanation on this article in the FAQ document<sup>8</sup> on the website<sup>9</sup> of DG Energy indicates that the following four items must be included:

<sup>8</sup> [https://ec.europa.eu/energy/sites/ener/files/documents/nreap\\_z\\_faq\\_040110.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/nreap_z_faq_040110.pdf)

<sup>9</sup> <http://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports>



1) Consumption of petrol for transport (all modes of transport, e.g. also aviation gasoline)

2) Consumption of diesel for transport (all modes of transport, e.g. also rail or inland waterways consumption of diesel)

3) Biofuels used in road and rail transport

4) Electricity used in any mode of transport (e.g. including for pipeline transport)<sup>10</sup>

LPG is not included in the denominator for the transport target, nor is aviation kerosene or any type of fuel used for international shipping.'

Transport modes, as defined in Regulation (EC) No 1099/2008, include: international aviation, domestic aviation, road, rail, domestic navigation, pipeline transport, and a category for transport not specified elsewhere. International marine bunkers (international shipping) are excluded and not considered in the transport sector.

The numerator 'energy from renewable sources consumed in transport' is, for the purpose of the calculations in the SHARES tool, defined as the sum of the following elements:

- Compliant biofuels (liquid and gaseous) in all modes of transport and, where applicable, the respective multiplier (2x) is used (for categories indicated in annex IX).
- Renewable electricity, by applying the national or community RES-E share to the total electricity consumption in transport (proportionality of renewable electricity in the grid principle) with the respective multiplier (5x) for road transport and for rail transport (2.5x), as defined in Article 3(4)(c). The RES-E share of year n-2 is applied ('... as measured two years before ...'), with the exception of the years 2004 and 2005, which use the ratio of the year 2004, as it is not possible to calculate ratios for years prior to 2004. For the purpose of the RES-T calculation, the value of RES-E will be capped at a maximum of 100% (in which case it means that all electricity is renewable).
- Hydrogen of renewable origin in all modes of transport.
- Synthetic fuels of renewable origin in all modes of transport.
- Other forms of renewable energy with reported consumption in the transport sectors in the annual renewable questionnaire (geothermal, solar thermal, renewable municipal waste, solid biofuels).<sup>11</sup>

With respect to the denominator, the text of the Directive 2009/28/EC – the latest consolidated version states in Article 3(4):

*(c) for the calculation of the contribution from electricity produced from renewable sources and consumed in all types of electric vehicles and for the production of renewable liquid and gaseous transport fuels of non-biological origin for the purpose of points (a) and (b), Member States may choose to use either the average share of electricity from renewable energy sources in the Union or the share of electricity from renewable energy sources in their own country as measured two years before the year in question. Furthermore, for the calculation of the electricity from renewable energy sources consumed by electrified rail transport, that consumption shall be considered to be 2,5 times the energy content of the input of electricity from renewable energy sources. For the calculation of the electricity from renewable energy*

<sup>10</sup> Following the update of the RES Directive, point 4 should now be read as follows: "Electricity used in any mode of transport (e.g. including for pipeline transport), as well as electricity used to produce renewable fuels of non-biological origin."

<sup>11</sup> This category is included only for the sake of full coverage of possible reporting in the annual renewable questionnaire. The actual contribution is expected to be zero or, in very exceptional circumstances, negligible.

sources consumed by electric road vehicles in point (b), that consumption shall be considered to be five times the energy content of the input of electricity from renewable energy sources;

The difference between the yellow and green is highlighted in turquoise.

Therefore, point b – numerator – has multiplier 5. For multiplier 2,5 it is not specified where it should apply, therefore the interpretation made is that it applies to both: numerator and denominator.

In other words, the yellow part defines the calculation for rail transport and does not specify any reference to denominator described in point (a) or numerator described in point (b). Therefore the Commission legal interpretation is that it applies to both. Green part defines calculation for road transport and it specifies a reference only to numerator described in point (b). Therefore the Commission legal interpretation is that it applies to the numerator and it does not apply to denominator.

Concerning the application of the factor 2 for categories under Annex IX, the Commission confirmed that this factor 2 for biofuels should be applied only in the numerator. This is in line with Commission Decision of 30 June 2009 establishing a template for National Renewable Energy Action Plans under Directive 2009/28/EC, which specifies how the sectoral renewable energy transport target and trajectory are calculated:

“For the transport target, and not for the overall target:

- Among petroleum products, only petrol and diesel count towards the denominator. This means that the kerosene/jet fuel used in aviation and the fuel oil used in shipping do not count (though the diesel used by some trains and some inland waterway vessels does),
- Biofuels from wastes, residues, non-food cellulosic material and ligno-cellulosic material count double **towards the numerator**,
- Electricity from renewable sources used in road vehicles counts 2,5 times towards the numerator and the denominator.”

The first sub-paragraph of Article 3(4) of Directive 2009/28/EC does not identify either the numerator or denominator, but refers to the transport target as a whole. However, this Commission Decision clarifies that the double counting should be specifically applied to the numerator.

The SHARES tool incorporates the categories to be reported under compliant biofuels in the TRANSPORT sheet. More specifically, this refers to the integration of the new categories indicated in Annex IX of the RED, together with the rest of possible categories that can be reported under compliant biofuels. Each category displayed under Annex IX is classified according to the criteria of the RED, in part A or B and with the same letter. The name of the category is displayed in a comment attached to each cell.

Eurostat as well as other data users highly appreciate historic data and earlier transmission of these detailed categories.

In addition, article 3(4)e states: "*each Member State shall seek to achieve the objective of there being a minimum level of consumption on their territory of biofuels produced from feedstocks and of other fuels, listed in part A of Annex IX. To that effect, by 6 April 2017, each Member State shall set a national target, which it shall endeavour to achieve*".

In order to allow for monitoring the national sub-targets, some lines have been added at the bottom of the TRANSPORT sheet of the SHARES tool. Since grandfathered biofuels<sup>12</sup> can

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<sup>12</sup> Grandfathered biofuels as defined in 3(4)e: Biofuels made from feedstocks not listed in Annex IX that were determined to be wastes, residues, non-food cellulosic material or ligno-cellulosic material by the competent national authorities and are used in existing installations prior to the adoption of Directive (EU) 2015/1513 of the European Parliament and of the Council.

be counted towards the national sub-targets, Member States are asked to report if there are such types of biofuels in their countries (row 97).

The denominator 'energy consumed in transport' is, for the purpose of the calculations in the SHARES tool, defined as the sum of the following elements:

- Petrol in all modes of transport (motor gasoline plus aviation gasoline<sup>13</sup>).
- Diesel in all modes of transport (non-bio gas/diesel oil).
- All biofuels (compliant and non-compliant) in road and rail transport (including respective quantities with multiplier as defined in Annex IX).
- Electricity in all modes of transport (including respective quantities with multiplier as defined in Article 3(4)(c)).

As indicated in section 3.2, the calculation procedures for the numerator and denominator of the share in transport (RES-T [%]) also take into account the following cap:

*"(...) for the calculation of biofuels in the numerator, the share of energy from biofuels produced from cereal and other starch-rich crops, sugars and oil crops and from crops grown as main crops primarily for energy purposes on agricultural land shall be no more than 7 % of the final consumption of energy in transport in the Member States in 2020."*

### **5.3. Reporting instructions**

- **Calorific values**

When calculating the amount of transport fuels to be reported in the SHARES tool, Directive 2009/28/EC defines which calorific values are to be used for transport fuels in Annex III.' Therefore the Annex III values (43 MJ/kg) are used for petrol and diesel consumption in the transport sector when calculating the RES-T numerator and denominator. When reporting quantities of biofuels used in transport, the calorific values in Annex III of Directive 2009/28/EC shall be used for reporting in rows 28–30, 32–34, and 43–70 (on the sheet 'TRANSPORT'). If certain biofuels are not listed in Annex III and unless otherwise specified, the country should use the best available calorific value at national level. In these cases, the country should include a small comment in the remark sheet with a very short description of the biofuel and the method that has been used to obtain the calorific value.

- **Reporting of all biofuels in transport**

All biofuels (compliant and non-compliant) should be reported on the sheet 'TRANSPORT' in rows 28–30 (liquid biofuels) and 32–34 (gaseous biofuels).

- **Reporting of hydrogen in transport**

Hydrogen of renewable origin used in transport shall be reported on the sheet 'TRANSPORT' in row 37.

If hydrogen is produced from electricity from renewable sources (via a direct physical connection or via the grid and using the RES-E share), then this hydrogen should be considered renewable only when corresponding electricity production is deducted from total electricity production — otherwise the renewable energies are counted twice.

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<sup>13</sup> Note: aviation gasoline is not to be confused with jet fuels (gasoline/kerosene-type jet fuels).

Please note that in Regulation (EC) No 1099/2008 on energy statistics hydrogen is not accounted for and monitored for its use due to its current statistical insignificance, and thus it does not need to be reported. This approach might change in the future if hydrogen is used to a significant scale as transport fuel or energy carrier. In any case, as hydrogen is not included in the denominator for the RES-T calculation, RES-T is not influenced at all by this approach. For the overall RES share the impact is negligible as the overall use of hydrogen in European energy economy is currently insignificant when compared to fossil fuels.

- **Reporting of synthetic fuels of renewable origin in transport**

Synthetic fuels of renewable origin used in transport shall be reported on the sheet 'TRANSPORT' in row 38. Synthetic fuels of renewable origin in transport are those renewable liquid and gaseous transport fuels of non-biological origin, other than biofuels as defined in Article 2(i) of Directive 2009/28/EC, whose energy content comes from renewable energy sources other than biomass and which are used in transport.

If synthetic fuels of renewable origin are produced from electricity from renewable sources (via a direct physical connection or via the grid and using the RES-E share), then this synthetic fuels of renewable origin should be considered renewable only when corresponding electricity production is deducted from total electricity production — otherwise the renewable energies are counted twice.

Please note that in Regulation (EC) No 1099/2008 on energy statistics synthetic fuels of renewable origin are not accounted for and monitored for their use due to its current statistical insignificance. This approach might change in the future if synthetic fuels of renewable origin are used to a significant scale as transport fuel. In any case, as synthetic fuels of renewable origin are not included in the denominator for the RES-T calculation, RES-T is not influenced by this approach. For the overall RES share the impact is negligible as the overall use of synthetic fuels of renewable origin in European energy economy is still insignificant.

- **Reporting of compliant (sustainable) biofuels in transport**

Compliance with Article 17 (Sustainability criteria for biofuels and bioliquids) has to be judged also with respect to Article 18 (Verification of compliance with the sustainability criteria for biofuels and bioliquids). As of 2011, countries shall report as compliant only those biofuels and bioliquids for which compliance with Articles 17 and 18 can be demonstrated.

Regardless of the circumstances, if compliance with the requirements of both Articles cannot be demonstrated, the quantities of such biofuels shall **not** be reported as compliant. Please note that demonstrating this compliance is not part of the SHARES tool.

Compliant biofuels should be reported in rows 42–70 on the sheet TRANSPORT. The detailed split of categories under Annex IX is compulsory only from 2017 onwards. In case quantities are known, biofuels with respect to Annex IX can be reported also for periods before 2017 (rows 44 - 67).

Calorific values as in Annex III of Directive 2009/28/EC should be used for all calculations for transport fuels, including for all types of biofuels. In case the biofuels used are not listed in Annex III of Directive 2009/28/EC, real world calorific values should be used for all calculations for biofuels and synthetic fuels of renewable origin.

## **Definitions related to transport for annual energy questionnaires (DRAFT version – provisional)**

### **Transport sector exclusion rules** for specific elements:

- All transport in the energy sector (for example: surface and underground mines) for the carrying and transporting material within the energy production sites and/or energy transformation sites (aka not on the publically accessible transport network) is to be reported in the respective categories of the energy sector (coal mines, oil and gas extraction, oil refinery).
- All transport on publically not accessible transport network areas (in general off-road areas, regardless if paved or unpaved roads) in the following sectors is to be reported in the respective end-use sectors of final consumption and not in the transport sector: agriculture, forestry, fishing, construction.
- Military vehicles (wheeled or crawler/tracked type vehicles) are to be reported in the "other sectors — not elsewhere specified".
- International Marine Bunkers are not considered as a part of the final consumption (transport sector) in the joint annual energy questionnaires.
- Energy consumption of elevators, lifts and moving stairs are to be reported in the residential, commercial/public services and/or industrial sectors.
- Stationary engines are excluded from reporting in the transport sector (including mobile generators).
- Energy used in buildings supporting activity of the transport sector (NACE 49-53) should be reported in the category commercial/public services.

**Transport Sector – Rail** includes all transport on the rail tracks. This includes all form of trains: high speed trains, maglev, express trains, inter-city trains, local trains, suburban trains, monorail, metro, trams, cable cars (funiculars) on rail tracks (aka cable railway) and industrial railways. This includes all passenger transport and freight transport as well as all surface transport and underground transport on rail tracks. All transport on rail tracks is included, regardless if in urban areas or not.

**Transport Sector – Road** includes all transport on publically accessible roads, highways, motorways and unpaved roads, regardless if infrastructure is privately or publically owned. This includes all forms of road vehicles: powered bicycles and tricycles (e.g. electric bicycles), scooters, mopeds, motorcycles, three-wheelers, quads, cars, vans, SUVs, mini-buses, buses (including trolley buses), coaches, trucks, road tractors and all types of mobile utility vehicles (for example: fire trucks, snow plows, garbage truck). Use of fuel of utility vehicles (industrial, agricultural, forestry and construction sector vehicles) on publically accessible roads, highways and motorways should be also reported here. However, the "off-road" consumption of energy of utility vehicles (industrial, agricultural, forestry and construction sector vehicles) is not to be reported here. Energy consumption in the non-wheeled vehicles (crawlers/tracked vehicles) is not to be reported in the road transport but in the respective sectors of energy sector or final energy consumption sectors - industry. All transport is included, regardless if in urban areas or not.

**Transport sector — International aviation** includes quantities of aviation fuels delivered to aircrafts (planes, helicopters and drones) for international aviation. The domestic/international split should be determined on the basis of departure and landing locations and not by the nationality of the airline. Excludes fuels used by airlines for their road vehicles (to be reported in the transport sector — not elsewhere specified) and military use of aviation fuels (to be reported in the other sectors — not elsewhere specified).

**Transport sector — Domestic aviation** includes quantities of aviation fuels delivered to aircraft (planes, helicopters and drones) for domestic aviation — commercial, private, agricultural, etc. Note that this may include journeys of considerable length between two airports in a country (see geographical definitions of countries). Includes fuel used for purposes other than flying, e.g. bench testing of engines. The domestic/international split should be determined on the basis of departure and landing locations and not by the nationality of the airline. Excludes fuels used by airlines for their road vehicles (to be reported in the transport sector — not elsewhere specified) and military use of aviation fuels (to be reported in the other sector — not elsewhere specified).

**Transport sector — Domestic navigation** includes quantities delivered to vessels of all flags not engaged in international. The domestic/international split should be determined on the basis of port of departure and port of arrival and not by the flag or nationality of the ship. Note that this may include journeys of considerable length between two ports in a country (see geographical definitions of countries). Fuel used by fishing boats should not be reported in transport sector, but in the final energy consumption category fishing (in other sectors).

**Transport sector — Pipeline transport** includes quantities used as energy in the support and operation of pipelines transporting gases, liquids, slurries and other commodities. Includes energy used for pump stations and maintenance of the pipeline. Excludes energy used for the pipeline distribution of natural or manufactured gas, hot water or steam from the distributor to final users (to be reported in the energy sector), energy used for the final distribution of water to household, industrial, commercial and other users (to be included in commercial and public services) and losses occurring during this transport between distributor and final users (to be reported as distribution losses).

**Transport sector — not elsewhere specified** includes quantities used for transport activities not included elsewhere. By the way of example:

- fuels used in the airports for the surface transport;
- fuels used in ports for ships' unloaders;
- various types of cranes;
- consumption in cable cars not on rail tracks (hanging cable cars, aerial lifts, gondolas, ski lifts)
- recreational use of powered vehicles (ski-jets, snowmobiles, golf carts), use in racing vehicles, fuel used during competitions and shows (including recreational use of ex-military vehicles and ex-industrial vehicles);
- fuel used in space shuttles and spacecrafts.

## 6. HEATING & COOLING (RES-H&C)

### 6.1. Definition of RES-H&C share

This ratio determining a Member State's RES-H&C share is not directly defined in the Directive, as such. Article 5 defines only what one could consider as the numerator of such ratio. However, footnote 4 in the *Template for Member State progress reports under Directive 2009/28/EC* provides additional information about how this ratio should be considered in Table 1: 'gross final consumption of energy from renewable sources for heating and cooling divided by gross final consumption of energy for heating and cooling'.

The numerator 'gross final consumption of energy from renewable sources for heating and cooling' is, for the purpose of the calculations in the SHARES tool, defined as the sum of the following elements:

- Final energy consumption of renewable energies other than electricity, heat and bioliquids in sectors other than transport. Using the terminology and definitions of joint annual energy questionnaires, this covers:
  - all consumption reported under 'Industry sector' and 'Other sectors' on the renewables questionnaire;
  - all consumption reported under 'Transformation sector — Blast furnaces' on the renewables questionnaire.
- Compliant bioliquids consumed in the 'Transformation sector — Blast furnaces', 'Industry sector' and 'Other sectors':
  - pure bioliquids reported in the renewables questionnaire
  - the corresponding part of blended bioliquids (biogasoline, bio jet kerosenes, biodiesels) reported in the oil questionnaire.
- Derived heat produced from geothermal, solar thermal, renewable municipal waste, solid biofuels and biogas as reported in the renewables questionnaire.
- Derived heat produced from compliant bioliquids:
  - heat produced from compliant pure bioliquids reported in the renewables questionnaire
  - the corresponding part of heat produced from compliant blended bioliquids (biogasoline, bio jet kerosenes, biodiesels) reported in the oil questionnaire.
- The share of biogas blended in the natural gas network applied to natural gas consumption in the 'Transformation sector — Blast furnaces', 'Industry sector' and 'Other sectors'.
- The share of biogas blended in the natural gas network applied to derived heat produced from natural gas.
- The contribution of renewable energy from heat pumps calculated based on Commission Decision 2013/114/EU<sup>14</sup> (notified under document C(2013) 1082).

The denominator 'gross final consumption of energy for heating and cooling' is, for the purpose of the calculations in the SHARES tool, defined as the sum of the following elements:

- Final energy consumption of all energies other than electricity in sectors other than transport. Using the terminology and definitions of joint annual energy questionnaires, this covers:
  - all consumption reported under 'Industry sector' and 'Other sectors' on the renewables, coal, oil and natural gas questionnaires;

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<sup>14</sup> <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32013D0114>

- all consumption reported under 'Transformation sector — Blast furnaces' on the renewables, coal, oil and natural questionnaires minus the production of 'Blast furnace gas' reported on the coal questionnaire.
- All derived heat consumed in the 'Transformation sector — Blast furnaces', 'Industry sector' and 'Other sectors'.
- The contribution of renewable energy from heat pumps calculated based on Commission Decision 2013/114/EU (notified under document C(2013) 1082).

## 6.2. Reporting instructions

### • Reporting of final consumption of compliant bioliquids

Final energy consumption of compliant bioliquids should be reported in rows 20 and 21 on the sheet 'OVERALL TARGET'. Report here only consumption in 'Industry sector', 'Other sectors' and 'Transformation sector — Blast furnaces'. Consumption in transport is **not** to be reported here.

### • Reporting of heat from compliant bioliquids

Derived heat (heat sold<sup>15</sup>) produced from compliant bioliquids should be reported in rows 26 - 29 on the sheet 'OVERALL TARGET'.

## 6.3. Reporting instructions for heat pumps

All reporting of renewable energy captured by heat pumps should be based on Commission Decision 2013/114/EU (notified under document C(2013) 1082). Please note that there were some typographical errors in the first version of this Decision and therefore the corrected version should be used.

All information about heat pumps is to be reported on the sheet 'HEAT PUMPS'.

Countries can report in row 8 on the sheet 'HEAT PUMPS' renewable energy captured by heat pumps in the following cases:

- For historic time periods where a lack of data does not allow to use the approach established in Commission Decision 2013/114/EU.
- If national methodology with improved accuracy is used and the conditions described in 2013/114/EU — Annex — section 3.12 are fulfilled.
- On a temporary basis, if only partial coverage of all heat pumps is reported according to Commission Decision 2013/114/EU in other rows on the sheet 'HEAT PUMPS'.

Countries have to ensure that there is no double counting of renewable energy reported in row 8 on sheet 'HEAT PUMPS' with other renewable energy data reported elsewhere. Also, countries are asked to provide a written explanation of what exactly is reported in this row, in case they decide to use it (please use sheet REMARKS)

Please report **Capacity of heat pump installed** in the respective rows for your country's climate condition areas (cold, average, warm) — reporting units are gigawatts (GW) and all heat pumps should be included. If this information is not available, please provide an estimate. This element complements the elements needed for calculation and is not actually entered into any calculations; it serves only for checking purposes.

As only renewable energy from heat pumps with an SPF greater than 2.5 should be considered towards the target, it is necessary to also report capacities in GW **of which SPF**

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<sup>15</sup> Please see harmonised IEA-Eurostat methodology for reporting in annual energy questionnaires.



**is above the minimum threshold'** in the respective rows for your country's climate zone (cold, average, warm).<sup>16</sup>

Clarification note for the minimum SPF threshold: Electrically driven heat pumps with an SPF of 2.5 and above, as well as thermally driven heat pumps with an SPF of 1.15 and above, should be included. Electrically driven heat pumps with an SPF below 2.5, as well as thermally driven heat pumps with an SPF below 1.15, must be excluded. It is not sufficient to judge if the national average is above this threshold — even if the national average is above this threshold the total capacity should be estimated based on the assessment of this threshold on the level of individual heat pump units.

Default values for 'Equivalent full load hours of operation' as well as 'Estimated average SPF' have been pre-entered. If based on scientific evidence and/or statistical data collections and more precise national values are available, such figures can be entered instead of the default values (please see Commission Decision 2013/114/EU — Annex — section 3.12).

The level of detail is significant (in total nearly 400 rows long). However, many Member States have only one climate condition area, several Member States have two areas, and only very few Member States might have all three climate condition areas to report.

Note: in the SHARES tool (MS Excel file) click on the '+' sign on the left side to expand the section you wish to see.

Until the map defined in Figure 2 of Commission Decision 2013/114/EU is defined in a more precise way in the legally binding documents referred to in this Decision or elsewhere, Eurostat defines on a **provisional basis** the climate condition areas based on the Heating Degree Days (HDD) dataset. This **provisional** definition is necessary to make reporting in the SHARES tool practical and operational. By no means is this provisional definition to prejudge any subsequent decision of the Commission on this matter.

Basic HDD data are available from Eurostat database<sup>17</sup> for the period 1980–2009, which allows the creation of long-term averages for nearly all NUTS 2 regions in the EU (and also country-level attribution, in case regional data are not available).

One of the main principles used when preparing heat pump guidelines was **conservatism** regarding heat pump performance. In line with this principle of conservatism, cold, average and warm climate areas were defined. This approach also has one additional advantage: countries are further encouraged to do some research in order to have better estimates for the default values in their territory.

A detailed table with attribution of available NUTS regions as in the Eurostat's database is provided in Annex I at the end of this document. On the next page, there is a provisional European map showing climate condition areas. Thresholds for defining cold/average/warm climates were set up as 2 000 and 3 000 annual heating degree days.

Please note the following aspects of this provisional definition of climate condition areas:

- This definition only defines how cold it is in winter for heating purposes and does not reflect how hot it is in summer.
- It is used only to apply default values when specific national values are not available.

For information: please also see other scientific work on climate classification.<sup>18</sup>

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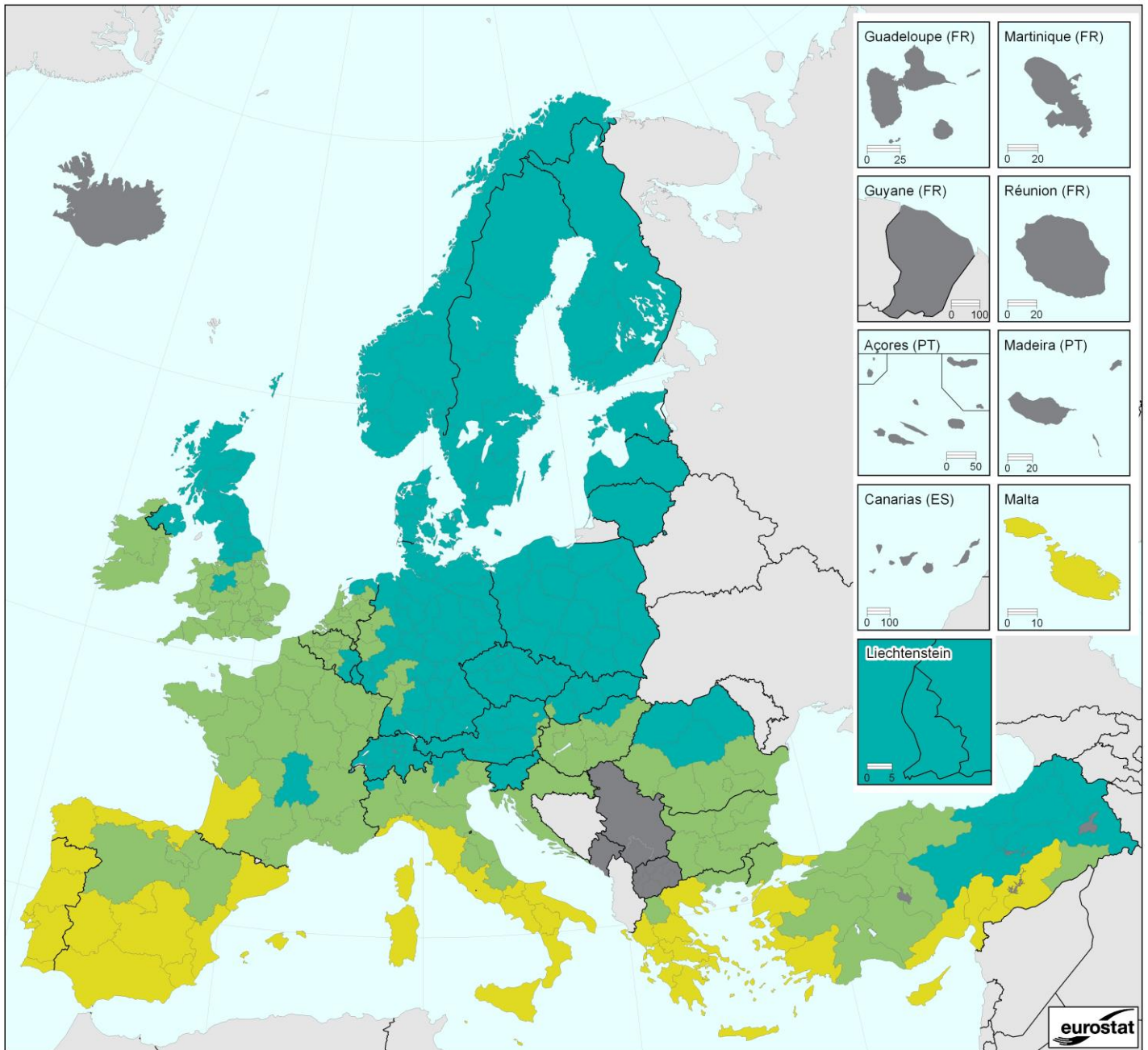
<sup>16</sup> SPF stands for 'Seasonal Performance Factor'.

<sup>17</sup> dataset: Heating degree days by NUTS 2 regions — annual data (nrg\_esdgr\_a)

<sup>18</sup> <http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf>

# Climate Condition Areas

Provisional approach for reporting in the SHARES tool



Map Units

### Legend

- warm climate ( $\leq 2000$ )
- average climate (2000 – 3000)
- cold climate ( $> 3000$ )
- Data not available

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat  
EurostatIMAGE



Footnote:

Eurostat [nrg\_esdgr\_a]

## 7. OVERALL RES SHARE

The RES ratio is defined in Article 5 of the Directive as this Article defines many details about the calculation of the share of energy from renewable sources. The following specificities and similarities with RES-E, RES-T and RES-H&C for overall RES share calculation are worth highlighting:

- While RES-T is calculated with a denominator as defined in Article 3, the overall RES share denominator is calculated with all fuels used in all transport modes (for example LPG and CNG consumption, as well as aviation consumption).
- While the RES-T numerator and denominator have a multiplier for renewable electricity in road transport and certain compliant (sustainable) biofuels, in the overall RES share numerator and denominator these multipliers are not applied.
- Additional renewable energy captured by heat pumps is included in the numerator and the denominator of RES-H&C as well as in the numerator and the denominator of the overall RES share.
- The calorific values for transport in Annex III are used in the numerator and the denominator of RES-T as well as the overall RES share; however, for the use of fuels outside the transport sector and fuels not defined in Annex III, calorific values as reported in the annual energy questionnaires are used.

Three elements of Article 5(1) are presented in the SHARES tool on the sheet 'OVERALL TARGET' in rows 47–49. These are automatically calculated based on input already provided and described in previous chapters.

'Gross final consumption of energy' (GFCoE) is calculated for each fuel on respective fuel sheets and is presented on the sheet 'OVERALL TARGET' in rows 37–41. Please note that the calculation of GFCoE has several particularities due to the linking of certain elements to RES-E and RES-T and in order to facilitate calculation in the SHARES tool:

- All transport fuels from the renewables questionnaire are included together with the 'OIL questionnaire' and values with the calorific values of Annex III are taken into account.
- The final energy consumption of renewable electricity and renewable derived heat is included together with other consumption of electricity and derived heat, and consumption quantities for GFCoE calculation are attributed to the "ELECTRICITY" questionnaire.

As a consequence, values under the heading 'RENEWABLE questionnaire' are much lower; however, as all values are summed together, this does not affect the total calculation. For individual calculations of RES-E, RES-T and RES-H&C, the correct amount of renewables in full are taken into account.

Overall RES share is presented in row 67 on the sheet 'OVERALL TARGET'. Data in this row are adjusted as described in sections 7.1 (Cooperation Mechanisms — Statistical Transfers) and 7.2 (Aviation adjustment) and also includes the 7% limit explained in sections 3.2 and 5.2.

### 7.1. Cooperation Mechanisms — Statistical Transfers

If any statistical transfers joint projects or joint supports schemes for renewables are put in place and reported (as defined in Articles 6–11 of the Directive), both the numerator and the denominator are correspondingly adjusted. The information in Table 1a of the *Template for*

*Member State progress reports under Directive 2009/28/EC* provides a calculation formula<sup>19</sup> that indicates that only the total RES share should be adjusted for any ‘Cooperation Mechanisms — Statistical Transfers’. Following a recent interpretation of the legal service of DG ENER, statistical transfers can be allocated directly to the transport sub-target, as long as the partner country deducts this amount also from its transport sub-target.

All values are to be reported in ktoe in the cells highlighted in yellow on the sheet ‘STAT. TRANSFERS’. Only positive values should be entered here (no negative values for amounts of energy to be deducted).

The first notification was sent to the Commission for the year 2012 and therefore reporting for previous years is not possible.

Reporting countries are strongly encouraged to double check with their counterparts in other countries and report exactly the same values in order to avoid any possible discrepancies from unit conversions and rounding to certain number of decimal places.

Reporting units are ktoe.

## **7.2. Aviation adjustment**

If bioliquids are used in aviation, the calorific values in Annex III should be used for conversion. As these are not reported in annual energy questionnaires, countries can provide adjusted values for aviation fuel consumption. If no fuels of renewable origin are used, no intervention by reporting countries is needed — there is a predefined formula with this respect included in the relevant cells.

Aviation consumption values are to be reported in ktoe in the cells highlighted in yellow on the sheet ‘OVERALL TARGET’ in row 63. Actual consumption without aviation cap adjustments should be reported there. The aviation cap adjustment with respect to Article 5(6) is performed subsequently.

## **8. REMARKS SHEET**

The sheet ‘REMARKS’ should include all important notes related to the elements in the SHARES tool. Such notes might include explanations for breaks in series and outliers.

## **9. TEMPLATE TABLES SHEET**

The sheet ‘TEMPLATE TABLES’ in the SHARES tool presents information that can be directly used for the preparation of certain tables in the progress report under Directive 2009/28/EC. It is not possible to provide information for all tables, only some information for tables 1, 1a, 1b and 1c is provided.

## **10. OVERALL SUMMARY SHEET**

The sheet ‘OVERALL SUMMARY’ in the SHARES tool presents key information that can be easily printed in landscape format. The sole purpose of this sheet is presentational. There is no new information calculated here, nor there are any additional data to be entered.

Several energy units can be chosen using the drop-down list.

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<sup>19</sup>  $(G) = (D) - (E) + (F)$ .

## 11. TECHNICAL NOTES

- Many elements of the SHARES tool are password protected in order to prevent any possible distortion in calculations. While the password will not be shared, an unprotected version will be provided upon request.
- Data are loaded from CSV files to the sheets 'COAL', 'OIL', 'GAS', 'ELE' and 'REN'. There is a one-to-one relationship between a data point in the CSV file and the loading place in the SHARES tool.
- Data loading is based on short name codes located in columns A–F on the sheets 'COAL', 'OIL', 'GAS', 'ELE' and 'REN'. These columns are hidden, as end-users of the SHARES tool do not need access to it.
- Loaded data are in areas with a table border, supporting calculations are in cells with no special formatting. Data are loaded for time periods starting in the year 1990. Due to normalisation for hydro, the first year that calculations are possible for is 2004 (1990 plus 15 years of data for normalisation).
- Data to be entered by reporting countries are in the cells highlighted in yellow.
- The structure of the sheets 'COAL', 'OIL', 'GAS', 'ELE' and 'REN' is the same:
  - The first part is the calculation of 'Gross Final Consumption of Energy' in ktoe.
  - The second part is the section on calorific values:
    - reported in the annual questionnaires
    - default values
    - conversion factors to GJ with no gaps for missing values.
  - The third part is data from annual energy questionnaires needed for the calculations; some other support calculations are included there as well.
- Completed SHARES tool shall be transmitted or uploaded by electronic means to the Single Entry Point for data at Eurostat. Therefore we kindly ask you to transmit your data to Eurostat following the **eDAMIS** implementing procedures (<https://webgate.ec.europa.eu/edamis>). Dataset name in eDAMIS for SHARES tool is **ENERGY\_SHARES\_A**. If SHARES tool contains confidential data, please mention it in the "Remarks" sheet as well as include a comment with your data transmission in eDAMIS.
- In case of any questions or comments, please contact Eurostat via email at: [ESTAT-ENERGY@ec.europa.eu](mailto:ESTAT-ENERGY@ec.europa.eu), [Fernando.Diaz-Alonso@ec.europa.eu](mailto:Fernando.Diaz-Alonso@ec.europa.eu) or [Marek.Sturc@ec.europa.eu](mailto:Marek.Sturc@ec.europa.eu).

## 12. ANNEX I — PROVISIONAL ATTRIBUTION OF NUTS REGIONS TO CLIMATE CONDITION AREAS

NUTS region code — NUTS regions name — annual HDD average 1980–2009 — climate area

### BE - Belgium - 2830 - average

BE10 - Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest - 2601 - average  
 BE21 - Prov. Antwerpen - 2693 - average  
 BE22 - Prov. Limburg (BE) - 2712 - average  
 BE23 - Prov. Oost-Vlaanderen - 2591 - average  
 BE24 - Prov. Vlaams-Brabant - 2619 - average  
 BE25 - Prov. West-Vlaanderen - 2650 - average  
 BE31 - Prov. Brabant Wallon - 2655 - average  
 BE32 - Prov. Hainaut - 2750 - average  
 BE33 - Prov. Liège - 3037 - cold  
 BE34 - Prov. Luxembourg (BE) - 3193 - cold  
 BE35 - Prov. Namur - 2977 - average

### BG - Bulgaria - 2654 - average

BG31 - Severozapaden - 2668 - average  
 BG32 - Severen tsentralen - 2616 - average  
 BG33 - Severoiztochen - 2582 - average  
 BG34 - Yugoiztochen - 2382 - average  
 BG41 - Yugozapaden - 2958 - average  
 BG42 - Yuzhen tsentralen - 2681 - average

### CZ - Czech Republic - 3533 - cold

CZ01 - Praha - 3441 - cold  
 CZ02 - Strední Cechy - 3414 - cold  
 CZ03 - Jihozápad - 3627 - cold  
 CZ04 - Severozápad - 3520 - cold  
 CZ05 - Severovýchod - 3584 - cold  
 CZ06 - Jihovýchod - 3466 - cold  
 CZ07 - Strední Morava - 3539 - cold  
 CZ08 - Moravskoslezsko - 3542 - cold

### DK - Denmark - 3438 - cold

DK001 - København og Frederiksberg Kommuner (NUTS 1999) - 3492 - cold  
 DK002 - Københavns amt (NUTS 1999) - 3485 - cold  
 DK003 - Frederiksborg amt (NUTS 1999) - 3454 - cold  
 DK004 - Roskilde amt (NUTS 1999) - 3409 - cold  
 DK005 - Vestsjællands amt (NUTS 1999) - 3392 - cold  
 DK006 - Storstrøms amt (NUTS 1999) - 3311 - cold  
 DK007 - Bornholms amt (NUTS 1999) - 3503 - cold  
 DK008 - Fyns amt (NUTS 1999) - 3338 - cold  
 DK009 - Sønderjyllands amt (NUTS 1999) - 3381 - cold  
 DK00A - Ribe amt (NUTS 1999) - 3373 - cold  
 DK00B - Vejle amt (NUTS 1999) - 3539 - cold  
 DK00C - Ringkøbing amt (NUTS 1999) - 3379 - cold  
 DK00D - Århus amt (NUTS 1999) - 3580 - cold  
 DK00E - Viborg amt (NUTS 1999) - 3430 - cold  
 DK00F - Nordjyllands amt (NUTS 1999) - 3547 - cold

### DE - Germany - 3199 - cold

DE11 - Stuttgart - 3185 - cold  
 DE12 - Karlsruhe - 2977 - average  
 DE13 - Freiburg - 3163 - cold  
 DE14 - Tübingen - 3427 - cold  
 DE21 - Oberbayern - 3389 - cold  
 DE22 - Niederbayern - 3393 - cold  
 DE23 - Oberpfalz - 3502 - cold  
 DE24 - Oberfranken - 3513 - cold  
 DE25 - Mittelfranken - 3356 - cold  
 DE26 - Unterfranken - 3178 - cold  
 DE27 - Schwaben - 3458 - cold  
 DE30 - Berlin - 3097 - cold  
 DE41 - Brandenburg - Nordost (NUTS 2006) - 3185 - cold  
 DE42 - Brandenburg - Südwest (NUTS 2006) - 3096 - cold  
 DE50 - Bremen - 3071 - cold  
 DE60 - Hamburg - 3188 - cold  
 DE71 - Darmstadt - 2964 - average  
 DE72 - Gießen - 3203 - cold  
 DE73 - Kassel - 3326 - cold  
 DE80 - Mecklenburg-Vorpommern - 3228 - cold  
 DE91 - Braunschweig - 3171 - cold  
 DE92 - Hannover - 3082 - cold  
 DE93 - Lüneburg - 3143 - cold  
 DE94 - Weser-Ems - 3002 - cold  
 DEA1 - Düsseldorf - 2771 - average  
 DEA2 - Köln - 2985 - average  
 DEA3 - Münster - 2905 - average  
 DEA4 - Detmold - 3069 - cold  
 DEA5 - Arnsberg - 3172 - cold  
 DEB1 - Koblenz - 3121 - cold  
 DEB2 - Trier - 3157 - cold  
 DEB3 - Rheinhessen-Pfalz - 2895 - average  
 DEC0 - Saarland - 3033 - cold  
 DED1 - Chemnitz (NUTS 2006) - 3499 - cold  
 DED2 - Dresden - 3272 - cold  
 DED3 - Leipzig (NUTS 2006) - 3098 - cold  
 DEE1 - Dessau (NUTS 1999) - 3073 - cold  
 DEE2 - Halle (NUTS 2003) - 3126 - cold  
 DEE3 - Magdeburg (NUTS 2003) - 3115 - cold  
 DEF0 - Schleswig-Holstein - 3214 - cold  
 DEG0 - Thüringen - 3366 - cold

### EE - Estonia - 4393 - cold

EE00 - Eesti - 4393 - cold

### IE - Ireland - 2871 - average

IE01 - Border, Midland and Western - 2964 - average  
 IE02 - Southern and Eastern - 2788 - average

**EL - Greece - 1642 - warm**

EL11 - Anatoliki Makedonia, Thraki - 2005 - average  
EL12 - Kentriki Makedonia - 1939 - warm  
EL13 - Dytiki Makedonia - 2519 - average  
EL14 - Thessalia - 1742 - warm  
EL21 - Ipeiros - 1887 - warm  
EL22 - Ionia Nisia - 1298 - warm  
EL23 - Dytiki Ellada - 1435 - warm  
EL24 - Sterea Ellada - 1483 - warm  
EL25 - Peloponnisos - 1413 - warm  
EL30 - Attiki - 1166 - warm  
EL41 - Voreio Aigaio - 1310 - warm  
EL42 - Notio Aigaio - 763 - warm  
EL43 - Kriti - 949 - warm

**ES - Spain - 1831 - warm**

ES11 - Galicia - 1897 - warm  
ES12 - Principado de Asturias - 1875 - warm  
ES13 - Cantabria - 1896 - warm  
ES21 - País Vasco - 1928 - warm  
ES22 - Comunidad Foral de Navarra - 2002 - average  
ES23 - La Rioja - 2225 - average  
ES24 - Aragón - 2132 - average  
ES30 - Comunidad de Madrid - 1960 - warm  
ES41 - Castilla y León - 2392 - average  
ES42 - Castilla-la Mancha - 1981 - warm  
ES43 - Extremadura - 1343 - warm  
ES51 - Cataluña - 1893 - warm  
ES52 - Comunidad Valenciana - 1396 - warm  
ES53 - Illes Balears - 1062 - warm  
ES61 - Andalucía - 1275 - warm  
ES62 - Región de Murcia - 1285 - warm  
ES63 - Ciudad Autónoma de Ceuta (ES) - 437 - warm  
ES64 - Ciudad Autónoma de Melilla (ES) - 708 - warm

**FR - France - 2459 - average**

FR10 - Île de France - 2527 - average  
FR21 - Champagne-Ardenne - 2763 - average  
FR22 - Picardie - 2722 - average  
FR23 - Haute-Normandie - 2664 - average  
FR24 - Centre (FR) - 2457 - average  
FR25 - Basse-Normandie - 2506 - average  
FR26 - Bourgogne - 2662 - average  
FR30 - Nord - Pas-de-Calais - 2658 - average  
FR41 - Lorraine - 2923 - average  
FR42 - Alsace - 2756 - average  
FR43 - Franche-Comté - 2950 - average  
FR51 - Pays de la Loire - 2242 - average  
FR52 - Bretagne - 2252 - average  
FR53 - Poitou-Charentes - 2156 - average  
FR61 - Aquitaine - 1926 - warm  
FR62 - Midi-Pyrénées - 2235 - average  
FR63 - Limousin - 2579 - average  
FR71 - Rhône-Alpes - 2771 - average  
FR72 - Auvergne - 3006 - cold  
FR81 - Languedoc-Roussillon - 2114 - average  
FR82 - Provence-Alpes-Côte d'Azur - 2299 - average  
FR83 - Corse - 1285 - warm

**IT - Italy - 1949 - warm**

ITC1 - Piemonte - 2314 - average  
ITC2 - Valle d'Aosta/Vallée d'Aoste - 3109 - cold  
ITC3 - Liguria - 1899 - warm  
ITC4 - Lombardia - 2436 - average  
ITD1 - Provincia Autonoma Bolzano/Bozen (NUTS 2006) - 4055 - cold  
ITD2 - Provincia Autonoma Trento (NUTS 2006) - 3485 - cold  
ITD3 - Veneto (NUTS 2006) - 2387 - average  
ITD4 - Friuli-Venezia Giulia (NUTS 2006) - 2444 - average  
ITD5 - Emilia-Romagna (NUTS 2006) - 2177 - average  
ITE1 - Toscana (NUTS 2006) - 1913 - warm  
ITE2 - Umbria (NUTS 2006) - 2220 - average  
ITE3 - Marche (NUTS 2006) - 2104 - average  
ITE4 - Lazio (NUTS 2006) - 1754 - warm  
ITF1 - Abruzzo - 2104 - average  
ITF2 - Molise - 1878 - warm  
ITF3 - Campania - 1500 - warm  
ITF4 - Puglia - 1448 - warm  
ITF5 - Basilicata - 1659 - warm  
ITF6 - Calabria - 1273 - warm  
ITG1 - Sicilia - 1125 - warm  
ITG2 - Sardegna - 1240 - warm

**CY - Cyprus - 762 - warm**

CY00 - Kypros - 762 - warm

**LV - Latvia - 4220 - cold**

LV00 - Latvija - 4220 - cold

**LT - Lithuania - 4048 - cold**

LT00 - Lietuva - 4048 - cold

**LU - Luxembourg - 3164 - cold**

LU00 - Luxembourg - 3164 - cold

**HU - Hungary - 2886 - average**

HU10 - Közép-Magyarország - 2868 - average  
HU21 - Közép-Dunántúl - 2892 - average  
HU22 - Nyugat-Dunántúl - 2902 - average  
HU23 - Dél-Dunántúl - 2798 - average  
HU31 - Észak-Magyarország - 3015 - cold  
HU32 - Észak-Alföld - 2927 - average  
HU33 - Dél-Alföld - 2811 - average

**MT - Malta - 543 - warm**

MT00 - Malta - 543 - warm

**NL - Netherlands - 2854 - average**

NL11 - Groningen - 3030 - cold  
NL12 - Friesland (NL) - 3008 - cold  
NL13 - Drenthe - 2976 - average  
NL21 - Overijssel - 2930 - average  
NL22 - Gelderland - 2845 - average  
NL23 - Flevoland - 2894 - average  
NL31 - Utrecht - 2819 - average  
NL32 - Noord-Holland - 2837 - average  
NL33 - Zuid-Holland - 2755 - average  
NL34 - Zeeland - 2620 - average  
NL41 - Noord-Brabant - 2759 - average  
NL42 - Limburg (NL) - 2745 - average

**AT - Austria - 3540 - cold**

AT11 - Burgenland (AT) - 2957 - average  
AT12 - Niederösterreich - 3263 - cold  
AT13 - Wien - 2980 - average  
AT21 - Kärnten - 3600 - cold  
AT22 - Steiermark - 3636 - cold  
AT31 - Oberösterreich - 3474 - cold  
AT32 - Salzburg - 3882 - cold  
AT33 - Tirol - 3858 - cold  
AT34 - Vorarlberg - 3570 - cold

**PL - Poland - 3574 - cold**

PL11 - Łódzkie - 3504 - cold  
PL12 - Mazowieckie - 3639 - cold  
PL21 - Małopolskie - 3645 - cold  
PL22 - Śląskie - 3539 - cold  
PL31 - Lubelskie - 3672 - cold  
PL32 - Podkarpackie - 3576 - cold  
PL33 - Świętokrzyskie - 3597 - cold  
PL34 - Podlaskie - 3908 - cold  
PL41 - Wielkopolskie - 3394 - cold  
PL42 - Zachodniopomorskie - 3429 - cold  
PL43 - Lubuskie - 3239 - cold  
PL51 - Dolnośląskie - 3442 - cold  
PL52 - Opolskie - 3394 - cold  
PL61 - Kujawsko-Pomorskie - 3565 - cold  
PL62 - Warmińsko-Mazurskie - 3796 - cold  
PL63 - Pomorskie - 3646 - cold

**PT - Portugal - 1278 - warm**

PT11 - Norte - 1805 - warm  
PT15 - Algarve - 797 - warm  
PT16 - Centro (PT) - 1343 - warm  
PT17 - Lisboa - 837 - warm  
PT18 - Alentejo - 977 - warm

**RO - Romania - 3092 - cold**

RO11 - Nord-Vest - 3289 - cold  
RO12 - Centru - 3572 - cold  
RO21 - Nord-Est - 3440 - cold  
RO22 - Sud-Est - 2804 - average  
RO31 - Sud - Muntenia - 2824 - average  
RO32 - Bucuresti - Ilfov - 2723 - average  
RO41 - Sud-Vest Oltenia - 2799 - average  
RO42 - Vest - 2867 - average

**SI - Slovenia - 3024 - cold**

SI0 - Slovenija - 3024 - cold

**SK - Slovakia - 3416 - cold**

SK01 - Bratislavský kraj - 2930 - average  
SK02 - Západné Slovensko - 3113 - cold  
SK03 - Stredné Slovensko - 3639 - cold  
SK04 - Východné Slovensko - 3536 - cold

**FI - Finland - 5774 - cold**

FI13 - Itä-Suomi (NUTS 2006) - 5639 - cold  
FI18 - Etelä-Suomi (NUTS 2006) - 4730 - cold  
FI19 - Länsi-Suomi - 5073 - cold  
FI1A - Pohjois-Suomi (NUTS 2006) - 6515 - cold  
FI20 - Åland - 4304 - cold

**SE - Sweden - 5387 - cold**

SE11 - Stockholm - 4134 - cold  
SE12 - Östra Mellansverige - 4227 - cold  
SE21 - Småland med öarna - 3990 - cold  
SE22 - Sydsverige - 3597 - cold  
SE23 - Västsverige - 3954 - cold  
SE31 - Norra Mellansverige - 4998 - cold  
SE32 - Mellersta Norrland - 5632 - cold  
SE33 - Övre Norrland - 6508 - cold

**UK - United Kingdom - 3081 - cold**

UKC1 - Tees Valley and Durham - 3243 - cold  
UKC2 - Northumberland and Tyne and Wear - 3309 - cold  
UKD1 - Cumbria - 3246 - cold  
UKD2 - Cheshire (NUTS 2006) - 2971 - average  
UKD3 - Greater Manchester - 3083 - cold  
UKD4 - Lancashire - 3024 - cold  
UKD5 - Merseyside (NUTS 2006) - 2831 - average  
UKE1 - East Yorkshire and Northern Lincolnshire - 2920 - average  
UKE2 - North Yorkshire - 3139 - cold  
UKE3 - South Yorkshire - 2935 - average  
UKE4 - West Yorkshire - 3084 - cold  
UKF1 - Derbyshire and Nottinghamshire - 2985 - average  
UKF2 - Leicestershire, Rutland and Northamptonshire - 2857 - average  
UKF3 - Lincolnshire - 2850 - average  
UKG1 - Herefordshire, Worcestershire and Warwickshire - 2902 - average  
UKG2 - Shropshire and Staffordshire - 3028 - cold  
UKG3 - West Midlands - 2915 - average  
UKH1 - East Anglia - 2776 - average  
UKH2 - Bedfordshire and Hertfordshire - 2793 - average  
UKH3 - Essex - 2729 - average  
UKI1 - Inner London - 2710 - average  
UKI2 - Outer London - 2708 - average  
UKJ1 - Berkshire, Buckinghamshire and Oxfordshire - 2803 - average  
UKJ2 - Surrey, East and West Sussex - 2711 - average  
UKJ3 - Hampshire and Isle of Wight - 2734 - average  
UKJ4 - Kent - 2640 - average



UKK1 - Gloucestershire, Wiltshire and Bristol/Bath area - 2781 - average  
 UKK2 - Dorset and Somerset - 2720 - average  
 UKK3 - Cornwall and Isles of Scilly - 2512 - average  
 UKK4 - Devon - 2691 - average  
 UKL11 - Isle of Anglesey - 2767 - average  
 UKL12 - Gwynedd - 2967 - average  
 UKL13 - Conwy and Denbighshire - 3122 - cold  
 UKL14 - South West Wales - 2896 - average  
 UKL15 - Central Valleys - 2724 - average  
 UKL16 - Gwent Valleys - 2736 - average  
 UKL17 - Bridgend and Neath Port Talbot - 2724 - average  
 UKL18 - Swansea - 2704 - average  
 UKL21 - Monmouthshire and Newport - 2747 - average  
 UKL22 - Cardiff and Vale of Glamorgan - 2731 - average  
 UKL23 - Flintshire and Wrexham - 3111 - cold  
 UKL24 - Powys - 3082 - cold  
 UKM10 - Aberdeen City, Aberdeenshire and North East Moray (NUTS 2003) - 3597 - cold  
 UKM21 - Angus and Dundee City - 3482 - cold  
 UKM22 - Clackmannanshire and Fife - 3375 - cold  
 UKM23 - East Lothian and Midlothian - 3456 - cold  
 UKM24 - Scottish Borders - 3435 - cold  
 UKM25 - Edinburgh, City of - 3557 - cold  
 UKM26 - Falkirk - 3365 - cold  
 UKM27 - Perth & Kinross and Stirling - 3478 - cold  
 UKM28 - West Lothian - 3548 - cold  
 UKM31 - East Dunbartonshire, West Dunbartonshire and Helensburgh & Lomond - 3317 - cold  
 UKM32 - Dumfries & Galloway - 3251 - cold  
 UKM33 - East Ayrshire and North Ayrshire mainland - 3345 - cold  
 UKM34 - Glasgow City - 3387 - cold  
 UKM35 - Inverclyde, East Renfrewshire and Renfrewshire - 3342 - cold  
 UKM36 - North Lanarkshire - 3412 - cold  
 UKM37 - South Ayrshire - 3234 - cold  
 UKM38 - South Lanarkshire - 3444 - cold  
 UKM61 - Caithness & Sutherland and Ross & Cromarty - 3512 - cold  
 UKM62 - Inverness & Nairn and Moray, Badenoch & Strathspey - 3602 - cold  
 UKM63 - Lochaber, Skye & Lochalsh, Arran & Cumbrae and Argyll & Bute - 3319 - cold  
 UKM64 - Eilean Siar (Western Isles) - 3307 - cold  
 UKM65 - Orkney Islands - 3454 - cold  
 UKN0 - Northern Ireland (UK) - 3075 - cold

**LI - Liechtenstein - 3207 - cold**

**NO - Norway - 5590 - cold**

NO01 - Oslo og Akershus - 4515 - cold  
 NO02 - Hedmark og Oppland - 5868 - cold  
 NO03 - Sør-Østlandet - 5080 - cold  
 NO04 - Agder og Rogaland - 4455 - cold  
 NO05 - Vestlandet - 4915 - cold  
 NO06 - Trøndelag - 5222 - cold  
 NO07 - Nord-Norge - 6357 - cold

**CH - Switzerland - 3463 - cold**

CH01 - Région lémanique - 3563 - cold  
 CH02 - Espace Mittelland - 3360 - cold  
 CH03 - Nordwestschweiz - 3146 - cold  
 CH04 - Zürich - 3139 - cold  
 CH05 - Ostschweiz - 3511 - cold  
 CH06 - Zentralschweiz - 3568 - cold  
 CH07 - Ticino - 3589 - cold

**HR - Croatia - 2561 - average**

**TR - Turkey - 2673 - average**

TR10 - Istanbul - 1842 - warm  
 TR21 - Tekirdag, Edirne, Kirklareli - 2064 - average  
 TR22 - Balikesir, Çanakkale - 1891 - warm  
 TR31 - Izmir - 1323 - warm  
 TR32 - Aydin, Denizli, Mugla - 1549 - warm  
 TR33 - Manisa, Afyonkarahisar, Kütahya, Usak - 2258 - average  
 TR41 - Bursa, Eskisehir, Bilecik - 2351 - average  
 TR42 - Kocaeli, Sakarya, Düzce, Bolu, Yalova - 2300 - average  
 TR51 - Ankara - 2871 - average  
 TR52 - Konya, Karaman - 2687 - average  
 TR61 - Antalya, Isparta, Burdur - 2041 - average  
 TR62 - Adana, Mersin - 1521 - warm  
 TR63 - Hatay, Kahramanmaraş, Osmaniye - 1852 - warm  
 TR71 - Kirikkale, Aksaray, Nigde, Nevsehir, Kirsehir - 2882 - average  
 TR72 - Kayseri, Sivas, Yozgat - 3461 - cold  
 TR81 - Zonguldak, Karabük, Bartin - 2300 - average  
 TR82 - Kastamonu, Çankiri, Sinop - 2857 - average  
 TR83 - Samsun, Tokat, Çorum, Amasya - 2631 - average  
 TR90 - Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane - 3066 - cold  
 TRA1 - Erzurum, Erzincan, Bayburt - 4235 - cold  
 TRA2 - Agri, Kars, Iğdir, Ardahan - 4344 - cold  
 TRB1 - Malatya, Elazığ, Bingöl, Tunceli - 3140 - cold  
 TRB2 - Van, Mus, Bitlis, Hakkari - 3744 - cold  
 TRC1 - Gaziantep, Adiyaman, Kilis - 1823 - warm  
 TRC2 - Sanliurfa, Diyarbakir - 1977 - warm  
 TRC3 - Mardin, Batman, Sirnak, Siirt - 2144 - average