

Parameters for Monitoring, Reporting and Verification of Article 7 Energy Efficiency Directive

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List of abbreviations

EED	Energy Efficiency Directive 2012/27/EU amended by Council Directive 2013/12/EU, Directive 2018/844, Directive 2018/2002/EU and Regulation 2018/1999/EU
EEOS	Energy Efficiency Obligation Scheme according to article 7a of the Energy Efficiency Directive
ENSMOV	Enhancing the Implementation and Monitoring and Verification practices of Energy-Saving Policies under Article 7 of the Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive 2010/31/EU amended by Directive 2018/844/EU and Regulation 2018/1999/EU
MRV	Monitoring, Reporting and Verification
MS	Member State

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ENSMOV Project

ENSMOV is an EU-funded project aiming to support public authorities and key stakeholders in 13 Member States (MS) and the UK, represented by its consortium (Austria, Belgium, Bulgaria, Croatia, France, Germany, Greece, Hungary, Italy, Lithuania, Netherlands, Poland, Romania and the UK, addressing all 27 MS, the UK, and accession countries) to monitor, revise, improve and complement the design and implementation of their national energy efficiency policies by developing resources on practical and strategic issues arising from the Article 7 EED.

ENSMOV follows up on two other very influential projects that have helped to shape Member State policies to address Article 7 requirements of the EED – IEE ENSPOL (www.enspol.eu) and H2020 MULTEE (<https://multee.eu/>).

ENSMOV has the following strategic objectives that will deliver impacts beyond the duration of the project:

- a) to ensure that energy efficiency policies do not only promise, but also realise a major, long-term contribution to the energy, environmental, economic and security goals of the EU and MS under the Energy Union; and
- b) to sustain an active platform and community for knowledge exchange of best practices in policy development and implementation of Article 7 EED policies, strengthening cooperation and improving the dialogue between national policymakers and stakeholders across the EU.

Representatives of EU Member States and beyond are invited to participate in [international workshops](#) and can contact the [project coordinator](#) in order to arrange national workshops.

Report Introduction

This report offers an overview of the most important parameters, terms, and concepts that are relevant for monitoring, reporting and verification procedures for Article 7 EED.

Additionally to offering a summarised list of relevant terms and concepts, the report offers easily comprehensible explanations thereof.

Please direct suggestions regarding revisions to bettina.reidlinger@energyagency.at (Austrian Energy Agency).

Definition of Elementary Terms

Term	Definition
Energy efficiency	Relation of output (product, service, power, etc.) to energy input; energy efficiency can be improved either by reducing energy input with constant output or by increasing output with constant energy input
Energy efficiency measure	A policy instrument to force individual energy-saving actions
Individual energy-saving action	Individual initiative/project to improve the energy efficiency of an energy-consuming object or of customers by awareness raising
Monitoring	A system to quantify and visualise energy efficiency measures
Reporting	The submission process of energy savings within an energy efficiency measure
Verification	Control mechanisms to check the eligibility of individual energy-saving actions
Evaluation	Analysis of the overall target achievement and contribution of the energy efficiency measures

Energy Efficiency Measures

Term	Definition
Obligation scheme	Legal requirements for a target group (e.g. energy supplier) to provide individual energy-saving actions
Funds and subsidies	Public money are used to co-finance individual energy-saving actions. The funds can be taken out of the state budget or collected as appropriated levies.
Taxes	The increase of energy prices leads to behavioural changes and to investments in less energy-consuming objects.
Regulatory actions	Legal requirements to ban inefficient objects from the market or to limit energy consumption for target groups
Voluntary agreements	Binding commitment of target groups to deliver individual energy-saving actions

Several Member States have implemented an Energy Efficiency Obligation Scheme (EEOS) that requires the involvement of energy suppliers or energy distributors to implement or incentivise energy-saving actions. The obligation of electricity and natural gas suppliers or distributors is most

common. Only a few Member States obligated energy suppliers in the transport sector or energy suppliers of all energy carriers. When setting up an EEOS, the involvement of relevant stakeholders is important for its success.

The white certificate system, a special form of an EEOS, uses certified energy savings instead of individual energy-saving actions as commodities.

Subsidy schemes and energy efficiency funds target private persons, private companies, and public institutions that consume final energy. They act as implementer of individual energy-saving actions and are responsible for the documentation. Along with formal testing institutes responsible for checking the correct appropriation of public funds, Article 7b (2) of the EED determines the implementation of independent verification systems to review the eligibility and methodical correctness of the calculation of energy savings attributable to the policy measure.

Energy taxes passively influence consumer behaviour insofar as higher energy prices reduce the number of non-essential consumption and encourage consumers to use more efficient equipment.

Regulatory actions determine energy efficiency requirements for energy-consuming objects (buildings, vehicles, electrical appliances, etc.). The regulations must be adhered to by all stakeholders concerned.

Voluntary agreements can target very different stakeholders (energy consumers, industry, energy distributor, etc.). For these agreements, the government negotiates with voluntary parties to define desired programmes, actions, and targets.

The ENSMOV [Snapshot reports](#) on alternative measures and on EEOS provide an overview of which countries use EEOS, alternative measures, or a combination of both to enhance their energy efficiency.

Target Groups

Target groups for MRV are public bodies, companies, or individual persons, who are directly affected by the implementation of Article 7 of the EED.

Target Group	Definition
Government	Responsible for policy design and legislation; needs technical input from qualified experts
Administrative body	Responsible for the operative implementation and jurisdiction of the national legislation (e.g. ministries, public authorities)
Monitoring authority	Evaluates target achievements, progress, and individual energy-saving actions
Funding authority	Administers public money for disbursement of funds and subsidies
Implementer	A public body, a private company, or a private person that reduces its own energy consumption by putting an energy-saving action into operation

Target Group	Definition
Beneficiary	An implementer who claims an incentive to execute an energy-saving action
Obligated party	Distribution system operators, energy suppliers, or energy-consuming companies that are obligated by law or by a voluntary agreement to provide individual energy-saving actions

Government, administrative bodies, monitoring authorities, and implementers are necessary for each policy instrument. It is possible for one entity to represent more than one target group.

Further information on the coordination of responsibilities of different target groups is available on the project website of MultEE ([Synthesis report on European best practices for M&V schemes and coordination mechanisms](#) (2016)).

In principle, implementers are the owner of energy savings. Usually, these implementers hand over the ownership of energy savings when they claim an incentive.

The ENSMOV [snapshot reports](#) on alternative measures and on EEOS contain interviews with responsible persons from ministries and implementing bodies regarding their experience with the implementation of Article 7 EED requirements.

Additionality

Annex V (2) (a) and (b) of the EED state that energy savings which would have occurred anyway (without incentives) cannot be counted under Article 7. Savings that have been triggered by EU legislation (as for example the Energy Performance of Buildings Directive (EPBD)¹ or the Ecodesign Directive) are therefore countable as savings achieved under Article 7 EED.

In this context, the topic of additionality needs to be taken into account on all levels of policy design.

Interactions between different EU-level and national policies have to be examined. Savings resulting from national standards set at a higher threshold than EU legislation are recognised in accordance with Article 7 EED; however, the interlinkage of national policies needs to be considered.

¹ By way of derogation from that requirement, savings related to the renovation of existing buildings may be claimed as energy savings for the purpose of Article 7(1), provided that the materiality criterion referred to in point 3(h) of this Annex is ensured (Energy Efficiency Directive 2012/27/EU amended by Council Directive 2013/12/EU, Directive 2018/844, Directive 2018/2002/EU and Regulation 2018/1999/EU).

Examples of regulations exceeding European legislation

If the national building code is based on regulations stipulated by the EPBD, additional savings generated by a subsidy scheme providing financial incentives to reach higher energy-efficient performance of a newly constructed building are acknowledged pursuant to Article 7.

In cases where there are stricter building codes, the energy consumption difference of the stricter building code compared to the building code at optimal costs is admitted under Article 7.

Example of interlinkages between national policy measures

In cases where both stricter building codes and subsidy schemes are in force, savings would need to be split into those generated by the stricter regulations of the regional building code and those achieved by the subsidy scheme.

Within the MRV process, Member States have to prove that additionality was achieved during the implementation of individual energy-saving actions.

More detailed information on additionality can be found in the [Commission Recommendation \(EU\) 2019/1658](#) of 25 September 2019 on transposing the energy savings obligations under the Energy Efficiency Directive, 7.3 Additionality and Appendix XI, Annex V (2) (a).

Materiality

In addition to proving that savings go beyond requirements set by EU legislation, Member States are required to satisfy the “materiality” criterion. Obligated, participating, or entrusted parties must have contributed to the individual savings action in question and explain how their actions have had an effect on the end-user’s decision to implement an energy-saving action.

This can be demonstrated by, for example, benchmarking how many energy-saving actions had been implemented before a measure was started. Another option for Member States is to set general materiality requirements that have to be confirmed by end-users for every project. These requirements can be realised by contracts stating that energy-saving actions must not be implemented before the contract has been issued or by statements from end-users that the decision to implement a measure has been based upon the contribution (e.g. a financial incentive) or intervention (e.g. an energy audit) of an obligated party. Both strategies also minimise the issue of double counting, as both implementers and the party preparing an incentive are clearly mentioned.

Savings generated under the Regulation (EU) 2018/842 (Regulation on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030) can be considered material if they result in verifiable and measurable energy efficiency improvements or ones that can be estimated.

More detailed explanations on this topic will be mentioned in the relevant chapters on Monitoring, Reporting, Verification, and Accounting of savings and take into account the different types of measures implemented in Member States.

Further information on materiality can be found in the [Commission Recommendation \(EU\) 2019/1658](#) of 25 September 2019 on transposing the energy savings obligations under the Energy Efficiency Directive, 7.4 Materiality and Appendix IX.

Monitoring

The term monitoring describes the periodic assessment of the progress made in relation to the defined energy savings targets. Aside from the monitoring of the overall energy-saving target, a separate monitoring might be needed for each policy implemented (e.g. an obligation scheme) for the achievement of Article 7 EED.

Monitoring includes the following tasks:

- Observation of the progress towards the target achievement
- Data collection and evaluation
- Determination of reporting and verification processes

In order for monitoring to function properly, measurable indicators, targets, and measurable individual energy-saving actions – which can be designed differently depending on their level – are needed. As the measured data might not be energy savings in all cases, it will be referred to as “monitoring unit” in the following explanation. Monitoring units have to be compatible with each other from top level (overall energy-saving target of a Member State) to bottom level (individual energy-saving action). If a policy defines targets expressed in different monitoring units, they have to be converted to a common unit on the next level. For the reporting to the European Commission, all monitoring units have to be converted to final energy savings achieved under Article 7 EED.

Example of a way to use different monitoring units in policies

A Member State implements a voluntary agreement with energy suppliers providing energy advice to households. The measured data will most likely be the number of consultations. To compare the results of this measure with other policies, the number of consultations has to be converted into energy savings.

Time Schedule for Monitoring

When defining the processes for monitoring, a time schedule needs to be prepared. In general, implementing a new policy needs lead time. Different policy measures need different approaches, which will be explained in the next few paragraphs.

When implementing an **obligation scheme**, the first step is to identify the obligated parties and the amount of their individual obligation. The individual obligation will be based on data (for example, energy sales to final customers) over a predefined period of time. When defining this period, data availability has to be kept in mind. Saving actions will be implemented within the reporting period by obligated parties or other stakeholders. This needs to be taken into account when defining the end date for the reporting deadline, as implementers of actions will need some time to collect the data for calculating or measuring the achieved savings and gathering information needed for verification, especially, for actions implemented at the end of a reporting period. After the reporting deadline, the individual target achievement of obligated parties as well as their individual energy-saving actions submitted for the relevant reporting period can be checked. Ideally, actions reported incorrectly or not complying with the standards set by the EED will be identified before the reporting to the European Commission. When checking the tabled energy-saving actions, implementers of actions considered faulty must be given appropriate time for a statement or providing more data, especially, in cases where flawed reporting might have legal consequences. Disagreement between the monitoring authority and obligated parties can lead to long-standing court litigations.

In the particular case of “White Certificate” obligation schemes, obligated parties do not implement saving actions themselves. Instead, targets can be achieved partially by trading white certificates. The time schedule for this scheme is basically the same as for other obligation schemes, except for all implemented saving actions being checked before they enter the white certificate market.

In the case of **funding schemes**, implementers apply for funding of individual saving actions at the funding authority before the actions are implemented. The funding authority checks all applications for eligibility. Actions considered eligible can be implemented. Funding is paid after valid data that proves the implementation has been submitted.

Energy Efficiency Funds follow the same principle as funding schemes. In the case of funds, financial resources are not provided by public authorities and have to be collected ex ante. Time for the collection of financial resources therefore has to be kept in mind when defining the time schedule for such schemes.

Taxes related to energy efficiency lead to an intentional reduction of consumption by higher prices on energy. As proving the reduction of consumption is considered a disproportionate burden, monitoring is usually based on studies of price elasticities of consumers and fiscal revenues of the given fiscal year.

Monitoring of **regulatory measures** depends on the type of regulation. For regulations on objects that are subject to approval (e.g. newly constructed buildings), the number of individual saving actions implemented can be easily determined. For other objects (e.g. maximum energy consumption of household appliances), the market average before and after the implementation of a regulation can be used to demonstrate the amount of individual saving actions.

For **voluntary agreements**, a contract with all participating parties should be prepared. This contract should include the definition of the reporting period – or reporting periods. The implementation of saving actions follows the same process as in an obligation scheme.

Monitoring of Additionality

Strategies for the consideration of additionality depend on the type of the actions implemented. The change in energy consumption caused by an individual action needs to be identified for every single case. However, an approximate division into the following categories can be made:

- Avoidance of energy consumption
- Energy-efficient appliances instead of market average appliances
- Early replacement of appliance stock

Avoidance of energy consumption is quite complicated to prove as it requires evidence of energy consumption that is no longer available. To calculate energy savings out of such actions, a comparison of the situation before and after implementing the action will be needed (e.g. by means of an 'ex-post' approach within an energy audit). The energy consumption difference of this comparison has to be adjusted for action-foreign influences (e.g. climate, production changes). For stakeholders, the documentation of the situation before implementing an action can be challenging (e.g. in the case of new appliances or buildings).

Examples of actions to avoid energy consumption

- Increasing energy taxes to raise energy prices
- Energy counselling to raise awareness of energy consumption
- Utilisation of waste heat for self-consumption

Market analysis is needed to identify the energy consumption of customary appliances. Average values for homogenous appliances are simpler to identify than for e.g. industrial systems.

In early replacements, it is possible to compare the energy consumption of an energy-efficient appliance for the remaining lifetime with that of an existing appliance. Yet, proving that lifetime is challenging. One way to calculate it is to combine the installation date or commissioning date of an appliance with a standardised lifetime. The difficulty of this approach is the collection of the individual commissioning dates, the lack of readily available standard lifetime values, and the definition of lifetime (e.g. including maintenance). Aside from capturing commissioning dates, it is also possible to define a top-down approach for early replacement, which shifts the calculation of the remaining lifetime to a central authority.

Monitoring of Materiality

The implementation of individual energy-saving actions is based on individual decisions. Demonstrating that an incentive has triggered certain energy-saving actions is challenging.

Possible steps are as follows:

- Implementers of energy-saving actions have to state actively that they would not have performed a particular energy-saving action without the incentive.
- Materiality can be determined by economic indicators such as share of financial aid on investments. This approach is not applicable for actions other than financial incentives (e.g. energy advice).

In Germany for example, all subsidy programmes are evaluated by independent studies to assess additionality and materiality of energy savings. Programme participants are asked in a survey whether they would have implemented the action a) even without the subsidies, b) at the same time or later (how many years later), and c) at the same or lower quality and/or efficiency level. Based on their answers, an indicator is constructed to calculate the additional and the net energy savings achieved by the programme.

Some energy efficiency measures do not need materiality proof, as it is not possible to act alternatively (e.g. regulatory actions).

More detailed information on monitoring can be found in the [Commission Recommendation \(EU\) 2019/1658 of 25 September 2019 on transposing the energy savings obligations under the Energy Efficiency Directive, 8. Measurement, Monitoring, Control, Quality and Verification](#) and in Appendix XII.

Reporting

Different levels of reporting have to be defined:

- Implementers of individual energy-saving actions or obligated parties report to the monitoring authority.
- The monitoring authority reports to the administrative authority.
- The administrative authority reports to the European Commission.

The period for the reporting of savings to the European Commission is set in the Governance Regulation (2018/1999/EU). Article 17 stipulates that until 15 March 2023 and every two years thereafter, all information on energy efficiency mentioned in Article 21 shall be reported. Article 21 and Annex IX includes – among other information – the reporting of cumulative energy savings in accordance with Article 7 EED of all installed policies and measures of the years X-3 and X-2 with X being the year of the report.

For the reporting between monitoring authorities and the administrative authority, all relevant parties have to be identified. Since it is possible that there are different institutions administering the policy

measures in place, the mode of reporting should be defined upfront. This includes how the savings are calculated, how data is exchanged, how possible interlinkages between policy instruments are dealt with in regard to double counting, how the criteria of additionality and materiality are taken into account, and finally, how the timeline is defined on when data will be reported.

Reporting from implementers of saving actions to monitoring authorities usually includes the greater number of parties involved. To keep the verification process as efficient as possible, the data collected for each saving action should be defined when setting up a policy. This includes both documentation to prove authenticity and data needed to verify eligibility of reported actions. Member States should think about data processing and necessary or desired outputs for the verification and interpretation.

Some Member States decided to set up a catalogue of allowed energy-saving actions to limit the number of different calculation methodologies and increase the predictability of reported actions. A catalogue can reduce the effort for verification, but the limitation can lead to higher costs for the individual energy-saving actions.

Online Reporting

Depending on the number of parties involved in reporting, a centralised IT solution should be considered. Administering the data collection from a few parties (e.g. institutions in charge of administering subsidy schemes reporting already aggregated data) could be dealt with using other solutions than an IT system, but especially when implementing EEOS or voluntary agreements, the persons in charge of reporting data might lack expertise on specific details set in the policy formulation. IT solutions offering the possibility to report both the party's obligation and implemented energy-saving actions in an easy way can substantially help to reduce mistakes and improve data quality. Data imports and upload functionalities can lessen the effort for individual data entry and communication. Sanity checks and cross-checks in reporting forms can bring down input errors in advance.

Example of sanity checks

An input field for the implementing date checks if the input is not earlier than the current date.

Example of cross-checks

An input field requires a number which is not allowed to exceed another number in the form.

Standardised method catalogues are easy-to-use solutions using predefined calculation methods, e.g. based on international standards and default values. Default values for different energy-saving actions should be defined with respect to the requirements of additionality and materiality and, therefore, can be based on statistical data, market averages, etc. Templates or forms can reduce the effort to report energy savings evaluated with standardised methods. If the development of standardised methods is disproportional due to high variability (e.g. industrial installations), it is also possible to give implementers the opportunity to calculate individually the savings generated by an action.

When using IT solutions, data security should always be considered. The reported data relevant for monitoring and verification will most likely contain commercially sensitive data. The reporting should be designed in a way that merely a minimum number of persons have access to the data. Another aspect of data security is the possibility of backtracking data inputs and data changes. Personalised accounts are crucial, especially, in cases where reporting of faulty information could lead to legal consequences.

Another issue that has to be kept in mind is the retention period of the reported data. While it is obvious that data should be stored for at least the lifetime of a policy measure, other factors should also be taken into account. Usually, policies define a period in which legal consequences for faulty or missing information can occur. Additional to that, the period for penal consequences triggered by fraud or counterfeiting needs to be considered.

More detailed information on reporting can be found in the [Commission Recommendation \(EU\) 2019/1658 of 25 September 2019 on transposing the energy savings obligations under the Energy Efficiency Directive, 9. Planning and Reporting Obligations](#) and in Appendix XII.

Verification

The main targets of verification are compliance with EED and national legislation as well as equal treatment concerning burden sharing of all stakeholders affected by the legislation. The principal task is to observe the progress of target achievement and check compliance of the reported individual energy-saving actions. Each policy instrument has to be analysed separately due to possible variations of the requirements in comparison to the EED. The following elements are subjects of verifications:

- Individual energy-saving actions
 - Implementation took place
 - Energy efficiency improvements are measurable
 - Compliance with eligibility criteria
- Market of energy-saving actions is in operation
- Stakeholders
 - Implementer of individual energy-saving actions
 - Obligated parties
 - Voluntary parties
 - Energy service provider
 - Funding authorities

In principle, the quality of verification highly depends on the quality of the reported data sets. For the purpose of efficient verification processes, material required for the reporting should be defined comprehensively.

Automatisation can reduce time and effort required for verification. Digitalisation and quality of data sets are preconditions for structured and efficient automatisations.

Verification Subjects

If different policy instruments target similar energy-saving actions, the verification on a national level needs to identify energy savings that are claimed by more than one political instrument.

The following table gives an overview of the main verification subjects relevant for the policy instrument:

Policy Instrument	Focus
Obligation scheme	<ul style="list-style-type: none"> • Implementation took place • Energy efficiency improvements are measurable • Compliance with eligibility criteria • Ownership of energy-saving action and of energy savings • Energy savings available on the market • Individual level of obligation • Individual progress tracking
Funds and subsidies	<ul style="list-style-type: none"> • Implementation took place • Energy efficiency improvements are measurable • Compliance with eligibility criteria • Compliance with funding criteria • Funding volumes and funding effectiveness
Taxes	<ul style="list-style-type: none"> • Individual tax liability • Total tax revenues (excl. tax exemptions) • Identification of taxpayers
Regulatory actions	<ul style="list-style-type: none"> • Number of affected objects/appliances • Compliance with regulations
Voluntary agreements	<ul style="list-style-type: none"> • Implementation took place • Energy efficiency improvements are measurable • Compliance with eligibility criteria • Ownership of energy-saving action and of energy savings • Individual progress tracking

The authority in charge of the verifications needs permission to get into contact with implementers and access to documents necessary to do the compliance checks.

Verification Characteristics

In general, verification tasks can be divided into ex ante or ex post. Ex-ante verifications are held before the implementation of the individual energy-saving action. An example of ex-ante verifications are compliance checks on funding criteria before granting. Compliance checks on the real implementation of an energy-saving action are only possible after (ex post) the installation thereof.

Implementers of energy-saving actions prefer ex-ante compliance checks because they want to have approval for the reported actions. Furthermore, ex-ante verifications can increase planning certainty for implementers and obligated parties.

Either all reported actions or solely samples can be part of the verification. The verification of all reported actions is very expensive and should only be considered when necessary for the market or

when using public budget to grant subsidies. In case of samples, a selection procedure is needed to choose representative data sets. It is recommended to select at least a minor share of the sample at random to minimise the potential of systematically missing flawed data sets due to selection criteria.

Concerning accuracy, the verifications can be structured as follows:

Level	Main Characteristics
Plausibility checks	Reported data are checked with respect to consistency or are compared with benchmarks and average values.
In-depth checks	Reported information are cross-checked with the requirements of the policy instrument and evidence.
On-site checks	Reported information are inspected at the place of implementation.

For the majority of cases, plausibility checks can indicate potential errors. Data identified as potential errors have to be investigated in detail. Plausibility checks, therefore, can be used as a selection procedure for creating an in-depth check sample.

In-depth checks focus on the correctness of data, the verification of documents, the proper usage of the provided reporting infrastructure, and the communication with the notifying parties. Plausibility checks and in-depth checks are done through desktop research.

On-site checks are sometimes needed to reveal issues that cannot be identified by desktop research. The main focus of on-site checks is to assess the actual installation or implementation of an action.

For each of the above-mentioned verification subjects, Member States have to consider appropriate verification mechanisms regarding each policy instrument to balance costs against benefits for the national economy.

Verification Mechanisms

The following non-exhaustive verification mechanisms are available for plausibility checks:

- Comparisons with former reporting periods
- Analyses of unrealistic deviations from typical or average values
Example: The typical power consumption of a LED (800 lumen) lies in a range of 6 to 9 Watt.
- Cross-checks within a data set or reporting form to identify inconsistencies
- Cross-checks between data sets or reporting forms to identify double counting (finding energy-saving actions with same attributes)
Example: two identical energy-saving actions at the same address
- Cross-checks with aggregated information of all data sets or with market information
Example: The thermal output of reported heat pumps substantially exceeds the average thermal output of heat pumps sold on the market.

In-depth checks can be performed on the following information:

- Installation or commissioning has been conducted
Examples: invoices, commissioning certificate, on-site inspection
- Evidence of materiality
Example: reason stated to implement individual energy-saving action
- Evidence of additionality
Example: comparison with market average
- Evidence for eligibility
Examples: action reduces final energy consumption; location of implementation is within Member State; calculation method is valid and takes into consideration additionality criteria

Potential Data Sources for Verification

The following data can be used for cross-checks or as an indicator in plausibility checks:

- Energy balances: total final energy consumption for coverage of policy instruments
- Energy audits: specific energy consumption of companies and branches
- Business data and tax revenue: indicating potential exceeding of threshold through turnover
- Market surveys: total number of sold appliances

Verification Output

The verification gives feedback on the progress against the target, which allows for making necessary changes (intensifying existing measures, adding new measures) to achieve the target.

Concerning individual energy-saving actions, the verification identifies fake or incorrect saving actions, which have to be revoked or corrected, respectively.

More detailed information on verification can be found in the [Commission Recommendation \(EU\) 2019/1658](#) of 25 September 2019 on transposing the energy savings obligations under the Energy Efficiency Directive, 8. Measurement, Monitoring, Control, Quality and Verification and in Appendix XII.

Further information on the data collection process for bottom-up monitoring is available on the project website of MultEE ([Data Collection Process for Bottom-up Monitoring \(2016\)](#)).

Accounting for Savings

Article 7 of the EED determines that Member States have to achieve final energy savings. Therefore, they have to evaluate the effect of the relevant policy instruments on final energy consumption. Annex V of the EED contains the common methods and principles for calculating final energy savings. This chapter abstracts the key points of the EED and adds some comments. General information can be found in the EED and the related guidance document (2019/1658/EU).

The provisions differ between obligation systems, energy taxes, and other alternative measures.

Except energy taxes, energy savings can be calculated using the following four methods:

Method	Main Characteristics
Deemed savings	Applying results of similar installations to the current installation
Metered savings	Measuring reduction of final energy consumption, taking into account impacts that are not caused by the individual energy-saving actions
Scaled savings	Estimated savings that are only applicable if other methods are disproportionately expensive
Surveyed savings	Only for changes in customers behaviour

In many cases, energy savings are calculated according to physical principles, whereas the above-mentioned methods are used to define the parameters of the calculation (instead of the savings).

Except ambient heat of heat pumps, the produced amount of heat and power of **renewable energy technologies** is not counted under Article 7 EED unless there are effects on reducing the final energy consumption (e.g. conversion losses).

The definition of a baseline is essential to consider **additionality**. The baseline depends on the situation before implementing an energy-saving action. The situation preceding the purchase of an energy-consuming object can be either an existing object or no energy consumption. The following table describes possible baselines for these two situations:

Previous Situation	Baseline
No consumption	<p>The energy consumption of an object that would have been purchased without the energy efficiency measure</p> <p>For homogenous objects (e.g. household refrigerators), the market average (without objects affected by the measure) is a possible top-down solution. If an average is not available, it is also possible to use minimum requirements (e.g. Ecodesign). Market average is always stricter than minimum requirements. The baseline must not be set below requirements of mandatory Union law.</p>
Existing consumption	<p>Energy-consuming objects that are defective have to be treated as if there is no consumption in the previous situation. Otherwise (early replacement), the existing object can be argued as baseline.</p>

Baselines can also be adopted to avoid double counting of different energy efficiency measures that affect the same energy-consuming object. The requirements of one policy instrument can be used as the baseline for another policy instrument.

Either the **lifetime** of an individual energy-saving action or the remaining years of an object until the end of the obligation period are relevant for the calculation of cumulative energy savings. In addition, the remaining lifetime of an existing device is needed to calculate cumulative energy savings for early replacements. If the remaining lifetime does not exceed the end of the obligation period, the cumulative energy savings have to be calculated with two different energy savings and their related lifetime:

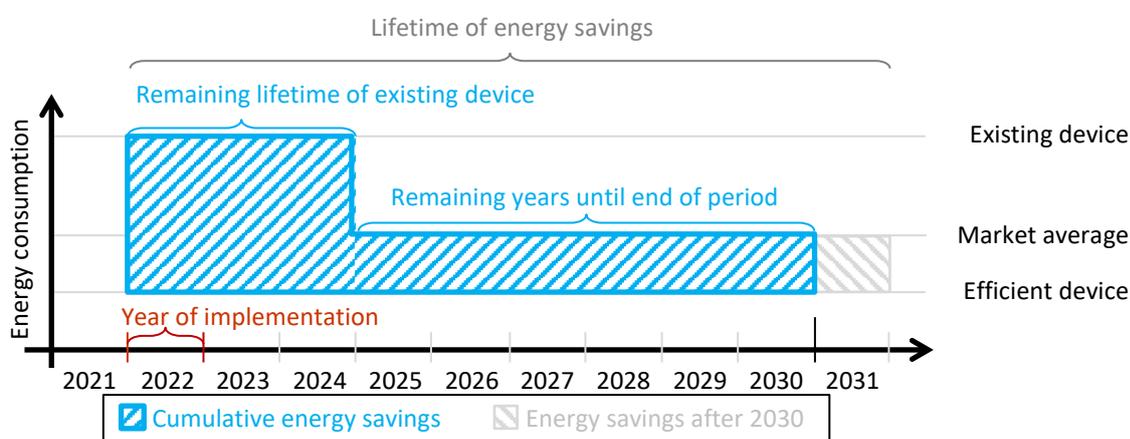


Figure 1: Example of cumulative energy savings of early replacements. Source: Austrian Energy Agency.

Factors that are not affected by the energy-saving action (e.g. climatic variations, changes in production volumes, capacity utilisations, etc.) have to be considered as **adjustments** in the calculation of energy savings.

The topic of declining energy savings is controversial.

Taxation can lead to behavioural changes or to the purchasing of more efficient equipment. Member States have to keep in mind that energy savings generated by taxation are difficult to separate from other measures. To avoid double counting between taxation and other measures, the following approaches are possible:

- If a taxation measure is only affecting certain energy carriers (e.g. taxes on mineral oil), it can be combined with measures impacting other energy carriers. Policy instruments affecting the same carrier (e.g. subsidies for alternative fuel vehicles) have to be considered more carefully when combined.
- The differentiation between short-term (behavioural changes) and long-term (investments in equipment) energy savings allows combining e.g. short-term energy savings of taxation measures with long-term energy saving of other policy instruments.
- If taxation and another policy instrument target the same energy-saving actions, a highly conservative approach can be to ignore energy savings of the policy instrument with the lower contribution.

Member States can decide to trigger energy-saving actions that have other benefits beside energy efficiency (e.g. increase share of renewable energy, reduce energy poverty, reduction of greenhouse gas emission) by privileging energy savings of such actions (e.g. special funding or higher valuation). When implementing such incentives, Member States have to take into account that the energy savings have to be calculated in accordance with the requirement of Article 7 EED for the progress report to the European Commission.

References

Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency (Text with EEA relevance.). Brussels, Belgium.

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L .2018.328.01.0210.01.ENG>

European Commission. (2019). Annex to Commission Recommendation on transposing the energy savings obligations under the Energy Efficiency Directive. C (2019) 6621 final. Brussels, Belgium.

https://ec.europa.eu/energy/sites/ener/files/documents/c_2019_6621_-_annex_com_recom_energy_savings.pdf

Pickl, N., Jellinek, R., Reidlinger, B., et. al. Data Collection Process for Bottom-up Monitoring (2016). MultEE.

https://multee.eu/system/files/D2.3_Data_collection_process_for_bottom-up_monitoring_online_0.pdf

Iatridis, M., Tourkolias, C., Jamek, A., et. al. Synthesis report on European best practices for M&V schemes and coordination mechanisms (2016).

https://multee.eu/system/files/EU_Best_Practice_for_M%26V_schemes_%26_Coordination_Mechanisms.pdf