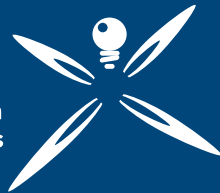




CEER
Council of European
Energy Regulators



REPORT

CEER Report on Unsupported Renewables

06.10.2026

PUBLIC REPORT

CEER Report on Unsupported Renewables

[RES WS of EWG]

Ref: C25-[RES WS]-84-05

06.10.2026

Council of European Energy Regulators ASBL
Cours Saint-Michel 30a, Box F – 1040 Brussels, Belgium
Arrondissement judiciaire de Bruxelles – RPM 0861.035.445

Information page

Abstract

This document (C25-RES-84-05) presents a paper on unsupported RES installations.

With this briefing, the Renewable Energy Systems Work Stream (RES WS) within the Electricity Working Group (EWG) aims to provide an update assessment of the status quo of formally supported RES installation and if changes were made to the market model, what kind of changes.

Target audience

European Commission, energy suppliers, electricity industry, consumer representative groups, Member States, academics and other interested parties.

Keywords

Support schemes; renewables; renewable energy;

If you have any queries relating to this paper, please contact:

CEER Secretariat

Tel. +32 (0)2 788 73 30

Email: brussels@ceer.eu

Related documents

CEER Documents

- [Status Review of Renewable Support Schemes in Europe for 2020 and 2021](#), September 2023, Ref: C22-RES-80-04
- [Status Review of Renewable Support Schemes in Europe for 2018 and 2019](#), June 2021, Ref: C20-RES-69-04
- [CEER 3rd Paper on Unsupported RES](#), May 2024, Res: C23-RES-83-05
- [CEER 2nd Paper on Unsupported RES](#) October 2021, Ref: C21-RES-75-05
- [Status Review of Renewable Support Schemes in Europe for 2016 and 2017](#), December 2018, Ref: C18-SD-63-03.
- [Status Review of Renewables Support Schemes in Europe 2014 and 2015](#), April 2017, Ref. C16-SDE-56-03.
- [Status Review of Renewables and Energy Efficiency Support Schemes in Europe 2012 and 2013](#), January 2015, Ref. C14-SDE-44-03.
- [Status Review of Renewable and Energy Efficiency Support Schemes in Europe, December 2012](#), Ref: C12-SDE-33-03.
- [Status Review on Renewable Energy Support](#), May 2011, Ref: C10-SDE-19-04a.

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Executive Summary

Background

Member Countries (MC) have been promoting the deployment of generation from Renewable Energy Sources (RES) for over a decade through dedicated support schemes. With varying support times, MC are progressively being confronted with an increasing number of RES installations reaching the end of their support time (EOS), which, in many cases, differ from their technical lifetime end.

From a socioeconomic perspective, it may be desirable to implement an enhancing framework allowing RES installations to further produce and sell their RES electricity beyond support times instead of being repowered or dismantled. Besides support systems, new business models, market players and/or market products will emerge to accommodate new and existing EOS installations as they strive for adequate market earnings. To reflect these developments, adaptations of national legal frameworks governing connection and dispatch arrangements might become relevant in certain MC.

Objectives and contents of the document

This paper has three main objectives: (1) Assessing the magnitude of RES installations, which will be running without support in the coming years. (2) Identifying the upcoming regulatory challenges and, if needed, changes to the legal framework and (3) Outlining alternative business strategies for RES installations running without support. The paper reflects the expert opinions of the MC. There were for example no actual studies provided for MCs on what installations will do at the end of their support time.

Brief summary of the conclusions

Against this background, CEER has gathered information via a questionnaire sent to all NRAs during autumn 2025. Based on the responses provided, the following messages can be brought forward:

- The legal framework governing RES installations has so far not been adapted: Either because the framework does not distinguish between supported and unsupported RES, or because support time is still running and adaptation will be needed only in the future; and
- The strategies followed by unsupported RES installations are manifold. As in the last report the most likely approach is – at least in case of larger installations – to rely on the market or the usage of PPAs. Smaller ones, mainly PV, are expected to focus on self-consumption. However, decommissioning installations also seems to be a serious option for operators.

- The coming years with the rising capacity reaching EOS will show if and how MC adapt their legal schemes to make decommissioning less attractive. Compared to the last report no major changes in the area were highlighted.

1 Introduction

An increasing number of Renewable Energy Sources (RES) installations will reach the end of their support time (EOS) in the upcoming years while in some CEER Member Countries (MC) formerly supported RES installations are already running without financial support. For the time being, no major enacted or planned changes to the legal framework impacting unsupported RES installations can yet be observed in CEER Member countries. Coming from a Feed-in-Premium (FiP) system, which was not in place in the early 2000s, one would expect RES plant operators to already be acquainted with a market environment, since they have been selling their electricity on a marketplace from the start. However, installations coming straight out of a Feed-in-Tariff (FiT) system do not necessarily get decommissioned after the end of their support time and therefore are required to somehow market or use their electricity successfully. With increasing shares of formerly supported installations, some challenges might intensify, e.g. taking on balancing responsibility or empowering operators of small installations to get actively involved in the energy market. For MC relying only on a FiT scheme for RES support, the question arises whether there will be enough knowhow and new players available to effectively handle the formerly supported electricity in a market environment.

Some MC mentioned that the quantitative data they provided on unsupported installations for this report does not clearly distinguish between installations after EOS and those installations that never received any support. Thus, the authors worked with the data as it has been provided. Readers should be aware that the data provided might not reflect the actual situation in some MC. For transparency reasons, the data provided is published with this report so that readers can make their own analyses.

2 Type and duration of support schemes for RES electricity

According to the 2011 CEER RES Status Review, which was depicting support systems in place in 2009, 15 years ago the main support instrument in place was a FiT. As such, it is very likely that most RES installations have already reached or are close to reaching the end of their support. In the current situation of RES installations, which are about to reach their EOS, the vast majority have not been operating under market conditions and will therefore be confronted with a new environment.

To assess the magnitude of unsupported RES installations, the RES WS has asked its members to provide further information about the year in which RES installations were supported for the first time and the time span of financial support granted. Based on the responses provided by the members (N=17), it can be seen that RES have been financially supported in some member countries as early as the late 1980s (e.g. Portugal) or the 1990s (Italy, Luxemburg, Spain, Latvia), years before the first European Directive 2001/77/EU on the promotion of Renewable Energy was adopted in 2001. Starting with Portugal in 1988, more and more MC introduced national support schemes for RES installations (see Table 1).

	Solar	Onshore wind	Offshore wind	Biomass	Biogas	hydro
AT	2002	2002		2002	2002	2002
CY	2005	2010		2010		
CZ	2006	2006		2006	2006	2006
DE	2000	2000	2000	2000	2000	
EE	2007	2007		2007	2007	2007
ES	1998	1998		1998		1998
FR	2002	2001	2011	2002	2001	2001
HU	2002	2002		2002	2002	2002
IT	1992	1992	2016	1992	1992	1992
LU	1993	1993		1993	1993	1993
LV	1998	1995		2007	2007	1995
MT	2006	2006	2020	2020	2020	2020
NL	2003	2008	2008	2008	2008	2008
PL	2004	2004	2020	2004	2004	2004
PT	1988	1988	1988	1988	1988	1988
RO	2011	2011		2011	2011	2011
SE			2006			

Table 1: Introduction of national support schemes

Support times for new installations are depicted in Table 2. They range from 12 years up to 30 years for PV installations in Spain.

	Solar	Onshore wind	Offshore wind	Biomass	Biogas	hydro
AT	20 years	20 years		20 years	20 years	20 years
CY	No FIT schemes currently available.		N/A		N/A	N/A
CZ	20 years	20 years	N/A	20 years	15/20	Up to 30 years - for electricity producers entering the support scheme. From 2022 onwards, the support period has been reduced to 20 years.
DE	20 years	20 years	20 years	20 years		
EE	12 years.	12 years.			Up to 12 years (auction-based premium system)	
ES	30 years	20 years		25 years		25 years
FR	20 years	20 years	20 years	20 years	20 years	20 years
HU	no change	It was 16,5 years for projects in the former FiT scheme. No new wind projects supported yet in the premium scheme.		15 years	5-15 years	15 years
IT	20 years	20 years	25 years	20 years	20 years	20 years
LU						

LV	Currently there is no new support.	Currently there is no new support.		Currently there are no new support.	Currently there are no new support.	Currently there are no new support.
MT	20 years (FiT for <40 kW; CfD for ≥40 kW. Eligible generation capped at 1,600 full-load hours/year)	20 years (CfD for ≥40 kW with eligible generation capped at 2,628 full-load hours/year)	20 years (CfD for ≥40 kW with eligible generation capped at 2,190 full-load hours/year)	20 years (CfD for ≥40 kW with eligible generation capped at 7,446 full-load hours/year)	20 years (CfD for ≥40 kW, with eligible generation capped at 5,256 full-load hours/year)	20 years (CfD for ≥40 kW, with eligible generation capped at 1600 full-load hours/year)
NL	15 years				12 years, 8000 fullload hours	
PL	15 years	15 years	25 years	15 years	15 years (17 years for installations not exceeding 1 MW that received certificates of origin for not less than 5 years)	15 years (17 years for installations not exceeding 1 MW that received certificates of origin for not less than 5 years)
PT	15 years or or 21 GWh/MW. The energy limite or yearly limit depends on what comes first.	15 years or or 33 GWh/MW. The energy limite or yearly limit depends on what comes first.	15 years or or 33 GWh/MW. The energy limite or yearly limit depends on what comes first.	Evolution from a scheme based on avoided costs to a differentiated method depending on the technology.	Evolution from a scheme based on avoided costs to a differentiated method depending on the technology.	Evolution from a scheme based on avoided costs to a differentiated method depending on the technology.
RO	15 years 6 CV/MWh for solar installations that entered the GC scheme until 31.12.2013 and	15 years 1 CV/MWh starting with 01.01.2018 for wind installations that entered the GC scheme until 31.12.2013,		15 years No change	15 years No change	15 years 3 CV/MWh for new hydro installation with power installed capacity < 10MW,

	starting with 01.01.2024 3 CV/MWh	- 0.75 CV/MWh starting with 01.01.2018 for wind installations that entered the GC scheme starting with 01.01.2014,				GC scheme until 31.12.2013 - Starting with 01.01.2014, 2.3 CV/MWh
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Table 2: Support times for new installations in 2024

3 Installed capacity and installed capacity reaching end of support time

This chapter gives an overview over the installed capacity of supported RES at the end of 2024 and what amount of capacity will reach the end of support time by the end of 2030.

3.1 Installed supported capacity at the end of 2024

Figure 1 and Figure 2 show the overall installed supported capacity per Member Country (MC) at the end of 2024.

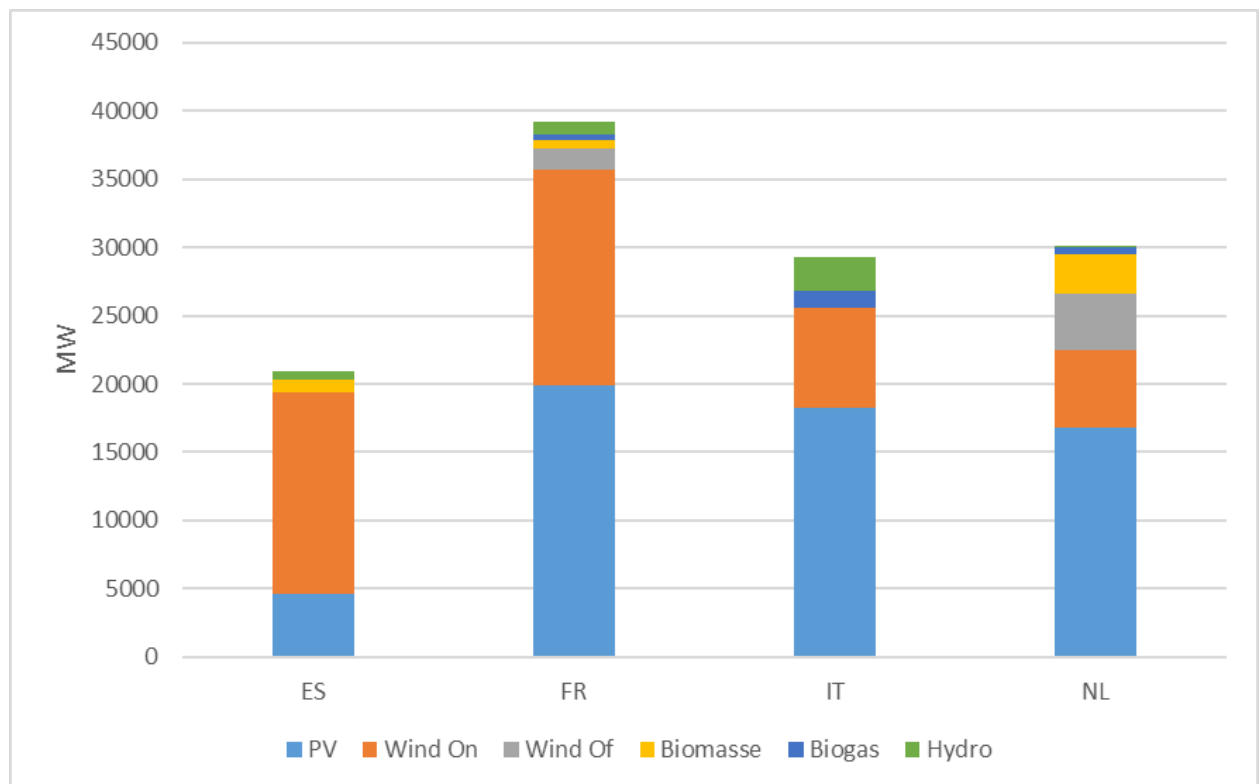


Figure 1: Installed supported capacity per country (>20 GW)

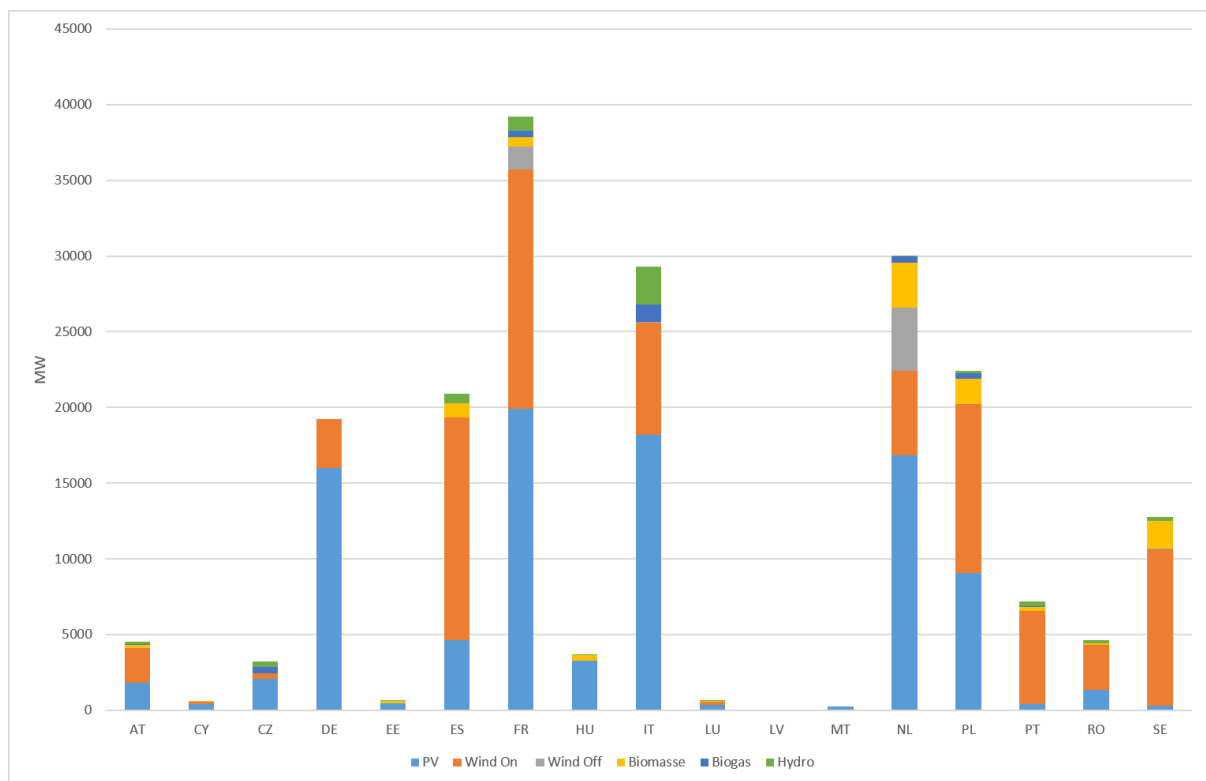


Figure 2: Installed supported capacity per country

3.2 Installed capacity reaching end of support time

Since most RES support schemes were introduced in the early 2000s and support times often last 20 years, an increasing number of supported RES installations started to reach the end of their support time from 2025 onwards. The data of this chapter is also published in a separate Excel file.

Figure 3 depicts the installed photovoltaic capacity that will reach the end of support by 2030. Significant shares of PV installations will reach their EOS mainly starting from 2028, as can be seen in Figure 3 and Figure 4.

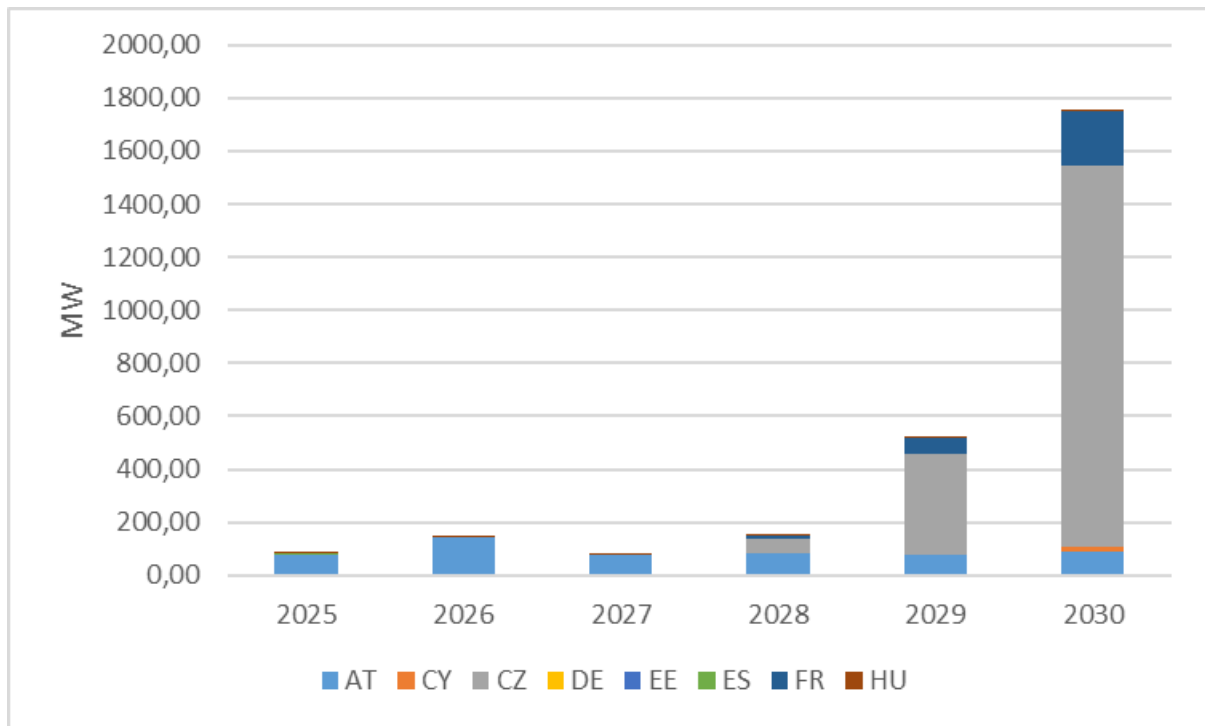


Figure 3: PV-installations reaching end of support by year.

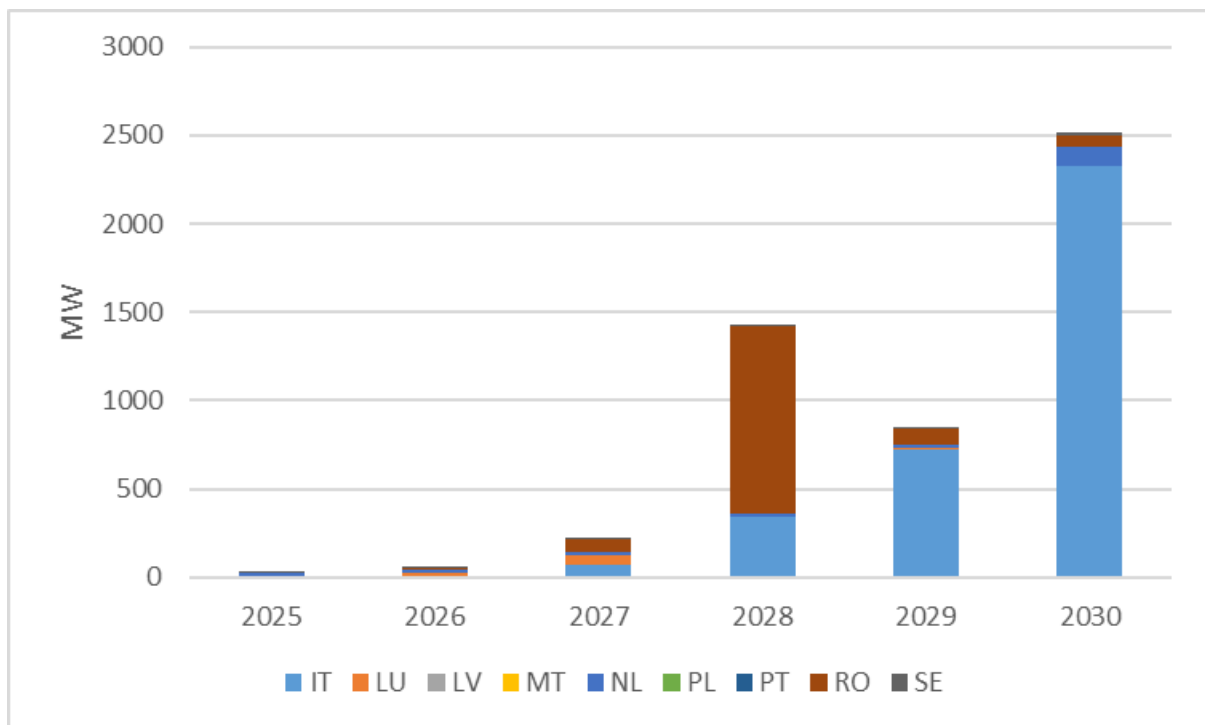


Figure 4: PV-installations reaching end of support by year.

Figure 5 and Figure 6 show the trend for onshore wind installations. Onshore wind has the biggest share of overall installed capacity in the support system according to the data collected for this study. Between the end of 2025 and the end of 2030, around 18 GW of onshore wind capacity will fall out of the RES support scheme. Spain has the biggest share with around 12 GW.

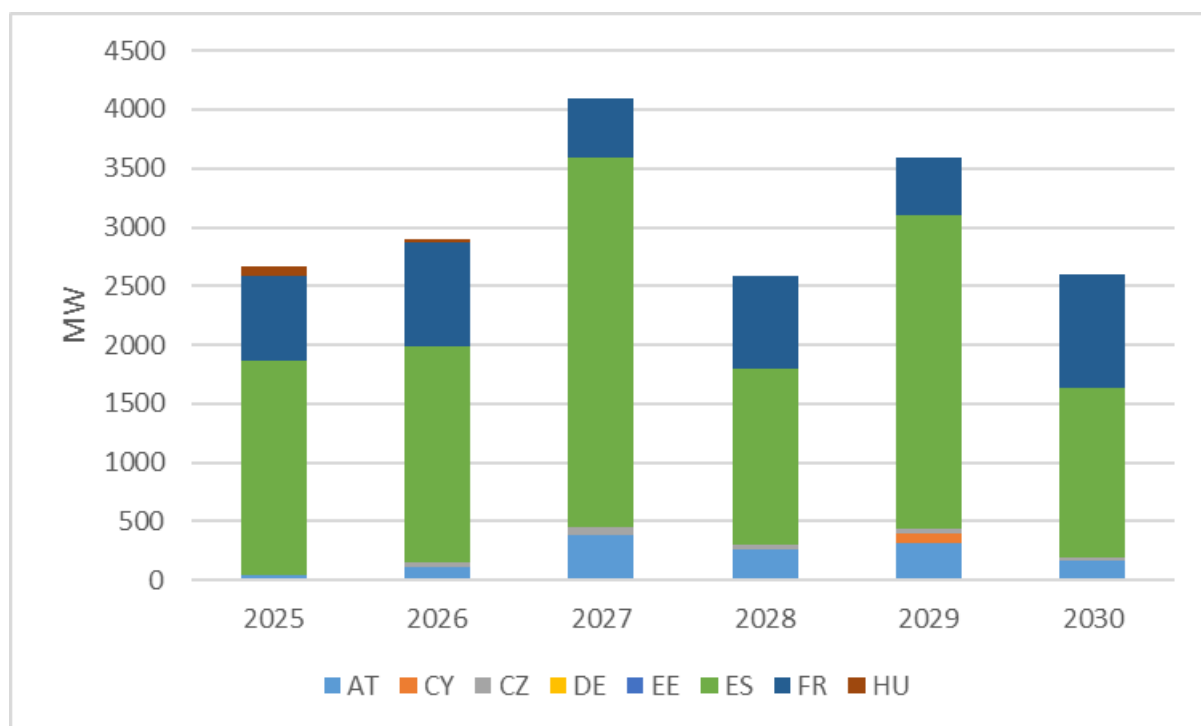


Figure 5: Onshore wind capacity reaching end of support by year.

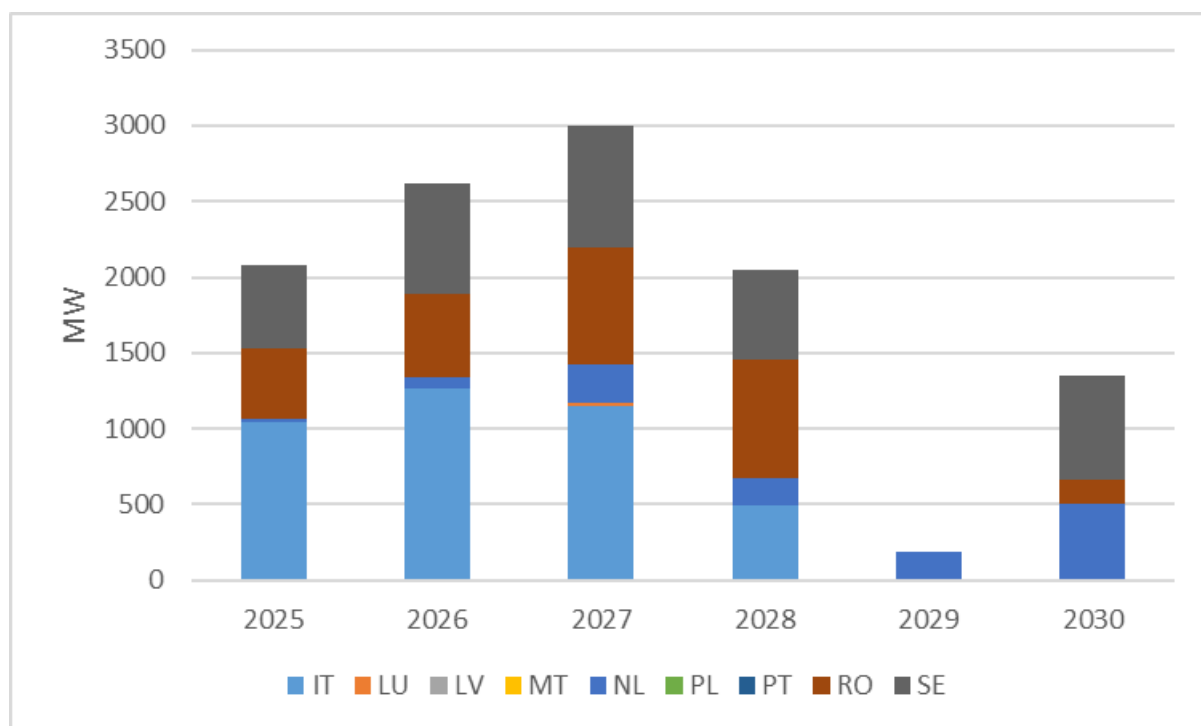


Figure 6: Onshore wind capacity reaching end of support by year.

The development for offshore wind is depicted in Figure 7.

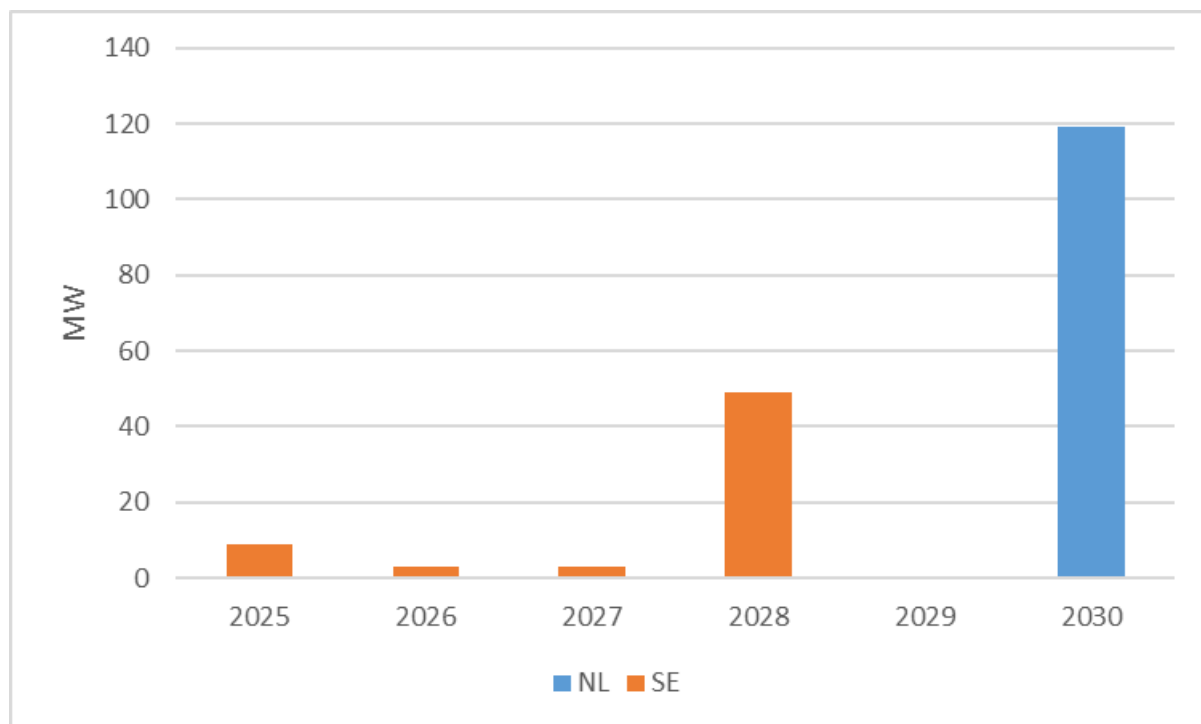


Figure 7: Offshore wind capacity reaching end of support by year

For biomass, the development is depicted in Figure 8 and Figure 9. Due to high costs of input materials further support might be needed to keep biomass plants operational after they reach the end of their support time.

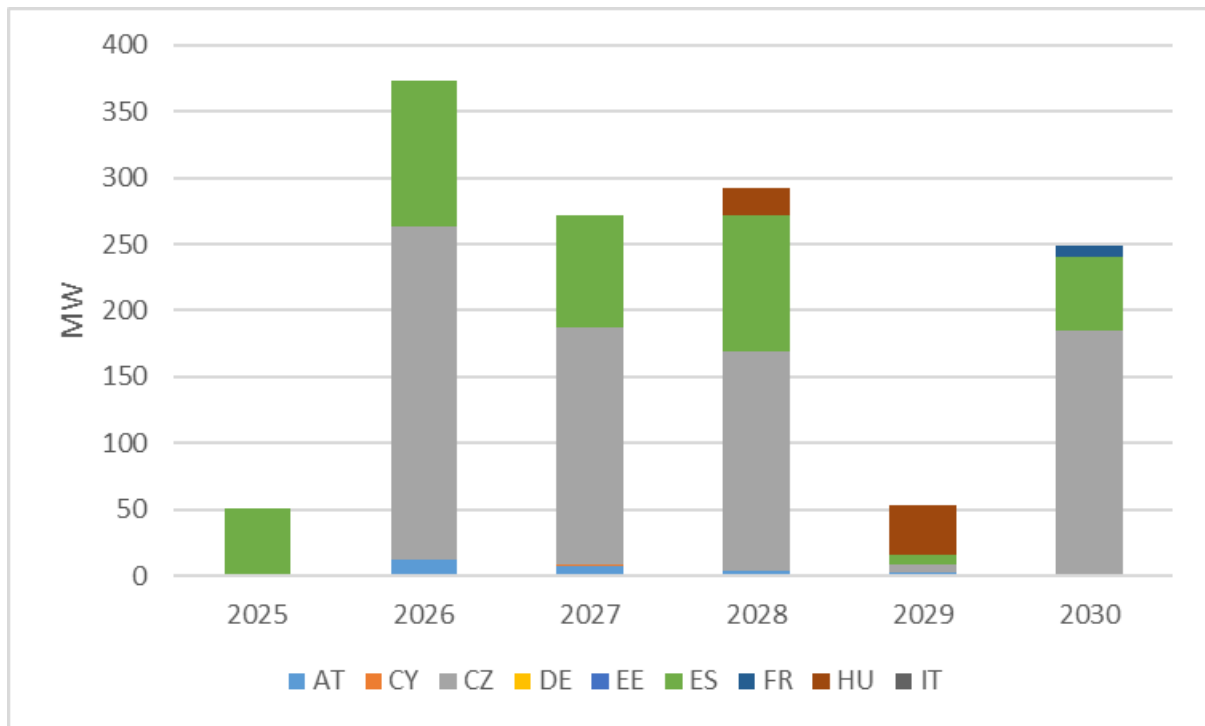


Figure 8: Biomass reaching end of support by year.

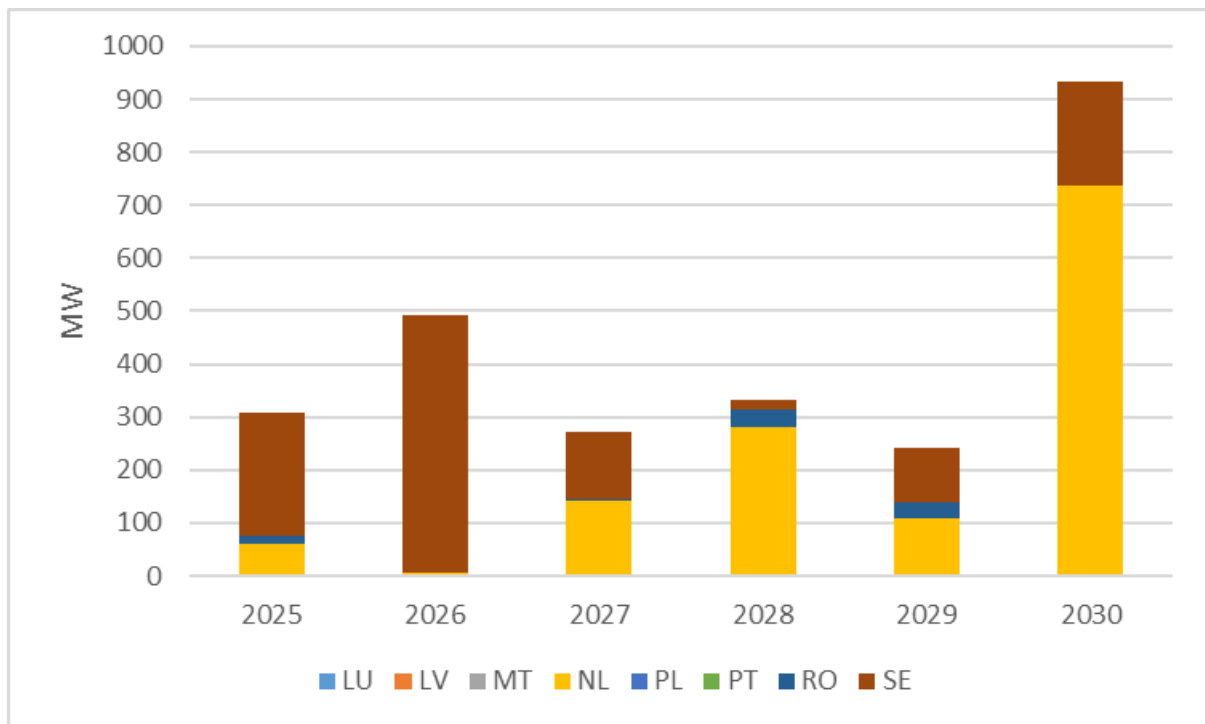


Figure 9: Biomass reaching end of support by year.

The development for biogas reaching EOS is depicted in Figure 10 and Figure 11. As for biomass, also for biogas it is very unlikely that biogas plants will be able to operate without any support after their EOS due to high operating costs – mainly fuel costs.

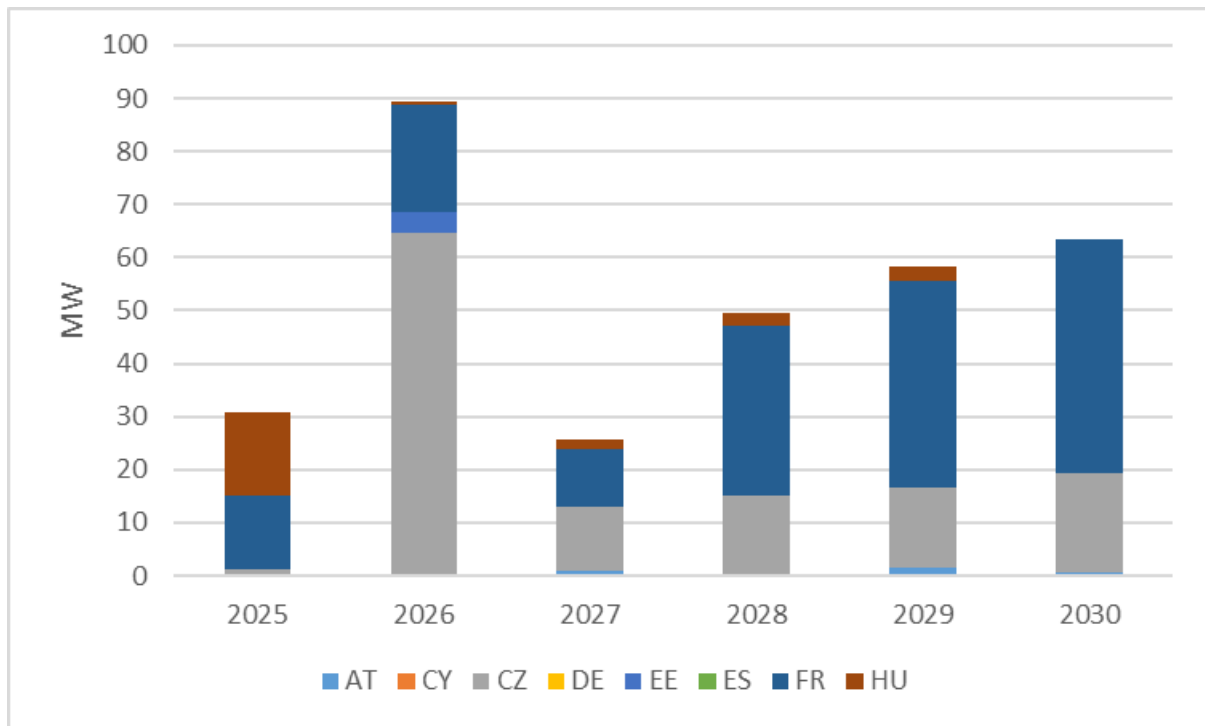


Figure 10: Biogas reaching end of support by year.

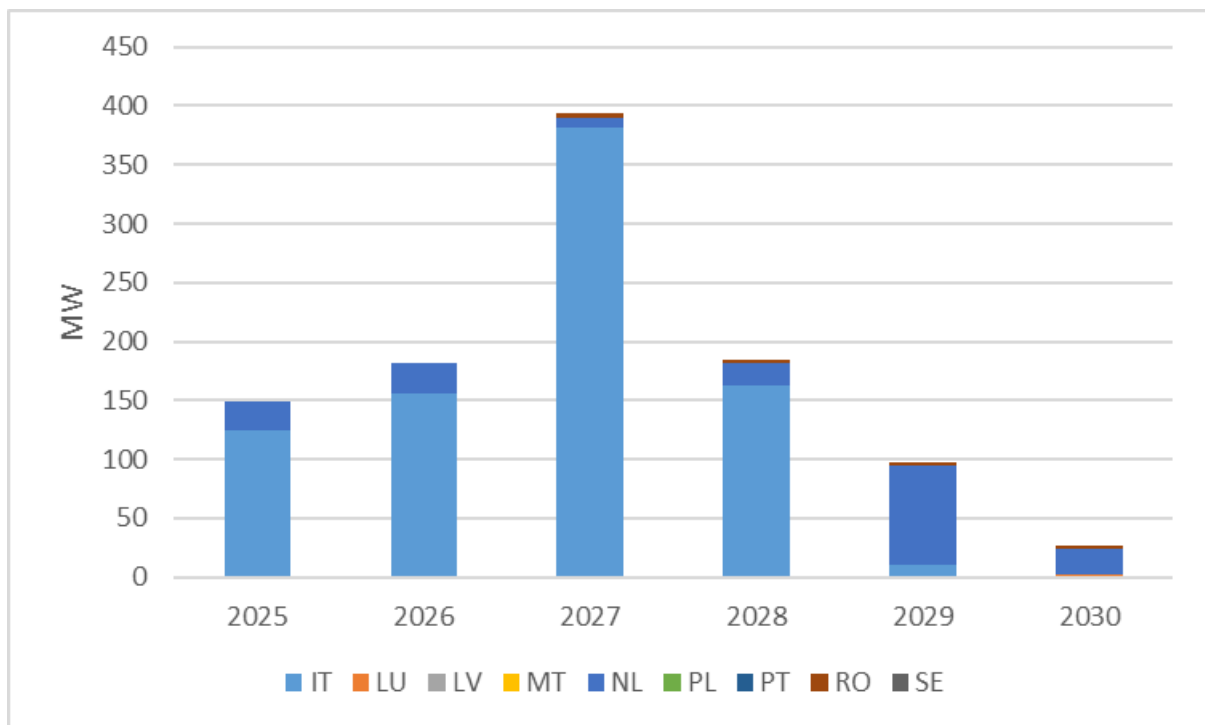


Figure 11: Biogas reaching end of support by year.

Figure 12 and Figure 13 show the installed capacity of hydropower reaching the end of support time. There is no common definition of small hydropower, but overall large hydro installations are usually not supported in current support systems. The situation for hydropower is somewhat special. Compared to other technologies they have a significantly longer lifetime and lower operating costs, meaning that a larger share of those plants will be capable of operating under market conditions without support.

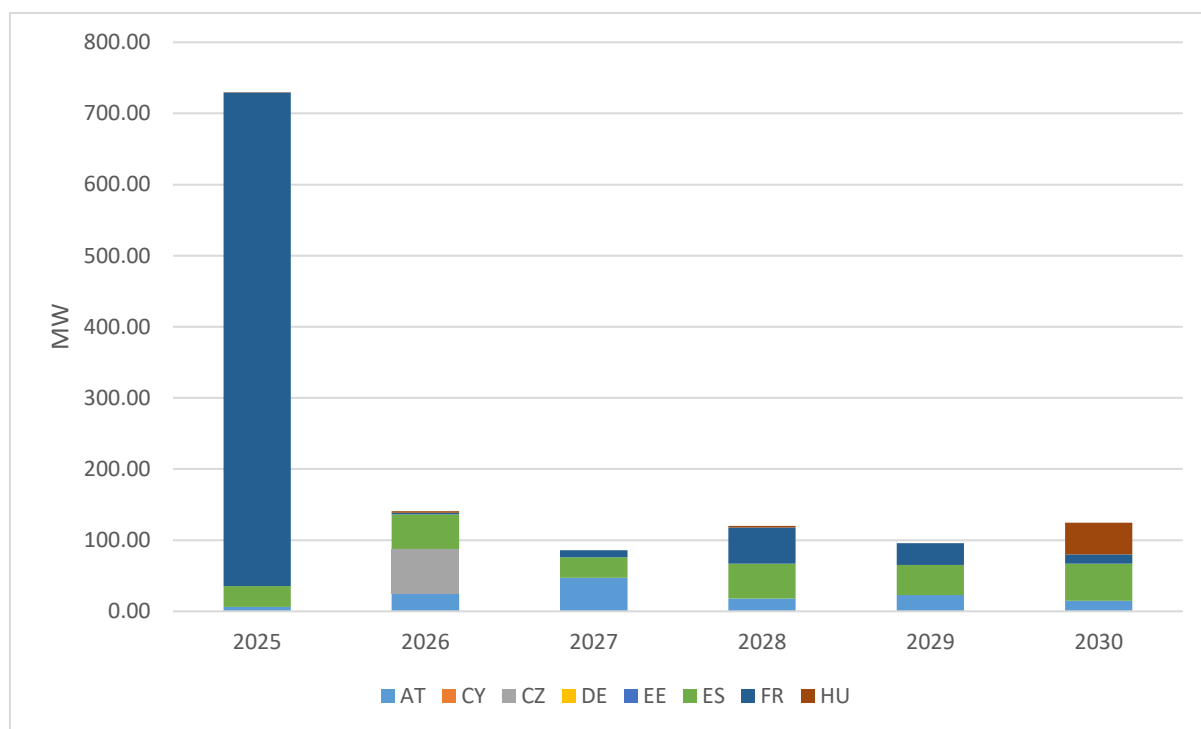


Figure 12: Hydropower reaching end of support by year.

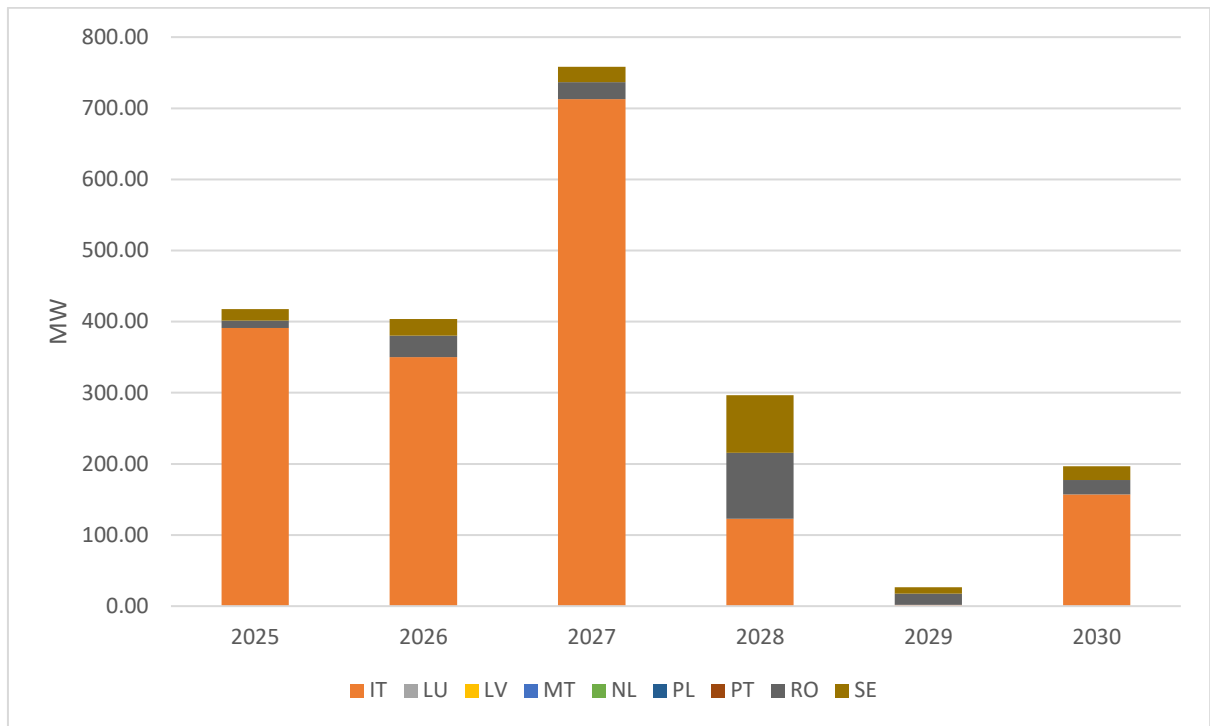


Figure 13: Hydropower reaching end of support by year.

4 Running without any financial support

Table 3 provides an overview of the answers to the question: *'Do you have RES installations in your country that are running without any financial support (e.g. FIT, FIP) by 31/12/2024?'* For every technology, there are unsupported plants in operation. Regarding photovoltaic, onshore wind and hydroelectric plants, the vast majority of member states reported that there are installations operating without support. Therefore, all member states will eventually gain experience with unsupported RES plants.

All countries with photovoltaic (PV) and wind power installations (excluding Cyprus) reported that they have plants for these technologies operating without direct support (e.g. FIP/FIT). However, this information may be misleading, as most countries also clarified that the support period for some PV installations had already ended or that other forms of support had been received, such as investment support, tax reductions or self-consumption. The majority of solar PV installations in MCs have been in the last decade, so EOS will mainly be reached after 2030.

Regarding offshore wind, Germany and Sweden stated that the support time for some installations had already ended, while Poland and the Netherlands responded that they had never received any support.

In the case of biomass and biogas, all countries that reported having production facilities in operation without support also stated that this support had ended for these facilities as opposed to never having existed.

In the case of hydro power production, countries reported the existence of production facilities without support and stated that their support time had either already ended or that they had never received it.

	PV	Onshore	Offshore	Biomass	Biogas	Hydro
AT	Yes	Yes		No		Yes
CY	Yes	No		Yes		
CZ	Yes	Yes		No	Yes	No
DE	Yes	Yes	Yes	Yes	Yes	
EE	Yes				No	
ES	Yes	Yes		Yes	Yes	Yes
FR	Yes	Yes	No	Yes	Yes	Yes
HU	Yes	Yes		Yes	No	Yes
IT	Yes	Yes	No	Yes	Yes	Yes
LU	Yes	Yes		No	Yes	Yes
LV	Yes	Yes		Yes	Yes	Yes
MT	Yes	Yes			Yes	
NL	Yes	Yes	Yes	Yes	Yes	Yes
PL	Yes	Yes	No	Yes	Yes	Yes
PT	Yes	Yes	No	No	Yes	Yes
RO	Yes	Yes		Yes	Yes	Yes
SE	Yes	Yes	Yes	Yes		Yes

Table 3: Running RES installations without any financial support

4.1 Legal schemes

In general, it seems that there are no special legal frameworks in place for renewable energy source (RES) installations once their support period has ended, compared to RES installations which have never received support. There may be differences regarding priority access and dispatch compared to conventional plants, but no special rules regarding balancing responsibility have been highlighted, for example. An excerpt summary of responses from CEER member countries regarding legal schemes is presented in Table 4.

Preferential treatment for renewable energy sources (RES), such as priority access and dispatching, is provided regardless of whether financial support is in place. These rules therefore also apply to facilities that no longer receive support. Additionally, RES facilities operating without financial support are likely to be treated like any other facilities. Some 'backup' solutions may exist or be under discussion for smaller facilities, particularly if they cannot find a supplier to purchase and sell their surplus electricity on the market.

	Current legal schemes for RES installations after EOS
AT	Standard market rules; no special post-support scheme.
CY	Competitive Energy Market or net-billing; no post-support scheme.
CZ	Same as unsubsidised generators; ≤100kW no licence; balancing transferable.
DE	Market rules; direct marketing ≥25kW obligatory from 2025.
EE	Market operation; dispatch & balancing depend on size/contract.
ES	Same as other RES generators.
FR	Balancing responsibility mandatory; market rules.
HU	Market rules; biomass/biogas may use brown premium.
IT	Liberalised market; priority dispatch only for equal-price offers.
LU	Contract with supplier/TSO/DSO mandatory; BRP required.
LV	Ordinary procedure; no special rules.
MT	No special post-support scheme.
NL	Standard market rules.
PL	General market rules; small installations retain privileges.
PT	Regular producers; aggregator of last resort available.
RO	Market rules; small installation with auto consumption become prosumers.
SE	Same as other generators; no priority dispatch.

Table 4: Legal schemes for RES installations

4.2 Changes in legal schemes

Table 5 displays the answers provided to the question whether any legal changes have been made to accommodate RES installations without support.

Six MC reported changes to legal schemes. Czech Republic, Germany, Hungary, Italy, and Portugal have introduced new rules.

Out of all CEER MCs, only the Czech Republic reported changes after implementing RED III that affect all technologies. Germany has introduced the option for specific PV installations to supply surplus electricity to the grid operator free of charge. In Hungary, legal changes affecting biomass and biogas have been adopted. Italy has introduced minimum guaranteed prices to cover operational costs for several technologies. Portugal reported that, in 2022, the aggregator of last resort was introduced for temporary situations.

Changes in legal schemes for RES installations after EOS	
CZ	The Czech Republic has adopted several legislative updates affecting RES installations after the end of support. Some production facilities (PD) can be modernised and transferred into the Feed-in Premium (FIP) operational support system, and since 2022 a new FIP scheme for biomass heat production has been introduced. After implementing RED III, extensive amendments were made to Energy Act No. 458/2000 Coll. and RES Act No. 165/2012 Coll., with gradual entry into force of individual provisions. E.g. from 1 January 2026, the system of GOs will change (GO new systems rules, auction and cancellation rules). A new electricity-sharing framework based on 15-minute allocation of generation to consumption was launched. Specific conditions for administrative FIP support for wind power plants have been tightened: plants below 1 MW face stricter rules (with some exceptions up to 6 MW), while new or modernised installations above 1 MW must participate in auctions. Biogas and Biomethane: An amendment to Act No. 165/2022 Coll. also introduced auction-based operational support for biomethane production. Existing producers using biogas, sludge gas or landfill gas, as well as new biomethane producers, may join or switch to biomethane provided they inject into the distribution grid. Producers under biomethane operational support cannot issue guarantees of origin; instead, these GOs are returned to the market and auctioned, and GOs may only be cancelled within the Czech virtual gas trading point. Since 2022, operational support for modernised small hydropower plants has also been introduced.
DE	Since 2024, plants up to 400 kWp that are commissioned by the end of 2025 have the option of supplying surplus electricity to the grid operator free of charge
HU	The so-called 'brown premium' has been introduced in 2017 for existing solid biomass and biogas plants in order to ensure their further operation after the end of the support period. The brown premium can be requested by the producer from MEKH for 5 years after the end of the support period, and this can be prolonged once.
IT	Minimum guaranteed prices have been introduced to cover operational costs for several technologies. For biomass power plants, minimum guaranteed prices apply until the end of their technical lifetime. For bioliquid power plants, these minimum guaranteed prices apply only until the end of 2025. In addition, minimum guaranteed prices have also been set for hydropower, covering electricity produced and injected (up to 1500 MWh) by supported hydro plants up to 500 kW and by unsupported hydro plants up to 1 MW.
LV	Not relevant.
PL	The Energy Regulatory Office, as a de jure executive body and not a legislative body, is unable to answer this question. Any future decisions in this regard will be made at the government level and will be political decisions. At the moment, there are no signs that any regulations in this area will be adopted, especially since it seems that high electricity prices on the market may provide generators with decent income. Maximum support period has been extended by 2 years up to 17 years (see Q2).
PT	In 2022 the aggregator of last resort was introduced for temporary situations.

Table 5: Changes in legal schemes for RES installations so far

5 Business models for RES installations and challenges

5.1 Possible business models

Looking at business models followed by RES installations once their support time ended, one can distinguish between (1) making major changes (decommissioning, repowering ...) and applying for new support in various ways or (2) not making any or only minor changes to an existing plant and making use of the produced electricity under market conditions. MC have been asked which business models currently could be used for the respective renewable energy sources after the support time has ended. The MC could select between the following predefined possibilities:

- Power Purchasing Agreements (PPA)
- Selling to the market via retailer
- Self-consumption
- Repowering (including new support)
- Any kind of follow up support scheme
- Decommissioning
- TSO/DSO/central entity has to buy (market value only) RES electricity
- REC (Renewable energy community)
- CEC (Citizens energy community)

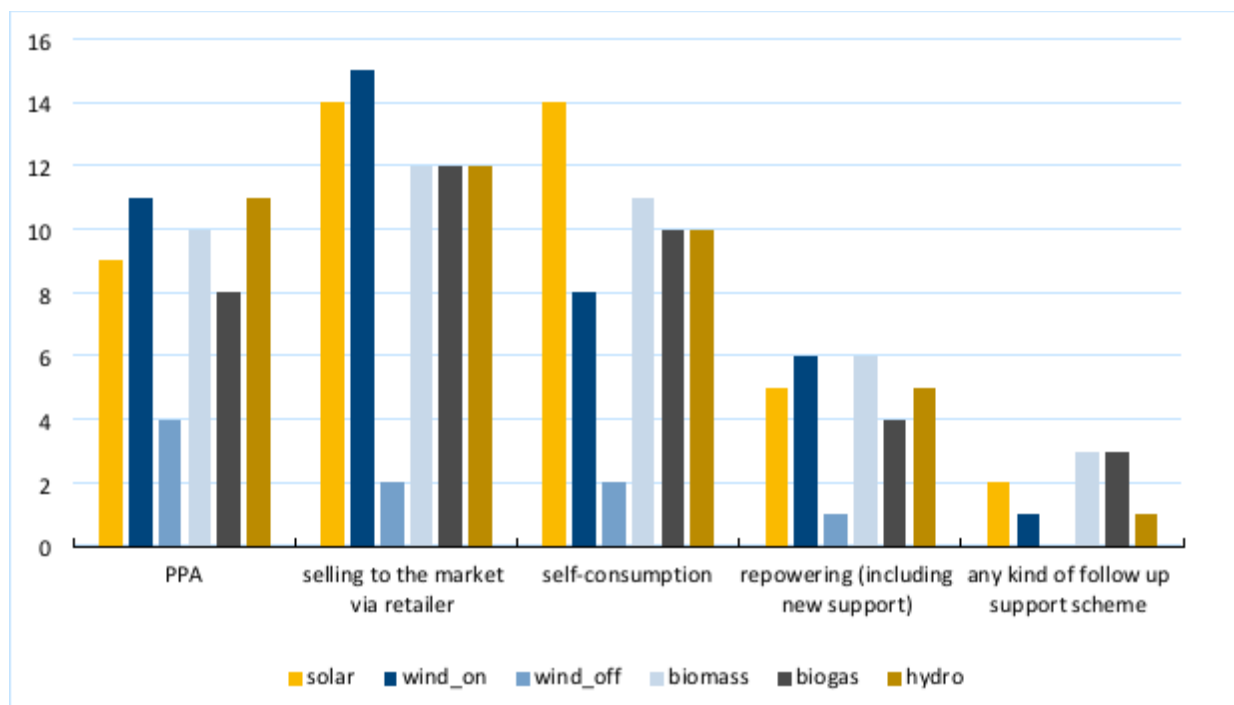


Figure 14: Business models followed by RES installations once their support time ended by number of MC with positive responses

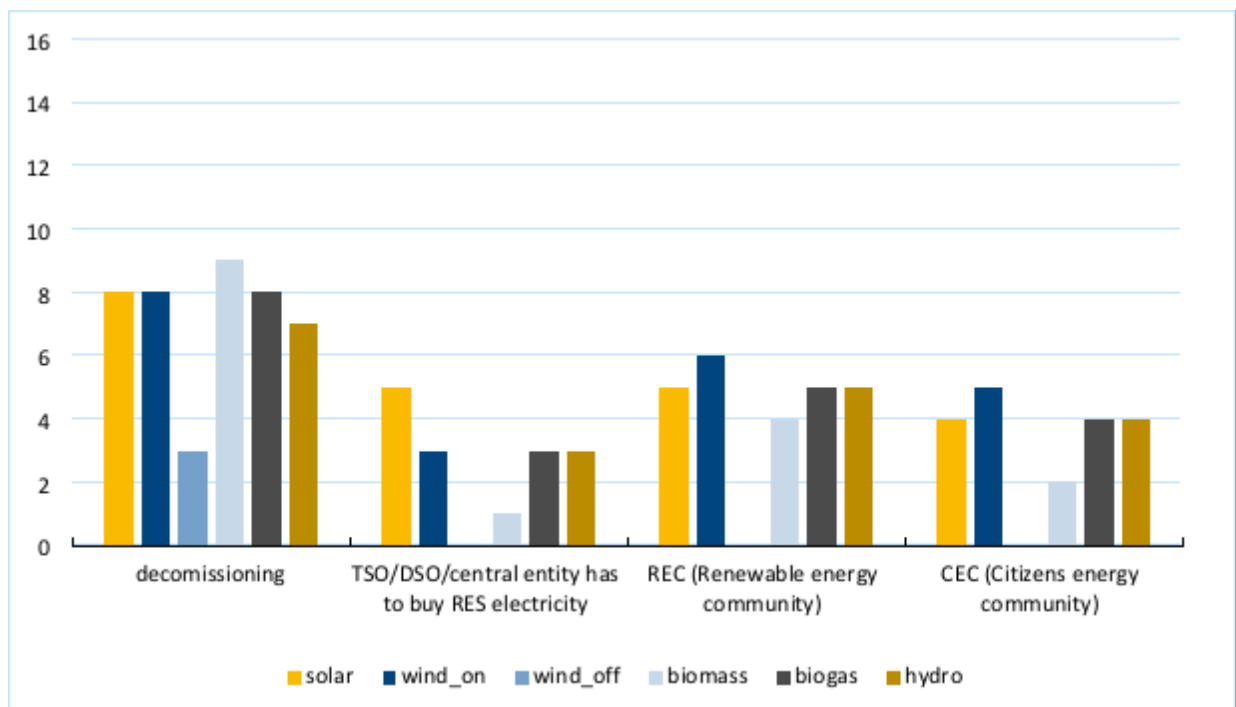


Figure 15: Business models followed by RES installations once their support time ended by number of MC with positive responses

As displayed in Figure 14, like in the last report, for all technologies the most frequently given answer was “selling to the market via retailer”.

For onshore wind installations, 15 MC consider regular market participation as a feasible business model in their respective country. Followed by solar, 14 MC, biomass, biogas and hydro with each 12 positive replies.

This time self-consumption is the second most reported business model. For solar, 14 MC consider self-consumption as a possible business model. For biomass, biogas and hydro it also seems to be a frequently used business option in many MC.

For the first time, this report also includes REC and CEC as potential business models in the questionnaire. Although these options are initially mentioned by a few member states, they could increase further in the future. They are already being used more frequently than TSO/DSO mandatory purchases.

Additionally, Sweden mentioned that once support is ended it is expected that the RES can be self-sufficient in market terms. The market for PPAs is a common business model for RES. Self-consumption is also observed.

Czech Republic replied that in principle, there is no restriction on the use of PPAs in this context, but the question needs to be asked whether there will be an interest of market participants to conclude long-term contracts, beyond the lifetime of the resource itself.

Poland replied that for other possibilities regarding onshore wind URE monitors RES installations that are no longer covered by support systems in terms of their fulfilment of statutory obligations (resulting from licenses, entries in registers, sales of electricity, etc.) but does not aggregate data regarding the subsequent business model of RES installations.

5.2 Reasons for producers to build RES installations without support

The previous chapter focused on RES installations that received subsidies at some point. For this chapter MC were asked why producers build RES installations that do not receive any support in the first place. MC could choose between the following options:

- No support scheme available for the technology / size of plant
- Existing support schemes impose constraints on the projects
- Producers expect higher profitability without support
- Other

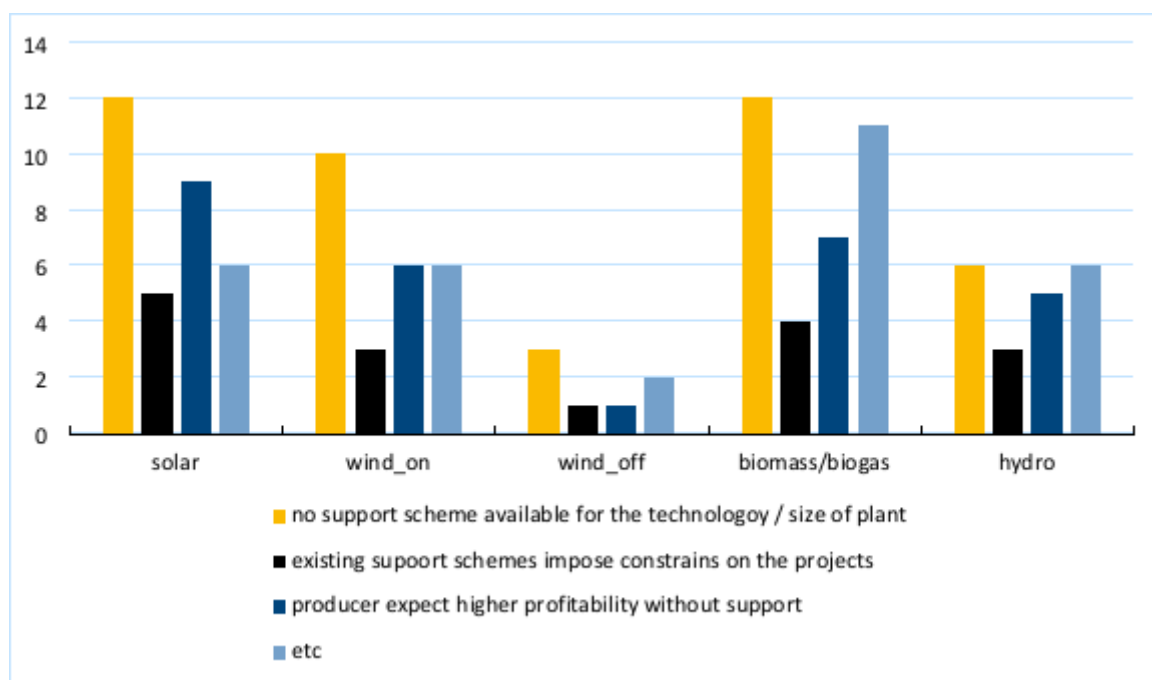


Figure 16: Reasons for producers to build RES installations without support by number of MC with positive response

As displayed in Figure 16, no support scheme available for the technology / size of the plant was chosen by the most MC and according to the answers, the reason seems to be especially relevant for solar installations. In addition to the predetermined responses, MC provided additional reasons. Like in the last report, especially regarding solar installations, multiple MC have identified self-consumption and/or net metering as reason for producers to build RES installations without support. The advantage of self-consumption is the use of electricity without using the public grid and thereby mainly having only the cost of producing the electricity. Depending on the countries' electricity market model, some additional charges may be applied to self-consumed electricity. However, the advantage of saving the grid charges and possibly other grid related charges (indirect support) also makes self-consumption an attractive option for small new installations being built without any direct support.

Poland mentioned that possible reasons for building renewable energy installations not covered by support include, first of all, high electricity prices: on the one hand, they enable favorable sales to producers not covered by support, and on the other hand, in the case of installations built to provide power to industrial plants, they allow - through self-consumption – the avoidance of costly energy purchases from the market.

However, the capacity of RES installations that have never received any support is limited and some MC have emphasised that they do not have any installations that were built without support.

5.3 Challenges for RES installations once support time has ended

The challenges faced by unsupported RES producers have remained consistent, primarily stemming from the transition away from the secure conditions provided by support schemes. In the case of feed-in tariff schemes, these conditions often included priority grid access, priority dispatch, direct off-take by the TSO, partial or no balancing responsibility, and, in some MC, simplified permitting procedures. RES plants operating under premium schemes may find the shift to full market conditions more manageable, as they have already been functioning in a market environment, although with protection from medium- to long-term price risks.

This time, an average of 15 MC provided answers to this question, slightly fewer than in the last report. The number of answers is not very consistent amongst all technologies except for solar and wind onshore. Despite the reduced number of responses, for solar and wind installations the three main challenges remain the same, for the full list please refer to Table 6:

- **Building permits:** Obtaining the necessary permits and approvals can be a time consuming and costly process. Environmental permits can be especially lengthy, and requirements can vary depending on the size, location and technology of the installation. This is causing project delays because of difficulties in the planning processes and increasing costs.

- **Grid access and connection:** Grid connection process is lengthy, including complex technical requirements and potential delays, which can significantly affect profitability. Furthermore, existing and planned RES face limitations in the capacity of the power grid. This can lead to a decline of connection for producers planning to generate electricity in renewable energy installations because of technical reasons and network congestion.
- **Balancing responsibility:** Regarded as the major challenge for unsupported RES. Production schedules of variable solar and wind are difficult to match with real production, thus balancing costs can rise substantially. Constant development of forecasting techniques and services, as well as market models that allow for modifying production schedules close to delivery, may reduce balancing costs. Aggregating different sources and locations of RES projects can also help keep deviations from production schedules low. Some MC stated that the challenges faced by the operators depend on the capacity of the plant. This supports the assumption that balancing responsibilities are especially demanding for small plants.

	PV	onshore	offshore	biomass	biogas	hydro
AT	For larger PV- installations it might get more difficult to find a supplier that buys the produced electricity.					
CY	Building/Environmental permits.			Building/Environmental permits.		
CZ	The amendment to the Energy Act changed the possibility of installing and operating renewable energy sources without a license up to 100 kW, creating energy communities and introducing a sharing system, battery storage, and simplifying permitting processes, etc.	Permitting procedures and the NIMBY effect appear to be the biggest obstacles to wind power construction.		The amendment to the Energy Act changed the possibility of installing and operating renewable energy sources without a license up to 100 kW, creating energy communities and introducing a sharing system, battery storage, and simplifying permitting processes, etc.	The amendment to the Energy Act changed the possibility of installing and operating renewable energy sources without a license up to 100 kW, creating energy communities and introducing a sharing system, battery storage, and simplifying permitting processes, etc.	
DE						

	PV	onshore	offshore	biomass	biogas	hydro
EE	Grid connection is one of the major challenges for renewable energy generators in Estonia. The connection process can be lengthy, with complex technical requirements and potential delays, which can significantly impact the profitability of the installation. Permitting and administrative processes can also be a challenge. The process for obtaining environmental permits can be lengthy and expensive, and requirements can vary depending on the size, location, and technology of the installation. Balancing responsibility is another challenge faced by renewable energy installations.			May face challenges related to the availability and cost of biomass feedstock. Biomass installations require a steady supply of feedstock in order to operate, and the cost and availability of biomass can vary	Smaller producers struggle to operate without support due to electricity price volatility and high balancing/administrative costs. After support expiry, producers must manage balancing obligations, which is burdensome for small units. Permitting and license amendments, especially for biogas and biomass plants, are often lengthy.	main challenges for hydro power installations in Estonia is the lack of suitable water resources. Estonia's rivers are generally low-flow and unsuitable for large-scale hydro power generation. Additionally, the country's topography and climate make it difficult to identify suitable areas for building dams or other hydro power infrastructure.
ES	Grid access and connection Issues. For almost all plants.			Grid access and connection Issues. For almost all plants.		In the case of Hydro, the challenge is the lack of natural resource. In general, main challenges are Grid access and connection Issues
FR	The main challenge is to find an offtaker who is willing to commit on a long-term agreement and who is prepared to pay potentially higher electricity prices.					
HU	Rentability, financing				Rentability	

	PV	onshore	offshore	biomass	biogas	hydro
IT	Building permits	The most important challenge has regarded permits and balancing responsibility.		The most important challenge has regarded permits		
LU						
LV	No survey has been conducted with producers on these issues and challenges.	Main challenge - public acceptance.		No survey has been conducted with producers on these issues and challenges.		
MT						
NL	Building permits; no large solarfields on agricultural areas and no available transport capacity on the (distribution)grid			Building permits (emissions e.g. NOx), sustainability issues biomass	Major challenge is rentability, sustainability of biomass	There is lack of potential (height decay) in the Netherlands!
PL	Currently, the biggest problematic issue is the limitations in the capacity of the power grid in relation to the existing and planned renewable energy generation capacities. For these technical reasons, unfortunately, more and more producers who plan to generate electricity in renewable energy installations are refused connection.					
PT	No available information.					
RO	Building permits and network access permits According to the DSOs/TSOs data there are some challenges to integrate the prosumers new capacities.					power installed capacity for hydro installations < 10MW

	PV	onshore	offshore	biomass	biogas	hydro
SE	PV solar (larger facilities): Permits and access to grid connection are two significant obstacles affecting profitability. Large solar power projects face similar challenges as wind power locally, both in terms of political objectives and social acceptance. PV solar (smaller facilities): Investment interest has declined due to the economic situation and the removal of policy instruments/subsidies, which affects profitability.	Wind: The political agenda has, among other things, led to decisions that rejects many offshore wind power projects, and political initiatives are instead supporting investments in fossil-free dispatchable electricity (nuclear power) rather than renewable intermittent electricity production. Investment interest has completely declined for 2025 in Sweden, as indicated by the fact that no orders for wind turbines have been placed so far this year.				

Table 6: Challenges for not supported RES installations (only countries displayed which provided information

6 Main findings and conclusions

Starting from 2020, the support time for more and more RES installations has ended throughout Europe. In countries with shorter support times, the end of support time has already been reached for some installations. Nevertheless, no major changes were made or are expected to be made to the electricity market models for those installations. The paper reflects the expert opinions of MCs. No specific studies were provided to undermine those opinions.

Based on the responses provided by CEER NRAs, the following limited messages can be brought forward:

- Like in the last report the legal framework governing RES installations has so far not been adapted: Either because the framework does not make a difference between supported and unsupported RES or because support time is still running, and adaptation will be needed only in the future.
- Coming from FiT support systems which mainly haven't been substituted by market-based support systems the handling of balancing responsibility will become a reality and could constitute a major challenge for existing RES plants.
- Besides other advantages the transition to market-based support systems gives an advantage to installations built under that market-based support system because they already have had the possibility to gain market experience which should make production without receiving support afterwards easier.
- Selling to the market via retailer was the most reported business model for RES installations once their support time ended, followed by PPAs and self-consumption.
- RECs and CECs are viewed as an option for all technologies except offshore wind.

The strategies followed by unsupported RES installations are manifold. The most likely approach is – at least in case of larger installations – to rely on the market as a source of income. Smaller ones, mainly PV, will most likely focus on self-consumption. However, decommissioning of the installation also seems to be a serious option for operators. The next years with the rising capacity reaching EOS will show if and how MC adapt their legal schemes to make decommissioning less attractive.

Annex 1 – List of abbreviations

Term	Definition
CEC	Citizen Energy Community
CEER	Council of European Energy Regulators
DSO	Distribution System Operator
EEAG	Environmental and Energy State Aid Guidelines
EOS	End of Support
FIP	Feed-in-premium
FIT	Feed-in-tariff
GW	Gigawatt
kWh	Kilowatt hour
LCOE	Levelized Costs of Electricity
MC	Member Country
MS	Member States
MW	Megawatt
NRAs	National Regulatory Authorities
PPA	Power Purchase Agreement
REC	Renewable Energy Community
RES	Renewable Energy Source
TSO	Transmission System Operator

About CEER

The Council of European Energy Regulators (CEER) is the voice of Europe's national energy regulators. CEER's members and observers comprise 38 national energy regulatory authorities (NRAs) from across Europe.

CEER is legally established as a not-for-profit association under Belgian law, with a small Secretariat based in Brussels to assist the organisation.

CEER supports its NRA members/observers in their responsibilities, sharing experience and developing regulatory capacity and best practices. It does so by facilitating expert working group meetings, hosting workshops and events, supporting the development and publication of regulatory papers, and through an in-house Training Academy. Through CEER, European NRAs cooperate and develop common position papers, advice and forward-thinking recommendations to improve the electricity and gas markets for the benefit of consumers and businesses.

In terms of policy, CEER actively promotes an investment friendly, harmonised regulatory environment and the consistent application of existing EU legislation. A key objective of CEER is to facilitate the creation of a single, competitive, efficient and sustainable Internal Energy Market in Europe that works in the consumer interest.

Specifically, CEER deals with a range of energy regulatory issues including wholesale and retail markets; consumer issues; distribution networks; smart grids; flexibility; sustainability; and international cooperation.

CEER wishes to thank in particular the following regulatory experts for their work in preparing this report: Harry Morris, Michael Sorger, Jana Vášová, Annika Vogt and Frank Weiss.

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Council of European Energy Regulators
Cours Saint-Michel 30a, box F - 1040 Brussels - Belgium
Tel. +32 (0)472 74 02 82 | brussels@ceer.eu

WWW.CEER.EU

