

Future-proofing Europe's energy system with innovative renewables

This year is pivotal for Europe's climate goals and strategies, both in upcoming policies and ongoing security crises. The war in Iran and its neighbourhood highlights the vital need for Europe to urgently scale up investment in locally renewable energy and take leap-steps in commercialising the next generation of renewable energy solutions. The upcoming review of the EU Governance Regulation provides a unique opportunity to bolster EU energy & climate governance but could also – under the guise of “simplification” – be the year that the energy & climate law unravels. The revised [Renewable Energy Directive \(RED III\)](#), adopted in late 2023, laid down the indicative target that 5% of all renewable energy capacity installed in 2030 should be of innovative technology. The Governance Regulation must include this target in the future framework and couple this with EU and national financial instruments and deliver the technologies highlighted in the **supporting annexes**.

Innovative renewables are vital to meet Europe's top energy goals

Whatever ‘simplification’ may come the way of the EU's energy & climate policy, the iRETs target needs to stay. With EU technology producers asking for protection from Chinese, American and other country imports (e.g. [the appeal from some in the PV sector for European content rules](#)), attention to innovation is necessary if EU producers are not to lose ground against their competitors abroad. [Protecting investment into iRETs ensures stability and security](#) of the energy supply in the medium term, industrial strength and competitiveness in the long term, and overall increases system flexibility and lowers cost.

Energy security. Innovative renewables deliver double energy security for Europe; they replace Europe's dependencies on fuel imports with home-grown power and are manufactured by European companies in Europe. This creates a fully secure source of supply, making them resilient to global supply chains' shocks and crises.

System flexibility. To decarbonise its energy system, Europe will continue to see a massive influx of cheap wind and solar on the grid. Power systems will need to become increasingly more flexible to manage peaks and lows as the share of variable renewables grows. Innovative renewables are key to helping Europe optimise its power system and meet supply and demand more efficiently by generating renewable power at different times, at different locations and often using different resources than established renewables. As a result, they can significantly reduce grid management costs and thus energy system costs in Europe.

Competitiveness. Innovative renewables are a key driver of Europe's future industrial competitiveness. Europe does not lead global markets in digital technologies, but has a real chance to dominate world markets in innovative renewables. European companies and research institutes are already global leaders in iRETs. [Europe also leads globally in green inventions](#) related to circularity, energy-intensive industries, and clean transport, and has an opportunity today to secure a share of the massive related global markets and high-skilled European jobs.

A target for innovative renewables is needed to drive market visibility and investment as evidenced with established renewables

[The public consultation open on the Governance Regulation](#) seems to indicate that secondary targets may be eliminated or reduced in related EU legislation. One target that must be maintained is the indicative **innovative renewable energy target in RED III**, which specifies that 5% of all new renewable energy capacity installed in 2030 should be of innovative technology. Today's innovative technology can be tomorrow's widespread technology. Offering specific support to iRETs creates the possibility to drive down the cost of renewable energy, and if such technologies are made in Europe, to keep European manufacturers competitive with their peers abroad.

The first Renewable Energy Directive targets played a fundamental role in the large-scale deployment of wind and solar PV in Europe. They provided long-term market visibility, giving manufacturers and industrial players the predictable demand needed to scale up supply chains, drive cost reductions and ultimately accelerate market uptake. The long-term political commitment provided by targets also delivered the investment and policy signals needed to unlock the large-scale upfront capital required to drive deployments. Market visibility and investment turned wind and solar into full-fledged industrial sectors, delivering power at scale and creating hundreds of thousands of jobs across Europe (see [IRENA's 2025 Annual Review](#)). A dedicated iRET target - including in the 2040 framework - is essential to achieve the same result with innovative renewables.

How to meet the target?

The 5% innovation target is ambitious but achievable, and also necessary (as EUREC showed in [two reports](#)). However, as the [European Commission acknowledges](#), and as shown by [Future Cleantech Architects \(FCA\) in its recent report](#), Member States have insufficiently addressed iRETs in their [National Energy and Climate Plans \(NECPs\)](#). Only ten make a reference to them, of which only five set a target at 5% or more for their deployment in line with the legislation. These references are often high-level and rarely accompanied by quantified deployment pathways, dedicated support measures, or monitoring arrangements, limiting the practical impact of the 5% target.

[Member States](#) need to intervene in the market to reach the many GW implied by the 5% goal. The deployment volumes are too big for R&I budgets to fund. We propose a couple of intervention methods to help Member States implement the target and scale up iRETs:

- Market creation via the Net Zero Industry Act (NZIA)
- iRET-specific support schemes
- New mission for the Renewable Energy Finance Mechanism
- Embedding innovative renewables in NECPs to boost planning and investment

Read more about these suggested support schemes in detail in **Annex 1 - How to meet the target?**.

Improving the definition of “innovative technologies”

A simplification drive could deliver one benefit: it could clean up inconsistencies in the definition of “innovative” when applied to renewable energy technologies or net-zero technologies more broadly, as currently three definitions exist: two in the Net Zero Industry Act (NZIA) and one in RED III. Our suggestion for a standardised definition across texts is:

“Innovative renewable energy technology” means entirely new renewable energy technology or not fully commercial renewable energy technology improving comparable state-of-the-art technology.”

Read more about definitions in **Annex 2: Improving the definition of “innovative technologies”** as well as our indicative list of what would qualify for innovative technologies in **Annex 3: Innovative renewable energy technologies**.

Achieving a diversified and sustainable energy system

In the face of a turn toward simplified processes and a potential fatigue surrounding subtargets, focus must be maintained on long-term goals and the needs of the future energy system. The future European energy system should be secure, flexible, competitive, and sustainable. Innovative renewable energy technologies are an absolutely necessary aspect to this future system. A target is the best way to ensure consistent, long-term support for innovative renewables. By maintaining – even increasing – ambitions for iRETs including the 5% target set by the RED, as well as enacting practical support measures to aid implementation efforts, we are one step closer to achieving Europe’s future sustainable energy system. In contrast, insufficient deployment of innovative renewables this decade risks creating a structural technology gap after 2030, when Europe will require a more diversified and flexible renewable generation mix to meet 2040 and 2050 climate neutrality objectives.



Annex 1: How to meet the target?

[Member States](#) would need to intervene in the market to reach the GW implied by the 5% goal, as the implied volumes are too big for R&I budgets to fund. We propose a couple of intervention methods:

Market creation via the Net Zero Industry Act (NZIA)

Member States should be taking the NZIA "[into consideration](#)" when writing NECPs, particularly with regard to "research, innovation and competitiveness". As of 2026, Member States must design their support for Renewable Energy Sources (RES) via public auctions¹, which includes non-price criteria. The [Industrial Accelerator Act](#) may also require that some net-zero technologies or their sub-components be made in Europe. Alongside these, "innovation" should be used as a non-price criterion, i.e. innovative technologies would be the object of public auctions. As innovation enhances competitiveness, Member States should be encouraged to use this criterion as much as possible.

iRET-specific support schemes

To avoid competition between iRETs and established renewable technologies in existing auctions, iRET-specific revenue or investment support schemes could be established in the form of technology-specific tenders or CfDs.² Incentives for iRETs that are pre-defined and approved by the Commission should not be subject to a state-aid procedure but should be automatically approved.

New mission for the Renewable Energy Finance Mechanism

The Renewable Energy Finance Mechanism (RENEWFM), which stems from the Governance Regulation (Art. 33), ensures enough renewable energy capacity is built across the EU to meet the 2030 RES target of 42.5%, which is binding on the EU but not on Member States' individual contributions. The Commission's 2025 NECP [analysis reveals](#) that while most Member States are in line with the RES target, a "limited ambition gap of 1.5 percentage points remains." RENEWFM is likely to be called upon to fill that 1.5% gap, but it should also fill any foreseen gap in the achievement of the 5% iRETs target by requiring that the missing capacity also be "innovative". More information about RENEWFM can be found in **Annex 4**.

Embedding innovative renewables in NECPs to boost planning and investment

Planning is essential to give innovative renewable developers the regulatory and market visibility they need to deliver projects and ultimately meet the 5% target. Yet in NECPs, innovative renewables are often bundled into R&D measures, failing to adequately drive deployment. NECPs should include a dedicated sub-section for innovative renewables under "National objectives and targets" for renewable energy in line with the reporting logic of the Governance Regulation, as well as a dedicated investment strategy³. A standardised reporting template would enhance transparency, comparability, and monitoring across Member States. Member States should clearly define planned renewable

¹ Article 26 of NZIA

² A non-EU example is the recent Allocation Round 7 of the offshore wind tender in the UK which included a specific allocation for floating offshore wind energy with a separate strike price of 216 GBP/MWh. In Germany, electricity from geothermal gets a remuneration of over 24 ct€/kWh.

³ INI, 2025, Security of energy supply in the EU

deployments by 2030, thereby supporting the Common Implementation and Investment Plans (CIIPs) and facilitating the monitoring of innovative renewables scale-up under NZIA⁴.

⁴ Article 42 of the Net-Zero Industry Act, Monitoring

Annex 2: Improving the definition of “innovative technologies”

A simplification drive could deliver one benefit: it could clean up inconsistencies in the definition of “innovative” when applied to renewable energy technologies or net-zero technologies more broadly. [The Commission has stated](#) that “a definition is often the first step in promoting a specific innovative form of deployment or an innovative renewable energy technology.” Currently, two definitions appear in the Net Zero Industry Act (NZIA)^{5,6} as well as one in RED III.⁷ Our suggestion for a standardised definition across texts is as follows:

“Innovative renewable energy technology” means entirely new renewable energy technology or not fully commercial renewable energy technology improving comparable state-of-the-art technology.”⁸

Illustrations of qualifying iRETs⁹ should be provided (See **Annex 3** for our suggested list), building on the initial list from ‘[Guidance on innovative technologies and forms of renewable energy deployment](#)’ from July 2025, and in the [2026 JRC report on early-stage technologies in the field of clean energy](#). Standing groups of experts mandated to advise on energy innovation policy have existed for some time through the European Technology and Innovation Platforms of the SET Plan and could be utilised to update the lists periodically. These updates would reflect technological progress across the EU and whether a technology remains innovative (by pre-specified parameters such as GW installed in Europe, x% market share, or costs below x EUR/MWh). Both the single, clear definition across EU legislation and a list of indicative pre-approved technologies would help Member States understand better how to satisfy the law, which is a key purpose of simplification.

⁵ NZIA Art. 3: ‘innovative net-zero technologies’ are defined as “net-zero technologies that comprise genuine innovations which are not currently available on the market and that are advanced enough to be tested in a controlled environment”

⁶ NZIA Art. 26: “innovation criteria” signify “providing entirely new solutions or improving comparable state-of-the-art solutions”

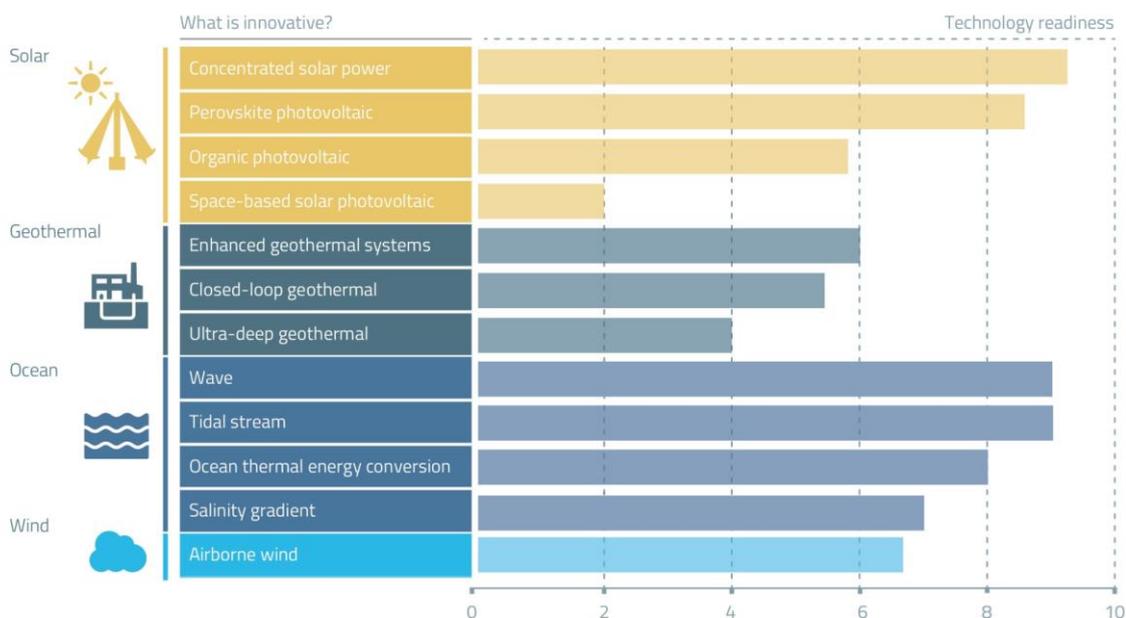
⁷ RED III Art. 2: “[I]nnovative renewable energy technology’ means renewable energy generation technology that improves, in at least one way, comparable state-of-the-art renewable energy technology or that renders renewable energy technology that is not fully commercialized or that involves a clear degree of risk exploitable.”

⁸ In October 2024, [a discussion in the Energy Union Committee centred around the topic of defining innovation](#). According to the record, Member States “asked how innovation would be quantified, particularly whether more efficient turbines or solar panels, which are natural progressions of existing technologies, would qualify as innovation.” The Commission answered by explaining that “innovation covers many dimensions which can lead to an improvement relative to the state-of-the-art.” Our suggested definition therefore builds upon this description by the Commission.

⁹ While innovative forms of deployment can provide system benefits, the primary purpose of the 5% target should be to accelerate new or not-yet-commercial renewable generation technologies and which fundamentally expand the renewable generation portfolio.

Annex 3: Innovative Renewable Energy Technologies

The table below serves as an indicative (not exhaustive) list of what would qualify as iRETs. This list, which does not include technologies under TRL 5, should certainly be amended over time in line with Europe’s technological and industrial landscape. FCA’s list focuses on innovative renewables with potential for the next few years.



Source: FCA analysis and JRC Ocean Energy in the European Union, 2025.

	iRET	JRC analysis¹⁰
Solar	Concentrated solar power	9
	Perovskite PV	7-8
	Organic PV	4-7
	Si-heterojunction (SHJ) PV	Early commercial ¹¹
Geothermal	Enhanced geothermal systems (EGS)	5-6
	Advanced geothermal systems (AGS)	5-6
	Networked geothermal	Early commercial
	Geothermal lithium & other minerals	Early commercial
Ocean	Wave	5-9
	Tidal stream	6-9
	Ocean thermal energy conversion	3-7
Wind	Airborne Wind	3-6 ¹²
	Floating offshore wind	6-9
	20+ MW offshore wind turbines	Siemens Gamesa announced plans to commercialise in Nov 2025

¹⁰ JRC, Clean Energy Technology Observatory (CETO), Status Report of Technology Development

¹¹ ITR PV 16th Edition, published May 2025: SHJ worldwide market share was ~8% in 2024, projected 12% in 2025

¹² Certain systems reach TRL 7-8, according to AWE industry

Note: Annex 4, written by EUREC, has not been consulted with the other signatories of the letter owing to time constraints, and therefore cannot be assumed with certainty to reflect their view.

Annex 4: Updated RENEWFM for the NZIA era

RENEWFM is descended from the Governance Regulation, putting it in the scope of this public consultation. RENEWFM has not been amended since the Governance Regulation appeared in 2018. Much has changed since. For example, the EU now considers it important for a Green Industrial Deal to accompany the Green Deal.

Competitiveness the EU's lodestar – innovation the path to achieve it

Early 2025 brought forth a Competitiveness Compass and a Clean Industrial Deal off the back of the warnings and recommendations of the Draghi Report. NZIA had laid out an industrial policy more interventionist than any in the last 20 years to support net-zero technologies including renewable energy technologies, its provisions now sharpened in the proposed Industrial Accelerator Act. The EU wants to help manufacturers of net-zero technologies on its soil but the mild protectionism offered as one of the IAA's most substantial measures will not be enough. Ultimately, EU-made NZTs will have to compete, if they can't already, with the performance and prices of imports. EU manufacturers must get in shape before the political winds change and EU buyers reject paying more than they have to for the kinds of product they want. The way to increase performance is with research and innovation. All opportunities to support innovation must be seized at the same time as the protections for manufacturers are put in place. This means even RENEWFM should play its part.

NZIA auctions for public support for renewable energy must consider more than just price – RENEWFM must support NZIA

Member States from this year must grapple with auctions for public support for renewable energy that use non-price criteria covering cyber-security, resilience, environmental profile, grid integration and innovation. This is their obligation under NZIA. Their understanding of how to implement non-price criteria favouring innovation is growing, including thanks to the Commission, which provided relevant official guidance in [May 2024](#) and again in [July 2025](#).

The Governance Regulation, in Art 33(2) "mode" ("enabling framework") can cater for innovative technology projects¹. The RENEWFM Regulation, and if necessary the Governance Regulation underlying it, should be updated to match all the other NZIA Art 26 non-price criteria listed above. The Governance Regulation should reference NZIA, specifically its Article 26, to create or strengthen the legal basis for greater use of RENEWFM in Art 33(2) mode in the service of NZIA objectives.

Member States interested in RENEWFM must be steered towards using RENEWFM in Art 33(2) ("enabling conditions") mode if they are behind on their 5% i-RETs target² (which applies to them individually) or behind on NZIA Art 26 auctions. This is in order to release the Commission from having to organise a tender based on price alone, as the other mode of RENEWFM, Art 32(3), requires. If a contributing Member State is behind on i-RETs, then the RENEWFM auction will use innovation as a non-price criterion.

The [Council's amendments](#) to the CEF Regulation under the next MFF indicate greater interest in allocating money to RENEWFM for cross-border RES projects that facilitate grid integration than the Commission proposed. The Council opens the door to doubling the allocation of 5%. While we

welcome the fact that CEF creates a channel for Union funds into RENEWFM, which may be widened, a further source of Union capital for RENEWFM such that it can fund RES projects that are not cross-border may need to be found. The CEF-originated funding may not be suitable for innovative renewable energy technology projects, because cross-border locations may not be the best technically for the innovation concerned, or may over-complicate the project.

Potentially significant input from RENEWFM needed for the 2030 RES target, and significant scope for RENEWFM to assist in meeting the i-RETs target

The Commission has calculated from Member States' final NECPs that the EU will only reach 41% of its final energy consumption from renewable energy, not the legal minimum of 42.5%³. This gap of 1.5%, considered as TWh, would need to be generated by about 75 GW of wind or solar capacity⁴. This of the same order of magnitude of new capacity that should be of 'innovative' renewable energy technology under the RED indicative target.

Such amounts of GW are far more than what could or should be funded with high-aid intensity schemes like Innovation Fund or Horizon Europe. The aim of this i-RETs provision is to help technologies that need little more than some space in the market, not substantial sums for derisking. The target would most realistically be met by CFDs for single-digits GW in each MS, set at a modest premium on average the energy market price, and RENEWFM could provide funding in this form.

As the deadline to deliver on the targets of the RED in force to 2020 approached, MS made greater use of RENEWFM-type mechanisms⁵. Those targets had been binding national targets. MS might take their responsibilities less seriously under the current RED as their national targets and the trajectories to reach them are indicative, meaning the Union itself may need to fill any gap. If a RENEWFM auction is run with Union money, then in that case, too, the auction should help to meet the 5% i-RETs target, as discussed above in relation to CEF.

Amendments to Governance Regulation (and related legislation)

In summary,

1. The RENEWFM parts of the Governance Regulation should be amended to
 - Mandate the Commission to, in priority, organise tenders for contributing Member states that help those MS to meet their Art 26 NZIA obligations, if they have any such obligations outstanding
 - Mandate the Commission to, in priority, organise tenders for contributing Member States that help them meet their indicative targets under the RED, including for i-RETs.
 - ...or do both at the same time
2. The definition of 'innovative renewable energy technology' should be harmonised across the RED and NZIA to avoid legal uncertainty. There are definitions in
 - NZIA Art 26: [an innovative technology would be one that] "provid[es] entirely new solutions or improv[es] comparable state-of-the-art solutions;"

- NZIA Art 3 (12 & 13): e.g. “‘innovative net-zero technologies’ means net-zero technologies that comprise genuine innovations which are not currently available on the market and that are advanced enough to be tested in a controlled environment;”
- RED Art 2: “‘innovative renewable energy technology’ means renewable energy generation technology that improves, in at least one way, comparable state-of-the-art renewable energy technology or that renders renewable energy technology that is not fully commercialised or that involves a clear degree of risk exploitable;”

We propose, “‘*Innovative renewable energy technology*’ means entirely new renewable energy technology or not fully commercial renewable energy technology improving comparable state-of-the-art technology.” [*‘renewable energy technology’ can be replaced with ‘net-zero technology’*]

3. The Governance Regulation must propose a way to capitalise RENEWFM with Union funds, if necessary, that can be spent on innovative renewable energy technology projects (per the definition above) without the constraint that the projects would have to be cross-border.