Republic of Latvia

Cabinet
Regulation No. 294
Adopted 17 May 2016

Procedures for Calculating Savings of Primary Energy Produced by Cogeneration Plants

Issued pursuant to
Section 46, Paragraph five of the Energy Law

1. The Regulation prescribes the procedures by which savings of primary energy produced by cogeneration plants shall be calculated.

2. The values which are used for the calculation of electricity produced in cogeneration, shall be determined on the basis of the expected or actual operation of the installation under normal conditions of use. In relation to micro-cogeneration installations such calculations may be based on approved values.

3. The amount of electricity produced in cogeneration during the time period for the settlement of accounts which is left after utilisation of electricity for the needs of the cogeneration plant, shall be determined as follows:

3.1. the total actual efficiency coefficient of energy production for the cogeneration plant shall be calculated (η_{fakt}^{CHP}), using the following formula:

$$\eta_{fakt}^{CHP} = \frac{E_{np}^{r} + Q_{np}}{B_{np}} \times 100\ \%$$

, where

E_{np}^{r} – is the amount of electricity produced in cogeneration installations installed in a cogeneration plant during the period of time for the settlement of accounts which is determined according to the readings of the meters at the generator output (MWh);

Q_{np} – is the amount of the useful thermal energy produced in cogeneration installations installed in a cogeneration plant during the period of time for the settlement of accounts (MWh);

B_{np} – is the amount of fuel consumed in cogeneration installations installed in a cogeneration plant during the period of time for the settlement of accounts (MWh);

3.2. it shall be assumed that the amount of electricity produced in cogeneration remaining after utilisation of electricity for the needs of the cogeneration plant is equal to the amount of electricity exported to the electricity grid during the period of time for the settlement of accounts, if one of the following conditions is conformed to:

3.2.1. the total actual efficiency coefficient of energy production for the cogeneration plant in which the technology referred to in Sub-paragraph 4.1 or 4.3 of this Regulation is used, is 80 % or more;

3.2.2. the total actual efficiency coefficient of energy production for the cogeneration plant in which any of the technologies referred to in Sub-paragraph 4.2, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10 or 4.11 of this Regulation is used, is 75 % or more;

3.3. if the calculated total actual efficiency coefficient of the cogeneration plant is less than the values referred to in Sub-paragraph 3.2.1 or 3.2.2 of this Regulation, the amount of electricity produced in cogeneration remaining after utilisation for the needs of the cogeneration plant (E_{np}^{CHP}) shall be calculated, using the following formula:

$$E_{np}^{CHP} = Q_{np} \times \alpha$$

, where

Q_{np} – is the amount of the useful thermal energy produced in cogeneration installations installed in a cogeneration plant during the period of time for the settlement of accounts (MWh);

α – is the proportion between the electricity produced in cogeneration and useful thermal energy which, using the data of the technical passport of the relevant installation, is calculated when the installation is fully operating in cogeneration. If such data are not available, the abovementioned value shall be determined depending on the cogeneration technology used (Annex 1).

4. Savings of primary energy in cogeneration plants which consist of the cogeneration installation and one or several boilers for production of thermal energy or only from a cogeneration installation and which concurrently produce electricity and useful thermal energy, shall be calculated for one or several of the following production technologies:

4.1. a combined cycle gas turbine with heat recovery;

4.2. a steam backpressure turbine;

4.3. a steam condensing extraction turbine with a steam discharge pipeline for heat supply;

4.4. a gas turbine with heat recovery;

4.5. an internal combustion engine;

4.6. a micro-turbine;

4.7. Stirling engines;

4.8. fuel cells;

4.9. steam engines;

4.10. organic Rankine cycle;

4.11. other technologies or combinations thereof if by using them it is possible to produce electricity and useful thermal energy concurrently.

5. The values which are used for the calculation of cogeneration efficiency and savings of primary energy, shall be determined on the basis of foreseeable or actual operation of the installation under normal conditions of use. In relation to micro-cogeneration installations the savings of primary energy may be calculated on the basis of approved data.

6. In order to determine the efficiency of a cogeneration plant, the primary energy savings (PES) which are obtained when the cogeneration plant produces energy in cogeneration, shall be calculated. The following formula shall be used for the calculations:

$$PES = \left(1 - \frac{1}{\frac{\eta_{el}^{CHP}}{\eta_{el}^{ref}} + \frac{\eta_{th}^{CHP}}{\eta_{th}^{ref}}}\right) \times 100\ \%$$

, where

η_{el}^{CHP} – is the electric efficiency coefficient of cogeneration installations installed in a cogeneration plant within a certain period of time which is calculated using the formula referred to in Paragraph 7 of this Regulation;
η_{th}^{CHP} – is the heat efficiency coefficient of cogeneration installations installed in a cogeneration plant within a certain period of time which is calculated using the formula referred to in Paragraph 8 of this Regulation;
η_{th}^{ref} – is the efficiency coefficient for an individual production of thermal energy depending on the type of fuel used (Annex 2);
η_{el}^{ref} – is the efficiency coefficient for an individual production of thermal energy depending on the type of fuel used (if firewood or biogas is used in a cogeneration plant, $\eta_{el}^{ref} = \eta_{el}^{harm}$ shall be assumed), which is calculated using the following formula:

$$\eta_{el}^{ref} = \eta_{el}^{harm} \times \left(e_{pašp} \times z_{pašp} + \left(1 - e_{pašp}\right) \times z_{nod}\right)$$, where

η_{el}^{harm} – is the harmonised efficiency coefficient with a climate correction for an individual production of electricity depending on the fuel used and the year in which the cogeneration plant was put into service (Annex 2);
$e_{pašp}$ – is the own consumption coefficient of a cogeneration plant which is calculated by dividing the annual amount of electricity consumed by a cogeneration plant with the annual amount of electricity produced in a cogeneration plant;
$z_{pašp}$ – is the correction coefficient for avoided grid losses in relation to electricity that is consumed in a cogeneration plant (Annex 3);
z_{nod} – is the correction coefficient for avoided grid losses in relation to electricity that is transferred into the grid (Annex 3).

7. The electrical efficiency coefficient (η_{el}^{CHP}) of cogeneration installations installed in a cogeneration plant within a certain period of time which is not less than four months, shall be calculated, using the following formula:

$$\eta_{el}^{CHP} = \frac{E^{CHP}}{B}$$, where

E^{CHP} – is the amount of electricity produced in cogeneration installations installed in a cogeneration plant within the relevant period of time which is not less than four months (MWh);
B – is the total amount of fuel consumed for the production of electricity and useful thermal energy in the cogeneration installations installed in a cogeneration plant within the relevant period of time which is not less than four months (MWh).

8. The heat efficiency coefficient (η_{th}^{CHP}) of cogeneration installations installed in a cogeneration plant within a certain period of time which is not less than four months, shall be calculated, using the following formula:

$$\eta_{th}^{CHP} = \frac{Q^{CHP}}{B}$$, where

Q^{CHP} – is the amount of the useful thermal energy produced in cogeneration installations installed in a cogeneration plant within the relevant period of time which is not less than four months (MWh);

B – is the total amount of fuel consumed for the production of electricity and useful thermal energy in the cogeneration installations installed in a cogeneration plant within the relevant period of time which is not less than four months (MWh).

Informative Reference to the European Union Directive

This Regulation contains legal norms arising from 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.

Prime Minister Māris Kučinskis

Deputy Prime Minister, Minister for Economics Arvils Ašeradens

Annex 1
Cabinet Regulation No. 294
17 May 2016

Proportion between Electricity Produced in Cogeneration and Useful Thermal Energy for Different Cogeneration Technologies

No.	Cogeneration technology	Energy and heat proportion α
1.	Combined cycle gas turbine with heat recovery	0.95
2.	Steam condensing extraction turbine with a steam discharge pipeline for heat supply	0.45
3.	Steam backpressure turbine	0.45
4.	Gas turbine with heat recovery	0.55
5.	Internal combustion engine	0.75

Deputy Prime Minister, Minister for Economics Arvils Ašeradens

Annex 2
Cabinet Regulation No. 294
17 May 2016

Efficiency Coefficients

I. Harmonised efficiency reference values with climate correction for individual production of electricity

Table 1

Fuel	Category	Type of fuel	The year of the putting into service of a cogeneration plant		
			2012 and earlier	2012-2015	2016 and later
Solid fuel	S1	Hard coal, including anthracite, bituminous coal, sub-bituminous coal, coke, semicoke, petroleum coke	0.442	0.442	0.442
	S2	Lignite, lignite briquettes, shale oil	0.418	0.418	0.418
	S3	Peat, peat briquettes	0.390	0.390	0.390
	S4	Dry biomass, including wood pellets and briquettes, dried woodchips, clean wood residues, nutshells and olive and other stones	0.330	0.330	0.370
	S5	Other solid biomass, including solid biomass of all types which is not listed in Category S4, as well as black and brown liquor	0.250	0.250	0.300
	S6	Municipal and industrial waste (non-renewable) and renewable/biologically degradable waste	0.250	0.250	0.250
Liquid fuel	L7	Heavy fuel oil, gas oil, diesel oil, other oil products	0.442	0.442	0.442
	L8	Biofuels, including biomethanol, bioethanol, biobutanol, biodiesel and other biofuels	0.442	0.442	0.442
	L9	Liquid waste, including biologically degradable waste and non-renewable waste (including pyrolysis oil, melted fat, fat, and spent grain)	0.250	0.250	0.290

Gaseous fuel	G10	Natural gas, LPG, LNG and biomethane	0.533	0.533	0.538
	G11	Refinery gas, hydrogen and synthesis gas	0.450	0.450	0.450
	G12	Biogas which has been obtained from anaerobic digestion, waste landfill and sewage treatment	0.428	0.428	0.428
	G13	Coke gas, blast furnace gas, mining gas and other recoverable gases (except refinery gas)	0.358	0.358	0.358
Other	O14	Waste heat (including exhaust gases of high temperature processes, products of exothermic chemical reaction)	–	–	0.300
	O15	Nuclear energy	–	–	0.300
	O16	Solar energy	–	–	0.300
	O17	Geothermal energy	–	–	0.300
	O18	Other fuel which is not referred to in this Table	–	–	0.300

II. Efficiency Coefficients for Separate Production of Thermal Energy

Table 2

Fuel	Category	Type of fuel	Type of use of thermal energy		
			Hot water	Vapour*	Direct use of waste gases**
Solid fuel	S1	Hard coal, including anthracite, bituminous coal, sub-bituminous coal, coke, semicoke, petroleum coke	0.88	0.83	0.80
	S2	Lignite, lignite briquettes, shale oil	0.86	0.81	0.78
	S3	Peat, peat briquettes	0.86	0.81	0.78
	S4	Dry biomass, including wood pellets and briquettes, dried woodchips, clean wood residues, nutshells and olive and other stones	0.86	0.81	0.78
	S5	Other solid biomass, including solid biomass of all types which is not listed in Category S4, as well as black and brown liquor	0.80	0.75	0.72
	S6	Municipal and industrial waste (non-renewable) and	0.80	0.75	0.72

		renewable/biologically degradable waste			
Liquid fuel	L7	Heavy fuel oil, gas oil, diesel oil, other oil products	0.85	0.80	0.77
	L8	Biofuels, including biomethanol, bioethanol, biobutanol, biodiesel and other biofuels	0.85	0.80	0.77
	L9	Liquid waste, including biologically degradable waste and non-renewable waste (including pyrolysis oil, melted fat, fat, and spent grain)	0.75	0.70	0.67
Gaseous fuel	G10	Natural gas, LPG, LNG and biomethane	0.92	0.87	0.84
	G11	Refinery gas, hydrogen and synthesis gas	0.90	0.85	0.82
	G12	Biogas which has been obtained from anaerobic digestion, waste landfill and sewage treatment	0.80	0.75	0.72
	G13	Coke gas, blast furnace gas, mining gas and other recoverable gases (except refinery gas)	0.80	0.75	0.72
Other	O14	Waste heat (including exhaust gases of high temperature processes, products of exothermic chemical reaction)	0.92	0.87	–
	O15	Nuclear energy	0.92	0.87	–
	O16	Solar energy	0.92	0.87	–
	O17	Geothermal energy	0.92	0.87	–
	O18	Other fuel which is not referred to in this Table	0.92	0.87	–

Notes.
1. * These values must be used by units which operate with vapour and have been put into operation after 31 December 2015. If such units, upon calculating the efficiency coefficient for individual production of thermal energy, do not take into account recovery of condensate, then the values indicated in the Table in case of vapour must be increased by 5 per cent by volume.
2. ** Such values must be used, if the temperature of waste gases is 250°C or higher.

Deputy Prime Minister, Minister for Economics Arvils Ašeradens

Annex 3

Correction Factors z for Avoided Grid Losses that are Applicable to the Calculation of Efficiency Coefficient for Separate Production of Electricity

Voltage in the grid to which a cogeneration plant is connected	For electricity exported to the grid	For electricity consumed in a cogeneration plant
345 kV or higher	1	0.976
From 200 up to 345 kV (not included)	0.972	0.963
From 100 up to 200 kV (not included)	0.963	0.951
From 50 up to 100 kV (not included)	0.952	0.936
From 12 up to 50 kV (not included)	0.935	0.914
From 0.45 up to 12 kV (not included)	0.918	0.891
Less than 0.45 kV	0.888	0.851

Deputy Prime Minister, Minister for Economics Arvils Ašeradens

