



Ministerstwo
Klimatu i Środowiska

VERSION
PRELIMINARY

Annex 3 to the EPCIP

Description of efficiency
improvement measures and PEF
ratio in networks



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Contents

Część A. Środki z dziedziny polityki mające na celu realizację wymaganych oszczędności końcowego zużycia energii, o których mowa w art. 8 ust. 1 dyrektywy 2023/1791	3
Część B. Wartości współczynnika nakładu energii pierwotnej dla energii elektrycznej z sieci elektroenergetycznej (ang. Primary Energy Factor – PEF) dla Polski	43
Źródła danych.....	46

Part A. Policy measures to achieve the required end-use energy savings referred to in Article 8 paragraph 1 of Directive 2023/1791

Member States in accordance with Article 8, paragraph 2 Directives are required to achieve cumulative end-use energy savings by:

- establishing an energy efficiency obligation scheme;
- the adoption of alternative policy measures, or
- they may combine the above-mentioned means.

Energy efficiency obligation schemes and alternative policy measures are equivalent in this respect. Member States have a high degree of flexibility and wide discretion to choose between different measures the system best suited to their specific situation, circumstances and circumstances.

The final energy savings obligation in Poland has been implemented since 2021 through an energy efficiency obligation scheme (energy efficiency certification scheme) and alternative policy measures. As of 2024, Poland will continue the above-mentioned approach in meeting the new target under Article 8 paragraph. 1 Directive. It is planned to maintain the existing level of the obligation for obliged entities under the energy efficiency certification scheme (for more information, see chapter 2.1), Poland will provide the remainder of the total cumulative savings required through alternative policy measures (see chapter 2.2 for more details).

1.1. Energy efficiency obligation scheme referred to in Article 9 of Directive (EU) 2023/1791

a) Summary description of the measure

<i>Name of measure</i>	Energy efficiency certification system, the so-called white certificate system
<i>Category</i>	Financial mechanism
<i>Legal basis</i>	The system operates on the basis of the Energy Efficiency Act of 20 May 2016 (Journal Of Laws 2021, item 2166).
<i>Implementation of the obligation</i>	Obligated entities shall implement the obligation to achieve energy savings by: <ul style="list-style-type: none"> – implementation of projects to improve the energy efficiency of the final consumer, resulting in final energy savings confirmed by an energy efficiency audit; – obtaining and presenting energy efficiency certificates, known as white certificates, to the President of the ERO; – implementation of projects to improve the energy efficiency of the final consumer under non-repayable co-financing schemes.
<i>Obligated entities</i>	<ul style="list-style-type: none"> – energy companies – end-users connected to the network members of the exchange

- end customers connected to the network that are members of the clearing house exchange
- final customers connected to the network importing natural gas in the context of intra-Community acquisitions or imports
- cargo brokerage houses or brokerage houses
- fuel entities placing liquid fuels on the market.

<i>Implementing Body</i>	Ministry of Climate and Environment
<i>Supervisory body</i>	Energy Regulatory Authority
<i>End-use energy savings</i>	27197 ktoe (total cumulative end-use energy savings)

b) Description of the measure

Under an energy efficiency obligation scheme, Member States shall ensure that obligated parties from among transmission system operators, energy distributors, retail energy sales companies or transport fuel distributors and retailers operating in their territory comply with end-use energy savings.

In Poland, the energy efficiency obligation scheme was introduced by law imposing an energy savings obligation on so-called obligated entities from 1 January 2013. The system currently operates on the basis of the Energy Efficiency Act of 20 May 2016. The last amendment to the Act was introduced by the Act of 20 April 2021 amending the Energy Efficiency Act and certain other acts (Journal of Laws: Of Laws 2021, item 868).

The Energy Efficiency Act requires the following groups of undertakings to achieve energy savings:

- energy undertakings engaged in the economic activity of generating or trading electricity, heat or natural gas and selling electricity, heat or natural gas to final customers connected to the grid in the territory of the Republic of Poland,
- final customers connected to the network in the Republic of Poland who are members of an exchange within the meaning of the Commodity Exchange Act of 26 October 2000¹ or a member of a regulated market, in respect of transactions concluded in their own name on a commodity exchange or on a regulated market by that entity,
- final customers connected to the network in the territory of the Republic of Poland who are members of a listed clearing house within the meaning of the Commodity Exchanges Act of 26 October 2000, in respect of transactions concluded by them outside a commodity exchange or market referred to in indent 2 which are settled within that chamber by a company operating a listed clearing house, by the National Depository of Securities S.A. or by a company to which the National Depository of Securities has delegated the tasks referred to in Article 48(1). 2 of the Act of 29 July 2005 on trading in financial instruments (Journal of Laws Of Laws 2021, item 328),
- final customers connected to the network in the territory of the Republic of Poland importing natural gas in the context of intra-Community acquisitions or imports within the meaning of the provisions on excise duty, in relation to the quantity of such gas consumed for their own use,
- commodity brokerage houses or brokerage houses within the meaning of the Commodity Exchanges Act of 26 October 2000, in respect of transactions carried out on a commodity

¹Notice of the Marshal of the Sejm of the Republic of Poland of 17 January 2019 *on the publication of the consolidated text of the Commodity Exchanges Act* (Journal of Laws Of Laws 2019, item 312).

exchange or on a market organised by an entity operating a regulated market in Poland at the request of final customers connected to the network in Poland,

- fuel entities placing liquid fuels on the market.

The above-mentioned obliged entities shall implement the obligation to achieve energy savings by:

- implementation of projects to improve the energy efficiency of the final consumer, resulting in final energy savings confirmed by an energy efficiency audit;
- obtaining and presenting energy efficiency certificates, known as white certificates, to the President of the ERO;
- implementation of projects to improve the energy efficiency of the final consumer under non-repayable co-financing schemes.

In accordance with Article 30, paragraph 1 of the Energy Efficiency Act derives from the energy efficiency certificate transferable property rights, which are listed goods within the meaning of the Commodity Exchanges Act of 26 October 2000, and are therefore traded. In the case of entities which, in accordance with the Act, are subject to the obligation to obtain energy efficiency certificates and do not obtain them and will not cancel or implement energy efficiency improvement projects at the final customer documented by an energy efficiency audit, they must pay a replacement fee of the appropriate amount laid down in the Act. Under the energy efficiency obligation scheme, obliged entities have statutory amounts of final energy which they are required to obtain and submit for redemption for each subsequent year.

Energy efficiency certificates may only be obtained for projects of the types referred to in Article 19. 1 Act. In accordance with the Energy Efficiency Act, the President of the URE issues certificates at the request of the entity at which the energy efficiency improvement project will be implemented; or an entity authorised by it.

The list of all eligible actions/projects under the energy efficiency obligation scheme notified by Poland was published by the Minister for Climate and the Environment by means of a notice and published in the Official Journal of Monitor Poland². The energy efficiency certificate issued under the scheme confirms the declared energy savings resulting from the implementation of the energy efficiency improvement project. One condition for obtaining a certificate is that an energy efficiency audit be drawn up for the project in question. This audit is submitted to the President of the ERO by the notifier of the project to improve energy efficiency.

In addition, as of 1 January 2022, obliged entities, or entities authorised by them, may implement non-repayable co-financing schemes to co-finance energy efficiency improvement projects consisting of replacing heating or domestic hot water equipment or installations with heating or domestic hot water equipment or installations with a higher energy efficiency class as referred to in delegated acts within the meaning of Article 2 paragraph. 1 of the Energy Labelling of Energy-related Products Act of 14 September 2012 (Journal Of Laws 2020, item 378), subject to Article 7, paragraph 2 of Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU Office L 198, 28.7.2017, p. (1) or connection to the district heating network on the basis of contracts concluded with final customers.

The amount of final energy, expressed in tonnes of oil equivalent, saved during the calendar year by final customers as a result of the implementation of the non-repayable co-financing scheme shall be calculated taking into account reference values. The reference value for final energy savings means the average

² Notice of the Minister for Climate and the Environment of 30 November 2021 *on the detailed list of projects to improve energy efficiency* (M.P. 2021, item 1188).

annual average final energy savings, expressed in tonnes of oil equivalent per year, obtained as a result of the implementation of a given type of energy efficiency improvement project.

On the other hand, as regards the option provided for in Article 9 paragraph. It should be stressed that obliged entities may count towards their obligations certified energy savings achieved by third parties, but this is not done in such a way that those parties have to achieve energy savings on behalf of obliged entities. Energy efficiency certificates shall be issued at the request of the entity carrying out the energy efficiency improvement project or the entity authorised by it. Those entities shall operate on a market basis and shall be independent from obliged entities. The system does not provide for such a possibility for obliged entities to fulfil their obligation through other state-accredited entities. According to the Energy Efficiency Act, property rights arising from certificates are transferable and constitute a commodity traded on a commodity exchange or a regulated market. Therefore, obliged entities may buy these property rights on the market and submit them for redemption to the President of the ERO in order to be counted towards the fulfilment of their obligation.

c) Calculation methods used as referred to in point 1 of Annex V to Directive (EU) 2023/1791

Under the energy efficiency obligation scheme operated on the basis of the Energy Efficiency Act of 20 May 2016, entities notifying projects aimed at improving energy efficiency are required to submit to the President of the ERO a properly completed application, together with an energy efficiency audit drawn up for this project. The detailed scope and method of drawing up an energy efficiency audit, the method and procedure for its verification and the method for calculating energy savings are laid down in the Regulation of the Minister for Climate and the Environment of 12 April 2022 amending the Regulation on the detailed scope and method of drawing up energy efficiency audits and methods for calculating energy savings (Journal Of Laws 2022, item 956).

In accordance with the Regulation, the energy efficiency audit carried out for a project to improve energy efficiency with regard to technical condition assessment and analysis of energy consumption (building, appliance or installation), as appropriate to the manner in which the audit is drawn up, shall include in particular:

- i. a technical inventory, including an indication of the type of building, appliance or installation and its performance and general technical data together with the documentation and/or technical description;
- ii. the results of measurements of the physical size and performance of the facility, equipment or installation, taking into account:
 - factors influencing energy consumption,
 - the characteristics of the equipment used to carry out measurements, together with documentation of these measurements and the determination of the periods during which these measurements were carried out,
- iii. the results of estimates of the energy consumption of the facility, appliance or installation, using analytical methods and taking into account rated or catalogue data and factors influencing energy consumption.

However, it should be stressed that, where it is not necessary to measure the physical size and performance of the plant, equipment or installation in order to properly assess the technical condition and analyse the energy consumption of the plant, equipment or installation, only estimates of energy consumption and justification are carried out. Therefore, depending on the assessment made, the methods for calculating energy savings referred to in point 1(a)(b) or (c) of Annex V shall be used: measured energy savings, i.e. measured energy consumption, scaled savings, i.e. technical estimates of energy

savings or assumed energy savings/deemed savings. However, the latter method can only be used for certain categories of simple projects identified in the Regulation, for which an audit can be carried out as a so-called simplified audit. The assessment of the technical condition, together with an analysis of energy consumption and the choice of the method for calculating savings, shall be carried out by qualified energy auditors, whose activities are independent of the obliged entities. The energy efficiency audit shall also include the identification of factors affecting energy consumption. Those factors may relate to issues concerning the location of the building and its occupancy (density, periodicity), operating conditions (temperature, humidity, light intensity and ventilation) and the volume of production. In addition, the energy efficiency audit contains a list of applicable regulations, standards, documents and source data, in particular specialist studies on best available technologies and best practices applied by the audit.

In addition, under non-repayable co-financing schemes, the amount of final energy saved as a result of their implementation shall be determined taking into account reference values. The reference values and the method for calculating them are laid down in the Regulation of the Minister for Climate and the Environment of 22 November 2021 on reference values for final energy savings for energy efficiency improvement projects and on the method of calculating these values (Journal of Laws Of Laws 2021, item 2172). The reference values for energy efficiency improvement projects consisting of the replacement in single-family dwellings of standard individual heat sources and the method of calculating the reference values for final energy savings for energy efficiency improvement projects consisting of the replacement of heat sources determine, in a standardised manner, the amount of final energy savings achieved without the need for an audit.

d) Method for expressing the amount of energy savings (primary or final energy savings)

In accordance with point Member States shall express the amount of energy savings required from each obligated party in terms of final or primary energy consumption. The method chosen to express the amount of energy savings required shall also be used to calculate the savings claimed by obligated parties.

Under the energy efficiency obligation scheme, the drawing up of an audit for a given project is a mandatory requirement to apply for a certificate (white certificate). The audit shall determine the basic parameters of the energy efficiency improvement project, such as the average annual final energy savings and the average annual primary energy savings. These parameters are recorded on the energy efficiency audit sheet. According to the Energy Efficiency Act, obliged entities must achieve final energy savings for each year.

Therefore, the certificate issued by the President of the ERO also includes, expressed in tonnes of oil equivalent, the amount of final energy saved on average over the year as a result of the implementation of the energy efficiency improvement project. On the other hand, where primary energy savings are achieved as a result of a project, the amount of energy savings in the certificate is determined by reference to conversion factors.

The conversion factors resulting from the efficiency of the processes of converting primary energy into final energy are laid down in the Regulation of the Minister for Climate and the Environment amending the Regulation on the detailed scope and method of drawing up energy efficiency audits and methods for calculating energy savings. The values of the coefficients were determined separately according to the type of energy carrier, including, inter alia, electricity supplied from the electricity grid, heat supplied from the district heating network and natural gas.

e) Lifetime of measures and rate at which savings decline over time

For the duration of the policy measures referred to in point 2(p) of Annex V to Directive (EU) 2023/1791, the energy efficiency obligation scheme uses the 'direct method' as recommended by the Commission³. This method takes into account the entire 'duration' of the measure when calculating energy savings. The

³ Commission Recommendation (EU) 2019/1658 of 25 September 2019 on the transposition of energy savings obligations under the Energy Efficiency Directive (OJ Office L 275, 28.10.2019, p. 1).

concept of 'duration' of individual energy saving measures refers to the fact that savings can be achieved not only in the year of implementation but also in subsequent years. 'Duration' is therefore the period during which the action will continue to deliver measurable savings. This is achieved by calculating the energy savings that will be achieved from each energy efficiency improvement project between the year of its implementation and the end of the obligation period. Poland does not use any other method which is permitted under point 2(p) of Annex V.

The duration of the policy measure, understood as the period for obtaining energy savings expressed in calendar years, is set out in the Energy Audit Charter published for each certificate issued on the website of the URE Public Information Bulletin. For example, for heat savings used for space heating, a balance shall be made for a standard heating period with standard outdoor temperatures. In the case of an audit of a production plant, the energy savings refer to the primary base production volume during the year.

It is envisaged to use indicative values for the duration of the measures specified for each type of policy measure in the list in the table in Appendix VIII of the Commission Recommendations³.

The 'direct' method clearly satisfies the condition that the calculation method used must actually achieve the required amount of energy savings over the obligation period.

f) Brief description of the method for calculating energy savings, including how additionality and materiality are ensured and the methods and benchmarks used for estimated and scaled savings

Energy savings to be achieved by 2030 in accordance with Article 8. 1 (b) of Directive (EU) 2023/1791, will be calculated in two ways. Final energy savings are determined by a bottom-up method for selected policy measures⁴. This method makes it possible to show a direct link between the implementation of these measures and the State's energy policy. Bottom-up measures cover a significant proportion of the total final energy savings required.

Additionality

Only energy savings exceeding the levels of Union requirements for the withdrawal of certain energy-related products from the market following the implementation of implementing measures under Directive 2009/125/EC may be recognised⁵. In particular, these requirements have been introduced for products linked to projects such as: modernisation of lighting installations, replacement of electric motors or replacement of boilers/heat sources in heating installations. The application of the additionality principle has been ensured in such a way that, for the above-mentioned projects (replacement of appliances/equipment subject to ecodesign requirements), appropriate corrections were made to the formulas used to calculate energy savings as part of the energy efficiency audit. For these projects, the minimum levels resulting from the implementation of EU legislation on ecodesign requirements are set and used as baselines for the calculation of energy savings.

Materiality principle

In order to be eligible, the relevant individual actions taken by national authorities must be 'relevant' to achieve the energy savings claimed. According to the Commission Recommendation³, the term 'substantial' means that these authorities must participate in the individual action in question and that the grant or commitment of the obligated party must clearly have more than minimal influence on the

⁴ The bottom-up method is a precise way of calculating energy savings from energy efficiency gains. First, the energy consumption for a single energy efficiency improvement measure shall be calculated over a defined period of time before the implementation of the energy efficiency improvement measure with 'benchmarks'. The level of consumption found is then compared to the energy consumption (in the same time interval, but after the implementation of the energy efficiency measure). The difference between the two results constitutes the measure of increase of energy efficiency.

⁵ Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (Office L 285, 31.10.2009, p. 10)

end-user's decision to invest in energy efficiency improvements. Therefore, Member States must be able to demonstrate that the savings result from policy measures taken to achieve end-use energy savings.

Compliance with the principle of 'essentiality' under the energy efficiency obligation scheme in operation in Poland guarantees the obligation to submit an energy efficiency audit to the President of the ERO and the establishment of a minimum level of final energy savings from which an energy efficiency certificate is granted equal to 10 tonnes of oil equivalent (toe) on average over the year. Certificates shall only be issued for the implementation of activities that generate significant energy savings. These can be single large projects or several projects of the same type achieving cumulative energy savings of at least 10 toe. The scheme therefore lays down general requirements for applicants for an energy efficiency certificate to document and prove their direct contribution to the implementation of the measure, i.e. to prove: whether the contribution was made directly or through intermediaries and whether the decision was taken before the implementation of the action. Furthermore, in accordance with the Energy Efficiency Act, obligated parties must submit to the President of the ERO, at his request, any documents or information necessary to assess compliance with the obligation.

In addition, with regard to non-reimbursable co-financing schemes, it should be noted that the final energy savings achieved under those programmes are relevant to achieving the national energy savings target set out in Article 8 of the Directive. Particular importance should be given to economies of scale. Non-repayable co-financing schemes achieve significant final energy savings in many energy efficiency improvement projects with a relatively small amount of energy savings.

g) Final and cumulative end-use energy savings for the period 2021-2030

In Poland, the current final energy savings target concerns energy sold to final customers (energy efficiency obligation scheme). For obliged entities selling electricity, natural gas and district heating, it amounts to 1.5 % of annual sales to final customers. For obliged entities selling liquid fuels, in the Energy Efficiency Act of 20 May 2016 (Journal Of Laws 2021, item 2166) sets out a progressive approach: in 2021, 0.2 %, in 2022 - 0.2 %, 2023 - 0.4 %, 2024 - 0.4 %, in 2025 - 0.5 %, 2026 - 0.6 %, 2027 - 0.7 %, in 2028 - 0.8 %, 2029 - 0.9, and in 2030 - 1.0 % by volume of annual sales to final customers. The obligation referred to above will therefore be spread over time, as shown in Tab. 4. The value of savings from the new average annual savings in 2021 was supplemented by the savings achieved resulting from the fulfilment of the obligation by obliged entities.

Tab. Energy efficiency certification 1 scheme: end-use energy savings achieved in 2021 and estimated savings to be achieved between 2022 and 2030 - annual and cumulative

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
End-use energy savings (ktoe)										699	Total cumulative end-use energy savings (by 2030)
									675	675	
								650	650	650	
							625	625	625	625	
						601	601	601	601	601	
					576	576	576	576	576	576	
				552	552	552	552	552	552	552	
			552	552	552	552	552	552	552	552	
		503	503	503	503	503	503	503	503	503	
		143	143	143	143	143	143	143	143	143	
Total (ktoe)	143	646	1198	1750	2326	2927	3552	4202	4877	5576	27 197

By 31 December 2030, it is estimated that obligated parties will deliver total cumulative energy savings of 27198 ktoe. The expected amount of end-use energy savings from 2022 under the obligation can also be achieved by obligated entities through a non-repayable co-financing scheme - so it is assumed that

the amount of the obligation imposed will be achieved. In view of the above, it is not planned to increase the level of the obligation for obliged entities under the energy efficiency certification scheme. However, it is planned to amend the system in order to make it more accessible to obliged entities, which will ultimately contribute to the attainment of the objective pursued.

h) Information on how to deal with possible duplication of measures and individual actions to avoid double counting of energy savings

In accordance with Article 8, paragraph 14 Directive (EU) 2023/1791 requires Member States to demonstrate that, where the effects of policy measures or individual actions overlap, energy savings have not been double-counted.

Under the energy efficiency obligation scheme, certificates are issued by the President of the ERO for the implementation of a specific energy efficiency improvement project. All certificates shall be numbered and registered. The data contained in the application for an energy efficiency certificate and in the related energy efficiency audit clearly identify the place, method and date of the project. This excludes the possibility of issuing certificates for the same project for two different entities, i.e. energy savings resulting from individual action cannot be claimed by more than one obliged party, as referred to in Annex V(3)(g) of Directive 2012/34/EU.

In this respect, an effective tool is to maintain a national database in which energy efficiency certificates issued are recorded, together with information on the entity that has received support to encourage the implementation of a given energy efficiency improvement project.

i) Taking into account climate differences between regions and the approach taken

Point 2(o) of Annex V to Directive (EU) 2023/1791 allows Member States to adjust energy savings to take account of climatic differences between regions. This provision includes two options: aligning energy savings to the default value or assigning different energy savings according to temperature differences between regions.

Climatic differences between regions are taken into account when calculating the energy savings resulting from the implementation of projects to rebuild or renovate buildings, including in particular thermomodernisation projects. Examples of thermomodernisation projects are: insulation of external walls, roof or roofs, modernisation or replacement of window joinery and modernisation of domestic hot water or heating of the building.

In accordance with the provisions of the Construction Law Act, climate zones with inverted external temperatures have been introduced in Poland, which are used to determine the heat balance necessary for heating the spaces. In the case of projects to rebuild or renovate a building, climate sharpness factors may be used to calculate the energy savings achieved. These coefficients are determined for each voivodship on the basis of data from measurement stations. For example, for a region with a milder climate in the west of the country, the factor is 0.975 and for the region with a warmer climate in the east is 1.124. Therefore, temperature differences between regions are taken into account by allocating different energy savings in line with these differences.

j) Monitoring and verification

Under the energy efficiency obligation scheme established in Poland on the basis of the Energy Efficiency Act, the notifier of an energy efficiency improvement project must submit to the President of the URE an energy efficiency audit drawn up for that project.

In accordance with the provisions in force, the President of the ERO carries out or instruct other entities selected in accordance with the rules and procedure laid down in the public procurement rules to carry out random verification of the energy efficiency audit and the consistency of energy savings obtained as

a result of the implementation of an energy efficiency improvement project with the amount of energy savings declared by the entity to which the energy efficiency certificate has been awarded.

Random verification of energy efficiency audits shall be carried out by specific entities that are independent of the obligated parties. Audit verifiers may be employees of the system supervisor, i.e.: The Energy Regulatory Office (URE) or external entities selected by the President of the ERO in a public procurement procedure.

Furthermore, in accordance with the applicable statutory provisions, energy efficiency audits confirming the energy savings achieved and declarations by entities to which energy efficiency certificates have been issued are subject to the verification procedure carried out by the President of the URE. The provisions of the Act provide for financial penalties for failure to submit for redemption to the President of the ERO an energy efficiency certificate with a value corresponding to the missing final energy savings if the verification found that the energy savings achieved were lower than those specified in the application for a certificate.

In accordance with the guidelines set out in the Commission Recommendation³: selecting a statistically significant proportion and representative sample of the energy efficiency improvement measures involves establishing a subset of a statistical population of energy-saving actions within each measure that accurately reflects the entire population of all energy-saving actions and thus allows for reasonably reliable conclusions to be drawn regarding confidence in the totality of the measures.

The rules on the operation of the EEOS use the concepts of verification and control, although they do not exist interchangeably, but each applies to a different entity and sets out their rules separately. In accordance with these provisions, the President of the ERO carries out a formal verification of all energy efficiency audits submitted and a random verification of the compliance of the final energy savings achieved by a project or projects of the same type aimed at improving energy efficiency completed with the amount of final energy specified in the application for an energy efficiency certificate. Other legislative provisions, on the other hand, provide for the possibility of checking compliance with the facts of the declaration accompanying the application for an energy efficiency certificate.

It should be stressed that, in accordance with the provisions of the Act, all projects in respect of which a certificate has been requested for achieving average annual final energy savings of more than 100 toe must be verified after the project has been completed by an audit carried out by the entity which received the certificate. This is a so-called as-built audit confirming the final energy savings achieved. The entity which has received the certificate shall attach a statement confirming that the energy savings achieved after the project has been completed comply with the amount of energy savings specified in the certificate. However, in the case of projects for which certificates have been granted for achieving average annual final energy savings of less than 100 toe, no as-built audit has to be carried out, but a sample verification is carried out for these projects by the President of the URE.

The verification of the volume of projects for which certificates have been awarded concerns the case of the so-called average number of measures. Therefore, a sample of around 10 % of the population may be appropriate in this case and the number of energy efficiency audits verified should exceed 20, which is in practice appropriate and representative for the overall number of reported measures.

In accordance with the Energy Efficiency Act, each year the President of the ERO publishes information on energy efficiency certificates issued, together with energy efficiency audit sheets, and on the total energy savings achieved as a result of the fulfilment of the obligation by obliged entities, which ensures compliance with the requirement of Article 9. 12, on the publication of information on the energy savings achieved under the scheme.

The energy efficiency obligation scheme provides for sanctions in the form of fines for non-compliance. These penalties shall be imposed in accordance with the principles referred to in Article 32 of the Directive, i.e. they should be: 'effective, proportionate and dissuasive', so the amount of the fine shall not be higher than 10 % of the revenue of the fined undertaking. When determining the level of penalties, the President of the ERO shall take into account the scope of the infringements, the repetition of

infringements or the financial benefits accruing from the infringement. The President of the ERO may refrain from imposing a penalty if he considers the scope of the infringements to be negligible.

1.2. Alternative policy measures in place during the period 2021-2030 referred to in Article 10 of Directive (EU) 2023/1791

Following an analysis of the instruments and measures in place in Poland to improve energy efficiency, a selection of policy measures was made to ensure the achievement of the requirements of Article 8 paragraph. 1 on energy efficiency in final energy savings for 2030

Against this background, the following alternative policy measures are envisaged:

for the period 2021-2030:

- The Thermomodernisation and Renovation Fund (TERMO programme);
- Tax credit for expenditure on thermomodernisation of single-family dwellings;
- Development of Public Collective Transport in Cities;

for the period 2022-2030:

- Improving the Energy Efficiency of Housing Buildings;
- An energy efficient public sector;
- Fuel charge and issue charge.

Since 2022, Poland has introduced additional new alternative measures (4-5) to ensure that Poland achieves the increased required target of total cumulative end-use energy savings by 2030. On the other hand, the measure entitled The fuel charge and the carbon levy were adopted as a supplementary measure whose role is merely to safeguard the achievement of the above-mentioned objective.

In addition, it should be noted that the above-mentioned alternative measures will continue to operate in Poland after 2030.

1) The Thermomodernisation and Renovation Fund (TERMO programme)

a) Summary description of the alternative measure

<i>Name of the alternative measure</i>	The Thermomodernisation and Renovation Fund (TERMO programme)
<i>Category</i>	Financial mechanism
<i>Purpose</i>	The primary objective of the Fund is to provide financial assistance to investors carrying out energy renovation and renovation projects.
<i>Actions</i>	<p>The detailed method of co-financing under each bonus and grant is laid down in the Act of 21 November 2008 <i>on support for thermomodernisation and renovation and on the central register of emissions of buildings (Journal of Laws Of Laws 2022, item 438)</i>. A bonus and a grant shall be granted for the implementation of projects which aim to:</p> <ul style="list-style-type: none"> – reducing energy consumption for heating and heating of useful water, – reducing the cost of obtaining heat supplied to the above-mentioned buildings, – reducing primary energy losses in local heating grids and local heat sources;

- a complete or partial change of energy sources to renewable sources, or using high-efficiency cogeneration – with the obligation to achieve energy savings defined in the Act.

<i>Type of beneficiaries</i>	<p>The TERMO bonus and grant may be applied for by owners or managers:</p> <ul style="list-style-type: none"> – residential buildings, including buildings where all dwellings form part of the municipal residential resource and are located within the area of the current so-called anti-smog resolution; – collective housing; – public buildings owned by local authorities and used by them for the performance of public tasks; – district heating network; – local heat sources. <p>Investors can benefit from bonuses and grants, regardless of their legal status, i.e. for example: they may include, for example, legal persons (e.g. housing cooperatives and corporations), local government entities, associations of owners of apartments, and natural persons, including owners of individual residential buildings. State-owned entities and plants financed from the State budget are not eligible for the grant.</p>
<i>Implementing Body</i>	Bank Gospodarstwa Krajowego (BGK), Ministry of Development and Technology (MRiT)
<i>Supervisory body</i>	MRiT

b) Description of the alternative measure

The Thermomodernisation and Renovation Fund was set up at Bank Gospodarstwa Krajowego replacing the Thermomodernisation Fund (in place since 1999). The legal basis for the Fund is the Act of 21 November 2008 on support for thermomodernisation and renovation and on the central register of emissions of buildings. The aim of the Fund is to provide financial assistance to investors carrying out thermomodernisation and renovation projects and to pay compensation to owners of residential buildings in which there were housing units. As part of the operation of the Thermomodernisation and Remontów Fund, Bank Gospodarstwa Krajowego decides to grant a premium and, once the conditions for its payment are met, transfers the premium to investors.

Project co-financing under bonuses and grants can be applied for by owners or managers:

- residential buildings,
- multi-apartment units;
- public utility buildings owned by local government units for the performance of their public tasks,
- district heating networks,
- local heat sources.

Bonuses and grants can be used by investors regardless of their legal status, excluding budgetary units and local government budgetary entities, i.e., inter alia:

- legal persons (e.g. housing cooperatives and commercial companies),
- territorial self-government bodies;
- associations of owners of apartments;
- social housing associations,
- natural persons (including owners of single-family houses),
- social housing initiatives;

- a municipality or a limited liability company or a public limited company in which the municipality holds more than 50 % of the votes at the shareholders' meeting.

The investor is entitled to a premium for thermomodernisation and renovation project and constitutes repayment of the loan taken out by the investor. The bonus shall be granted only to investors using the loan. It cannot be used by investors carrying out thermomodernisation project solely with their own resources.

The amount of the premium ranges from 16 % to 60 % of the costs of thermo-modernisation or renovation project, depending on the type of project being implemented.

The main condition for receiving funding is the presentation of an energy audit. The audit should be attached to the application for a thermomodernisation premium submitted together with the loan application at the lending bank. The further conditions are linked to the granting and repayment of the loan and are as follows:

- the lending bank decides to grant the credit in accordance with its own procedures, assessing the creditworthiness of the applicant and establishing the required guarantee for repayment of the loan,
- the investor states in the premium application, inter alia, that the loan is not intended to finance works for which public support has been obtained;
- the loan is triggered on condition that thermomodernisation premium is granted.

c) Calculation methods used as referred to in point 1 of Annex V to Directive 2023/EU and taking into account climatic differences

The final energy savings of each thermomodernisation project are determined by an ex-ante method (estimated savings), calculated and reported in the mandatory energy audit.

Energy audit is a study defining the scope and technical parameters and economic energy renovation projects, indicating the optimal solution, in particular from the point of view of the costs of implementing the project and energy savings. The audit is the basis for obtaining the right to thermomodernisation premium and is also the basis for the construction project for the project being implemented.

The detailed methodology for the implementation of the energy audit is set out in the Regulation of the Minister for Infrastructure of 17 March 2009 on the detailed scope and forms of energy audit and part of the renovation audit, model audit sheets and the algorithm for assessing the cost-effectiveness of thermomodernisation project (Journal of Laws 2022, item 2816). The energy audit of the building shall take into account external factors affecting energy consumption. These factors concern, inter alia, the location (the climate zone of Poland) and the location of the building, the operating conditions. The energy audit takes into account energy losses (penetration and ventilation), energy needs for heating, cooling, lighting and domestic hot water, and solar and domestic gains. The energy audit defines the technical (energy savings) and economic impact of thermomodernisation projects. The energy audit shall be drawn up on the basis of relevant European standards, technical documentation of the building, on-site vision, available measurements of energy consumption and media, and the proposed improvements are based on the knowledge and practice of an energy auditor that takes into account the best available technologies and the costs of materials and services.

d) Method for expressing the amount of energy savings (primary or final energy savings)

The amount of energy consumption is determined on the basis of an energy audit of the building, which sets out the basic parameters of the energy efficiency improvement project, including the average annual final energy savings expressed in toe per year.

e) Lifetime of measures and rate at which savings decline over time

In line with Appendix VIII The duration of the measures and the rate of reduction of savings over this period until the Commission Recommendations have³ been set out the indicative duration of the measure. As part of the implementation of the programme, the following tasks shall be carried out:

- low-carbon project in accordance with Article 2 paragraph (1b) the Act of 21 November 2008 on support for thermomodernisation and renovation of buildings and on the central register of emissions of buildings,
- thermomodernisation project within the meaning of Article 2(2) of the Act of 21 November 2008 on support for thermomodernisation and renovation and on the central register of emissions of buildings,
- renovation project within the meaning of Article 2(3) of the Act of 21 November 2008 on support for thermomodernisation and renovation of buildings and on the central register of emissions of buildings,
- thermomodernisation project financed by the measures referred to in Article 18. Points 2-6 of the Energy Efficiency Act.

Given the type of activities carried out under the scheme, the duration of the measures will not exceed 25 years.

f) Brief description of the method for calculating energy savings, including how additionality and materiality are ensured and the methods and benchmarks used for estimated and scaled savings

The energy savings resulting from the TERMO programme shall be calculated on the basis of the following formula:

$$O_{FTiR} = \sum_{i=1}^N o_i \quad (1)$$

where

- O_{FTiR} — annual average final energy savings [ktoe/year];
-
- o_i — energy savings resulting from the energy audit for each of thermomodernisation projects carried out [toe/year];
- N — number of investments.
-

Materiality principle

The possibility of obtaining a thermomodernisation bonus will motivate the investor to take a decision on the implementation of an energy-saving project with the lowest possible investment effort. The condition of a minimum SPBT (Simply Pay Back Time) for improving thermomodernisation is included in the methodology for the performance of the energy audit.

The final energy savings achieved under this alternative measure are important for achieving the national energy savings target set out in Article 8 of the Directive. Particular importance should be given to

economies of scale. This alternative measure generates significant final energy savings in many energy efficiency improvement projects with a relatively small amount of energy savings.

Additionality

In accordance with point Savings from the renovation of existing buildings may be counted as energy savings for the purposes of Article 8(c) of Annex V. 1 provided that the materiality criterion is met. Moreover, the energy audit first of all points to the desirability of taking reasonable measures to improve the energy performance of the building in order to reduce the energy demand for heating the building and preparing domestic hot water. This is achieved through additional thermal insulation of the building envelope, removal of thermal bridges, reduction of ventilation losses, sealing of coatings separating the building from the outside environment, partial or complete replacement of window or door joinery. The investor, stimulated by the possibility of obtaining funding from the programme, performs these tasks in the first place. As a result of the implementation of the thermomodernisation project, the minimum current standards for a new nearly zero-energy building, defined and specified in the Regulation of the Minister for Infrastructure of 12 April 2002 on the technical conditions to be met by buildings and their location, must be met.

g) Information on how to deal with possible duplication of measures and individual actions to avoid double counting of energy savings

For the implementation of a thermomodernisation project, the investor shall be entitled to a premium to repay part of the loan taken out for thermomodernisation project if the energy audit shows that the energy renovation project will result in a reduction of at least 25 % in annual energy losses. The loan could not and cannot be used to finance works supported by other public funds.

In order to calculate savings resulting from alternative measures, the Central Final Energy Savings Register has been established⁶, in which all projects carried out under the TERMO programme are reported. The BGK, as the institution signing the co-financing agreement with the final recipient, is obliged to provide individual data on the project by 31 March each year, after the completed investment. The system then verifies that there is no 'double counting' for the location of the project.

h) End-use savings in the period 2021-2030

Table 5 shows the annual and cumulative final energy savings for the period 2021-2030. The TERMO programme is estimated to deliver 1175 ktoe of total cumulative final energy savings by 2030.

Tab. 2 Thermomodernisation and Renovation Fund: end-use energy savings achieved in 2021 and estimated savings to be achieved in 2022-2030 – annual and cumulative.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030			
End-use energy savings (ktoe)										30	Total cumulative end-use energy savings (by 2030)		
									30	30			
								30	30	30			
							30	30	30	30			
						30	30	30	30	30			
				30	30	30	30	30	30	30			
		5	5	5	5	5	5	5	5	5			
	5	5	5	5	5	5	5	5	5	5			
	Total (ktoe)	5	10	40	70	100	130	160	190	220		250	1 175

⁶ Article 35a of the Energy Efficiency Act of 20 May 2016 (Journal Of Laws 2021, item 2166).

The table above contains actual final energy savings for 2021 and estimated savings for the years 2022-2030. It is envisaged to increase the value of the end-use energy savings achieved in 2023-2030 due to the fact that from 2023 the programme has a new component – the grant system and the list of beneficiaries has been extended, the above measures should ensure that the expected savings are achieved.

i) Monitoring and verification

The BGK commissions the verification of each energy audit to other independent entities selected in the tender procedure. The assessment of the correctness of the audit performance of the audit shall form the basis for deciding whether to grant or refuse thermomodernisation premium and to determine the amount thereof. The procedure and rules for verifying energy audits are specified in the Regulation of the Minister for Infrastructure and Development of 24 August 2015 amending the Regulation on the detailed method of verifying energy audits and parts of the renovation audit and the detailed conditions to be met by entities to which Bank Gospodarstwa Krajowego may commission audit verifications (Journal of Laws 2015, item 1405).

In addition, individual information on the amount of final energy savings reported to the Central Final Energy Savings Register is verified by system administrators. Each project added to the CROEF must be checked in terms of substance (i.e. type of project, amount of average annual savings, period of savings and confirmation of final energy savings achieved) by the administrator of the Ministry of Climate and Environment.

2) Tax credit for expenditure on thermomodernisation of single-family dwellings

a) Summary description of the alternative measure

<i>Name of the alternative measure</i>	Tax credit for expenditure on thermomodernisation of single-family dwellings, the so-called ‘thermomodernisation relief’
<i>Category</i>	Financial mechanism
<i>Purpose</i>	Create an incentive in personal income tax for thermomodernisation of single-family residential buildings.
<i>Actions</i>	<p>The detailed list of types of construction materials, equipment and services related to the implementation of thermomodernisation projects supported is set out in the Regulation of the Minister for Investment and Development of 21 December 2018 <i>laying down a list of types of construction materials, equipment and services related to the implementation of energy renovation projects</i>. In particular, the following construction materials, equipment and services shall be entitled to thermomodernisation concession:</p> <ul style="list-style-type: none"> – window and door joinery, – building materials included in the heating installation, domestic hot water preparation, electric heating system, – heat pump, solar collector or photovoltaic cell with accessories, – installation of the above-mentioned materials and equipment, – activation and adjustment of the heat source and analysis of flue-gas, hydraulic adjustment and balancing of the installation, dismantling of the heat generator into solid fuel.
<i>Type of beneficiaries</i>	The beneficiaries of the thermomodernisation reduction are PIT taxpayers who own or co-owner single-family residential buildings and who incur expenditure on thermomodernisation projects.

<i>Implementing Body</i>	Minister for Finance (MF)
<i>Supervisory body</i>	MF

b) Description of the alternative measure

The policy measure in question consists of the introduction of a tax credit, known as the 'thermomodernisation relief', the objective of which is to create an incentive in personal income tax for thermomodernisation of single-family residential buildings.

State support to date for the thermal renovation of residential buildings provided as part of resources from the State budget is insufficient to achieve the required results in terms of improving energy efficiency. Therefore, Poland is currently intensifying its activities aimed at air quality and the energy efficiency of single-family residential buildings through thermomodernisation of these buildings, i.e. a reduction in the demand for heat energy and the resulting reduction of pollutant emissions from the combustion of fuels for heating purposes.

A tax incentive has therefore been created for owners of single-family dwellings who will be able to finance thermomodernisation project without public funds. These persons, who are subject to personal income tax, have received a fiscal instrument in the form of a deduction from income (or revenue) of expenditure relating to thermomodernisation projects in single-family residential buildings. State support in this case consists of waiving part of the tax on those persons in connection with the implementation of the thermomodernisation project.

The thermomodernisation reduction consists of deducting from income (or revenue) expenditure incurred in carrying out thermomodernisation project, with that deduction being capped. 23 % of expenditure is deductible, with the total deduction not exceeding PLN 53 thousand, irrespective of the number of energy renovation projects carried out in each year. In order to mobilise the beneficiaries of State aid not to extend thermomodernisation project, the implementation of this project has been limited to three consecutive years.

c) Calculation methods used as referred to in point 1 of Annex V to Directive (EU) 2023/1791

Given the broad scope of the measure and the fact that it is characterised by a simple tax deduction for the beneficiary of the costs incurred in connection with an energy efficiency improvement project, the savings will be calculated on the basis of expert estimates, a scaled method (i.e. scaled savings).

d) Method for expressing the amount of energy savings (primary or final energy savings)

The energy savings resulting from the proposed energy efficiency improvement measure are expressed in final energy toe per year.

e) Lifetime of measures and rate at which savings decline over time

In line with Appendix VIII The duration of the measures and the rate of reduction of savings over this period until the Commission Recommendations have³ been set out the indicative duration of the measure. As part of the implementation of the programme, the following tasks shall be carried out:

- low-carbon project in accordance with Article 2 paragraph (1b) the Act of 21 November 2008 on support for thermomodernisation and renovation of buildings and on the central register of emissions of buildings,
- thermomodernisation project within the meaning of Article 2(2) of the Act of 21 November 2008 on support for thermomodernisation and renovation and on the central register of emissions of buildings,

- renovation project within the meaning of Article 2(3) of the Act of 21 November 2008 on support for thermomodernisation and renovation of buildings and on the central register of emissions of buildings,
- thermomodernisation project financed by the measures referred to in Article 18. Points 2-6 of the Energy Efficiency Act of 20 May 2016 (Journal of Laws 2016, item 2166).

Given the type of activities carried out under the scheme, the duration of the measures will not exceed 25 years.

f) Brief description of the method for calculating energy savings, including how additionality and materiality are ensured and the methods and benchmarks used for estimated and scaled savings

Final energy savings are estimated using the top-down method on the basis of⁷ the amount of the deduction of costs incurred in the framework of thermomodernisation investment. The calculation was based on the amount of energy savings achieved by making a certain investment effort. The reference point is the data obtained from the implementation of the Thermomodernisation and Renovation Fund (FTiR) managed by Bank Gospodarstwa Krajowego (BGK) on the basis of the Act of 21 November 2008 on support for thermomodernisation and renovation of buildings and the data on the funding received under the Clean Air priority programme implemented by the National Fund for Environmental Protection and Water Management. The value of energy savings is determined by the formula:

$$O_{tax-relief} = volume \cdot w_{FTiR} \cdot w_{ekspert} \cdot p \quad (2)$$

where

$O_{Tax\ relief}$	— final energy savings [ktoe/year];
	—
$Volume$	— the amount of deductions in a given year [PLN/year];
	—
w_{FTiR}	— indicator, which is the ratio of final energy savings to capital expenditure [kWh/PLN],
	— determined on the basis of the database of energy audits carried out under the Thermomodernisation Fund;
w_{CZP}	— a ratio of CapEx to the amount of co-financing determined on the basis of data
	— obtained under the Clean Air Priority Programme;
p	— unit conversion factor [ktoe/kWh].
	—

Materiality principle

The possibility of obtaining a tax credit encourages the investor to take the decision to implement an energy-saving project with the lowest possible investment effort.

The final energy savings achieved under this alternative measure are important for achieving the national energy savings target set out in Article 8 of the Directive. Particular importance should be given to economies of scale. This alternative measure generates significant final energy savings in many energy efficiency improvement projects with a relatively small amount of energy savings.

⁷ The top-down method uses an aggregate and is therefore called the 'energy efficiency index' method. It can establish correct indicators of developments, but does not give precise value for energy savings at a detailed level.

Additionality

In accordance with point Savings from the renovation of existing buildings may be counted as energy savings for the purposes of Article 8(c) of Annex V. 1 provided that the materiality criterion is met. In addition, in the case of investments aimed at: the retrofitting of lighting installations or the replacement of boilers/heat generators in heating installations may only be recognised for energy savings exceeding the levels of Union requirements for the withdrawal of certain energy-related products from the market following the implementation of implementing measures under Directive 2009/125/EC5. For these projects, the minimum levels resulting from the implementation of EU legislation on ecodesign requirements are set and used as baselines for the calculation of energy savings. Funding is granted only if the materials and equipment used are listed in the Annex to the Regulation of the Minister for Investment and Development of 21 December 2018 laying down a list of types of construction materials, equipment and services related to the implementation of energy renovation projects.

g) Information on how to deal with possible duplication of measures and individual actions to avoid double counting of energy savings

If the tax deduction resulting from the thermomodernisation advantage is combined with other grants for energy renovation, expenditure financed or subsidised or reimbursed to the taxpayer in any other form from public funds will not be deductible. In addition, if, after the deduction of expenditure under the thermomodernisation allowance has been made, the beneficiary has received a refund of the expenditure deducted in the form of a grant, it is required, in accordance with the tax rules, to add the amounts previously deducted from the income for the tax year in which the refund was received.

h) Taking into account climatic differences between regions and the approach taken

Due to the specificities of the alternative tax relief measure, national disparities between regions are not taken into account in the calculation of the energy savings resulting from that alternative measure.

i) End-use energy savings for the period 2021-2030

Table 7 shows the annual and cumulative final energy savings for the period 2021-2030. The thermomodernisation reduction is estimated to result in 15 720- ktoe of total cumulative final energy savings by 2030.

Tab. Thermomodernisation 3 Ulga: end-use energy savings achieved in 2021 and estimated savings to be achieved between 2022 and 2030 for the thermal renovation reduction - annual and cumulative.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030			
End-use energy savings (ktoe)										300	Total cumulative end-use energy savings (by 2030)		
									300	300			
								300	300	300			
							300	300	300	300			
						300	300	300	300	300			
				300	300	300	300	300	300	300			
			300	300	300	300	300	300	300	300			
		222	222	222	222	222	222	222	222	222			
	Total (ktoe)	222	522	822	1122	1422	1722	2022	2322	2622		2922	15 720

It was originally estimated that thermomodernisation relief would generate on average 200 ktoe of annual average final energy savings. In 2021 alone, the total amount of deductions was PLN 10.4 billion. In view of the high interest of beneficiaries in simple tax deductions, it is estimated that the share of savings in achieving the objective of the thermomodernisation relief will increase in the following years.

j) Monitoring and verification

Verification is carried out on the basis of invoices submitted for goods and services, and the Ministry of Finance is directly responsible for verifying the claimed deductions under the thermomodernisation allowance. In accordance with Article 275 1 of the Tax Code of 29 August 1997, if it is apparent from the tax return submitted that the taxable person has benefited from the tax advantages granted to him, the tax authority may ask him to produce documents or to submit photocopies of documents the possession of which, at a specified time, is required by a provision of law.

3) Development of Public Collective Transport in Cities

a) Summary description of the alternative measure

<i>Name of the alternative measure</i>	Development of public transport in cities
<i>Category</i>	Financial mechanism
<i>Purpose</i>	Development and greater use of low-emission urban transport to serve the inhabitants of functional urban areas.
<i>Actions</i>	<p>Infrastructural investments: adaptation, construction, reconstruction and extension of the urban transport network, including, but not limited to:</p> <ul style="list-style-type: none"> • construction, reconstruction and extension of the track system on routes, loops, sidings and depots, • construction of a metro line, • construction, reconstruction, and development of energy network and tramway and trolleybus traction sub-stations; • reconstruction, extension of roads with a view to introducing privileged traffic or favouring the use of existing public transport vehicles, • equipping roads, streets, tracks with engineering structures and necessary road equipment/purchase of the necessary equipment for the safety of public transport vehicles, • equipping roads, streets with infrastructure serving public transport (e.g. ramps, exits) and passengers (e.g. stops, islands), • construction, reconstruction and extension of hubs, including parking systems for 'Park & Ride' and 'Bike & Ride' cars, • construction of transport systems PRT (Personal Rapid Transport). <p>Investments concerning rolling-stock: purchase, modernisation of rolling stock (tramway, metro, railway), trolleybus and bus rolling stock, together with the necessary infrastructure for its maintenance (e.g. technical facilities for the operation and maintenance of the rolling stock, together with the necessary specialised equipment, alternative fuel supply facilities and facilities).</p>
<i>Type of beneficiaries</i>	<ul style="list-style-type: none"> – local government units and their associations – regional cities and their functional areas and organisational units and special purpose vehicles acting on their behalf; – managers of infrastructure used by urban transport; – public transport operators
<i>Implementing Body</i>	Ministry of Infrastructure (MI), Centre for EU Transport Projects (CUPT), NFOŚiGW
<i>Supervisory body</i>	MI, NFOŚiGW

b) Description of the alternative measure

Support for public transport was one of the elements of implementing measures under the Operational Programme Infrastructure and Environment for the period 2014-2020, resulting from low-carbon economy plans prepared by local and regional authorities, covering issues relating to sustainable urban mobility. Investments are both infrastructural and rolling stock as well as comprehensive, covering both types of projects. Preference shall be given to rail transport projects and alternative fuel bus rolling stock over internal combustion engines. There are also projects enriched with other elements (investments) in addition to basic linear infrastructure, including ITS, improving the functioning of the entire transport

system, which integrate the infrastructure of existing modes of transport. Support from the EU Cohesion Fund for local low-emission public transport continues under the Operational Programme Infrastructure and Environment for the 2021-2027 period.

The development of green transport at local level was set out in the Act of 11 January 2018 on electromobility and alternative fuels. A local government unit with more than 50000 inhabitants provides or commissions the provision of public transport services within the meaning of the Public Transport Act of 16 December 2010 to an entity whose share of zero-emission buses in the fleet of vehicles used in that local authority is at least 30 %.

Cities themselves decide which way to achieve mandatory or self-defined targets and define them in their strategic documents, such as the Sustainable Urban Mobility Plans. In the public transport segment at national level, it is estimated that there will be 3000 electric buses in 2030.

With a view to 2030, both EU and national funds are earmarked for the development of collective public transport. Amongst others:

- The largest infrastructure investments, railways and public transport under cohesion policy 2021-2027 involve the share of funds related to zero-emission transport, such as: European Regional Development Fund and Cohesion Fund. These measures are complemented by an Efficient Transition Fund. A total of EUR 25.1 billion will be provided under the national and regional programme.
- Poland accepted the National Recovery Plan with an allocation of more than EUR 6 million in the 'Green, Smart Mobility' component.
- The new operational programme Penix (European Infrastructure Fund, Climate, Environment) includes support for green energy, sustainable and smart mobility.
- The third edition of the 'Green Transport Public Transport' programme) is planned to be launched in 2022) of the National Fund for Environmental Protection and Water Management, which subsidise the zero-emission urban fleet and urban infrastructure.
- The Polish Development Fund (PFR) is a group of financial and advisory institutions supporting local government and investing in the sustainable socio-economic development of Poland.
- Public utility bus development fund, instrument for financial support for local government units organising public transport. Thanks to co-financing from the Fund, local and regional authorities are supported in carrying out their own tasks relating to ensuring the operation of public public transport in the field of public transport by bus of a public interest nature. The Fund shall be a state special-purpose fund.

c) Calculation methods used as referred to in point 1 of Annex V to Directive 2023/EU

In line with the requirements on methods and rules for calculating energy savings set out in Annex V, point 1, of the Energy Efficiency Directive 2023/EU, a methodology for estimating energy savings (i.e. deemed savings) and scaled savings (i.e. scaled savings) has been adopted.

d) Method for expressing the amount of energy savings (primary or final energy savings)

The energy savings resulting from the proposed energy efficiency improvement measure are expressed in final energy toe per year.

e) Lifetime of measures and rate at which savings decline over time

In line with Appendix VIII The duration of the measures and the rate of reduction of savings over this period until the Commission Recommendations have³ been set out the indicative duration of the measure. As part of the implementation of the programme, the following tasks shall be carried out:

- modal shift
- purchase of energy efficient vehicles

Given the type of activities carried out under the scheme, the duration of the measures will not exceed 15 years.

f) Brief description of the method for calculating energy savings, including how additionality and materiality are ensured and the methods and benchmarks used for estimated and scaled savings

Values for the specific energy consumption of cars and buses have been developed and published in the Regulation of the Minister for Climate and the Environment amending the Regulation on the detailed scope and method of drawing up energy efficiency audits and methods for calculating energy savings (Journal Of Laws 2022, item 956), energy savings shall be calculated on the basis of the formula:

$$O_{FLOTA} = Noeb \cdot esj + NoH2b \cdot esjh2b + other\ saving, \quad (3)$$

where:

O_{FLOTA}	—	annual savings [ktoe/year];
	—	
$Noeb$	—	number of new electric vehicles;
	—	
esj	—	the final energy savings per unit of the electric vehicle [ktoe/1 bus];
	—	
$NoH2b$	—	number of new vehicles powered by alternative fuels;
	—	
$esjh2b$	—	the specific final energy savings of the alternatively fuelled vehicle [ktoe/1 bus];
	—	

Materiality principle

The possibility of obtaining co-financing motivates the investor to take a decision on the implementation of an energy-saving project with the lowest possible investment effort.

The final energy savings achieved under this alternative measure are important for achieving the national energy savings target set out in Article 8 of the Directive. Particular importance should be given to economies of scale. This alternative measure generates significant final energy savings in many energy efficiency improvement projects with a relatively small amount of energy savings.

Additionality

Only energy savings exceeding the levels of Union requirements for the withdrawal of certain energy-related products from the market following the implementation of implementing measures under Directive 2009/125/EC may be recognised⁸. In particular, these requirements have been introduced for products related to the replacement of electric motors. In the case of vehicles, the minimum levels resulting from the implementation of Union legislation on ecodesign requirements that are set and used as baselines for the calculation of energy savings shall apply.

⁸ Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 *establishing a framework for the setting of ecodesign requirements for energy-related products* (Office L 285, 31.10.2009, p. 10)

g) Information on how to deal with possible duplication of measures and individual actions to avoid double counting of energy savings

Under the Act of 20 May 2016 on energy efficiency, institutions concluding co-financing agreements with applicants for projects aimed at improving energy efficiency at final customers are required to enter into the central register of final energy savings using the ICT system operating that register, by 31 March of each year for the previous calendar year, information on the projects implemented to improve energy efficiency and the amount of final energy savings achieved as a result of their implementation. The system then verifies that there is no 'double counting' for the location of the project.

h) Taking into account climatic differences between regions and the approach taken

Due to the specific nature of the alternative measure in the form of projects carried out in the transport sector, national disparities between regions are not taken into account in the calculation of energy savings.

i) End-use energy savings for the period 2021-2030

Table 8 shows the annual and cumulative final energy savings for the period 2021-2030. The development of public collective transport in cities is estimated to result in 6622 ktoe of total cumulative final energy savings by 2030.

Tab. 4 Development of Public Collective Transport in Green Cities: end-use energy savings achieved in 2021 and estimated savings to be achieved between 2022 and 2030 for the programme – annual and cumulative.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
End-use energy savings (ktoe)										130	Total cumulative end-use energy savings (by 2030)
									130	130	
								130	130	130	
							130	130	130	130	
						130	130	130	130	130	
				130	130	130	130	130	130	130	
			130	130	130	130	130	130	130	130	
		130	130	130	130	130	130	130	130	130	
		182	182	67	67	67	67	67	67	3	
Total (ktoe)	182	312	327	457	587	717	847	977	1043	1173	6 622

Taking into account the energy intensity of electric and hydrogen buses and the expected amount of other investments in the transport sector over the period 2021-2030 (i.e. secured by a dedicated budget), the average annual energy savings for the period 2022-2030 were assumed to be 130 toe per year.

j) Monitoring and verification

Reports containing information on the volume of rolling stock purchased and upgraded and the volume of zero- and low-emission vehicles purchased shall be submitted to the minister responsible for transport. In addition, in the case of subsidies implemented under the Fund for the development of bus transport services of a public utility nature, the provincial governors submit annual reports to the minister responsible for transport on the implementation of the tasks for which co-financing was granted in the province concerned concerning the previous year.

Data on the exchange of rolling stock of public transport vehicles carried out as part of the activities of the Centre for EU Transport Projects are reported and verified in a central ICT system. In the case of measures implemented under special-purpose funds, annual reports on investments are reported to the minister responsible for transport.

The Ministry responsible for transport within the framework submitted annually by entities and institutions with competence to carry out energy efficiency tasks (e.g.: CUPT and JSTs), reports and funding intensity verifies the scope of the tasks to be carried out.

In addition, individual information on the amount of final energy savings reported to the Central Final Energy Savings Register is verified by system administrators. Each project added to the CROEF must be checked in terms of substance (i.e. type of project, amount of average annual savings, period of savings and confirmation of final energy savings achieved) by the administrator of the Ministry of Climate and Environment.

4) Improving the Energy Efficiency of Housing Buildings

a) Summary description of the alternative measure

<i>Name of the alternative measure</i>	Improving the Energy Efficiency of Housing Buildings
<i>Category</i>	Financial mechanism
<i>Purpose</i>	Improving energy efficiency by renovating existing buildings, improving energy efficiency by increasing heat generation from low-carbon heat sources; reduce emissions of dust and other pollutants into the atmosphere.
<i>Actions</i>	<ul style="list-style-type: none"> – Replacement/purchase of a heat generator, investment in the connection of ca.o. and c.w. (including, but not limited to: connection to the district heating network and connection, purchase of a heat pump, purchase of a condensing gas boiler). – Insulation of building envelopes, replacement of window and door joinery. – Purchase and installation of windows, doors separating rooms from unheated spaces. – Purchase and installation of mechanical ventilation with heat recovery. – The installation of hybrid systems, i.e. a photovoltaic or a wind power plant with a heat pump, coupled to a single system.
<i>Type of beneficiaries</i>	Natural person, housing cooperatives, housing community
<i>Implementing Body</i>	National Fund for Environmental Protection and Water Management (NFOŚiGW), Regional Funds for Environmental Protection and Water Management (WFOŚiGW), Local Government Units (JST)
<i>Supervisory body</i>	Ministry of Climate and Environment (MKiŚ), NFOŚiGW, JST

b) Description of the alternative measure

Poland's energy policy 2040⁹ aims to develop two specific objectives: Development of heating and cogeneration and improvement of energy efficiency. The above objectives describe two horizontal problems observed in Poland, i.e. reducing emissions and reducing the use of solid fuels in households, which can be reduced by supporting energy efficiency measures.

In view of the above, since 2018, the National Fund for Environmental Protection and Water Management has been implementing priority programmes aimed at improving energy efficiency and, as a result, contributing to reducing emissions and phasing out solid fossil fuels in Polish households.

Given the scale of exchanges of inefficient heat sources, the initiative was also taken over by local government units which, as part of specific subsidies granted under low-emission programmes, emission reductions and environmental resolutions, implement projects to improve energy efficiency in a municipality, city or district. In addition, JSTs, which are covered by the Act, are eligible for co-financing under the STOP SMOG programme.

Under the alternative measure, the Beneficiary may implement the following projects:

Purchase/assembly of an efficient heat source with the necessary accessories and/or hot water tank with accessories;

- Construction of the gas connection and the installation from the connection to the boiler;
- Purchase/assembly of installation materials and equipment included in the central heating installation (including solar collectors and heat pumps for domestic hot water);
- Purchase/assembly of installation materials making up a mechanical ventilation system with heat recovery (ventilation with ventilation centre, wall rebuilders).
- Purchase/assembly of building materials used for the warming of building envelopes and internal building envelopes separating heated spaces from unheated spaces, ceilings under non-heated and enclosed floor spaces, balcony boards, foundations, etc., forming part of heating systems or used to protect against humidification.
- Purchase/assembly of window joinery including windows/balcony doors, floor windows, non-opening transparent surfaces with assembly systems.
- Purchase/assembly of door joinery including external doors, doors separating heated and unheated spaces, doors/garage gates.

In addition, the Beneficiary has the possibility to benefit from co-financing covering the costs of technical documentation, i.e. an energy audit, expert opinions and project documentation. The programme financed by the NFOŚiGW, the National Recovery Plan, the European Union budget under the 2021-2030 financial perspective and the World Bank for Results Programme financial instrument, as well as from the own resources of the SJUs.

Despite the fact that the programme is implemented on a country-wide basis, the acceptance of grant applications and the disbursement of grants are implemented locally, i.e. by the 16th WFOŚiGW and by the JST (e.g. municipalities, cities, districts). The availability of funding information is therefore localised, advisory and information points are organised, and this approach strongly influences the decision to join the programme.

In addition, the [cleanair.pl](https://czystepowietrze.gov.pl/) platform¹⁰ has been launched, where all information on the available programmes can be found, and the platform allows for electronic submission of grant applications, which

⁹ Annex to the Notice of the Minister for Climate and the Environment of 2 March 2021 on the country's energy policy until 2040 (Monitor Polski of 2021, item 264)

¹⁰ <https://czystepowietrze.gov.pl/>

makes it even more willing to benefit from the grant. The Energy Efficiency Expert Platform¹¹, which aims to facilitate contact between those planning to replace an inefficient heat source in their home or a partial or comprehensive energy renovation of a building, and experts in the energy efficiency of the building, is also complemented. Experts can help make a rational decision based on technical and economic considerations.

c) Calculation methods used as referred to in point 1 of Annex V to Directive (EU) 2023/1791

As regards the implementation of contracts under the Programme for the Improvement of Energy Efficiency in Housing Buildings, data on energy savings achieved at final customers are collected by the WFOŚiGW and by the JST. In view of the fact that the programme provides for the implementation of different projects, two possible methods of calculating energy savings are used: estimated and scaled savings.

Estimated savings

As part of the energy audit, a study is being drawn up specifying the scope and technical and economic parameters of thermomodernisation project, indicating the optimal solution, in particular from the point of view of the cost of implementing the project and energy savings. The audit is the basis for the construction project for the project being carried out. Furthermore, the audit determines the technical (energy savings) and economic effect of the thermomodernisation projects, energy losses (penetration and ventilation), energy needs for heating, cooling, lighting and domestic hot water, and solar and domestic profits are taken into account.

Scaled savings

As the programme is implemented on a massive scale, potentially affecting millions of beneficiaries, the methodology for determining the effects is estimated on the basis of the average values for the reference building.

d) Method for expressing the amount of energy savings (primary or final energy savings)

The amount of energy consumption is determined on the basis of an energy audit of the building or, where justified, a simplified energy audit of the building, i.e. the ecological effect indicator is calculated. On the basis of the above, the basic parameters of the energy efficiency improvement project shall be determined, including the average annual final energy savings.

e) Lifetime of measures and rate at which savings decline over time

In line with Appendix VIII The duration of the measures and the rate of reduction of savings over this period until the Commission Recommendations have³ been set out the indicative duration of the measure. As part of the implementation of the programme, the following tasks shall be carried out:

- low-carbon project in accordance with Article 2 paragraph 1b) the Act of 21 November 2008 on support for thermomodernisation and renovation of buildings and on the central register of emissions of buildings (Journal of Laws Of Laws 2022, item 438),
- thermomodernisation project within the meaning of Article 2(2) of the Act of 21 November 2008 on support for thermomodernisation and renovation and on the central register of emissions of buildings,
- renovation project within the meaning of Article 2(3) of the Act of 21 November 2008 on support for thermomodernisation and renovation of buildings and on the central register of emissions of buildings,

¹¹ <https://www.peee.gov.pl/pl>

- o thermomodernisation project financed by the measures referred to in Article 18. Points 2-6 of the Energy Efficiency Act of 20 May 2016 (Journal of Laws 2021, item 2166).

Given the type of activities carried out under the scheme, the duration of the measures will not exceed 25 years.

f) Brief description of the method for calculating energy savings, including how additionality and materiality are ensured and the methods and benchmarks used for estimated and scaled savings

Final energy savings calculated on the basis of a simplified methodology for estimating the ecological effect, which is prepared each time for a given priority and on the basis of the Regulation of the Minister for Climate and the Environment of 22 November 2021 on reference values for final energy savings for energy efficiency improvement projects and on the method of calculating these values (Journal Of Laws 2021, item 2172). The relevant methodology has been developed taking into account the seasonal efficiency of heat generators and the non-renewable primary energy input factor. The data for the estimates were adopted on the basis of available literature and the Regulation of the Minister for Infrastructure and Development of 27 February 2015 on the methodology for determining the energy performance of a building or part of a building and energy performance certificates (Journal Of Laws 2015, item 376). On this basis, average indicators of achievement of the target (i.e. reduction in final energy consumption) in relation to 1 m² of floor area have been established for each of the projects implemented under the programme. In order to monitor progress towards the final energy savings target, the following formula shall be used:

$$R_f = A \cdot \omega, \quad (4)$$

where

- | | | |
|----------|---|--|
| R_f | — | reference value for final energy savings [ktoe/year]; |
| | — | |
| A | — | a controlled air temperature area [m ²]; |
| | — | |
| ω | — | final energy saving factor for the replacement of a heat source in a residential building [toe/m ²]. |

Taking into account that the programme also assumes the possibility of implementing the project on the basis of an energy audit, which estimates... the final energy savings for the Housing Buildings Energy Efficiency Programme are calculated using the formula:

$$O_{PEEBM} = R_f + \text{other savings}, \quad (5)$$

where

- | | | |
|-------------|---|-----------------------------------|
| O_{PEEBM} | — | final energy savings [ktoe/year]; |
| | — | |

- other savings*
- other final energy savings resulting from the estimated method, i.e. energy
 - audits or energy efficiency carried out as part of the implementation of the project.

The estimates determined on the basis of the Methodology for estimating the effect provided by the NFOŚiGW are updated on an ongoing basis as part of selective checks on the durability of the project. The scheme rules provide that the installation financed under the project should be operated at a minimum of 3 to 5 years, depending on the type of investment. During this period, the NFOŚiGW carries out selective checks to update the estimated values of environmental impact indicators, including final energy savings.

Materiality principle

The co-financing has a significant impact on the decision to implement a project aimed at improving energy efficiency, the beneficiary's actions are the result of financial support offered under priority programmes and targeted grants for SSTs. Moreover, the scheme is also aimed at beneficiaries living in multi-family constructions between 3 and 20 premises. In Poland, there is a great potential for thermomodernisation of multi-apartment buildings, so the possibility of receiving subsidies in the form of grants will be taken into account when a decision is taken on the cost-effectiveness of implementing energy efficiency projects.

In addition, the beneficiary is encouraged to first carry out an energy audit of the building, given that the audit, as an eligible cost, can obtain a co-financing intensity of 100 %. The energy audit of a building should identify the most cost-effective solutions for improving energy efficiency.

The final energy savings achieved under this alternative measure are important for achieving the national energy savings target set out in Article 8 of the Directive. Particular importance should be given to economies of scale. This alternative measure generates significant final energy savings in many energy efficiency improvement projects with a relatively small amount of energy savings.

Additionality

In accordance with point Savings from the renovation of existing buildings may be counted as energy savings for the purposes of Article 8(c) of Annex V. 1 provided that the materiality criterion is met. Moreover, the energy audit first of all points to the desirability of taking reasonable measures to improve the energy performance of the building in order to reduce the energy demand for heating the building and preparing domestic hot water. This is achieved through additional thermal insulation of the building envelope, removal of thermal bridges, reduction of ventilation losses, sealing of coatings separating the building from the outside environment, partial or complete replacement of window or door joinery. The investor, stimulated by the possibility of obtaining funding from the programme, performs these tasks in the first place. As a result of the implementation of the thermomodernisation project, the minimum current standards for a new nearly zero-energy building, defined and specified in the Regulation of the Minister for Infrastructure of 12 April 2002 on the technical conditions to be met by buildings and their location, must be met.

In addition, in the case of investments aimed at: the retrofitting of lighting installations or the replacement of boilers/heat generators in heating installations may only be recognised for energy savings exceeding the levels of Union requirements for the withdrawal of certain energy-related products from the market following the implementation of implementing measures under Directive 2009/125/EC5. For these projects, the minimum levels resulting from the implementation of EU legislation on ecodesign requirements are set and used as baselines for the calculation of energy savings.

- g) Information on how to deal with possible duplication of measures and individual actions to avoid double counting of energy savings**

The data contained in the application for funding submitted to the WFOŚiGW clearly identify the place, method and time limit for carrying out the project. This excludes the possibility of issuing co-financing for the same project to two different entities, so that energy savings resulting from an individual action cannot be claimed by more than one obligated party.

If the beneficiary of the scheme has received funding from other publicly funded programmes, including in particular: under the 2014-2020 regional operational programmes and other priority programmes of the NFOŚiGW, the applicant may receive co-financing from the programme only for the scope of the project for which it has not received funding under other programmes.

In order to calculate savings resulting from alternative measures, the Central Final Energy Savings Register has been established, in which all projects carried out under the programme for improving energy efficiency in residential buildings are reported. The institutions signing the co-financing agreement with the final recipient are required to provide individual data on the project by 31 March each year, after the completed investment. The system then verifies that there is no 'double counting' for the location of the project.

h) Taking into account climatic differences between regions and the approach taken

Climate differences between regions shall not be taken into account for the estimated method of calculating energy savings. In the case of investments carried out in connection with the implementation of an energy audit, external factors such as climatic differences are taken into account. This is due to the fact that the energy audit of the building takes into account external factors affecting energy consumption, such as the location (the climate zone of Poland) and the location of the building, as well as the operating conditions.

i) End-use energy savings for the period 2021-2030

The implementation of the Programme for Improving the Energy Efficiency of Housing Buildings will contribute to new average annual end-use energy savings of 60 ktoe in 2022 and 90 ktoe in the period from 2023-2030. Table 9 shows the annual and cumulative end-use energy savings over the period 2021-2030.

Tab. 5 Improving the Energy Efficiency of Housing Buildings: end-use energy savings achieved in 2021 and estimated savings to be achieved between 2022 and 2030 – annual and cumulative

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030		
End-use energy savings (ktoe)										90	Total cumulative end-use energy savings (by 2030)	
									90	90		
								90	90	90		
							90	90	90	90		
					90	90	90	90	90	90		
				90	90	90	90	90	90	90		
		60	60	60	60	60	60	60	60	60		
		0	0	0	0	0	0	0	0	0		

Total (ktoe)	0	60	150	240	330	420	510	600	690	780	3780
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j) Monitoring and verification

The WFOŚiGW and SUUs are obliged to transfer the environmental and material effects resulting from the agreements signed and concluded with beneficiaries under the grant agreements signed and concluded. The above data are sent to the National Fund for Environmental Protection and Water Management and/or to the Central Final Energy Savings Register.

Individual information on the amount of final energy savings reported to the Central Final Energy Savings Register shall be verified by system administrators. Each project added to the CROEF must be checked in terms of substance (i.e. type of project, amount of average annual savings, period of savings and confirmation of final energy savings achieved) by the administrator of the Ministry of Climate and Environment.

In addition, the WFOŚiGW transmits to the National Fund for Environmental Protection and Water Management (NFOŚiGW) up-to-date information on the implementation of the programme, including: the number and amount of applications submitted, the number and amount of grant decisions taken, the number and amount of contracts signed, and data on payments.

5) Energy efficient Public Sector

a) Summary description of the alternative measure

<i>Name of the alternative measure</i>	Energy efficient Public Sector
<i>Category</i>	Financial mechanism
<i>Purpose</i>	<p>The programme aims to:</p> <ul style="list-style-type: none"> • dissemination of good practices in the field of energy efficiency; • reducing emissions of pollutants into the atmosphere by implementing investments consisting of comprehensive energy renovation of buildings leading to energy efficiency; • improving the energy efficiency of public buildings.
<i>Actions</i>	<ul style="list-style-type: none"> • Thermomodernisation, renovation and low-carbon project within the meaning of the Act of 21 November 2008 <i>on support for thermomodernisation and renovation and on the central register of emissions of buildings</i> (Journal of Laws 2022, item 438) • Retrofitting or replacing lighting. • Modernisation of a technological, manufacturing, telecommunications or IT process. • Replacement or modernisation of equipment and installations and energy recovery in industrial processes. • Reducing energy losses in the transition. • Refurbishment or replacement of the district heating network. • Modernisation or replacement of drives, in particular engines, transmissions and adjustment systems. • Reduction of reactive energy losses of electric power consumers. • Modernisation or replacement of road or rail transport vehicles.
<i>Type of beneficiaries</i>	Local government units, public universities, local cultural institutions, autonomous public health institutions operated by local authorities, non-governmental organisations, religious associations and communities, budget units, local government budgetary institutions or other entities in the public finance sector
<i>Implementing Body</i>	National Fund for Environmental Protection and Water Management (NFOŚiGW), Regional Funds for Environmental Protection and Water Management (WFOŚiGW), Local Government Units (JST)
<i>Supervisory body</i>	MKiŚ, NFOŚiGW, JST

b) Description of the alternative measure

The Efficient Public Sector Programme implements tasks for priority areas such as: protecting the atmosphere, energy efficiency, just transition, etc. The programme is implemented by the WFOŚiGW and SST as part of co-financing from own resources and from the European Funds for the period 2021-2027. Within the framework of the above priorities, carry out the following tasks, inter alia:

- Implementation of area-based programmes to reduce dust and gas emissions;
- Implementation of projects for modern, efficient and environmentally friendly technological systems and systems for the generation, transmission or use of energy;
- Thermomodernisation of buildings to the extent resulting from the energy audit;

- Modernisation of existing heat sources;
- Increasing energy efficiency, including through the use of renewable energy sources;
- The deployment of smart grids;
- Retrofitting of lighting.

The support financed is addressed to public service providers in fulfilment of the obligations of their own local authorities, either in the form of grants or as a repayable instrument.

In the case of programmes relating to the comprehensive energy renovation of a public utility building and voluntary fire brigades, funding for activities carried out in accordance with the energy and economic efficiency standards indicated in the energy audit of the building annexed to the application, as an optimal option for the project.

In particular, the Programme supports investments in the comprehensive (deep) energy renovation of public sector buildings. Projects will be subsidised with a view to, inter alia:

- heating bridges replacing the door joinery and replacing windows.
- refurbishment/modernisation of heating systems,
- installation/reconstruction of ventilation and air-conditioning systems,
- installation/reconstruction of cooling systems,
- replacement of lighting with energy-efficient lighting,
- use of smart energy management systems
- modernisation of heating and domestic hot water installations,
- performance of energy audits (investment component)

In addition, support will be given to the construction and extension of installations for the production of heating and cooling from renewable energy sources, together with energy storage facilities, as well as other justified measures which are not directly apparent from energy audits aimed at increasing technical-use standards and enhancing adaptation to climate change. The use of best possible techniques, smart and low-carbon solutions will create energy-sustainable areas that exploit local energy potential.

The Efficient Public Sector Programme provides for grants for investments aimed at increasing energy efficiency of at least 60 %, in particular ESCO projects or other models using private capital, including PPPs.

c) Calculation methods used as referred to in point 1 of Annex V to Directive (EU) 2023/1791

With regard to the implementation of contracts under the programme, data on energy savings achieved in public sector buildings are collected by WFOŚiGW, NFOŚiGW and JST. Possible methods for calculating energy savings: estimated savings, scaled savings and, where applicable, measured savings.

Estimated savings

As part of the energy audit, a study is being drawn up specifying the scope and technical and economic parameters of thermomodernisation project, indicating the optimal solution, in particular from the point of view of the cost of implementing the project and energy savings. The audit is the basis for the construction project for the project being carried out. Furthermore, the audit determines the technical (energy savings) and economic effect of the thermomodernisation projects, energy losses (penetration

and ventilation), energy needs for heating, cooling, lighting and domestic hot water, and solar and domestic profits are taken into account.

Scaled savings

In order to simplify the funding availability path for standard projects, e.g. replacement of lighting, a method is used to determine the effects as scaled on the basis of the average values for the reference building. The potential beneficiary is required to submit a simplified energy audit as one of the elements required in the grant application.

Savings measured

In the case of implementation of projects other than thermomodernisation project, the investment must be completed by an as-built energy efficiency audit verifying the investment assumptions.

d) Method for expressing the amount of energy savings (primary or final energy savings)

The amount of energy consumption is determined on the basis of an energy audit of the building or, where justified, a simplified energy audit of the building, i.e. the ecological effect indicator is calculated. On the basis of the above, the basic parameters of the energy efficiency improvement project shall be determined, including the average annual final energy savings.

e) Lifetime of measures and rate at which savings decline over time

The duration of the savings was drawn up in accordance with Appendix VIII to Commission Recommendation (EU) 2019/1658 of 25 September 2019 on the transposition of energy savings obligations under the Energy Efficiency Directive (OJ Office L 275/1 of 28.10.2019). The estimated duration of the projects under the alternative measure is 2 to 25 years.

f) Brief description of the method for calculating energy savings, including how additionality and materiality are ensured and the methods and benchmarks used for estimated and scaled savings

In order to implement the project, a pre-implementation energy audit is required, which will determine the scope of the modernisation. The chosen option of the project must take into account the criterion of economic efficiency, i.e. the expenditure relating to the achieved energy demand reduction effects). Moreover, for projects other than the renovation of buildings, an energy efficiency audit for the project is required, e.g. for retrofitting lighting systems. The verification of the stated objectives and of the investment outcomes (beyond the ESCO formula) must be confirmed by an ex-post audit after the completed investment.

Materiality principle

Grants under the measure are directed to public sector entities, including mainly budgetary units carrying out tasks of local government units, so that the co-financing has a significant, if not the only impact on the decision to implement a project to improve energy efficiency. In addition, funding concerns specific priorities, e.g. Just transition, efficient use of energy or air protection. The wide range of programmes available allows the applicant to receive co-financing for the task that will have the most measurable energy and economic impact in its unit.

The final energy savings achieved under this alternative measure are important for achieving the national energy savings target set out in Article 8 of the Directive. Particular importance should be given to economies of scale. This alternative measure generates significant final energy savings in many energy efficiency improvement projects with a relatively small amount of energy savings.

Additionality

In accordance with point Savings from the renovation of existing buildings may be counted as energy savings for the purposes of Article 8(c) of Annex V. 1 provided that the materiality criterion is met. Moreover, the energy audit first of all points to the desirability of taking reasonable measures to improve the energy performance of the building in order to reduce the energy demand for heating the building and preparing domestic hot water. This is achieved through additional thermal insulation of the building envelope, removal of thermal bridges, reduction of ventilation losses, sealing of coatings separating the building from the outside environment, partial or complete replacement of window or door joinery. The investor, stimulated by the possibility of obtaining funding from the programme, performs these tasks in the first place. As a result of the implementation of the thermomodernisation project, the minimum current standards for a new nearly zero-energy building, defined and specified in the Regulation of the Minister for Infrastructure of 12 April 2002 on the technical conditions to be met by buildings and their location, must be met.

In addition, in the case of investments aimed at: the retrofitting of lighting installations or the replacement of boilers/heat generators in heating installations may only be recognised for energy savings exceeding the levels of Union requirements for the withdrawal of certain energy-related products from the market following the implementation of implementing measures under Directive 2009/125/EC5. For these projects, the minimum levels resulting from the implementation of EU legislation on ecodesign requirements are set and used as baselines for the calculation of energy savings.

g) Information on how to deal with possible duplication of measures and individual actions to avoid double counting of energy savings

The data contained in the application for co-financing clearly identify the place, method and time limit for carrying out the project. This excludes the possibility of issuing co-financing for the same project to two different entities, so that energy savings resulting from an individual action cannot be claimed by more than one obligated party.

If the beneficiary of the scheme has received funding from other publicly funded programmes, including in particular: under the 2014-2020 regional operational programmes and other priority programmes of the NFOŚiGW, applicants may receive funding from the programme only for the scope of the project for which they have not received funding under other programmes.

In addition, it should be noted that, in order to count alternative measures, a Central Final Energy Savings Register has been established⁶, in which all projects implemented under the Energy Efficiency Public Sector Programme are reported. The validation of newly added projects makes it possible to verify that the same project has not been financed twice for a given location, in which case a record will not be added.

h) Taking into account climatic differences between regions and the approach taken

Climate differences between regions shall not be taken into account for the estimated method of calculating energy savings. In the case of investments carried out in connection with the implementation of an energy audit, external factors such as climatic differences are taken into account. This is due to the fact that the energy audit of the building takes into account external factors affecting energy consumption, such as the location (the climate zone of Poland) and the location of the building, as well as the operating conditions.

i) End-use energy savings for the period 2021-2030

The implementation of the Efficient Public Sector Programme will contribute to new average annual end-use energy savings of 6 ktoe. Table 10 shows the annual and cumulative end-use energy savings over the period 2021-2030.

Tab. Energy 6 efficient Public Sector: end-use energy savings achieved in 2021 and estimated savings to be achieved between 2022 and 2030 – annual and cumulative

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
End-use energy savings (ktoe)										6	Total cumulative end-use energy savings (by 2030)
									6	6	
								6	6	6	
							6	6	6	6	
					6	6	6	6	6	6	
			6	6	6	6	6	6	6	6	
		6	6	6	6	6	6	6	6	6	
	0	0	0	0	0	0	0	0	0	0	
	Total (ktoe)	0	6	12	18	24	30	36	42	48	

j) Monitoring and verification

The WFOŚiGW and SUUs are obliged to transfer the environmental and material effects resulting from the agreements signed and concluded with beneficiaries under the grant agreements signed and concluded. The above data are sent to the NFOŚiGW and/or to the Central Final Energy Savings Register (CROEF). CROEF is used to aggregate and verify projects carried out under the so-called alternative measures. The institutions signing co-financing agreements with the final recipient are required to provide individual data on the project by 31 March each year, after the completed investment. The system then verifies that there is no 'double counting'.

In addition, a module for verification of projects by system administrators has been introduced. Each project added to the CROEF must be checked in terms of substance (i.e. type of project, amount of average annual savings, period of savings and confirmation of final energy savings achieved) by the administrator of the Ministry of Climate and Environment.

6) Fuel charge and issue charge

a) Summary description of the alternative measure

<i>Name of the alternative measure</i>	Fuel charge and issue charge
<i>Category</i>	Tax measure
<i>Sector</i>	Transportation
<i>Type of taxable person</i>	Fuel consumers
<i>Implementing Body</i>	Ministry of Finance, Ministry of Infrastructure

b) Description of the alternative measure

A policy measure to achieve energy savings at the end-user in the transport sector aims to reduce or avoid carbon dioxide emissions through reduced fuel consumption in the transport sector. To this end, a tax was introduced on fuels above the minimum level laid down in Directive 2003/96/EC of the European Parliament and of the Council of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (Journal Office (OJ L 285/51, 31.10.2003, p. 405).

Fuel charge

Act of 27 October 1994 on toll motorways and on the National Roads Fund (Journal of Laws 2001, No 110, item 1192, as amended). Of Laws 2022, item 659) imposes a charge for the placing on the national market of motor fuels and gas used to power internal combustion engines. The obligation to pay the fee is laid down in Article 37j of the above-mentioned Act; these are: producers and importers of motor fuels and gas, entities making intra-Community acquisitions within the meaning of the provisions on excise duty on motor fuels or gas and other entities subject to excise duty liability in respect of excise duty on motor fuels or gas.

The amount of the fuel charge is determined by the minister responsible for transport in accordance with Article 37 m of the Act of 27 October 1994 on toll motorways and on the National Road Fund. The amount of the fuel charge rate for the period 2014-2023, broken down by fuel, is shown in table 11:

Tab. Amount 7 of the fuel charge rate in 2014-2023.

4th year of application	Per 1 000 l of petrol, referred to in Article 37h. Article 4(1) of the toll motorways and the National Road Fund Act [PLN]	Per 1 000 l of gas oils, referred to in Article 37h. Point 4(2) of the toll motorways and the National Road Fund Act [PLN]
2014	104,20	262,52
2015	129,41	288,05
2016	129,41	288,05
2017	129,41	288,05
2018	131,40	293,05
2019	133,21	297,61
2020 January- February	138,49	306,34
2020 March - December	155,49	323,34
2021	165,14	338,53
2022	152,61	329,12
2023	172,91	372,90

Emission platform

Environmental Protection Law Act (Journal Of Laws 2022, item 2556) requires producers and importers of motor fuels, entities making intra-Community acquisitions within the meaning of the provisions on excise duty placing motor fuels on the domestic market to pay an emission charge of PLN 80/1000 l.

The emission charge is the revenue of the National Fund for Environmental Protection and Water Management and the Fund for the development of public utility bus transport services referred to in the Act of 16 May 2019 on the Public Utility Bus Development Fund (Journal Of Laws 2022, item 2464), with

95 % of the emission charge representing the revenue of the National Fund for Environmental Protection and Water Management, and 5 % of that fee is the Fund for the development of public utility bus transport.

The energy savings resulting from the proposed energy efficiency policy measure, which will be counted from 2022 onwards, will result from the imposition of both fuel and emission charges. The authority responsible for supervision and implementation is the Ministry of Finance and the Ministry of Infrastructure, respectively.

c) Calculation methods, calculation of the price elasticity of demand for the selected fuel type

For the calculation of the flexibility, an analysis has been used that takes into account the variables affecting energy consumption in correlation with the volatility of fuel prices in Poland. The evolution of energy consumption is influenced by two flexibilities: short-term and long-term. In the short term, the increase in fuel prices contributes to energy savings due to behavioural reaction, i.e. a tension limiting the use of passenger vehicles. In the long term, the increase in prices leads citizens to purchase energy-efficient vehicles, which also translates into the final energy consumption of the sector under review. The price volatility observed over the period 2010-2020 was also used to determine the projected fuel consumption scenario.

The price volatility used to determine the fluctuations in fuel prices over the period considered showed that large fluctuations have been observed over the last decade in this sector of the economy. Therefore, short-term price elasticity was used to calculate energy savings.

To calculate the elasticity, a time series autogressivity analysis was used. Variables included in the calculation: fuel price, fuel consumption, number of cars, average nominal gross wages and transport price indices. The following data were used for the calculation: The Central Statistical Office, the Ministry of Climate and Environment, the Ministry of Infrastructure, the European Central Bank and Eurostat.

The flexibility is -0,186, -0.321 for Eurodiesel and unleaded petrol 95 respectively. Short-term price elasticity was used for the calculation due to the large fluctuations in fuel prices over the period considered.

d) Brief description of the method for calculating energy savings

In accordance with point 4(a) of Annex V on the ENERGTIVE EFECTIVE, Member States shall ensure that energy savings resulting from taxation measures arise only as a result of the resulting difference between the forecast fuel consumption where the tax levied in a Member State is higher than the minimum tax in the EU laid down in Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity.

To calculate the impact of the tax (i.e. the fuel charge and the carbon charge), the savings achieved in the period 2022-2030 were determined on the basis of a scenario where the tax level was reduced to the minimum rates imposed by the EU as of 1 January 2022. The analysis of energy consumption without energy tax has been carried out in line with the example presented by the European Commission in its Recommendations...

As a first step, the change in energy prices should be estimated when state taxes are higher than the minimum allowable tax rate in the EU:

$$\Delta p_i = (tax_{rzeczywisty,i} - tax_{min}) \cdot \frac{1}{cena\ energii_i}, \quad (6)$$

where

i	–	the years for which the alternative energy consumption is calculated, – i.e. $i = 2021, 2022 \dots$;
Δp_i	–	change in energy price in a given year i [%].
$tax_{rzeczywisty,i}$	–	the amount of the tax;
tax_{min}	–	the minimum amount of tax imposed on an energy product pursuant to – Directive 2003/96/EC ¹² .

The alternative energy consumption is then calculated taking into account the percentage change in energy prices and short-term elasticity of demand:

$$EK_{alternatywne,i} = EK_{rzeczywiste,i} \cdot \frac{1}{1 + \Delta p_i \cdot \frac{\partial e}{\partial p}} \quad (7)$$

where

$EK_{alternatywne,i}$	–	alternative energy consumption per year i (energy consumption – excluding energy tax) [ktoe/year];
$EK_{rzeczywiste,i}$	–	actual energy consumption in year i [ktoe/year];
$\frac{\partial e}{\partial p}$	–	price elasticity of demand.

Final energy savings are the difference between increased alternative energy consumption and actual energy consumption in a given year:

$$O_{tax} = \sum_i (EK_{alternatywne,i} - EK_{rzeczywiste,i}), \quad (8)$$

where

O_{tax}	–	final energy savings [ktoe];
	–	

e) Information on how to deal with possible duplication of measures and individual actions to avoid double counting of energy savings

¹² Full Name: Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity OJ L 283/51, 31.10.2003, p. 405)

In order to avoid double counting for the period 2023-2030, energy savings were calculated using short-term price elasticities in accordance with point 4(d) of Annex V and the estimation of the impact of other policy measures in the transport sector was calculated separately using the bottom-up method.

f) Final and cumulative final energy savings over the period 2021-2030

The difference resulting from the assumption of an alternative energy consumption scenario, where the fuel and emissions charge is not in excess of the minimum tax imposed by the EU, contributes to annual average final energy savings of around. 50 ktoe. For the period 2023-2030, total end-use energy savings are 400 ktoe – W Tab. 12. End-use energy savings have been calculated since 2023, due to the fact that in 2022 tax rates in Poland were reduced to the minimum tax rate in the EU due to the energy crisis.

Tab. Fuel and emission 8 charge: end-use energy savings to be achieved between 2023 and 2030 - annual and cumulative.

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Final energy savings (ktoe)										50	Total end-use energy savings (by 2030)
									50	0	
								50	0	0	
							50	0	0	0	
						50	0	0	0	0	
				50	0	0	0	0	0	0	
			50	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	
Total (ktoe)	0	0	50	50	50	50	50	50	50	50	400

Part B. Primary energy input factor values for electricity from the electricity grid

Primary Energy Factor – PEF) for Poland

The non-renewable primary energy input factor currently in force in Poland is 2.5.

Commission Delegated Regulation (EU) 2023/807 of 15 December 2022 on the review of the primary energy factor for electricity in application of Directive 2012/27/EU of the European Parliament and of the Council, amending Annex IV to Directive 2012/27/EU, provides that for savings expressed in kWh, Member States may apply a default coefficient of 1.9 or exercise the right to set a different coefficient, provided that they can justify it.

Justification for using a value other than the 1.9 recommended by the European Commission.

In Poland, the values of the non-renewable primary energy input factor have been applied consistently since 2008. The evolution of the value of the non-renewable primary energy input factor adopted in national regulations was as follows:

- with regard to the Energy Performance of Buildings Directive 2010/21/EU (hereinafter: EPBD), Regulation of the Minister for Infrastructure of 6 November 2008 on the methodology for calculating the energy performance of a building and a dwelling or part of a building forming an independent unit for technical and usage purposes and the method of drawing up and model energy performance certificates (Journal of Laws 2008, No 201, item Established a non-renewable primary energy input factor of 3;
- Regulation of the Minister for Development and Technology of 28 March 2023 amending the Regulation on the methodology for determining the energy performance of a building or part of a building and energy performance certificates (Journal of Laws 2023, item 697) set a value of 2,5 non-renewable primary energy input factors for the generation and supply of electricity from the system electricity grid. (The Regulation entered into force on 28 April 2023);
- with regard to ENERGETIC EFFECTIVE, in the Regulation of the Minister for Economic Affairs of 4 September 2012. on the method of calculating the amount of primary energy corresponding to the value of the energy efficiency certificate and the unit amount of the replacement fee (Journal of Laws 2012, item 1039) The electricity system efficiency was determined with 0.33, which corresponds to a non-renewable PEF value of 3.

the current value of 2.5 has been determined by the Regulation of the Minister for Energy of 5 October 2017 on the detailed scope and method of drawing up energy efficiency audits and methods for calculating energy savings (Journal of Laws 2017, item 1912).

In 2022, the calculation of the total input and non-renewable primary energy factor for Poland's energy mix was analysed¹³; using the calculation principles set out in standard PN-EN 17423.

For the period 2005-2020, a summary of the data and the results of the calculation of the total primary energy input factor for electricity from the electricity grid is presented in table 12 below.

¹³ KAPE S.A., Amendment to the regulation on the determination of the energy performance of a building or part of a building and energy performance certificates, 2.11.2022.

Tab. 9 Results of the calculation of the total primary energy ratio for Poland's energy mix

Paliwo	Wskaźnik	Jedn.	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PV	Produkcja $E_{prod,el,j}$	GWh	0	0	0	1	1	7	57	124	165	300	711	1958
	Sprawność $\eta_{prod,j}$	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	$f_{nren,j}$		1	1	1	1	1	1	1	1	1	1	1	1
	$PE_{nren,j}$	GWh	0	0	0	1	1	7	57	124	165	300	711	1958
Wiatr	Produkcja $E_{prod,el,j}$	GWh	135	1664	3205	4747	6004	7676	10858	12588	14909	12799	15107	15800
	Sprawność $\eta_{prod,j}$	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	$f_{nren,j}$		1	1	1	1	1	1	1	1	1	1	1	1
	$PE_{nren,j}$	GWh	135	1664	3205	4747	6004	7676	10858	12588	14909	12799	15107	15800
Wodne	Produkcja $E_{prod,el,j}$	GWh	2201	2920	2331	2037	2439	2182	1832	2139	2560	1970	1958	2118
	Sprawność $\eta_{prod,j}$	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	$f_{nren,j}$		0,06	1	1	1	1	1	1	1	1	1	1	1
	$PE_{nren,j}$	GWh	132	2920	2331	2037	2439	2182	1832	2139	2560	1970	1958	2118
Pozostałe paliwa	Produkcja $E_{prod,el,j}$	GWh	4466	4797	4200	3991	3900	3810	4200	5193	4613	4 745	4 620	4291
	Sprawność $\eta_{prod,j}$	%	36,2%	36,2%	36,6%	36,8%	36,7%	37,0%	37,1%	37,5%	37,6%	37,9%	38,1%	38,7%
	$f_{nren,j}$		1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
	$PE_{nren,j}$	GWh	13571	14577	12623	11930	11689	11327	12453	15233	13495	13772	13339	12197
Biomasa i biogaz	Produkcja $E_{prod,el,j}$	GWh	1511	6305	7601	10094	8622	9976	9932	7957	6416	6511	7578	8350
	Sprawność $\eta_{prod,j}$	%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
	$f_{nren,j}$		1	1	1	1	1	1	1	1	1	1	1	1
	$PE_{nren,j}$	GWh	6044	25220	30404	40376	34488	39904	39728	31828	25664	26044	30312	33400
Węgiel kamienny	Produkcja $E_{prod,el,j}$	GWh	87123	87863	87326	80528	81568	76162	77693	79400	79022	81257	76538	69668
	Sprawność $\eta_{prod,j}$	%	36,20%	36,20%	36,60%	36,80%	36,70%	37,00%	37,10%	37,50%	37,60%	37,90%	38,10%	38,70%
	$f_{nren,j}$		1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
	$PE_{nren,j}$	GWh	264738	266987	262455	240709	244482	226428	230357	232907	231181	235838	220976	198023
Węgiel brunatny	Produkcja $E_{prod,el,j}$	GWh	54758	48651	52529	54054	56150	53365	52825	50920	52166	49331	41639	38148
	Sprawność $\eta_{prod,j}$	%	36,20%	36,20%	36,60%	36,80%	36,70%	37,00%	37,10%	37,50%	37,60%	37,90%	38,10%	38,70%
	$f_{nren,j}$		1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
	$PE_{nren,j}$	GWh	166392	147835	157874	161574	168297	158653	156624	149365	152613	143177	120218	108431
Paliwa gazowe	Produkcja $E_{prod,el,j}$	GWh	5165	4890	5821	6259	5247	5329	6405	7831	10141	12709	15131	16891
	Sprawność $\eta_{prod,j}$	%	36,20%	36,20%	36,60%	36,80%	36,70%	37,00%	37,10%	37,50%	37,60%	37,90%	38,10%	38,70%
	$f_{nren,j}$		1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
	$PE_{nren,j}$	GWh	15695	14859	17495	18709	15727	15843	18991	22971	29668	36886	43685	48011
Zużycie energii pierwotnej	GWh	466707	474061	486387	480083	483127	462019	470899	467155	470256	470786	446305	419937	
Produkcja energii elektrycznej $E_{prod,el,j}$	GWh	156936	157658	163548	162139	164557	159058	164944	166634	170465	170039	163 989	158 043	
Sprawność przesyłu - η_{del}	%	90,00%	95,82%	95,82%	95,82%	95,82%	95,82%	95,82%	95,82%	95,82%	95,82%	95,82%	95,82%	96,01%
Energia dostarczona	GWh	141242	151068	156712	155362	157679	152409	158049	159669	163340	162931	157134	151737	
Bonus CHP	GWh	36221	36221	36431	36535	36483	36638	40710	42576	44746	43993	42856	41309	
PEF (całkowite)			3,05	2,90	2,87	2,85	2,83	2,79	2,72	2,66	2,61	2,62	2,57	2,50

The symbols in the table above are as follows:

- $E_{prod,el,j}$ — electricity produced by the conversion of the j th fuel;
—
 $f_{tot,j}$ — total energy input factor j -th fuel;
—
 $\eta_{prod,j}$ — efficiency of electricity generation from the conversion of j -th fuel;
—
 η_{del} — efficiency of electricity transmission and distribution.
—

The graph below shows the evolution of the calculated values of the non-renewable primary energy input factor for system electricity.

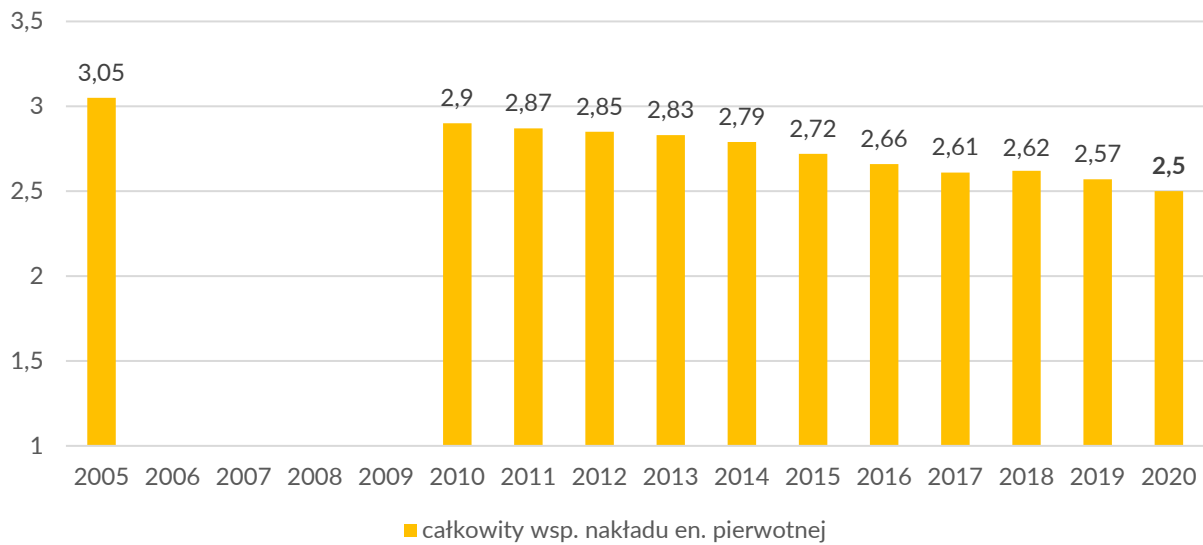


Figure 3.1 Total primary energy input factor in subsequent years

On the other hand, the calculation of the non-renewable primary energy input factor resulted in a value of 2.1913.

The calculation of the primary energy input factor also took into account the calculations of the largest electricity producers and suppliers in Poland for the average efficiency of electricity generation, with a value of 34.987 %. This corresponds to the value of the total primary energy input factor of 2.86 ($1/0,34987$). By applying the ratio between the values of the non-renewable input factors and the total primary energy ($2.19/2,5$)¹³ to the input factor of 2.86, the value of the non-renewable primary energy input factor of 2.505 was obtained. The value of 2.5 is the value currently in force in Poland both in the regulations implementing Directive 2010/31/EU and Directive 2012/27/EU.

Data sources

1. Data on energy production in the Polish electricity system broken down by energy carrier, efficiency of energy conversion, production of electricity from cogeneration:
 - a) Years 2005 and 2019 and 2020 – Energy Statistics 2020, ISSN – 1232-2415, Publication of the Ministry of Climate and the Environment and the Energy Market Agency S.A.
<https://www.ure.waw.pl/badania-statystyczne/wynikowe-informacje-statystyczne/publikacje-roczne>
 - b) 2010-2018 Fuel and energy economy 2010-18, Central Statistical Office,
<https://stat.gov.pl/obszary-tematyczne/srodowisko-energia/energia/gospodarka-paliwowo-energetyczna-w-latach-2019-i-2020,4,16.html>.
 - c) 2025 2040 – Energy Policy of Poland until 2040, adopted by RM on 2 February 2021. Annex 2, <https://www.gov.pl/web/klimat/polityka-energetyczna-polski-do-2040-r-przyjeta-przez-rade-ministrow>.
2. Non-renewable primary energy input factors per energy carrier:
 - a) Coefficients for renewable energy carriers and fossil fuels – Regulation Of Laws 2015, item 376.
 - b) Nuclear fuel – adopted a value of 1 and a conversion efficiency of 33 %, as recommended in the report: A. Esser, F. Senfuss, *Evaluation of primary energy factor calculation options for electricity*. Final Report 13.5.2016, Multiple Framework Service Contract ENER/C3/2013-484, Fraunhofer ISE:
https://ec.europa.eu/energy/sites/ener/files/documents/final_report_pef_w_on_energy_efficiency.pdf.