



TOGETHER FOR
100% RENEWABLE
EUROPE



Engaging citizens and local communities in the solar revolution

An Update

April 2024





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Author: Francesc Cots (Eco-union) on behalf of CAN Europe

The following members and partners of CAN Europe contributed to the development of the report with assessments for their countries:

Bulgaria: Kris Dimitrov (Greenpeace Bulgaria); **France:** Alexis Monteil-Gutel (CLER-Réseau pour la transition énergétique) and Bruno Gaidon (Hespul); **Germany:** Birthe Maerz (DNR- Deutscher Naturschutzring) and Sebastian Breer (WWF Germany); **Greece:** Ioanna Souka (GreenTank); **Italy:** Francesca Andreolli (Ecco) and Eugenio Barchiesi (Kyoto Club); **Latvia:** Krista Petersone (Green Liberty); **Lithuania:** Domantas Tracevicius (VšĮ Žiedinė ekonomika - Circular Economy); **Portugal:** Pedro Nunes (ZERO); **Romania:** Marian Mandru (Greenpeace Romania) and Andrei Craciun; **Sweden:** Jan-Olof Dalenback (on behalf of AirClim); **Spain:** Francesc Cots and Jeremie Fosse (Eco-union, Spain), Juan Fernando Martin and Ismael Morales (Fundacion Renovables)

Reviewed and edited by CAN Europe: James O'Connor and Seda Orhan



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Executive Summary

The purpose of this update is to evaluate and report on the progress made by Member States in the deployment and facilitation of household rooftop solar PV since the original report published in May 2022. This update seeks to assess the impact of significant policy and regulatory changes in the EU, particularly in response to Russia's invasion of Ukraine and the energy price crisis. These regulatory changes include the Rooftop Solar Initiative and the EU Solar Strategy introduced as part of the REPowerEU Package, as well as the adoption of a new EU Solar Standard as part of the Energy Performance of Buildings Directive (EPBD).

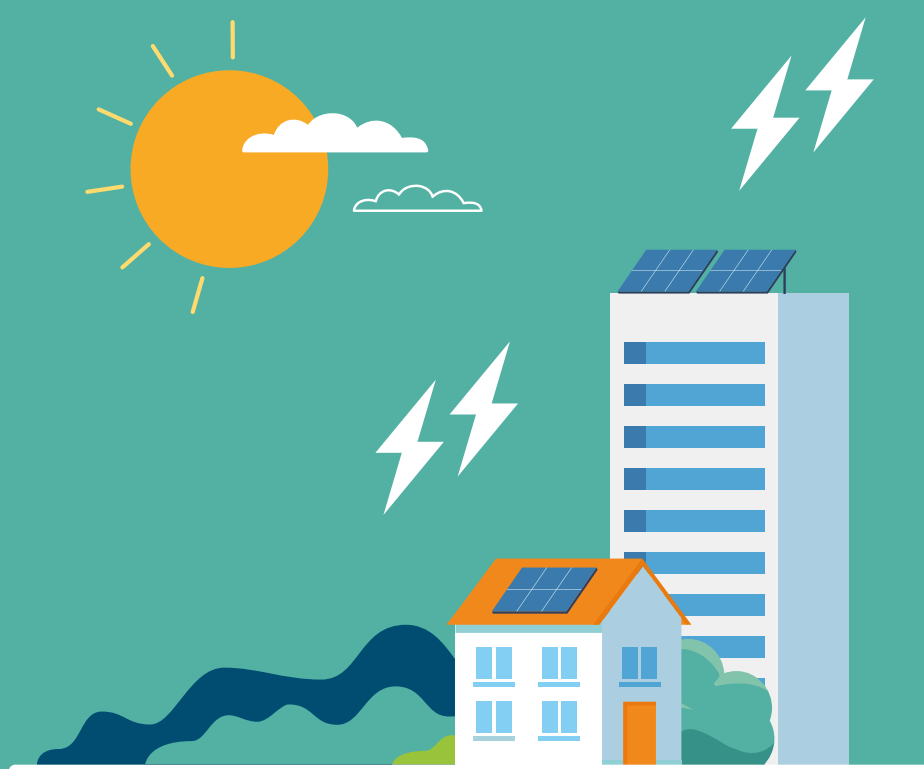
By examining the progress made and challenges faced, the report aims to provide a comprehensive overview of the current state of residential rooftop solar PV adoption across the EU, offering insights, highlighting successes, and identifying gaps where further efforts are required.

Key Findings:

- 1. Governance:** Most Member States lack a clear roadmap or strategy for rooftop solar PV, with insufficient stakeholder involvement and institutional mechanisms to support development.
- 2. Incentives:** There exists a variation in support schemes across Member States, with some utilising feed-in tariffs and others focusing on net billing schemes. However, frequent changes in policy and a lack of targeted support for low-income households have impacted consumer confidence and sector stability.
- 3. Permitting and Administrative Procedures:** Recent EU regulations have led to a more favorable permitting environment for residential rooftop PV, but national and local implementation shows inconsistency. Efforts to streamline processes and reduce bureaucratic hurdles are ongoing, with some successes in reducing permit times and simplifying procedures.
- 4. Energy Sharing and Collective Self-Consumption:** There is growing adaptation of regulations to support energy sharing and collective self-consumption, particularly in multi-apartment buildings. However, restrictions on grid usage and geographical limitations remain barriers.
- 5. Energy Communities:** While the transposition of EU definitions for Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) into national legislation has progressed, many Member States have not fully developed an enabling framework to support their emergence and operation.
- 6. Additional Measures:** Efforts to increase public awareness, deploy smart meters, and ensure grid readiness for the increased adoption of solar PV are deemed essential for future growth. Training programs for installers and administrative staff are needed to align with the rising demand for solar PV.

This update highlights the dynamic and evolving nature of the residential rooftop solar PV uptake, emphasizing the need for cohesive strategies, enhanced governance, and targeted support to realise the full potential of rooftop solar PV in achieving a fast and fair renewable energy transition with citizens and communities at its heart.

Introduction



Solar energy is pivotal for a people-centred transition as it can democratise energy production by enabling individuals and local communities to actively participate in and benefit from the energy transition.

Confronted with a convergence of crises - worsening climate change, geopolitical turmoil, energy insecurity, surging inequalities, and rising cost of living - the urgency for action has never been more evident. Science¹ unequivocally dictates the necessity of a swift transition away from fossil fuels to renewable energy to stay within a safe global warming limit of 1.5°C. This means transforming our energy systems by drastically reducing energy consumption and massively increasing sustainable renewable energy towards a 100% renewable energy system in the European Union by 2040. The transition must be fast and fair, putting citizens and communities at its heart.

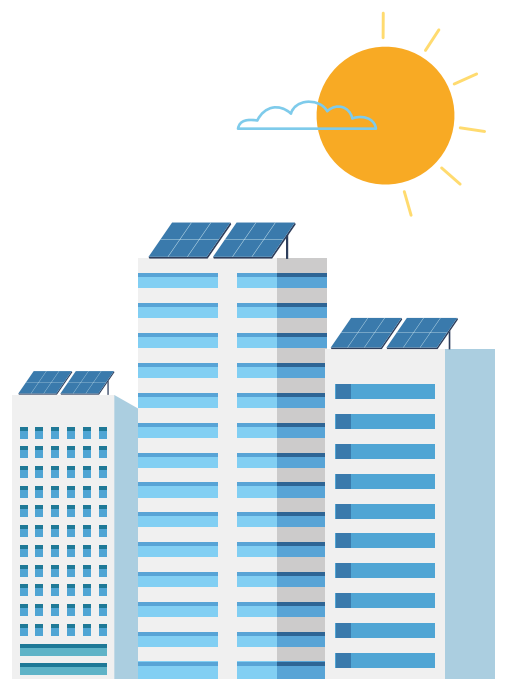
Solar energy is pivotal for a people-centred transition as it can democratise energy production by enabling individuals and local communities to actively participate in and benefit from the energy transition. Rooftop Solar, in particular, with its enormous potential², scalability and accessibility, facilitates households and communities to generate their own power and reduce their energy bills and reliance on volatile, expensive, and dangerous fossil fuels, helping to alleviate energy poverty and foster energy independence.

Moreover, PV systems on rooftops do not compete with space use, might have very limited environmental impacts, and their integration into the electricity system is relatively easy due to their proximity to the point of consumption. More than a tool in fighting the climate crisis, rooftop solar PV bolsters economic and social resilience, cementing its role as central for a sustainable, fully renewable, affordable, and inclusive energy future for all.

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Since the May 2022 publication of CAN Europe's report '[Engaging citizens and local communities in the solar revolution](#),³ which highlighted significant barriers to households' rooftop solar PV adoption in 11 Member States⁴, the EU's energy policy and market landscape have undergone significant changes. These have been largely a response to Russia's invasion of Ukraine and the ensuing exacerbated energy price crisis.

The initial report highlighted considerable national-level barriers and a lack of appropriate regulatory frameworks. This update primarily focuses on the progress made by Member States in facilitating the deployment of household rooftop solar PV, while illustrating good and bad practices.



1 https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

2 PV on rooftops and beyond can surpass targets while preserving the environment, JRC, February 2024, https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/pv-rooftops-and-beyond-can-surpass-targets-while-preserving-environment-2024-02-14_en#:~:text=It%20then%20uses%20the%20JRC's,the%20EU's%202022%20electricity%20consumption.

3 <https://caneurope.org/content/uploads/2022/05/Rooftop-Solar-PV-Country-Comparision-Report-2.pdf>

4 Bulgaria, France, Germany, Greece, Italy, Latvia, Lithuania, Portugal, Sweden, Spain, Romania

Rooftop solar PV in the EU⁵ is thriving and grew by 54% year-on-year⁶. The EU has adopted various new strategies and regulatory changes to accelerate the roll-out of renewables, in particular solar energy:

Key Development	Date	Description
Adoption of REPowerEU Plan	May 2022	The European Commission adopted its “REPowerEU ⁷ ” plan which entailed a dedicated EU Solar Energy Strategy. It put forward a target of 400 GW/dc of solar photovoltaic by 2025 and 750 GW/dc by 2030. The EU Solar Energy Strategy also launched a “European Solar Rooftops Initiative” with targeted recommendations to Member States.
Recommendation on speeding up permitting	May 2022	Alongside the RepowerEU plan, the Commission also presented a Recommendation ⁸ on speeding up permit-granting procedures for renewable energy projects and the EC Guidance ⁹ to Member States on good practices to speed up permit-granting procedures including those on small-scale renewables by households and energy communities.
Adoption of the revised Renewable Energy Directive (RED III)¹⁰	Entered into force on November 2023	A major development. RED III stipulates Member States that permit-granting procedure for the installation of solar energy equipment (and co-located energy storage) in artificial structures such as rooftops shall not exceed three months. For installations under 100 kW, including those by self-consumers and renewable energy communities, the process should take no more than one month. RED III also introduces 'administrative positive silence' for these smaller installations, where a lack of response from authorities is deemed approval. (Article 16d).
Emergency Council regulation¹¹ on accelerating the renewable energy deployment	Since December 2022 until June 2024	The regulation includes actions targeted to accelerate the deployment of renewable energy sources through fast tracking of the simplification of permitting procedures including for the installation of solar energy equipment on artificial structures such as rooftops and a positive administrative silence for the installation of solar energy equipment with a capacity below 50 kW. The regulation bridges the time until the new provisions on permitting from the revised RED will have to be transposed by the Member States.
Electricity Market Design Reform	December 2023	The Council and the Parliament reached a provisional agreement to reform the EU’s electricity market design aiming to make electricity prices less dependent on volatile fossil fuel prices, shield consumers from price spikes, accelerate the deployment of renewable energies and improve consumer protection. ¹² The reform clarifies rules for energy sharing and duties for system operators ¹³ .

5 All three segments: residential, commercial and industrial

6 <https://www.solarpowereurope.org/insights/outlooks/eu-market-outlook-for-solar-power-2023-2027/detail>

7 https://eur-lex.europa.eu/resource.html?uri=cellar:fc930f14-d7ae-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF

8 [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=PL_COM:C\(2022\)3219](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=PL_COM:C(2022)3219)

9 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022SC0149>

10 https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=OJ%3AL_202302413

11 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R2577&qid=1692447021947>

12 <https://www.consilium.europa.eu/en/press/press-releases/2023/12/14/reform-of-electricity-market-design-council-and-parliament-reach-deal/>

13 https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ITRE/AG/2024/01-15/1293668EN.pdf

At national level, Member States had to submit their drafts of revised NECPs by the end of June 2023. Until December 2022, 24 Member States¹⁴ submitted their updated plans including policies and measures to promote and facilitate the development of self-consumption and renewable energy communities in the NECPs. The Commission's assessment found that many Member States consider the importance of solar energy and have plans to promote its uptake mostly in the residential sector through incentives and simplified permitting procedures.

Given this substantially changed policy and regulatory landscape, how have Member States progressed in enabling the roll-out of household rooftop solar PV? Do the revised draft NECPs include sufficient measures and demonstrate ambition to expedite expansion of rooftop solar by households and energy communities?

This update focuses on the evolving landscape in 11 Member States (Bulgaria, France, Germany, Greece, Italy, Latvia, Lithuania, Portugal, Sweden, Spain, Romania) following the EU's regulatory and policy changes since the publication of the original report in May 2022. It examines specific measures for rooftop solar PV in the draft NECPs updates, spotlights notable cases of substantial progress, and provides concrete suggestions to expedite the deployment of household rooftop PV.

This update looks into the progress that has been made and highlights good & bad examples in the following areas:

- Governance
- Incentives: support schemes, taxes and subsidies
- Permitting and administrative procedures
- Energy sharing and collective self-consumption
- Energy communities
- Additional measures to support the development of rooftop solar PV such as awareness raising campaigns, training programmes and the roll out of smart metres.



¹⁴ https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en

Key Findings & Recommendations



Governance aspects

Across the 11 Member States assessed in this report, most of the countries still lack an adequate road-map/strategy with a clear pathway of measures and actions specific for rooftop solar PV. Furthermore, the views of stakeholders and multilevel governments are not often incorporated and the majority of the countries lack institutional mechanisms to support the development of rooftop solar PV.

However, the ongoing revision of the NECPs, which are still being drafted, represents a step forward in elevating the ambition of goals and targets, as well as in the concretisation of actions and measures. Nevertheless, it is imperative that Member States increase their contributions to collectively achieve the binding EU energy targets set for 2030. On the other hand, the revision of the NECPs should have been better utilised to improve the involvement and participation of stakeholders in the policy making process with regard to solar rooftop.

Key Recommendations

- Develop a strategy/roadmap with stakeholder involvement, setting clear, ambitious targets with annual milestones. These should be specific to system sizes and differentiate between distributed and utility-scale installations.
- Base targets on a comprehensive analysis of barriers and potentials for rooftop solar PV, considering geographical, physical, technical, economic, and qualitative factors such as informational gaps, alignment issues between owners and tenants, neighbourhood conflicts, energy sharing challenges, and misconceptions about solar PV reliability.
- Ensure strategy implementation through a continuous institutional mechanism that includes diverse stakeholders and government levels.
- Create and adequately fund local and regional renewable energy agencies to assist citizens, SMEs, and local authorities. These agencies should have a clear mandate to enhance the use of renewable energy in their respective areas.
- Use the revision process of the NECPs to increase the ambition of solar PV targets to ensure consistency with the EU 2030 binding renewable energy target of 42.5% and indicative 45%, concretising sub-targets related to capacity and number of individual/collective prosumers, small-scale projects, energy communities, etc. In undertaking this process, involve all the key stakeholders in the formulation of a strategy with a clear pathway of measures and actions specific for rooftop solar PV.
- Implement mandatory solar PV on all new public, non-residential, and residential buildings, as well as all buildings undergoing a major renovation, parking lots and other applicable artificial structures based on at least the criteria of the new deal regarding the Energy Performance of Buildings Directive (EPBD)¹⁵, in anticipation of its entry into force.



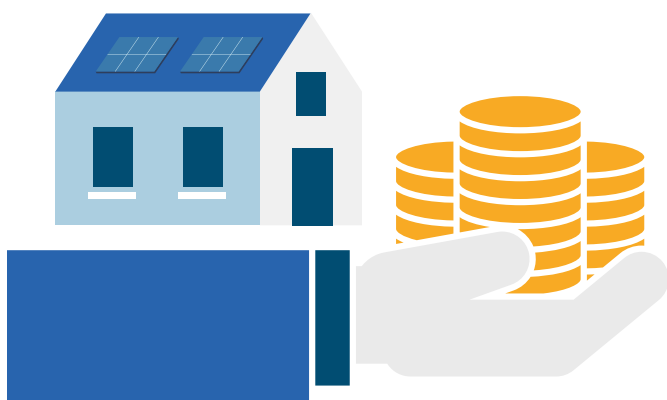
15 Article 9a "Solar Energy in buildings"

Incentives: support schemes, taxes and subsidies

While some Member States have a longstanding tradition of supporting rooftop solar PV through feed in tariffs, others have focused more on net billing schemes. European funds have provided additional incentives including subsidies for solar panels. However, changes and revisions in policies on incentives (including taxation) in many countries impact the confidence of the sector and condition the level of consumer support, who make strategic choices while awaiting new support initiatives, especially in a context where interest rates and energy prices are highly volatile. Finally, in some countries, bureaucracy and mismanagement of European funds have delayed the level of penetration of solar PV in the market.

Key Recommendations

- Member States should ensure self-consumers are compensated for the renewable electricity they contribute to the grid, through support schemes like feed-in tariffs, feed-in premiums, net billing, or subsidies.
- Tailor support schemes to national contexts, with consistent monitoring and adjustment to boost rooftop solar PV adoption. Consider factors like installation size and geographical location, offering more aid to smaller installations in less sunny areas.
- Guarantee that surplus power fed into the grid is valued and remunerated at sufficiently high tariffs, encouraging full utilisation of rooftop spaces by prosumers and energy communities.
- Maintain stable support frameworks to build market trust and attract investors. Small-scale and citizen-driven installations should be exempt from competitive bidding.
- Review the grant-making process to reduce levels of bureaucracy and avoid significant delays in the delivery of funds.
- Encourage self-consumption, especially integrating solar systems with storage batteries for flexibility and night-time use.
- Minimise applicable taxes and use European and national funds to subsidise rooftop solar PV, focusing on low-income households and energy communities with limited financial access.
- Use funds to support integrated building renovations that include on-site renewable solutions, particularly rooftop solar, to improve operational energy performance and provide affordable electricity to low-income and vulnerable households.



Permitting and administrative procedures

Recent European regulations have positively impacted national legislative frameworks, creating a more favourable and simplified permitting for small scale projects on artificial structures, providing with clearer deadlines, the substitution of construction permits by prior notices, more digitalisation or the establishment of single contact points. Nevertheless, substantial efforts are still required to implement these new frameworks at both national and municipal levels, primarily due to a shortage of human resources, expertise, or training. Moreover, in some countries, more fundamental issues, such as inadequate grid capacity, adversely affect the permitting processes.

Key Recommendations

- Further simplify the legal framework by establishing at least one consumer-friendly modality with a grid access requiring minimal paperwork, no need for producer status, and free from taxes or grid-related fees. This modality should include no administrative permission or financial guarantees for grid access.
- For larger rooftop PV installations, minimise grid tariffs and network charges as much as possible and applicable only to respect the cost reflective principle.
- Fully and properly transpose and implement European regulations at national level to streamline permitting process for solar rooftop PV by replacing construction licences or permits with prior notices, establishing positive silences for grid connection requests, increasing digitalisation and enhancing single contact points.
- Allocate sufficient resources at the national, regional, and municipal levels to guarantee the practical implementation of the new provisions under the Emergency Regulation, RED III, and revised Electricity Market Design.
- Reduce response times by implementing progressively shorter response times from DSOs, public authorities, and energy suppliers, with penalties for delays after an initial learning period.
- In those countries that suffer from lack of grid capacity, introduce clear criteria of prioritisation which ensure access for local actors such as energy communities.
- Digitise the permitting process for efficiency and provide tools to assist citizens and community projects in navigating permitting and approval processes.
- Maintain a registry of small installations, managed by public authorities to track the progress of rooftop PV, with automatic producer registration by authorities.



Energy sharing and collective self-consumption

Most EU countries started adapting their national regulations towards the implementation of energy sharing and/or collective self consumption in 2020, mostly for multi-apartment houses. However, only a few of them allow the use of the public grid for this purpose. On a positive note, recently, some of the countries have relaxed the geographical and size (power) limitations that previously hindered collective engagement. Additionally, they have modified the ‘majority rules’ to make reaching agreement easier. Regarding energy sharing, the recent political agreement on the reform of the EU's electricity market design may constitute a decisive step forward in the facilitation of energy sharing by clarified rules for energy sharing, an established definition, a set of rights and obligations for actors that want to share energy with each other, measures to ensure that energy poor and vulnerable households can access energy sharing schemes and more clear duties around what system operators need to do to facilitate energy sharing¹⁶. However, considerable effort is still needed to fully utilise the potential and benefits that energy sharing and collective self-consumption offer.

Key Recommendations

- Ensure all national frameworks support both energy sharing through the distribution grid and collective self-consumption, in line with RED II & III implementation and revised Electricity Market Design (currently in the formal adoption process)
- Enable energy sharing and collective self-consumption in apartment buildings without forming an energy community in line with the revised Electricity Market Design, with straightforward majority rules for solar PV installation to minimise conflicts.
- Limit restrictions on stakeholder participation in energy sharing or collective self-consumption schemes, including allowing household members outside proximity requirements. Promote virtual energy sharing to include those without suitable rooftops and to facilitate funding.
- Avoid restrictive proximity and size requirements
- Provide favourable conditions for vulnerable households in energy sharing to combat energy poverty.
- Provide flexibility in business models for energy sharing or collective self-consumption, allowing either collectives or third parties to own and operate installations in line with the revised rules under Electricity Market Design (currently in the formal adoption process)
- Adopt flexible rules for energy distribution within collectives, including dynamic and variable coefficient distribution options, to enhance demand side management
- Streamline bureaucratic procedures related to energy sharing and collective self-consumption, with a particular focus on the role and duties of DSOs, preventing them from introducing unjustified obstacles for collective self-consumption schemes to access the grid, while ensuring continuous dialogue.



¹⁶ <https://www.rescoop.eu/news-and-events/press/the-sprint-is-over-like-hastily-done-homework-europes-electricity-market-design-has-lost-the-plot>

Energy Communities

Most of the analysed Member States, with the exception of Sweden, have transposed both the Renewable Energy Communities (REC) and Citizen Energy Communities (CEC) definitions into their national legislations. However, most are very superficial and provide very little detail (if any) on the actual principles, basically copy-pasting the definitions of the RED II and Electricity Directive and often delegating the task of developing more comprehensive legislation to an authority, such as the energy regulator. On the other hand, while many Member States have support measures and incentives for energy communities, very few have put in place a coherent and comprehensive enabling framework that allows these communities to emerge as mandated by EU directives.

Key Recommendations

- Fully and adequately transpose RED II and the Electricity Market Directive, defining renewable and citizen energy communities clearly in national legislation, including criteria like openness, voluntary participation, autonomy, and geographical proximity.
- Ensure national legislation encompasses both renewable energy communities (RECs) and citizen energy communities (CECs) coherently.
- Clearly define objectives for RECs and CECs in national legislation, with responsible governance to prevent misuse for greenwashing.
- Assess barriers and potentials for renewable energy communities as per Article 22(3) of RED II.
- Designate an authority to monitor and follow up on the objectives and provisions for energy communities.
- Establish measures to ensure non-discriminatory treatment and a level playing field for energy communities, including access to financing, technical expertise, and capacity building, while creating a coherent and comprehensive enabling framework.
- Set ambitious and practical objectives for rooftop solar PV projects within energy communities.
- Implement policies to integrate vulnerable households into RECs and CECs.
- Establish conditions for effective partnerships between RECs, CECs, and public local entities.
- Incorporate concrete national objectives, targets, measures and actions to enhance energy communities in national energy planning and NECPs, including specific provisions for minimum RES capacity from energy community projects.



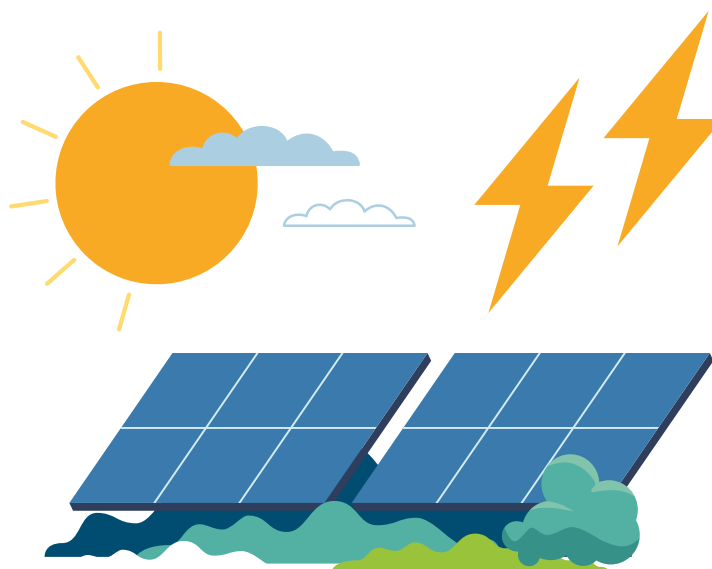
Additional Measures

While there has been a significant and steady rise in rooftop solar PV installations across most European countries over the past three to four years, additional efforts are necessary in Member States to design public awareness campaigns. These campaigns should highlight the benefits and potential of solar PV to accelerate its adoption, especially among population segments that are more resistant to using this technology, often due to long-standing myths or misconceptions. Moreover, there is a need to finance training programs for installers and administrative staff, aligning the installation rate with the current demand for solar PV.

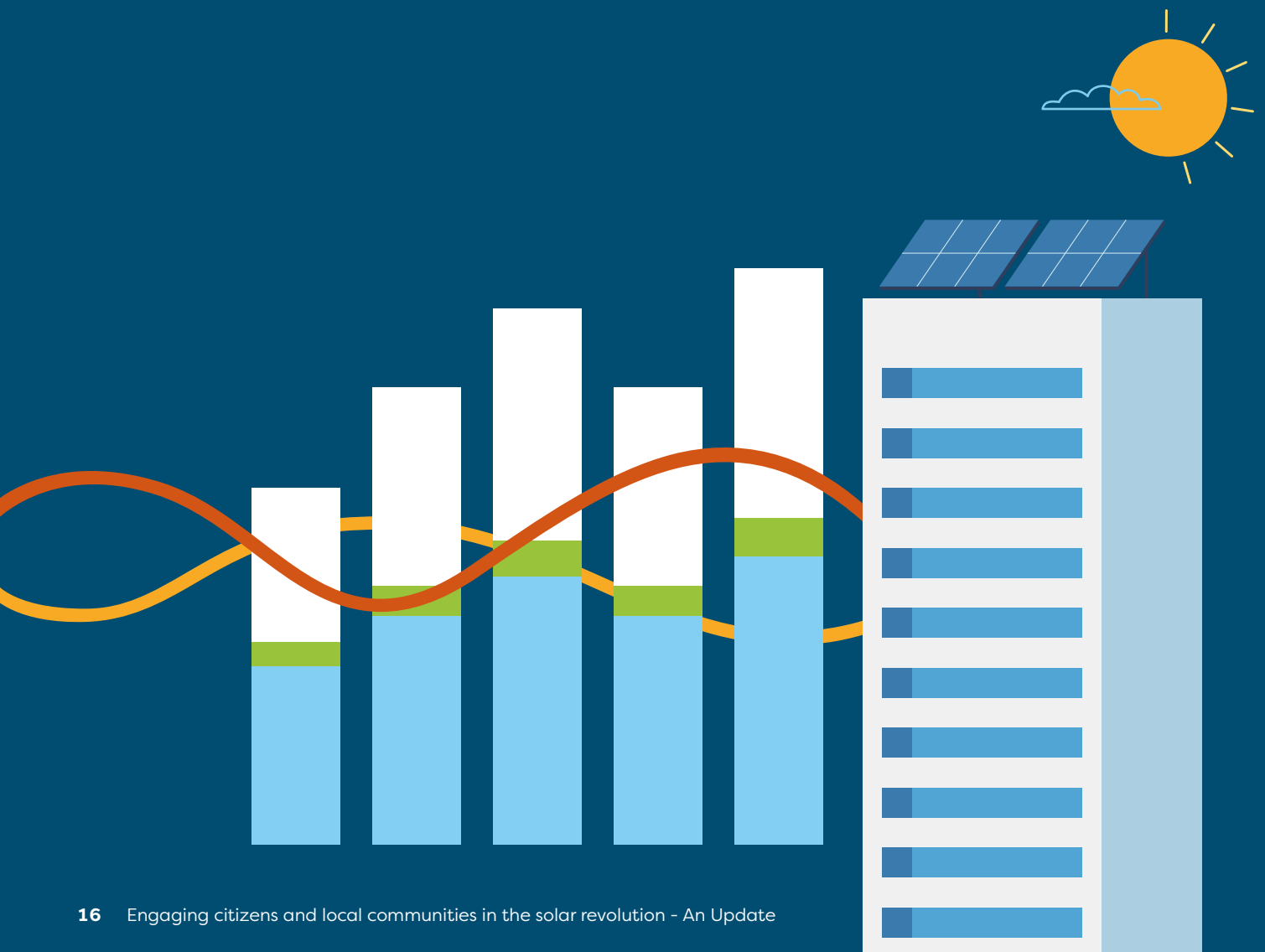
However, in at least one of the countries analysed, a combination of lower energy prices and higher interest rates negatively affected the growth rate of solar PV in 2023, which also impacted employment levels in the sector. Regarding smart metres, while some countries have achieved 100% penetration, a third of the analysed countries have very few or no smart metres at all.

Key Recommendations

- Launch public awareness campaigns to highlight the benefits of rooftop solar PV and provide easy access to information.
- Develop renewable energy training programs for administrative staff and policy makers at national, regional, and local levels.
- Establish programs to ensure a sufficient number of qualified installers, energy planners, and architects.
- Deploy digital metres that provide energy users with data access for efficient self-consumption schemes and grid integration, ensuring data privacy.
- Prepare the distribution grid for a significant increase in solar PV and self-consumption, utilising all flexibility options.



Progress in Member States: Success Stories & Challenges



GOVERNANCE

Why is governance important?

Governance represents the institutional framework within which public policies are developed. Good governance is essential to ensure proper information flow among different actors and to align everyone with shared objectives and way of working. In this context, good governance impacts all the other areas discussed in this report. It enhances the efficiency and impact of incentives on the proliferation of solar panels, ensures quicker permits through improved coordination among actors, facilitates progress in collective self-consumption, leads to the creation of more energy communities, and in general increases public interest in self-consumption.

Progress at the European level since the 2022 report

With regard to the governance of rooftop solar panels, one of the most important advancements at the European level has been the national revision of National Energy and Climate Plans (NECPs). NECPs were first adopted in 2019 and are being updated between 2023 and 2024 according to the Governance Regulation¹⁷. Member States should have submitted the draft update in June 2023. However, many countries have delayed their submission. On 18 December 2023, the Commission published its EU-wide assessment of the draft updated NECPs, together with individual assessments and country-specific recommendations for the 21 Member States that submitted their draft plans¹⁸. Member States have an excellent opportunity to update them and align with the EU's updated 2030 requirements, or even go beyond them¹⁹. The NECPs are crucial for solar. They form the basis for the EU-27's energy policy and strengthen the business environment for solar investments in Europe – predictability, efficiency, and transparency²⁰.

Another key advancement at European level since the publication of the 2022 report has been the adoption by the the Commission in May 2022, as part of the REPowerEU plan, of the EU solar energy strategy, which identifies remaining barriers and challenges in the solar energy sector and outlines initiatives to overcome them and accelerate the deployment of solar technologies. The strategy has as its goal to reach over 320 GW of solar photovoltaic by 2025 and almost 600 GW by 2030. In the meantime, the Commission also launched a set of initiatives on permitting renewable energy projects in order to accelerate solar energy deployment in the EU, which have been mirrored in the recent revision of the Renewable Energy Directive in October 2023.

With a specific focus on the topic of this report, the EU solar energy strategy launched the European Solar Rooftops Initiative, which sets the objective of adding 19 TWh (i.e. 16 to 19 GW) of rooftop solar in the first year of its implementation and 58 TWh by 2025 (i.e. 50.7 to 58 GW). In general, the initiative aims to accelerate the potential of rooftops to produce clean energy, for instance ensuring that at least one renewable energy community is set up in every municipality with a population higher than 10,000 people by 2025 or supporting member states in implementing collective self-consumption and energy community frameworks. It also established, among others, that Member States should set robust support frameworks for rooftop systems, including in combination with energy storage and heat-pumps, based on predictable payback times that are shorter than 10 years. More recently, the European Union finalised discussions on the Energy Performance Buildings Directive, which requires the incorporation of solar panel installations in newly constructed public and commercial buildings by 2026, in the newly built residential structures by 2029, and in non-residential buildings undergoing relevant upgrades by 2027. Existing public buildings will progressively adopt solar installations, aiming to have them implemented by 2030 through a phased approach.

17 Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action.

18 <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52023DC0796>

19 https://caneurope.org/content/uploads/2023/10/NECPs_Assessment-Report_October2023.pdf

20 <https://www.solarpowereurope.org/advocacy/national-energy-and-climate-plans>

Progress in the Member States since the 2022 report

Level of ambition

According to the EU-wide assessment of the draft updated NECPs, “the level of ambition put forward by Member States amounts to a renewable energy share (RES) of between 38.6% and 39.3% in 2030 at Union level. This is significantly higher than the 32% in the Renewables Energy Directive (RED II) yet it is lower than the 42.5% binding share set in the revised RED II. As a result, there is an ambition gap for the EU27 and Member States need to raise their contributions in their final updated NECPs in order to collectively achieve the 2030 binding EU renewable energy target”²¹. With regards to solar, and according to the analysis of Solar Power Europe in October 2023, “the 15 available updated NECPs for 2023 add a new 100 GW of EU solar ambition, bringing the total target, for now, to 434 GW of solar by 2030”²². The new 2023 targets increased by 66% compared to 2019 by weighted average. Lithuania has set the most ambitious goal by multiplying by more than 5 times its capacity, while Portugal and Sweden have doubled their previous goals and Spain has increased its target by 95%²³. However, it seems it is not enough to meet the goal set by the EU Solar Strategy target of 750 GW. According to Solar Power Europe, if extrapolated to all Member States, this will result in 555 GW total ambition by 2030.

Level of detail and adequacy of sub-targets, policies and measures

Many countries lack concrete references to sub-targets, or proper development pathways, or sufficient ambition for the established sub-targets. In Greece, currently, there is no roadmap or strategy at the time being specific for rooftop solar PV. Policies should be strengthened by setting specific quantitative targets for both individual as well as collective self-consumption by 2030 and beyond. The draft NECP does not contain such targets. In Italy, the draft of NECP defines a goal for solar plants of 79.9 GW by 2030, but it does not specify the volumes for PV rooftop and solar utility-scale.²⁴ On a positive note, Lithuania provides in its draft NECP an ambitious target of 30% prosumers (compared with the total number of consumers) by 2030. In Germany, the Solar Package I, which was approved by the cabinet on August 16, 2023, is a central step towards achieving the ambitious PV expansion goals by 2030. It contains a variety of measures that will accelerate the installation of solar PV both on the ground and on the roof and strengthen the participation of citizens²⁵. The new solar package is currently still under negotiation in the parliament.

Participation of stakeholders

Member States need to improve the involvement and participation of stakeholders in the policy making process with regard to solar rooftop. The revision of the NECPs was a great opportunity in this sense, since the Governance regulation states that Member States must organise effective public consultations at an early stage when all options are still available and establish a Multilevel Climate and Energy Dialogue (MCED) to discuss energy and climate policies, including NECPs. However, during the round of revision of the draft NECPs, compliance to such requirements ranged from poor to non-existent²⁶. From all the Member States analysed in this report, only in Lithuania CSOs found public consultations satisfactory²⁷. In Portugal and France, the draft NECP was not shared during the consultation process²⁸. In Spain, the draft was shared in the consultation phase, but too late to provide meaningful input and lacking scenarios with additional policies so that stakeholders could debate potential alternatives.

With regard to the requirement established in article 11 of the Governance regulation for discussing the NECP in the framework of a MCED, Spain did not set up any. On the other hand, Portugal created a MCED but without participation of the public sector. On a positive note, both Lithuania and France discussed their draft within the MCED. Other countries have included the participation of stakeholders in the formulation of their respective national strategies. For instance, in Germany, the recent solar legislative package is based on a consultation process with the industry and NGOs.²⁹

21 [Rhttps://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52023DC0796](https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52023DC0796)

22 <https://www.solarpowereurope.org/advocacy/national-energy-and-climate-plans>

23 <https://www.solarpowereurope.org/advocacy/national-energy-and-climate-plans>

24 <https://commission.europa.eu/system/files/2023-07/ITALY%20-%20DRAFT%20UPDATED%20NECP%202021%202030%20%281%29.pdf/>

25 <https://www.bmwk.de/Redaktion/DE/Dossier/Energieversorgung/details-solarpaket.html>

26 https://caneurope.org/content/uploads/2023/10/NECPs_Assessment-Report_October2023.pdf

27 https://caneurope.org/content/uploads/2023/10/NECPs_Assessment-Report_October2023.pdf

28 https://caneurope.org/content/uploads/2023/10/NECPs_Assessment-Report_October2023.pdf

29 <https://www.bmwk.de/Redaktion/DE/Dossier/Energieversorgung/details-solarpaket.html>

Solar Mandate

Some countries have taken steps forward with regard to the so-called solar mandate, or the obligation, a standard, to install solar energy in different types of buildings over the next few years, starting with new public and commercial buildings, but also residential buildings. Others are waiting for the European Union to legislate on this topic. In France, there is an obligation to install solar PV on new or renovated buildings from 500 m² (compared to 1000 m² previously).

However, some countries face obstacles in translating these more general agreements into concrete actions. In Lithuania, the Ministry of Environment refuses to introduce the solar mandate (as of November 2023) for all new buildings into the building code, even though there are regulations that foresee the installation of solar PV on renovated apartment houses (with area above 1500 m²) for common use. In Germany, a rather weak form of solar mandate was foreseen in the coalition government agreement of 2022 and in the draft of the federal government's solar strategy, but was not released in the final strategy paper. However, some federal states, such as Baden-Wurttemberg or Hamburg, implemented solar mandates - yet to different extents.



Lithuania organised a participatory process for the elaboration of the draft revised NECP which was one of the few, if not the only, considered satisfactory by CSOs. Also, the composition of the Committee serving as the MCED structure was provided along with its role, which reinforced the presence of CSOs on the table: “The National Committee [...] consists of experts from government, academia and non-governmental organisations (NGOs) competent to solve strategic and other important tasks related to the formation and implementation of the national policy of climate change management. The purpose of the Committee was to coordinate the formulation and implementation of the national policy on climate change management, and it has an advisory role.³⁰”



In Spain, a national round table for self-consumption has been recently set up in 2023 by the energy regulator which brings electricity suppliers, the industry and CSOs and discusses the progress on the road map of self consumption.



France's draft national energy and climate plan (NECP), even though concretizing solar targets, fails to mention a renewable energy objective for 2030, referring instead to a “decarbonised” energy target incorporating nuclear power, contradicting the EU's Renewable Energy Directive.



In Bulgaria, the first draft of the revised NECP draft is published but without any data about concrete numbers. The modelling of how different scenarios will impact the development of the energy sector and the whole industry was not included. It is mentioned that by March 2024 the modelling will be presented.

30 <https://eeb.org/wp-content/uploads/2023/09/NECPs-reporting-report-Dec-23.pdf>

INCENTIVES: TAXES, SUBSIDIES, AND SUPPORT SCHEMES

Why are incentives important?

The proliferation of solar panels on roofs is what is called a positive externality in economics, offering societal benefits including reduction of CO2 emissions. While the reduced costs of solar panels have significantly improved their economic viability over the past decade, eliminating the need for financial incentives, the substantial societal and environmental benefits they offer justify continued encouragement of their use. In particular, direct public support and innovative financing models should facilitate access to solar energy for the energy poor and vulnerable households.

The public consultation of the European Solar Strategy pointed to the low remuneration for the excess electricity produced as a negative factor³¹. This is consistent with the Renewable Energy Directive³², which establishes that self-consumers are entitled to receive remuneration, including through support schemes, “which reflects the market value of that electricity and which may take into account its long-term value to the grid, the environment and society.” Support and incentives for prosumers may take various forms: investment subsidies, feed-in tariffs, exemptions from certain taxes or the possibility to sell excess electricity to other consumers or directly in the market. In this context, each country has to find their way to incentivise rooftop solar in an efficient way according to their own economic, social and geographical features, without creating distortions in the market.

Progress at the European level since the 2022 report

Each Member State decides how to encourage and promote rooftop solar PV, since it is a state responsibility. However, at the European level there has been a commitment to finance the installation of solar panels through European funds. Commission analysis indicates that additional investments in solar PVs under REPowerEU would amount to EUR 26 billion between now and 2027, in a combination of public and private funding. The Recovery and Resilience Facility already dedicated at least EUR 19 billion to accelerate the roll-out of renewables³³. Other instruments contributing to this effort are the cohesion policy funds, InvestEU, the Innovation Fund, the Modernisation Fund, Horizon Europe and the LIFE programme³⁴.

The EU also has created some of the right conditions to allow Member States to develop their own incentives mechanisms. For instance, the new State aid CEEAG guidelines foresee exemptions from mandatory competitive bidding processes to provide aid, including those below or equal to 1 MW of installed capacity. Also, the 2021 proposal for the revision of the Energy Taxation Directive allows Member States not to tax electricity of solar origin. On a negative note, there are almost no clear guidelines yet to the Member States on how to ensure that all these available funds are addressed to vulnerable households³⁵. Poorly designed support schemes that fail to prioritise vulnerable households may indirectly exacerbate the current existing energy divide among wealthy and vulnerable households (accentuated by the increase in electricity prices). Conversely, well targeted support schemes could both be cost effective in maximising energy savings and renewable energy penetration and increase the social acceptance of renewables.³⁶

31 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A221%3AFIN&qid=1653034500503>

32 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001>

33 Based on the 22 Recovery and Resilience Plans (RRP) adopted by the Council of the EU and the two RRP of Sweden and Bulgaria endorsed by the Commission on 29 March 2022 and 7 April 2022 respectively.

34 https://eur-lex.europa.eu/resource.html?uri=cellar:516a902d-d7a0-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF

35 https://eur-lex.europa.eu/resource.html?uri=cellar:516a902d-d7a0-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF

36 <https://caneurope.org/content/uploads/2022/05/Rooftop-Solar-PV-Country-Comparision-Report-2.pdf>

Feed-in tariffs and feed-in premiums

Several countries continue to rely on support schemes based on feed in tariffs and feed in premiums, remunerating the electricity injected in the grid. In Lithuania, the draft revised NECP provides a support scheme for prosumers with a total budget from EU funds of €160 million between 2023 and 2029 up to 10kW³⁷. Regular calls for solar PV subsidies are made each year. In Spring 2022, for instance, 39.5 million out of 48 million were allocated to Solar PVs on their rooftops. Up to 10 kW, each participant could obtain about 320 Eur/kW, so it is a very relevant incentive for the uptake of solar PV. But support is dwindling since PV costs are decreasing. In Germany, from 30th July 2022, there were increases in feed-in tariffs for all newly commissioned PV systems³⁸. In Greece, a new feed in tariff program for small solar rooftop PVs (up to 6kWp) was established in 2022 with a guaranteed price (of 0.087Euros/kWh), for a 20 year contract, even though citizens are opting to use the net metering and virtual net schemes instead of this program.

Net billing/metering

Generally speaking, European countries are shifting from public support schemes like feed-in tariffs to the promotion of self-consumption and private power purchase agreements (PPAs). More Member States are now employing net metering and net billing regimes as essential tools to support decentralised energy generation, especially solar PV. More Member States are employing net metering and net billing regimes as a fundamental tool to support decentralised energy generation (especially solar PV). Countries such as Romania, Bulgaria, Latvia, Spain, Greece, Portugal or Italy are offering different versions of net billing/metering schemes. In Romania, the Parliament is working on a new legislation which will allow prosumers with installed capacities up to 400kW to store and sell directly the energy to another person who is connected to the production installation through a net billing scheme, with the condition that they be connected to the same DSO and supplier.

Subsidies

European funds, in particular the Resilience and Recovery Facility, have boosted the installation of rooftop solar panels across Europe. There are multiple recent examples. In April 2023, the Italian Ministry of Agriculture incentivized the support of rooftop solar PV in the agricultural and agro-industrial sectors, with funding covering up to 80% of the costs, through the funds of the Recovery and Resilience Fund. In Lithuania, the NECP draft also proposes an interesting scheme to support RES communities and to fight energy poverty at city level, with planned operating grants of €78.5M and provides clear objectives of storage deployment at household level, with the intervention of the EU structural funds for a volume of €3.3bn and 20 MWh between 2023 and 2029.³⁹ In Spain, the government has just approved in November 2023 a line of 500 additional million euros more of European funds for recovery to encourage new self-consumption facilities thanks to an addendum to the Recovery, Transformation and Resilience Plan⁴⁰. In this sense, there is sufficient budget available and self-consumption is being encouraged to a large extent.

Stability of the funding

However, the stability of the funding continues to be a key element in terms of providing confidence to investors, especially in a context where interest rates and energy prices are volatile. In the past, revisions of the funding programmes created distrust in the solar market, making potential investors hesitant towards new investments under similar subsidy schemes and many of them went bankrupt. Therefore, attention needs to be put in the present in order not to repeat the same mistakes.

For instance, in Spain, when European funds run out, the rate of installation falls because users prefer to wait for new lines of aid to be opened, due to recent lower energy prices and higher interest rates. In Italy, the 110% tax deduction, which largely accelerated the installation of small-scale PV plants in the last two years, has been reduced to 90% without the possibility of a credit transfer. This will affect mostly low-income households. On a positive note, Germany has halted the so-called “breathing cap” that blocked solar deployment for quite some time. Feed-in tariffs for solar are limited and will be reduced by 1% every 6 to 12 months (depending on the type of solar energy).

37 <https://www.solarpowereurope.org/advocacy/national-energy-and-climate-plans>

38 <https://www.streem.eu/blog-posts/eeg-2023-important-changes-for-germany>

39 <https://www.solarpowereurope.org/advocacy/national-energy-and-climate-plans>

40 <https://elpais.com/economia/2023-11-06/las-comunidades-tendran-500-millones-mas-de-los-fondos-europeos-para-ayudas-al-autoconsumo.html>

However, the German Federal Network Agency can adapt the tariffs in auctions when needed in order to secure further deployment as seen in December 2023.⁴¹

Management of incentives

There are also concerns regarding the management of the subsidies. In Spain, more than two years after the first funds began to be distributed from the central government to the autonomous communities, only 44% of the users who requested their subsidy have seen it deposited into their checking accounts according to data provided by the Ministry of Ecological Transition⁴². In Romania, although financial incentives have driven up the number of prosumers, bureaucracy issues have delayed several times the implementation of the programs and this situation blocked the whole PV sector for many months on each of the three editions of the incentives program.

Taxation

Tax systems should not discourage the uptake of rooftop solar PV. Sweden, for instance, concentrates almost all of its incentives to solar PV in tax reductions. Producers with PV systems of less than 500 kWp do not have to pay any energy tax for the self-consumed electricity. Additionally, there is an (income) tax reduction of 0,6 SEK/kWh for feed-in electricity for connections up to 100A and an (income) tax credit related to the installation cost for private persons, which is equal to an investment subsidy of the order of 10-15% of the total cost⁴³.

In Spain, self-consumption can also be deducted in the income tax return with deduction rates of 20%, 40% and 60% of the tax base of the installation depending on its nature. At the end of 2022, Portugal published the Decree Law 85/2022, exempting natural or legal persons from the payment of VAT and taxes associated with the sale of surplus electricity from self-consumption electricity production units with an installed capacity equal to or less than 1 MW. In Romania, In January 2023, the government enacted a law to bring down value added tax (VAT) on solar panels and their installation to 5% from 19% to accelerate solar power deployment in the country, which may be increased back at 9% in the near future⁴⁴.



In Greece, excess energy from a PV installed can be used to offset consumption through a net billing scheme. The netting period is 3 years⁴⁵. This scheme, which was very successful last year, can be also applied virtually only for public entities, professional farmers and energy communities. During the last year (2022-2023) requests for self-consumption through net metering and virtual net metering have increased by 65% (from 15,169 to 35,162 requests⁴⁶).

As a limitation, there is a maximum capacity for net billing of 10 kW in households and 100 kW in businesses.



In Bulgaria, in the recent revision of the Renewable energy sources law in 2023⁴⁷, the obligation which the DSOs had for purchasing the surplus energy produced by the prosumers was removed with the argument to stimulate the free market, but as a result many contracts between the DSOs and the prosumers have been discontinued without any notice.

41 https://www.gesetze-im-internet.de/eeg_2014/ and https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/Ausschreibungen/Solar2/FestlegungSolarII2024.pdf?__blob=publicationFile&v=3

42 <https://www.20minutos.es/noticia/5189108/0/las-ayudas-autoconsumo-cuentagotas-mas-mitad-hogares-empresas-con-placas-no-han-recibido-todavia-subsencion/>

43 <https://iea-pvps.org/wp-content/uploads/2022/10/National-Survey-Report-of-PV-Power-Applications-in-Sweden-2021.pdf>

44 <https://www.startupcafe.ro/taxe/ministrul-finantelor-taxe-tva-horeca-panouri-solare.htm>

45 [https://www.lexology.com/commentary/energy-natural-resources/greece/rokas/new-Law-introduces-significant-changes-to-energy-regulatory-framework](https://www.lexology.com/commentary/energy-natural-resources/greece/rokas/new-law-introduces-significant-changes-to-energy-regulatory-framework)

46 The Green Tank, 29.02.2024 Energy communities and self-production in Greece and its lignite areas, Review #5 <https://shorturl.at/wyHS3>

47 <https://balkangreenenergynews.com/bulgaria-simplifies-procedure-for-rooftop-solar-installations/>
<https://www.me.government.bg/bg/library/zakon-za-energiyata-ot-vazobnovyaeimi-iztochnici-167-c25-m1515-1.html>

PERMITTING AND ADMINISTRATIVE PROCEDURES

Why are permitting and administrative procedures important?

The process of granting permits for the installation of solar panels on rooftops should not be complicated and cumbersome. Furthermore, the installation of solar panels on roofs is aimed mainly at ordinary citizens, who are not supposed to have any expertise in complex permit issues. As we mentioned in the 2022 report, “for rooftop solar PV to massively scale up, the procedure to install small solar panels should be very simple and straightforward since regular consumers are not used to engaging in business activities”⁴⁸. There are still many myths and misconceptions regarding the effectiveness or profitability of photovoltaics and citizens may still be reluctant to invest, so an overly complex procedure discourages all those citizens who have doubts about it. In this context, it is also important to ensure the capacity of the grid to absorb more PV and the need for establishing access criteria that guarantee connection also to the most vulnerable groups and local actors like energy communities and prosumers. As a final note, the regulatory and permitting framework should be favourable not only for rooftop PV, but also for their storage, another measure that can contribute to reducing the congestion problem of the grid and therefore accelerate permitting procedures.

Progress at the European level since the 2022 report

In November 2023, RED III entered into force⁴⁹. It stipulates Member States that permit-granting procedure for the installation of solar energy equipment (and co-located energy storage) in artificial structures such as rooftops shall not exceed three months. For installations under 100 kW, including those by self-consumers and renewable energy communities, the process should take no more than one month. RED III also introduces 'administrative positive silence' for these smaller installations, where a lack of response from authorities is deemed approval. (Article 16d).

Since December 2022 an emergency Council Regulation⁵⁰ on accelerating the renewable energy deployment is in place. This regulation, temporary until June 2024, includes actions targeted to accelerate the deployment of renewable energy sources through fast tracking of the simplification of permitting procedures including for the installation of solar energy equipment on artificial structures such as rooftops and a positive administrative silence for the installation of solar energy equipment with a capacity below 50 kW. The regulation bridges the time until the new provisions on permitting from the revised RED will have to be transposed by the Member States.

Other relevant permitting dispositions were already approved in RED2. For instance, the compulsory designation of one or more contact points for the permitting process and the allowance to submit relevant documents in digital form, as well as the obligation to establish a simple-notification procedure for grid connection of small-scale PV (<10,8 kW). This threshold can be extended up to 50 kW under Member States' discretion.

Digitalisation and single contact points

Member States have progressed substantially in the areas of digitalisation and the establishment of single contact points for the permitting process.⁵¹ For instance, from the Member States analysed in this report, France, Germany, Greece, Bulgaria, Portugal and Romania have established such contact points, with different degrees of success, basically depending on the resources, availability and stability of staff with enough expertise and training.

48 <https://caneurope.org/content/uploads/2022/05/Rooftop-Solar-PV-Country-Comparison-Report-2.pdf>

49 https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=OJ%3AL_202302413

50 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R2577&qid=1692447021947>

51 <https://www.solarpowereurope.org/advocacy/position-papers/res-booster-stocktake>

Acceleration of procedures

A significant number of countries have introduced at least changes in legislation to accelerate procedures, for instance removing the need for a construction permit for rooftop PV (France, Germany, Greece, Spain, Bulgaria and Romania) or providing for a positive silence for small-scale projects (below 50kW or below 10,8kW), according to which the absence of a reply by the relevant authorities entails the approval of the permit (Portugal, Greece, Bulgaria and Spain)⁵². However, even though some Member States have legislated at national level, provisions related to deadlines are not being implemented yet at local level, again due to lack of human resources, expertise or training⁵³.

In Bulgaria, a new legislation easing the rules for the installation of rooftop solar systems for own use removes the requirement for a construction permit and for the submission of a project for rooftop solar systems of up to 20 kW. Instead of a building permit, the owner will notify the local authority and the project becomes valid if the municipality does not object within 14 days.⁵⁴ However, the procedure remains complex for the prosumers who wish to deliver their excess electricity output to the grid. In Spain, since June 2023 all Spanish Autonomous Communities have removed the requirement for a construction permit and only ask for a prior notice.

Historical heritage concerns

Another additional complexity is when rooftop PV projects are being developed in areas considered as historical heritage. One of the most affected countries is Italy, but recent improvements have been implemented with law 32/2022 which states that the installation of photovoltaic and thermal solar systems on buildings will be considered an ordinary maintenance intervention not subject to the acquisition of permits, with the exception of systems that are situated on buildings and areas of considerable public interest.

Access to the grid

Other barriers are problems related to a lack of transparency and a lack of grid infrastructure to distribute the generated electricity from PV within and between Member States, which is the cause of many rejections to connect. In Greece this is probably the main reason that impedes solar development and that makes administrative procedures longer, including rooftop solar. Additionally, the responsible authorities have been criticised for the non-transparent decision-making process. To avoid problems with security of supply due to lack of infrastructure, grid planning should be reinforced.

In the meantime, some countries have opted to establish grid access criteria that guarantee access to the most vulnerable groups and prosumers in accordance with public policy criteria. The Lithuanian Parliament recently voted to restrict commercial solar plants to 2 GW grid capacity (out of 4,4 GW total grid capacity dedicated to solar). The remaining 2,4 GW grid capacity for solar was assigned to priority groups such as vulnerable households or renewable energy communities run by municipalities. The grid reservation for priority groups meant that in the period from 2022 July to 2022 September 54,489 households and businesses became prosumers (inc. remote prosumers) with an additional solar capacity of 564 MW (more than half of total installed solar energy production capacity in Lithuania) and the number is growing further⁵⁵.

Storage regulations

Other alternatives to avoid congestion in the grid, and as a consequence, achieve faster permitting timeframes, are the promotion of self-consumption schemes with batteries, which prevent producers from discharging more electricity to the network. However, for that to happen, permitting procedures should be improved also with regards to storage activities. For instance, currently in France the entity storing electricity is deemed by the regulator as an electricity consumer when it stores electricity, but as an electricity producer when it releases the electricity previously stored, which implies long and burdensome administrative procedures.

Despite the significant technical improvements in electricity storage methods, the lack of a specific legal storage regime is preventing this business from growing – and it may ultimately hinder the momentum of solar

52 <https://www.solarpowereurope.org/advocacy/position-papers/res-booster-stocktake>

53 <https://www.solarpowereurope.org/advocacy/position-papers/res-booster-stocktake>

54 <https://balkangreenenergynews.com/bulgaria-to-abolish-limitations-for-rooftop-solar-panels-for-own-use/>

55 <https://enmin.lrv.lt/lt/naujienos/nustatytos-elektros-tinklu-pralaidumu-paskirstymo-proporcijos-ir-tolesnes-saules-elektro-pletos-principai>

and renewable energies⁵⁶. On the other hand, in Lithuania the “electricity storage” period in the grid has been extended for an additional one year (2 years in total). This legislative change will give more flexibility to prosumers that have excess electricity production and prefer to consume it rather than get a compensation⁵⁷.



From 2020 in Latvia, systems below 11.1 kW no longer need a permit thanks to a reform according to which the installation of solar panels on the ground or on buildings do not require such permit (there are applicable exemptions)⁵⁸. In these cases, the permitting for microgenerator installations is fast and digitalized. It takes 1,5 days on average to get the approval from the DSO. However, more complex permitting procedures apply for the solar projects above 500 kW and larger projects may encounter rejection and long delays due to grid capacity.



In Greece, due to grid capacity issues, up until December 2023, 48% of the requested energy communities’ renewables projects have received a notification of inability to connect from the Hellenic Electricity Distribution Network Operator (HEDNO)⁵⁹.



In Germany, solar balcony systems have become increasingly popular as a sustainable solution for energy production. These systems typically consist of one or two solar panels mounted outside a balcony, providing an excellent way for homeowners and renters to generate their electricity and reduce their dependence on grid power.

Nevertheless, balcony photovoltaic systems have faced bureaucratic barriers and limitations that restrict the power generation capacity to within 600 watts for residential installations, hindering many people from adopting this technology. There is currently a debate as to whether a maximum output power of 800 watts will be allowed and where bureaucratic hurdles can be further reduced (administrative procedures with the Federal Network Agency etc.)⁶⁰.

56 <https://www.dlapiper.com/en-au/insights/publications/2023/05/solar-energy-where-does-france-stand-and-what-are-the-consequences-for-the-real-estate-sector>

57 <https://wallace.com/news/how-will-the-breakthrough-package-change-renewable-energy/>

58 https://www.em.gov.lv/en/permits?utm_source=https%3A%2F%2Fwww.google.com%2F

59 The Green Tank, 29.02.2024 Energy communities and self-production in Greece and its lignite areas, Review #5 <https://shorturl.at/wyHS3>

60 <https://www.pv-magazine.com/press-releases/germanys-new-legislation-empowers-balcony-photovoltaic-systems/>

ENERGY SHARING AND COLLECTIVE SELF CONSUMPTION

Why are energy sharing and/or collective self consumption important?

The RED II defines jointly acting renewables self-consumers as a group of at least two cooperating “renewables self-consumers [...] who are located in the same building or multi-apartment block” or, where permitted by a member state, within other premises. From here on, we will use the term collective self consumption (CSC) to refer to “jointly acting renewables self-consumers”. The term “energy sharing” is not further defined in the RED II, however, the revised Electricity Market Design⁶¹ which is currently under a formal adoption process, establishes a definition and clarifies rules.

As we mentioned in the 2022 report *“Energy sharing and collective self-consumption (CSC) can unleash the potential for a massive scale up of solar PV widely across Europe”*, opening new windows of opportunity to the market for rooftop solar. This option enables the participation in collective schemes of citizens who would not have the capital to do it on their own, since buying PV panels in bulk lowers the per unit cost of solar panels and there is no need to buy additional metres and inverters, plus those having less capital may invest in lower percentages and still benefit from solar PV thanks to the possibility to share the investment among multiple participants. Also, 40% of Europeans live in apartment blocks⁶², so with the exception of balcony photovoltaic systems that are promoted in countries like Germany, this is the only option they have to reduce their vulnerability to the electricity market in general and contribute at the same time to the reduction of CO₂ emissions.

From an economic perspective, owners of rooftop solar systems will increase their returns since excess energy can be shared with nearby consumers at rates just below supplier tariffs which is probably more profitable for generators than many feed-in tariffs.⁶³ This will incentivise more consumers to participate in energy sharing or CSC schemes which will accelerate renewable deployment.

Additionally, energy sharing done locally may be considered a flexibility measure, since it incentivises local shifting due to the difference of price between supplier and CSC delivered electricity, and supports the grid due to more efficient usage, reducing congestion and need for additional investments⁶⁴.

Progress at the European level since the 2022 report

Energy sharing and CSC have catalysed the distributed generation deployment such as rooftop solar in Europe. In 2022, 138 GW of solar was installed on Europe’s buildings and the capacity should double.⁶⁵ With this regard, the European Solar Rooftops Initiative announced in the Commission’s REPowerEU Communication, aims at ensuring all Member States allow consumers in multi-apartment buildings to effectively exercise their right to collective self-consumption, without undue costs. Currently, article 21 of the RED Directive states that all final consumers have a right to participate in joint renewables self-consumption, which must be allowed for multi-unit buildings and multi-apartment blocks.

However, this regulation is clearly not sufficient, as nowadays very few Member States have been successful in making use of the potential that offer energy sharing and/or CSC. To address this, among other issues, in December 2023, the Council and the European Parliament reached an agreement on the reform of the EU's electricity market design, in which energy sharing will be facilitated to provide the opportunity to a wider group of consumers to access self-generated renewable energy, whether shared by an individual prosumer with other consumers, or shared between two or more consumers that co-own, lease or rent an off-site generation facility.

61 https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ITRE/AG/2024/01-15/1293668EN.pdf

62 <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20210521-1>

63 <https://www.solarpowereurope.org/advocacy/position-papers/framework-for-collective-self-consumption>

64 <https://www.solarpowereurope.org/advocacy/position-papers/framework-for-collective-self-consumption>

65 <https://www.solarpowereurope.org/insights/market-outlooks/eu-market-outlook-for-solar-power-2022-2026-2>

The reform proposes to guarantee households and SMEs the ability to treat off-site renewables production as self-consumption, as long as production and consumption are carried out within the same bidding zone. It strengthens obligations for network operators to clarify procedures and provide transparency for prospective energy sharing initiatives, while mandating regulators with the task of making sure barriers for citizen energy community projects are removed. It also limits interference from other commercial market actors. Moreover, it facilitates the introduction of plug-in mini-solar systems of up to 800 W capacity in and on buildings⁶⁶. Furthermore, it requires Member States to remove barriers that prevent renewables producers from selling directly to third parties through power purchase agreements (PPAs) and to make sure vulnerable customers have access to energy sharing schemes, are protected from disconnections and can enjoy universal service.

Lack of regulation framework for energy sharing

Despite the clear advantages detailed above, in 2023, from the analysed countries in this report, only Spain, France, Italy and Portugal allow the use of the public grid for CSC or energy sharing. Nowadays, probably France has achieved a more successful implementation, while the other Member States are moving forward. Yet, there remains a substantial amount of work to be done. Greece and Lithuania allow for virtual or remote net metering schemes. Germany and Sweden have introduced local self-consumption approaches without energy sharing or connection to the grid. Other countries, despite announcements or declarations of good intentions, have not achieved yet any clear advancement on the ground. For instance, in Bulgaria energy sharing was included in the recent revision of the Renewable Energy Sources law of 2023⁶⁷ as part of the potential actions and measures to be promoted, but there are no specifications or draft on how the actual sharing will be carried out yet. In Romania, the existing legal framework poses significant challenges for a group of prosumers aiming to share power among installations and consumption sites. However, the revised definition of prosumer (still a draft in November 2023) presents potential opportunities to pave the way for energy sharing.

Proximity and size restrictions

In general, in order to extend the scope of possible participants and therefore maximise the potential of CSC and/or energy sharing, limits to energy sharing and CSC in legal frameworks should be reduced, making proximity requirements and size restrictions permissive. Current best practices are in France and Portugal. For instance, in Portugal, the perimeter is restricted to 2 km on low-voltage, 4 km on medium voltage, 10km on high voltage, and 20 km on very high voltage grids. Alternatively, generation units and consumers must be connected under the same substations. Larger distances may be authorised by the National Licensing Authority (Directorate-General for Energy and Geology) on a case-by-case basis.⁶⁸ On medium, high and very high voltage the CSC needs to be in the same substation.

Larger distances may be authorised by the National Licensing Authority (Directorate-General for Energy and Geology) on a case-by-case basis.⁶⁹ In Spain, a legal reform at the end of 2022 increased the distance to allow energy sharing to 2 km in case of artificial structures, after receiving strong criticisms for the previous 500m limit. With this measure, Spain follows the path of France and Portugal in terms of the legal framework, but there are still many difficulties on the ground. In Greece, energy sharing is implemented using the energy community framework via either the virtual net metering or virtual net billing mechanisms by local authorities, farmers or energy communities formed by citizens or businesses aiming at covering their own electricity needs. Since 2023, virtual net-metering is available to high-voltage consumers regardless of the location where the renewable system is installed, in contrast with the previous framework under which self-consumers were eligible to connect only to low or medium voltage networks.

Energy sharing/Collective self consumption in multi apartments

The option to install solar PV in multi apartment buildings should not depend on the creation of an energy community, since this implies additional bureaucracy work and higher coordination efforts and transaction costs, eventually blocking the potential agreement between neighbours. Up until recently, in Lithuania and Greece, the constitution of an energy community for that purpose was a requirement, but thanks to recent

66 Article 15a

https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ITRE/AG/2024/01-15/1293668EN.pdf

67 <https://balkangreenenergynews.com/bulgaria-simplifies-procedure-for-rooftop-solar-installations/>
<https://www.me.government.bg/bg/library/zakon-za-energiyata-ot-vazobnovyaemi-iztochnici-167-c25-m1515-1.html>

68 <https://www.solarpowereurope.org/advocacy/position-papers/framework-for-collective-self-consumption>

69 <https://www.solarpowereurope.org/advocacy/position-papers/framework-for-collective-self-consumption>

legislative developments, apartments and common areas of the same building in both countries have the possibility of sharing the same solar panels without having to form an energy community, even though there is still work to be done to implement such provisions on the ground.

Majorities needed to reach agreements among neighbours should be easy to achieve as well (for instance, 1/3 in Spain due to a recent legislative reform in 2022), making it more difficult for opponents to block the agreement. In Latvia and Sweden, neighbours may use solar PV for their collective consumption only for their common premises, but the option to distribute electricity to individual apartments is not yet available since the standard practice is that solar PV installations can be connected to a single smart metre and a single electricity contract with the utility.

Role of DSOs

The setting of an adequate legal framework for energy sharing/collective self consumption constitutes a first step in the right direction, but the new rules have to be accepted and internalised by the key actors, which in occasions may exhibit resistance. In Spain, despite the fact that 67% of Spaniards live in multi apartments and despite the existence of a legal framework for energy sharing, the results are discouraging. Although Spain has 5.4 GW of installed self-consumption and has increased by 1,200% since 2018, only 1% of it is collective. According to a recent report from the energy regulator (CNMC), *“unnecessary and unjustified administrative procedures, delays by electricity distributors and disproportionate and continuous requirements hinder the takeoff of collective self-consumption in Spain.”* Currently, CNMC investigates Endesa and Naturgy (2 of the biggest DSOs in Spain) for allegedly putting obstacles to the promotion of collective self-consumption. Due to the importance of the issue, CNMC has recently created a national table inviting the relevant stakeholders in an attempt to address this issue with more than 140 identified barriers⁷⁰.

Flexible and operative business models and agreements

Plenty of options should be available for prosumers to create their own business models and agreements with few restrictions in order to make as easy as possible the development of energy sharing and CSC. For instance, third parties should be allowed to invest since often they are more experienced and have more options to finance installations than consumers, as long as they respect strict consumer rights that protect citizens from this engagement with a business partner. On the other hand, we recognise that there is a higher degree of empowerment for citizens when they take the financial and operative control of the solar installation without any “business” partner involved. The revised rules under Electricity Market Design now allows active customers to appoint a third party as an energy sharing organiser.⁷¹

In France, Portugal and Spain, multiple financing options and potential business models facilitate the installation process for consumers, without restriction for potential participants or regarding the owners/holders of the assets.⁷² With regard to the distribution of electricity, as long as the members agree on it, there should be the option of dynamic distribution, since it adapts better to the real consumption of the participants and promotes their capacity to manage their demand in a more effective way. The French model is also a reference for the implementation of dynamic sharing, which are implemented by default by the DSO on the basis of the consumption of each member at each hour or otherwise agreed, with the support of a software platform that tracks the amounts “sold” and provides a framework for financial transactions.⁷³

To manage all these issues and make the business model operative, CSC entities should be able to designate a legal representative to centralise communication with DSOs and regulators, like in France or Portugal . In Spain, one of the main barriers for the uptake of CSC has been the obligation of all and each of the associated

⁷⁰ <https://www.energias-renovables.com/autoconsumo/la-cnmc-detecta-140-problemas-que-20231201>

⁷¹ Article 15a “ Active customers may appoint a third party as an energy sharing organiser for purposes of: (a) Communication on the energy sharing arrangements with other relevant entities, such as suppliers and network operators, including on aspects related to the applicable tariffs and charges, taxes or levies. (b) provide support at managing and balancing the behind the metre flexible loads, distributed renewable generation and storage assets that are part of the relevant energy sharing arrangement. (c) contracting and billing of active customers participating in energy sharing. (d) installation and operation, including metering and maintenance, of the generation or storage facility; The energy sharing organiser or another third party may own or manage a storage or renewable energy generation facility of up to 6 MW, without being considered an active customer except in the case it is one of the active customers participating in the energy sharing project.” Provisional Agreement https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ITRE/AG/2024/01-15/1293668EN.pdf

⁷² <https://www.solarpowereurope.org/advocacy/position-papers/framework-for-collective-self-consumption>

⁷³ <https://www.solarpowereurope.org/advocacy/position-papers/framework-for-collective-self-consumption>

consumers to sign an "energy sharing agreement" and send it individually to the DSOs, either directly or through its supplier. Notwithstanding, currently the figure of the CSC manager in Spain is in process of being internalised as well by the main energy actors.



In France, thanks to a favourable legal framework for CSC, French grid operator Enedis has identified 187 collective self consumption operations in France as of the end of March 2023. The operations bring together 2,200 consumers and more than 300 producers, generating 11 MW total power capacity, mainly from solar.⁷⁴



In Germany, even though the governmental coalition agreement in 2022 established the clear purpose to provide a legal framework favourable for energy sharing, so far no concrete measures have been adopted up to date. Notwithstanding, the solar package approved in August 2023 by the government will encourage the so-called "communal building supply", according to which it will be possible to use PV electricity within a building together and un-bureaucratically—without having to fulfil all the obligations of an electricity supplier as before⁷⁵.

⁷⁴ <https://www.pv-magazine.com/2023/05/18/france-has-187-energy-communities-in-operation-says-grid-operator/>

⁷⁵ <https://www.bmwk.de/Redaktion/DE/Dossier/Energieversorgung/details-solarpaket.html>

ENERGY COMMUNITIES

Why are energy communities important?

The development of both renewable energy communities (RECs) and citizen energy communities (CECs) may substantially increase solar PV development. Energy communities have been designed on a political and legislative level with the purpose of enabling the collective organisation and participation of citizens in the energy system, thus creating social acceptance and support, empowering citizens, facilitating access to financing and allowing for new business models. Energy communities differ with the concept of energy sharing or collective self consumption in the sense that they are legal organisations, focused around collective decision-making and governance structures. On the other hand, CSC can be understood as the activity of energy sharing between different participants, including the economic and technical requirements of such activity.

RECs and CECs differentiate each other in the sense that the former has stricter requirements related to proximity (participants must be local), autonomy, and eligibility criteria (shareholders or members must be natural persons, SMEs or local authorities) and have the expansion of renewables as their main purpose (other type of energy sources are excluded). CECs have no geographical limitation (participants do not have to be local), can be applied to any type of technology (also non renewables), have more permissive eligibility criteria (they should be effectively controlled by members or shareholders that are natural persons, local authorities or SMEs, but other type of members can participate), but deal with electricity only.

Rooftop solar PV is therefore a type of activity that both RECs and CECs can develop since it fulfils the requirements of both organisations. Energy communities will have a very important role to play in the future expansion of solar rooftop PV, but for that to happen it is necessary that the adequate enabling framework with the right tools of support is designed.

Progress at the European level since the 2022 report

The EU adopted in 2019 the Clean energy for all Europeans package, which introduced the concepts of CEC and REC. The Directive on common rules for the internal electricity market ((EU) 2019/944) enabled consumer participation both individually or through citizen energy communities in all electricity markets, namely by generating, consuming, sharing or selling electricity, or by providing flexibility services. On the other hand, the revised Renewable Energy Directive (2018/2001/EU) enhanced the role of renewable energy communities. In this regulative context, the European Union has continued promoting and financing energy communities through multiple initiatives and programs. More recently, we can highlight the following ones:

- The Energy Communities Repository, launched in April 2022, seeks to assist local actors and citizens willing to set up a CEC or a REC in urban areas through technical and administrative advice.
- The Rural Energy Community Advisory Hub, launched in June 2022, can be understood as the extension of the Energy Communities Repository and the Covenant of Mayors in rural areas.
- The support service for Citizen-Led Renovation is a Commission initiative launched in April 2023 which targets established or planned energy communities that seek support in developing citizen-led initiatives to deliver additional energy renovations and renewable installations in buildings⁷⁶.

It is also important to mention that the EU-wide European Solar Rooftops Initiative, announced in the Commission's REPowerEU Communication, establishes that Member States will work together to set up at least one renewables-based energy community in every municipality with a population higher than 10,000 by 2025; and will ensure that energy poor and vulnerable consumers have access to solar energy, e.g. through social housing installations, energy communities, or financing support for individual installations.

⁷⁶ https://energy.ec.europa.eu/topics/markets-and-consumers/energy-communities_en

Absent or deficient transposition

Despite the deadline being June 2021, some countries, like Sweden, have still not transposed the definitions of CEC and REC into national legislation. Other countries have made progress in transposing the Directive, although the majority have limited themselves to copying the definitions of the Directives without clarifying the key concepts and, above all, without establishing an enabling framework. For instance, Bulgaria and Romania have recently introduced for the first time the definitions of RECs and CECs in their national legislations, but their approach has been to copy paste the definitions from the directives and commission their energy agencies or regulators with the definition of barriers and potential and further development of the legislation.

In Spain, the definitions of both CEC and REC have been transposed into national legislation (CEC was introduced in June 2023), together with their general principles. However, it is still pending further regulatory development and the design of an effective and more concrete enabling framework. In this regard, in April 2023, the Government published the "Draft Royal Decree developing the figures for renewable energy communities and citizen energy communities" which, in case of being approved, would represent a step forward in terms of concretisation. France has adopted 2 different concepts for REC and CEC, but legislation lacks provisions on how REC and CEC should relate to each other. An application decree recently approved in December 2023 elaborates which legal entities are allowed to become energy communities, including joint-stock companies, and cooperative societies. On the other hand, French legislation has not designated any authority to oversee the implementation of REC and CECs⁷⁷.

Enabling frameworks and support measures

Despite only modest regulatory progress in some countries, the initiative of citizens and/or the design of effective support schemes are enabling the widespread adoption of energy communities. Generally speaking, Germany is fairly far behind in terms of transposing provisions of the Directives, since it has only transposed the REC definition and has not provided yet a coherent enabling framework.⁷⁸ But there is a long tradition of energy community engagement based on electricity cooperatives ("Strom-Genossenschaften") which started in the early 20th century and declined since 2013 due to lower feed-in tariffs and the introduction of tendering in 2017.⁷⁹

However, a recent amendment to the Green Renewable Energy Sources Act (EEG) in 2022 exempting solar systems of citizen energy companies of up to 6 megawatts from the requirement to participate in tenders to be able to receive support, created a favourable context again for energy communities⁸⁰. In Spain, the number of energy communities that produce electricity has increased (291 the 4th December 2023)⁸¹, due basically to self-consumption subsidies and the initiative of groups of pioneering individuals, but not because of a stable regulatory framework, which is still lacking. Differently, Lithuania has provided a beneficial enabling framework for energy communities, without need to have a licence as an independent electricity supplier and with clear priorities in the use of the grid. Notwithstanding, it is still burdensome to get an energy community status from the regulator. As of November 2023 only 2 organisations have status of RECs, but none of them produce energy from rooftops.

Respect for the principles and criteria of REC and CEC

In some countries, there is the risk of appropriation of the "energy community" concept by electricity companies and investors who can take advantage of the created incentives to obtain windfall profits at the expense of citizen driven energy communities, while bypassing steps in environmental permitting, avoiding the competition with their peers and securing generous feed-in tariffs. With this regard, it is essential that the transposition reflects a strict adherence to the principles established in the Directive (open and voluntary participation, effective control, proximity criteria and democratic governance).

Greece was a frontrunner in establishing a new type of civil cooperative, the "energy community" (Law 4513/2018), including most of the criteria in the EU directives (effective control, open and voluntary

77 <https://www.rescoop.eu/policy/france-rec-cec-definitions>

78 <https://www.rescoop.eu/policy/germany-rec-cec-definitions>

79 <https://pub.norden.org/nordicenergyresearch2023-03/germany.html>

80 <https://www.rescoop.eu/policy/germany-2>

81 <https://informesweb.idae.es/visorccee/>

participation, local proximity, etc.)⁸². However, the experience has shown that some commercial companies have hijacked the concept of energy community, taking advantage of the existing incentives. In this context, the capacity of commercial renewables projects (mostly PV) selling the electricity they produce to the grid has surpassed the 1 GW milestone (1,064.2 MW), 83 times higher than the installed capacity of self-consumption projects by energy communities (14 MW).

To address this issue, a new law approved in 2023 foresees several measures such as a stricter definition of both CEC and REC and a 20% limit on the profits that can be distributed to the members of the energy communities if they take advantage of priority access to the grid or are eligible for financial support. Similarly, in 2022 in Germany, as a counterpart for the reintroduction of exemptions for ‘citizen energy companies’ from the requirement to participate in tenders to be able to receive support, a stricter definition of citizen energy company was introduced with the purpose to prevent abuse or corporate capture and ensure that the incentives are assigned to citizen driven energy communities⁸³.

Accessibility to low income and vulnerable households

The creation of a regulatory framework for energy communities should go hand in hand with the design of support measures and policies that make it easier for economically vulnerable, energy poor and low income households to become members or shareholders of REC and CECs, for instance giving them the opportunity to participate at no upfront costs in municipal projects or receiving technical assistance. However, accessibility to energy communities of low-income and vulnerable households has not been explicitly foreseen in some countries such as France, Germany or Lithuania⁸⁴. On the other hand, Italy, Greece, Spain and Portugal have included specific provisions in this regard. In Spain, “the “fight against energy poverty” is one of the criteria considered for receiving financial assistance under the umbrella of an Energy Communities programme, and the participation of vulnerable households is prioritised through the involvement of (mainly) municipal administrations in specific RECs.”⁸⁵ Greece has established a concrete approach which offers vulnerable consumers or citizens living under the poverty limit who live in the same district a right to be involved in virtual net metering schemes. Portugal and Italian legislation state that participation in RECs is open to all consumers, including low income or vulnerable households, even though the effective implementation of this provision requires further concretisation.



In Sweden, there has been no transposition at all of the definitions of CEC and REC yet, only a set of recommendations from the national regulator on how to transpose the law.



In France, there is a Roadmap⁸⁶ approved which sets an objective of 1,000 citizen initiatives by 2028 and communicates 10 different measures to make this a reality, such as the promotion of awareness raising campaigns at national level, a significant increase of the staff allocated to advise energy communities or the decrease of the costs for accessing the grid.

82 <https://www.rescoop.eu/policy/france-rec-cec-definitions>

83 <https://www.rescoop.eu/policy/greece-rec-cec-definitions>

84 <https://www.rescoop.eu/transposition-tracker>

85 <https://www.rescoop.eu/policy/spain>

86 https://www.ecologie.gouv.fr/sites/default/files/21191_10MesuresEnergiesRenouvelablesCitoyenne_def_light.pdf

ADDITIONAL MEASURES

Why is it important to implement additional measures like improving awareness, the roll out of smart metres, planning grid investments and training of future workers?

Since 2019, the EU solar market has seen remarkable growth, notably at the residential level and largely in response to the energy price crisis. In Europe, 2023 is the third consecutive year of annual growth rates of at least 40%⁸⁷. This significant advancement goes hand in hand with greater acceptance by society of solar panels, word-of-mouth among potential users is helping to dispel myths and false perceptions about solar PV as an unreliable technology, gradually breaking down these barriers. However, even though it is expected that rooftop solar will continue dominating the market, some estimates indicate that its share will gradually decline over the next four years, influenced by a decrease in residential demand and an increase of large-scale utility plant developments due to an acceleration of permitting processes⁸⁸.

In this context, in order to reach the EU climate and energy goals, it is important that solar PV reaches through effective awareness raising campaigns. These should target individuals with available space for panel installation but who remain hesitant due to misconceptions about its reliability. This must go hand in hand with the installation of smart metres, which allow the participation of more users through collective self-consumption and better management of demand, thanks to real-time, more accurate and regular measurements of consumers' energy use.

Finally, if demand continues to grow at the above mentioned speed, we must anticipate and plan for future needs by training enough EU workers and investing in the grid so that it has sufficient capacity to absorb this additional injection of electricity, together with the necessary flexibility and demand side management measures. Also, many grids are decades old and need to be adapted from the traditional model of large, fossil fuel power plants to wind and solar power generation. For the EU to reach its objectives for renewables and energy efficiency, it is estimated that about €584 billion of electricity infrastructure investments are needed between 2020 and 2030⁸⁹, in particular in the distribution grid.

Progress at the European level since the 2022 report

As part of the REPowerEU plan, the Commission adopted in May 2022 an EU solar energy strategy⁹⁰, which identifies remaining barriers and challenges in the solar energy sector and outlines initiatives to overcome them and accelerate the deployment of solar technologies. This Strategy launched the European Solar Rooftops Initiative, seeking to accelerate the vast and underutilised potential of rooftops through a massive deployment of rooftop solar energy which could mean almost 25% of the EU's electricity consumption.⁹¹ According to the European Commission⁹², if fully implemented, this Initiative will accelerate rooftop installations and add 19 TWh of electricity after the first year of its implementation (36% more than expected in the Fit for 55 projections). By 2025, it will result in 58 TWh of additional electricity generated (more than double the Fit for 55 projections).

The EU Solar strategy also launched the EU large-scale skills partnership in March 2023, to address the skills gap in the EU and promote the development of a skilled workforce in the renewable energy sector. The partnership plans to set a clear vision of concrete upskilling and reskilling measures for solar energy expansion, including training cooperation between companies along the value chain, social partners, training providers, and regional authorities⁹³. As a concrete measure, the EU has introduced a new article in the RES Directive, so that Member States provide “adequate resources to ensure qualified staff, upskilling and reskilling of their

87 https://api.solarpowereurope.org/uploads/SPE_EMO_2023_full_report_c496546963.pdf

88 https://api.solarpowereurope.org/uploads/SPE_EMO_2023_full_report_c496546963.pdf

89 https://energy.ec.europa.eu/topics/markets-and-consumers/smart-grids-and-meters_en

90 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A221%3AFIN&qid=1653034500503>

91 Bódis, K., Kougias, I., Jäger-Waldau, A., Taylor, N., Szabó, S.: A high-resolution geospatial assessment of the rooftop solar photovoltaic potential in the European Union (2019) *Renewable and Sustainable Energy Reviews*, 114, art. no. 109309

92 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A221%3AFIN&qid=1653034500503>

93 https://energy.ec.europa.eu/news/pact-skills-launch-large-scale-renewable-energy-skills-partnership-2023-03-21_en

competent authorities in line with the planned installed renewable energy generation capacity provided for in their integrated national energy and climate plans”.

The Commission has also put in place a supportive framework for the rollout of electricity grids across Europe including the revised TEN-E regulation, the revised Renewable Energy Directive and proposals for a Net-Zero Industry Act and a reformed electricity market design. Finally, it has recently proposed an Action Plan to the main challenges in expanding, digitalising and better using EU electricity transmission and distribution grids⁹⁴.

Awareness raising campaigns

In 2022, the EU installed more than 40 GW of solar, seeing a 47% year-on-year increase from the 28 GW installed in 2021⁹⁵. In 2023, the EU experienced a record year for solar PV, with 55.9 GW installed across the 27 Member States, which means a 40% increase from 2022 and a doubling of the market in just two years⁹⁶. In 2023, 20 Member States achieved their best solar year, and 25 installed more solar than the previous year⁹⁷. This rapid and consistent increase in the production is definitively a good sign that European citizens trust solar PV.

However, there are still significant delays in the deployment of solar rooftop by citizens due to lack of awareness and information, and training programmes for installers. For instance, in Bulgaria, despite its high potential in terms of solar irradiation and the fact that the production cost of solar power has fallen to record lows in recent years, the majority of solar power installations are not on roofs, but on the ground.⁹⁸ So it is essential to design awareness raising campaigns in order to reach the segments of the population more resistant to use this type of technology, often due to myths or misconceptions that have been installed for a long time.

Smart metres

Thirteen of the 27 EU countries have completed their smart metering rollouts with penetration greater than 80 %, with countries like Sweden, Spain and Italy almost having reached 100 %, followed by Latvia and France. Portugal will reach 80% in 2024, but Bulgaria, Germany and Greece, have very few or no smart metres, and Lithuania has barely started their rollout.⁹⁹ Unfortunately, there is a great discrepancy between Eastern and Western Europe when it comes to the rollout of smart metres. According to Eurelectric’s latest Power Barometer, the western part of the European Union has achieved smart metre penetration upwards of 90%, while some countries in Central and Eastern Europe are mostly below 20%. On a positive note, recently in 2023, the European Investment Bank disbursed loans for the rolling out of smart metres in many of the countries that are lagging behind through the Modernisation Fund, such as in Bulgaria, including necessary infrastructure, stage of the project for integration of advanced metering infrastructure^{100,101}.

Grid issues

Many countries, such as Greece, Bulgaria, Italy or Romania¹⁰², are facing serious challenges with the capacity of their grids to accommodate the expansion of renewables. For instance, Bulgaria’s electricity system operator revealed in October 2022 that it had approved applications to build new renewable energy projects with an aggregate installed capacity of more than 24 GW, which doubled the country's installed generating capacity.

The Bulgarian grid operator is now holding meetings with potential investors since it urgently needs to expand its grid to accommodate the planned renewables capacity¹⁰³. In Italy, one of the biggest challenges in the near future will be the transport of renewable electricity from the South and the islands to the Northern consumption points¹⁰⁴. In this context, the revised NECP draft provides clear network planning of transmission capacities until 2030 but does not establish concrete measures to reinforce the distribution grid.

94 https://ec.europa.eu/commission/presscorner/detail/en/ip_23_6044

95 https://api.solarpowereurope.org/uploads/SPE_EMO_2023_full_report_c496546963.pdf

96 Ibid

97 Ibid

98 Ibid

99 <https://www.smart-energy.com/industry-sectors/smart-meters/smart-metering-progresses-in-europe-but-11-countries-have-barely-started/>

100 Future-proofing Central Eastern European Grids for Tomorrow's Energy System, February, 2024, https://caneurope.org/content/uploads/2024/02/CAN-Europe_Future-Proofing-Central-Eastern-European-Grids.pdf

101 https://modernisationfund.eu/wp-content/uploads/2023/06/COMMISSION-DECISION-of-30.05.2023-on-disbursement-of-revenues-of-the-Modernisation-Fund-under-Directive-2003_87_EC-of-the-European-Parliament-and-of-the-Council-Annex.pdf

102 Future-proofing Central Eastern European Grids for Tomorrow's Energy System, February, 2024, https://caneurope.org/content/uploads/2024/02/CAN-Europe_Future-Proofing-Central-Eastern-European-Grids.pdf

103 <https://www.pv-magazine.com/2022/10/10/bulgarian-grid-operator-reviewing-connection-requests-for-24-gw-of-renewables/>

104 <https://www.solarpowereurope.org/advocacy/national-energy-and-climate-plans>

Trained staff

The lack of trained staff affects both the public and private sector significantly reducing the speed at which solar PV penetrates the market. In the 2022 report, we mentioned that countries like Germany, France, Sweden and Spain, were suffering from lack of staff due to a very high demand for solar PV in recent years. With this regard, the EU solar PV sector employed 357,000 full-time equivalent (direct and indirect) jobs in 2020 and this figure is expected to at least double by 2030¹⁰⁵. There is already a lack of skilled workers. This bottleneck could grow quickly if unaddressed.

However, in Spain, a combination of higher interest rates, lower electricity prices and delays in the payment of public subsidies are hindering the installation of solar panels in homes after the boom that occurred in 2022. Union Española Fotovoltaica (UNEF) estimates that in 2023 the Spanish residential self-consumption market will fall between 25% and 50% compared to last year¹⁰⁶. Companies such as Holaluz, Solarprofit and Svea Solar are already negotiating Employment Regulation Files to reduce their workforce. In Sweden, the same factors have impacted in a negative way the growth rate of solar PV in 2023.



The Spanish Institute for the Diversification and Saving of Energy has recently implemented some of the dissemination measures foreseen in the Self Consumption Road Map: the creation of a website with informative tools with the aim of supporting prosumers (including regulations, technical guides, mailbox of doubts and questions, interactive maps, etc); and the resolution of the first call of the program for Community Transformation Offices (OTC) with an award of 20 million euros to a total of 79 offices spread across a large part of the national territory that will facilitate the creation of new energy communities through dissemination, advisory and support measures.



In Greece, HEDNO, the distribution operator, carried out a large tender in 2021 to buy 7.5 million smart meters and install them by 2030. However, one of the participants, Swiss company Landis+Gyr, took HEDNO to court for excluding it from the process over missing documentation. It resulted in a two-year delay. Due to this delay, currently there is a penetration rate of smart metres of only 6%¹⁰⁷. Nowadays, the full nationwide rollout of approximately 7.5 million smart metres is expected to be completed in 2030 with a deployment rate of approximately 1 million metres per year. As a positive note, HEDNO is receiving European Investment Bank support for its 3.12 million first phase smart metre roll out which will run to 2026.¹⁰⁸

105 https://commission.europa.eu/news/focus-solar-energy-harnessing-power-sun-2022-09-13_en

106 <https://cincodias.elpais.com/companias/2023-09-28/unef-asegura-que-el-autoconsumo-residencial-esta-cayendo-de-forma-dramatica.html>

107 <https://balkangreenenergynews.com/central-eastern-europe-severely-lagging-in-smart-meters-rollout/>

108 <https://www.smart-energy.com/industry-sectors/smart-meters/greeces-hedno-to-deploy-3-1-million-smart-meters/>



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Rue d'Edimbourg 26
1050 Brussels, Belgium

info@caneurope.org
www.caneurope.org

