FEBRUARY 2026

# Clean Flexibility Checklist

Guidelines and best practice principles for data input and analysis for national DSOs and TSOs for **The Flexibility Needs Assessment.**

BEYOND FOSSIL FUELS

CAN CLIMATE ACTION NETWORK Europe

# Introduction and background

The transition to cheap, homegrown renewable energy comes with many opportunities: from greater energy security, to more stable energy costs – as we decouple from highly volatile global fossil fuel markets. To securely integrate renewables into the energy system and make the most of the benefits they offer, it will be important to shift towards more flexible patterns of energy usage.

Energy flexibility is the ability to balance the power system to ensure that electricity supply is always able to meet electricity demand. Flexibility has always been an important part of the electricity system, ensuring it is resilient and responsive to changing conditions.

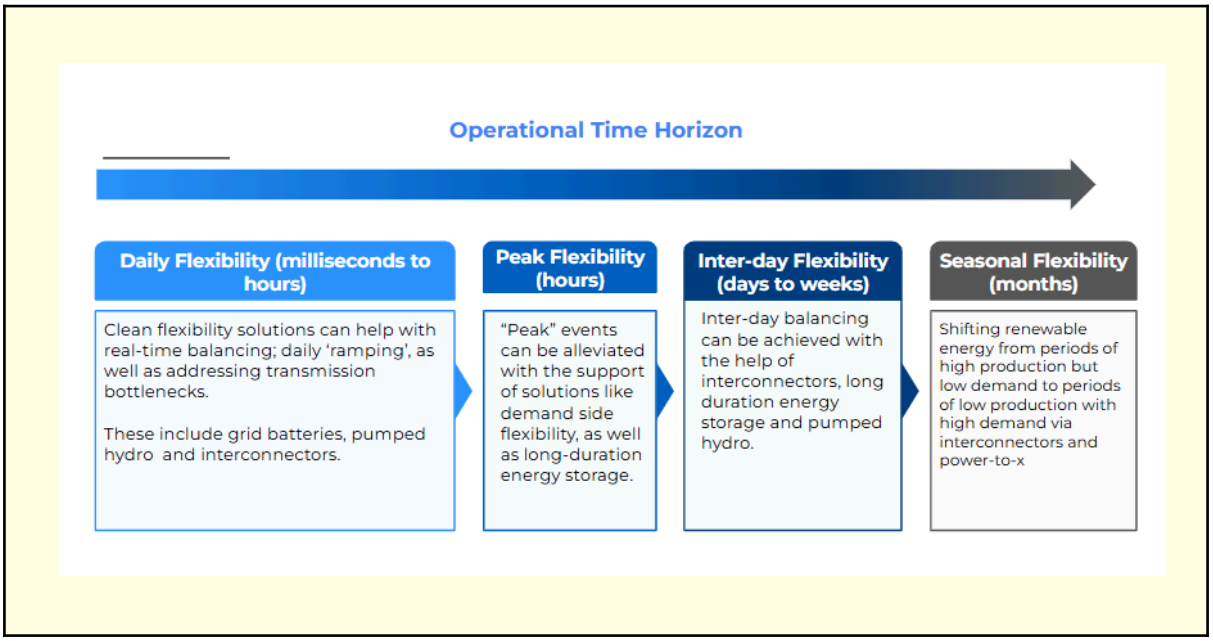
While power systems have historically relied on fossil gas to provide flexibility, clean flexibility is provided by fossil-free approaches. These include mature technologies such as batteries and existing pumped hydro storage, as well as emerging solutions such as EV smart charging and long-duration energy storage. Households and industrial consumers are increasingly playing a role through demand-side response.

**A vision for a flexible energy future: A portfolio of solutions to replace fossil gas**

Clean flexibility can make our electricity system cheaper, more secure and efficient. Clean flexibility capacity in Europe is expected to grow from 150 GW in 2030 to over 700 GW by 2050.[1] By replacing the role currently played by gas in the power system, it provides several benefits to European households, businesses and governments.

Clean flexibility is best understood as a portfolio of solutions that address flexibility needs across time: the benefits to the power system come from deploying the right mix in a timely fashion. This includes demand side flexibility technologies installed by customers that can change how they consume electricity; large energy storage technologies such as batteries, pumped hydropower, and other forms of long-duration energy storage; sector coupling which converts electricity into other forms of useful energy; and grid technologies that help get more capability out of the existing power system.

[1] https://tyndp.entsoe.eu/




***Unpacking the process: what, when and where***

The Flexibility Needs Assessment (FNA) is a mandatory EU process in which each EU country will quantify its power grid's need for flexibility to complement the acceleration of renewables, while maintaining a high level of supply security. This analysis will be used to identify where there are flexibility 'gaps' that can be addressed through new support schemes. These assessments will in turn be used to set national objectives for non-fossil flexibility, aiming to reduce gas reliance and meet 2030 climate goals.[2]

The FNA was introduced by the revised EU Electricity Markets Regulation, adopted into law in 2024.[3] A standardised FNA methodology was developed by European Network of Transmission System Operators for Electricity (ENTSO-E) and the EU DSO Entity; defining data types, formats, and analysis steps for national assessments. This was approved by the Agency for the Cooperation of Energy Regulators (ACER) in July 2025.

The next step is national implementation. National regulatory authorities (NRAs), or another entity designated by the Member State, shall adopt a report by July 2026 on the estimated flexibility needs over a 5-10 year horizon, based on the approved methodology, using data from both Transmission System Operators (TSOs) and Distribution System Operators (DSOs). In the case where a TSO has been assigned the role of designated entity, the NRA shall approve the report, and amend if needed. Once submitted, ACER will assess the national reports – and if necessary, issue recommendations for removing market barriers and ensuring sufficient non-fossil flexibility. Based on assessments, Member States have an obligation to set indicative national objectives for non-fossil flexibility by January 2027.[4]

[2] https://publications.jrc.ec.europa.eu/repository/handle/JRC139027
[3] https://www.entsoe.eu/system-flexibility/
[4] https://www.acer.europa.eu/news/acer-approves-eu-wide-methodology-assess-national-electricity-flexibility-needs

***Follow the cash: how these assessments fit into the struggle for the energy future***

By identifying flexibility "gaps", national governments will have firmer footing for developing supportive policies and funding mechanisms to help ramp up the technologies and incentive schemes necessary.

This is a great opportunity to scale up the clean energy approaches which we need to support a fairer, cleaner energy system. However, there is a risk if countries underestimate the potential of clean flexibility and renewables; the trend of expensive investments in gas plants will continue.

A growing number of countries are looking to adopt capacity markets (CMs) – at least in part to support payments to new and existing gas plants. This has been seen in Germany, Greece, Czechia, Spain, and even Scandinavian countries which were previously opposed to CMs. This is based on the belief that guaranteeing adequate energy resources requires subsidies to compensate power plants for their availability.[5]

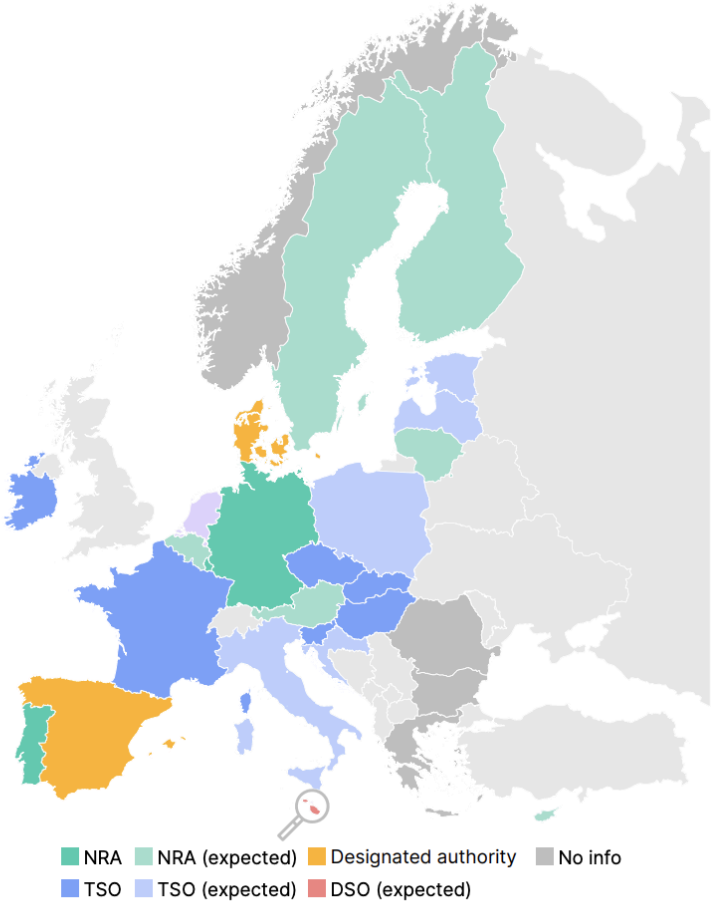
Thus, despite the existence of technical guidelines and methodologies; value judgements and political leanings could influence both the outcomes of the FNAs and subsequent targets and policies. Given the potential implications, there will also be vested interests who may seek to influence the process.

The FNAs must be used as an opportunity to support a new, fairer and more secure energy future. We hope to see Member States using FNAs as a tool to maximise clean flexibility to over time help replace the role of gas in the energy system. We hope this checklist can contribute towards this, by setting stretching yet realistic 'best practice' expectations from which we can evaluate countries' FNAs.

# Purpose of the document and how it is to be used

The purpose of this document is to provide guidelines for national DSOs and TSOs – responsible for providing data to shape Flexibility Needs Assessments – to set out best practice principles for data input and analysis. The other core audience for this briefing is the "designated entity" compiling the FNA, likely to be the NRA, but also in some cases the appointed authority could be the national TSO (see map below).[6]

[5] https://www.bruegel.org/policy-brief/europes-electricity-capacity-mechanisms-need-be-better-coordinated
[6] https://www.acer.europa.eu/sites/default/files/documents/Publications/ACER-2025-Security-of-EU-electricity-supply.pdf




*Source*: *ACER Security of Supply 2025 Monitoring*

A methodology has been developed by EU DSO Entity and ENTSO-E to help guide the development and production of FNAs. Despite providing many clear guidelines; many questions still remain open — not only in terms of what approach to use but, more importantly – how to interpret the results and translate them into targets and policies to support non-fossil flexibility.

This checklist does not seek to replicate or critique the methodology; but rather provide key principles from which we can judge whether the inputs, and therefore the outputs, of the FNA are aligned with a fast and fair energy transition.

In the future, we will use this checklist to assess national FNAs to see how they align with the best practice principles set out in this document. We will use it to compare good – and bad – practices, and evaluate national FNAs as they are published.

# Checklist summary ✔️

✔️**Prioritise clean flexibility[7] over fossil gas.** In order to reap the benefits of cheap, clean, homegrown renewables – and boost energy security via ending dependence on fossil gas imports – it will be key for the Flexibility Needs Assessments (FNAs) to explicitly prioritise clean sources of flexibility over fossil gas. Key for success will include:

- A commitment to adopt an ambitious clean flexibility target in line with EU and national climate and energy targets, via their obligation to define a national objective for non-fossil flexibility.
- A commitment to publish a Clean Flexibility Policy Roadmap to scale-up batteries, long-duration energy storage, interconnection and demand side response, including the development of non-fossil flexibility schemes.
- A comprehensive analysis of policy and market barriers for clean flexibility, such as capacity markets which prioritise flexibility from fossil gas.
- "Hydrogen ready" gas plants should not be counted as clean flexibility until they have been converted to 100% renewable hydrogen, nor should CCS-fitted power plants.

✔️**Use robust, independent and transparent data sources.** The targets and analysis which come out of FNAs will only be as strong as the data inputs that are fed into them, and the modelling methods that assess them. Key indicators for success will include:

- Modelling assumptions that do not contain a bias favouring incumbent, fossil assets.
- Use renewable and efficiency targets in modelling which reflect climate goals and on-the-ground advancements in the clean flexibility sector.
- Transparent and reliable data sources and scenarios, and the use of open-source modelling; with coordination among national and European data sources .

✔️**Ensure an inclusive approach to clean flexibility to maximise benefits-sharing.** The shift to a more flexible energy system should be designed in a way to ensure that market barriers are removed and the cost-saving benefits are spread in a socially-fair way.

[7] Throughout the checklist and policy briefing; clean flexibility and fossil-free flexibility are used to refer to the portfolio of solutions which can replace fossil gas in the power system. The FNA is principally aimed at scaling demand side response and energy storage.

- Consideration of energy tariffs that enable and incentivise households and businesses to share in the benefits of flexible energy use. This could also include redistributive approaches (like social tariffs) to ensure homes in energy poverty can also access the benefits.
- Measures to support a more socially inclusive approach to smart electrification – for example, supporting household measures like smart meters, home retrofits, and batteries in combination with solar PV.
- Consideration of how to better support projects that support community benefits – including social housing projects, energy communities and public buildings – to use energy flexibility; so it is not just large energy companies benefiting from support measures.

✔️**Include a robust and climate-aligned understanding of electrification profile.** A robust understanding of the energy demand side – such as heat pumps, electric vehicles, and industrial electrification – will be key to estimate the future possibility of flexibility measures like vehicle-to-grid and demand side response. While the electrification of heating, transport and industrial sectors will be a critical enabler of climate goals; over-hyped electricity demand projections for data centres could undermine progress towards emissions reductions. We will therefore look to ensure that Member States have properly considered these opportunities and challenges.

- FNAs should include a climate-aligned understanding of electrification of heating, transport and industrial sectors when considering future electricity demand.
- FNAs should properly consider the risks associated with overstating potential increases in electricity demand, particularly that related to growth in data centres and other significant load drivers, including electrolysers and industrial electrification.

✔️**Cross-border coordination.** Better interconnectivity will be key to meet future energy demand in the cleanest, most efficient way. However, at present, many TSOs and governments have a tendency to fall back on national resources. Factors for success could include:

- Optimisation of cross-border clean flexibility opportunities to properly consider potential benefits and efficiency gains.
- Consideration of the 15% interconnection target and 70% cross-border energy target.
- Regional collaboration between TSOs and NRAs to inform FNAs.

# Understanding the key criteria: Unpacking the core elements of the checklist

## Prioritise clean flexibility and renewables over fossil gas

In order to reap the benefits of cheap, clean, homegrown renewables – and boost energy security via ending dependence on fossil gas imports – it will be key for countries to prioritise clean sources of flexibility over fossil gas. Clean flexibility reduces reliance on gas, which was responsible for the ten-fold increase in electricity prices during the energy crisis of 2021–2022.[8] It also insulates Europe from price volatility in the global LNG market.

The rationale behind the introduction of FNAs is to support the adoption of non-fossil flexibility – specifically demand side response and energy storage – instead of fossil flexibility.[9] However, the assessments could have implications for fossil gas if they underestimate clean flexibility potential. For example, a DSO that does not have robust evidence about home installations of EV chargers, behind-the-meter batteries and technologies may significantly underestimate the flexibility potential of the network. This could lead to the conclusion that there will be an adequacy problem without more gas plants.

Another means by which countries might underestimate the full potential of clean flexibility is whether they are interpreted by Member States simply as a means to reduce levels of renewables curtailment; or whether they are understood as a tool to help more profoundly reshape the energy system.[10]

Renewables curtailment, whereby renewable generators are forced to reduce their output due to grid or market constraints, is an concerningly large-scale issue across Europe. Congestion management costs in Europe reached €8.9 billion in 2024; while 72 TWh of mainly renewable generation was curtailed.[11] If the wasted renewable energy had been stored or used flexibly, it could have thus not only have saved the countries billions of euros; but also have prevented the need for subsequent gas generation.

However, beyond reducing renewables curtailment and congestion more generally, there are other, more system-changing ways in which clean flexibility could benefit the energy system. In addition to 'absorbing' renewable energy which currently goes to waste, it can also be understood as a way of injecting new capacity into the energy system to support resource adequacy – and therefore displacing gas plant usage.

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[8] https://www.europarl.europa.eu/RegData/etudes/STUD/2023/740094/IPOL_STU(2023)740094_EN.pdf
[9] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202401747
[10] https://www.agora-energiewende.org/publications/making-the-most-of-green-electricity
[11] https://auroraer.com/company/press-room/europes-three-fold-solar-and-wind-growth-sparks-urgent-grid-investment-aurora-finds

Resource adequacy is understood as having enough electricity assets (generation, storage, demand response, interconnectors) to reliably meet current and projected demand, balancing system needs under various scenarios.[12] There is an unclear delineation between national resources adequacy assessments (RAAs)[13] and FNAs. RAAs generally heavily rely on thermal assets like gas plants. It is likely the case that a significant share of the electricity supply which is today met via gas plants, could in the future be replaced with clean flexibility solutions. Thus, FNAs could be used as a tool to complement, addressing the underrepresentation of clean flexibility.[14]

***How clean flexibility could reduce gas plant dependency in Germany***

Renewables curtailment is an expensive problem in Germany, where 4.38 TWh of renewable energy was curtailed in the first six months of 2025.[15] This is equivalent to the combined generation of Germany's four largest fossil gas power plants,[16] which accounted for over 3 GW of installed capacity, over the same period.[17] If clean flexibility solutions had been able to capture this wasted energy, there would have been significant system savings.

However, focusing on curtailment reduction alone is only one side, the other is clean power can be reinjected into the energy system to reduce reliance on gas plants. In 2025, Germany announced its new Power Plant Strategy to build 20 GW of new gas turbines for electricity. This was then scaled back to 10 GW of gas, with another 2 GW to be decided between gas or longer duration energy storage. Already, the argument to use sources of non-fossil flexibility helped lower gas expansion ambitions. FNAs should also evaluate how to use non-fossil flexibility to reduce the use of gas turbines, both existing and projected.

The Commission is aware of the interrelation between the FNAs and RAAs and encourages harmonisation; but there remains much scope for Member States to interpret the extent to which they will target to replace current use of fossil fuels, which contribute to resource adequacy, with clean flexibility.

[12] https://www.entsoe.eu/eraa/
[13] The resource adequacy assessment ("RAA") is conducted using probabilistic models taking into account the most likely scenario of future supply and demand, current and future grid characteristics, weather impacts, etc. RAAs are technical-economic prospective studies and therefore represent a probable vision of what a power system (European, regional, national) will look like in the mid to long-term.
[14] https://www.agora-energiewende.org/fileadmin/Projekte/2025/2024-27_EN_EW_Flex-Assessment/A-EW_365_PST_Flex_Assessment_WEB-1.pdf
[15] https://www.smard.de/page/en/topic-article/212250/214114/redispatching-by-energy-source
[16] Emsland D, Irsching 5, Knapsack 1, and Herne
[17] Beyond Fossil Fuels own analysis, based on ENTSO-e data.

We encourage Member States to take this additional step – beyond just viewing clean flexibility as a way to reduce renewables curtailment – but more fundamentally to challenge the status quo reliance on fossil fuels for resource adequacy.

We will assess whether NRAs, TSOs and DSOs are acting in this spirit and working to fulfil the potential of clean flexibility and looking to displace fossil gas as the principal source of system adequacy.

Key for success will include:

- **A commitment to adopt an ambitious clean flexibility target in line with EU and national climate and energy targets.** All EU countries have committed to the EU target of net zero by 2050, and have agreed to 2030 climate, renewable energy and energy savings targets with 2040 targets under discussion. Each country should commit to adopt an ambitious national clean flexibility target that will accelerate the scale up of clean flexibility technologies and displace fossil gas plants to further the decarbonisation of its power sector in line with these targets.
- **A commitment to publish a Clean Flexibility Policy Roadmap to scale-up batteries, long-duration energy storage, interconnection and demand side response.** Each country should commit to publish a Clean Flexibility Policy Roadmap that will set out how the government will maximise all forms of clean flexibility over fossil fuel sources of flexibility; including to displace existing fossil infrastructure.
- **A comprehensive analysis of policy and market barriers for clean flexibility, such as capacity markets which prioritise flexibility from fossil gas**. The FNA report must include an analysis of barriers for clean flexibility. This analysis should be broad and include elements such as existing market mechanisms that favour fossil gas (such as capacity markets), lack of market access for clean flexibility, grid constraints, delayed digitalisation and a lack of incentives and information for all categories of customers.
- **"Hydrogen ready" gas plants should not be counted as clean flexibility until they have been converted to 100% renewable hydrogen, nor should CCS-fitted power plants.** While the Commission makes clear that when referring to clean flexibility, it is referring to storage and demand side flexibility, some countries may seek to include gas plants which theoretically might be converted to hydrogen, CSS or biogas within their classification. This risks fossil-fuel lock-in due to the significant uncertainties around these technologies and could crowd out investment for cleaner forms of flexibility.

## Robust, independent and transparent data and analysis

FNAs outcomes will only be as strong as the data inputs that are fed into them, and the modelling methods that assess them. If there are significant gaps in the data, or certain

assumptions are made when undertaking modelling exercises, this could lead to inaccurate conclusions, likely to underestimate the clean flexibility potential.

The FNA methodology provides a strong basis upon which to ensure robust data standards – although there is leeway built in to adapt for national and local circumstances. For example, DSOs are allowed to use their own assumptions, scenarios, methods or data; where information is "unavailable or insufficient".[18] However, even with these requirements and guardrails in place, limitations and weaknesses in the data may still be present.

Concerns regarding the adequacy of data are likely to be particularly elevated at the DSO level. DSOs will play a particularly important role in helping understand the potential for demand side response technologies – and then in turn, helping to unlock these opportunities. However, there is limited data transparency across many of European DSOs; raising questions regarding knowledge of existing capacity in grids, local energy usage, installations of demand-side measures (such as heat pumps and EV chargers), as well as installations of household renewables and batteries.

Distribution Network Development Plans (DNDPs) are expected to be the main data source for the distribution level under the FNA methodology.[19] However, ACER and CEER[20] note a wide variation in the number of DSOs currently considering flexibility in their DNDPs.[21] Incentive frameworks for DSOs still encourage a focus on capital expenditure measures, which can reduce focus on non-wire, flexibility upgrades. [22]

A lack of uniform digitalisation contributes to this concern, with a 'substantial' spread in DSO digital maturity noted in a recent survey.[23] The legacy grid infrastructure (40% of the grid over 40 years) and technology systems are decades old and not suited to use the many data points being added to the grid system. Some areas are highly influenced by regulation policies (e.g., smart meter roll-out, data usage, and readiness of the flexibility market).[24] According to a recent survey, at the end of 2024, over 40% of EU households still did not have smart meters[25] – with numbers particularly low in Germany, Croatia and other countries opting out of the smart meter roll out altogether.[26] We note that these challenges point to the

[18] https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/ACER-Decision-05-2025-FNAM-Annex-I.pdf
[19] https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/ACER-Decision-05-2025-FNAM-Annex-I.pdf
[20] https://static.smartgridsinfo.es/media/2025/08/ACER-CEER-electricity-distribution-network-planning-guidance-2025.pdf
[21] Considered by all DSOs: the Flemish region in Belgium, Croatia, Denmark, Estonia, Finland, Hungary, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden; Considered by some DSOs: Austria, Germany; Planned for next iterations: Czech Republic, Italy, Luxemburg.
[22] https://www.researchgate.net/publication/371447952_Regulatory_Challenges_for_Energy_Infrastructure-Do_Electricity_Distribution_Remuneration_Schemes_in_Europe_Promote_the_Use_of_Flexibility_from_Connected_Users
[23] https://powersummit2024.eurelectric.org/wp-content/uploads/2024/05/Wired-for-tomorrow-full-report.pdf
[24] https://powersummit2024.eurelectric.org/wp-content/uploads/2024/05/Wired-for-tomorrow-full-report.pdf
[25] https://powersummit2024.eurelectric.org/wp-content/uploads/2024/05/Wired-for-tomorrow-full-report.pdf
[26] https://www.berginsight.com/smart-electricity-meter-penetration-rate-in-europe-reached-63-percent-at-the-end-of-2024

need for a wider suite of policy changes to future-proof the distribution grid to support a fair and fast energy transition.[27]

All this means that the data held by DSOs is unlikely to reliably depict the full potential that could be realised from demand side flexibility. When compiling the FNAs, we encourage NRAs to draw from a wide range of expert, independent data sources which might be able to provide more comprehensive and forward looking estimations, taking into account the role that supportive policy measures could play.

Meanwhile, at the TSO level, other data challenges can come into play. While TSOs generally will have access to much better data, and are more highly digitalised, certain issues may occur which lead to an underestimation of clean flexibility technologies.

This includes the work assigned to TSOs to understand energy system needs.[28] Resource adequacy models can be biased in support of gas due to structural issues, including an overemphasis on cost minimisation that favours established infrastructure. Grid operators and planners have historically underused novel assets for security purposes, particularly batteries, and took some time to accept the important role of synthetic inertia. Assessments can overstate resource needs if they underplay cross-border availability.[29]

There can also be inaccuracies in how these models account for the growth of renewable energy and clean flexibility assets. Since modelling tends to project trends from the past into the future, it is very hard for models to accurately predict the possible take off of these technologies. When these contributions are underestimated, firm dispatchable sources – often gas plants in the modelling framework – appear more necessary.

These modelling issues play out in recent assessments. Ember points out that battery storage deployment trajectory in European Resource Adequacy Assessment (ERAA) 2025, which assumes 136 GW installed in Europe by 2030, is lower than recent industry outlooks and not aligned with existing policy targets. The latest European Association for Storage of Energy outlook suggests that Europe's battery capacity could reach 163 GW by 2030, with an additional 128 GW of batteries projected to be added to European grids, up from 35 GW installed at the end of 2024. For some countries, such as Spain and Greece, ERAA assumptions on installed battery or storage capacity by 2030 are lower than what is assumed in the final National Energy and Climate Plans (NECPs), highlighting a potential disconnect with policy targets.[30]

The trend of underestimating the trajectory of clean technology may be most consequential when looking at weekly and monthly flexibility requirements, where an injection of power is

[27] You can find our recommendations here: https://beyondfossilfuels.org/wp-content/uploads/2025/11/Report_DSO_From_gatekeepers_to_enablers.pdf
[28] https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/ACER-Decision-05-2025-FNAM-Annex-I.pdf
[29] https://www.bruegel.org/policy-brief/europes-electricity-capacity-mechanisms-need-be-better-coordinated
[30] https://ember-energy.org/app/uploads/2025/04/Ember_ERAA2025_consultation_response.pdf

needed less often, but at crucial moments for often longer durations. Underestimating the role of Long Duration Energy Storage (LDES) technologies could mean an expansion of gas turbines or a delayed phase-out from coal.

Therefore, while it will be important to support alignment between FNAs and resource adequacy assessments, there is a need to ensure that any pro-fossil biases or assumptions are not mirrored in these assessments; which could undermine the ambition of FNAs.

Another area where clean energy potential could be underestimated is via use of renewables targets to form assessments which do not reflect progress on the ground. In the FNA methodology, 'renewables target' refers to the national estimated share of renewable energy in the electricity sector included in the most recent NECP or from another relevant official national document consistent with the most recent NECP.[31]

A number of Member States' NECPs fall short of what would be needed to meet climate targets;[32] and furthermore are failing to keep pace with progress on the ground. For example, Italy underestimates the capacity for installation of renewables, despite studies indicating a much higher potential than in the NECP update.[33] Using renewable targets which do not reflect on-the-ground growth in these sectors could lead to an underestimation of the level of clean flexibility the future energy system could need.

Key indicators for success will include:

- **Modelling assumptions that do not contain a bias favouring incumbent, fossil assets;** but take an innovative approach to better understand the potential of clean flexibility. Assess to ensure that factors that could result in an overestimation of the amount of fossil capacity needed for resource adequacy do not dampen the ambition of FNAs. Modelling assumptions and inputs, such as future technology growth, should be subject to a public consultation.
- **Use renewable energy and energy savings targets in modelling which reflect climate goals and on-the-ground sector growth.** NECPs should be considered as the minimum, rather than the limit of potential renewables growth – with wider trends taken into account to understand more scenarios which could see much faster growth.
- **Transparent and reliable data sources and open-source modelling** – drawing on diverse and most recent sources of information, including academic, and independent studies (as well as TSO, DSO, JRC and industry data).

[31] https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/ACER-Decision-05-2025-FNAM-Annex-I.pdf
[32] https://1point5.caneurope.org/necps-assessment-report/
[33] https://1point5.caneurope.org/necps-assessment-report/

## Ensure an inclusive approach to clean flexibility to maximise benefits-sharing

The shift to a more flexible energy system should be designed in a way to ensure the cost-saving benefits are spread in a socially-fair way. The FNA report must evaluate the barriers for flexibility in the market and propose mitigation measures and incentives – including the removal of regulatory barriers, and possible improvements to markets and system operation services or products.[34] However, there is limited guidance in the FNA methodology to support NRAs[35] to undertake this analysis in a manner which supports a socially inclusive approach to clean flexibility.

In the EU, between 8% and 16% of the population lives in conditions of energy poverty – meaning they cannot reliably access essential energy services, such as heating, hot water, cooling, lighting and energy to power appliances.[36] Energy bills and energy affordability remain high on the political agenda across the EU. In February 2025, the Commission published the Action Plan for Affordable Energy, which included a number of areas related to flexible energy use.[37] The complete delivery of an electricity system underpinned by market integration, renewable generation and flexible capacity could result in 40% lower wholesale electricity prices on average in the EU.

Thus, the incorporation of socially inclusive measures when formulating the national FNA will be an important opportunity to address energy poverty and ensure the benefits of clean energy are more fairly distributed. For example, a FNA which only focuses on large-scale, privately owned storage assets may be missing out on opportunities to enable more people to participate – and ultimately, greater overall system savings and a large capacity of non-fossil flexibility.

Flexibility of demand is key to reducing costs for all, by aligning electricity use with periods of plentiful, low-cost renewable generation and by minimising the network upgrades needed to accommodate peaks in demand.[38] However, at present, it is neither easy nor especially attractive for domestic and business energy users to shift their electricity usage to times of high renewable generation – despite the significant cost savings this can offer. For schemes,

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[34] https://eepublicdownloads.blob.core.windows.net/public-cdn-container/clean-documents/sdc-documents/flexibility-needs/250424_Presentation_Public_webinar.pdf

[35] The guidance is limited to the following: For the purpose of evaluating the barriers for flexibility in the market and the contribution of digitalisation in the FNA report pursuant to Article 19e(2), points (c) and (d) of the Electricity Regulation, the TSO(s) and/or DSOs shall provide, where relevant, data for the following categories: a. Lack of proper legal framework for market access to new entrants and small actors b. Lack of enablers and incentives to provide flexibility c. Restrictive requirements to provide balancing services d. Restrictive requirements to provide congestion management e. Complex, lengthy, and discriminatory administrative requirements f. Lack of regulatory incentives to system operators to consider non-wire alternatives.

[36] https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/whos-energy-poor-eu-its-more-complex-it-seems-2024-09-25_en

[37] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52025DC0079&qid=1741780110418

[38] https://www.raponline.org/knowledge-center/flex-ability-for-all-pursuing-socially-inclusive-demand-side-flexibility-europe/

technologies and offers to be genuinely inclusive, they must be accessible to lower-income and vulnerable households while also serving their energy needs.[39]

The Regulatory Assistance Project (RAP) notes that the barriers low-income and vulnerable households face can include energy-inefficient homes with fewer flexibility-enabling assets (smart meters, controllable electric loads, storage and generation) and lack of high-speed internet connection. Other barriers can include limited personal agency, particularly for tenants; upfront cost; lack of information and awareness; and mistrust of energy companies. Moreover, technology innovation and adoption favour the more affluent early adopters, meaning that technologies and services are designed with these households in mind.[40]

Although all users on a system benefit from the significant collective gains derived from system flexibility, more affluent groups are far more likely than others to enjoy the additional layer of value obtained from direct flexibility participation.[41] Thus, while it will be critical to take steps to support affluent early adopters of technologies like electric vehicles and heat pumps to participate in flexibility schemes; these households should not be the only ones to share in the benefits.

Authorities responsible for compiling the FNA should also consider the role of projects that support direct community benefits; and consider how FNA can help further support these kinds of initiatives. For example, there are schemes under development that enable social housing buildings to save money through flexible energy use of electric storage heating and hot water;[42] as well as initiatives to equip social housing with batteries and solar to support lower bills for residents.[43] There are also examples of community energy storage underway in a number of countries, allowing neighbourhoods to maximise the benefits associated with local renewable generation.[44]

Key aspects that should be considered when compiling the FNA report should include:

- **Consideration of energy tariffs that enable and incentivise households and businesses to share in the benefits of flexible energy use.** This could also include redistributive approaches to ensure homes in energy poverty can also access the benefits. These can help build a bridge to flexibility through low-risk and upside-only retail offers.
- **Measures to support a more socially inclusive approach to smart electrification** – for example, supporting household measures like smart meters, home retrofits, and

[39] https://www.raponline.org/knowledge-center/flex-ability-for-all-pursuing-socially-inclusive-demand-side-flexibility-europe/
[40] https://www.raponline.org/knowledge-center/flex-ability-for-all-pursuing-socially-inclusive-demand-side-flexibility-europe/
[41] https://www.raponline.org/wp-content/uploads/2023/12/rap-yule-bennett-sunderland-flex-ability-all-socially-inclusive-demand-side-flexibility-europe-2024-january.pdf
[42] https://www.energyunlocked.org/247-cfe
[43] https://www.socialenergyplayers.eu/news/missed-the-webinar-on-energy-sharing-with-vulnerable-households/
[44] https://www.euro-inox.org/how-europes-solar-storage-revolution-is-reshaping-grid-stability

behind-the-meter batteries. Policies should prioritise lower-income households for energy efficiency upgrades and flexibility-enabling technologies.

- **Consideration of how to better support projects that support community benefits** – including social housing projects, energy communities and public buildings – to use energy flexibility; in order to maximise all potential benefits.
- **Clear and simple information and advice for households**, including socially disadvantaged households, allowing them to make informed decisions on their participation.

## Include a robust and climate-aligned understanding of electrification profile

The FNA report will provide an estimation of the national flexibility needed for a period of at least the next 5 to 10 years – and thus will necessarily make assumptions stretching into the future. A robust understanding of the energy demand side – such as building renovations, heat pumps, electric vehicles, and industrial electrification – will be key to estimate the future possibility of flexibility measures like vehicle-to-grid and demand side response. Electrification of heating and cooling, transport and industrial sectors is key for reducing emissions, which will lead to an increase in electricity demand, but an overall reduction in energy due to efficiency gains. With the right smart-enabled technologies, efficient electrification can help people to benefit from cheap, plentiful renewables.

On the other hand, increased electricity demand from other energy-hungry sources – most notably, the recent growth in data centres – could undermine progress towards emissions reductions. Without guardrails in place, the energy needs of data centres could outstrip the growth in renewable energy in certain places – meaning that renewables would fail to displace overall fossil fuel use in the economy.[45] Whether data centres' enormous energy use can become part of demand side response is hotly debated, but the current reality is that they perform little, if any flexibility, due to a number of technical, operational, and financial issues.[46]

The demand profile used to calculate resource adequacy and flexibility needs assessments will therefore be crucial. If the actual demand growth is lower, the rationale for building new fossil gas capacity weakens. There are wide ranging predictions on power demand trajectories. Governments and system operators have projected that power demand in major European countries could increase by as much as 7% per year by 2030; but the consultancy McKinsey has suggested that up to 40% of the modeled growth might never materialise, due to a range of actors including energy efficiency gains, structural economic changes (like deindustrialisation), and milder winters reducing heating demand.[47]

[45] https://beyondfossilfuels.org/wp-content/uploads/2025/02/SystemOverload_Report_BeyondFossilFuels.pdf
[46] https://www.ams.sunysb.edu/~zhliu/DCDRsurvey.pdf
[47] https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/electricity-demand-in-europe-growing-or-going

Under the FNA methodology, TSOs are responsible for providing demand data to be fed into the final report, including a breakdown of implicit demand side response (iDSR) profiles (electric vehicles, heat pumps, behind-the-meter batteries).[48] DSOs are not asked to provide granular information on demand, but this will need to be taken into account when calculating network flexibility needs.

It is welcome that FNAs will need to consider scenarios aligned with NECPs, but this might not be enough to ensure this aligns with necessary electrification levels for the decarbonisation of heating, ventilation and air conditioning (HVAC), transportation and industrial sectors. It has been noted that there is not enough focus on electrification in NECPs, with very few countries explicitly setting a target electrification rate for 2030, and in some cases, a lack of detailed plans for the decarbonisation of these key sectors including heating and industry.[49]

The same critique might be levelled at the European Resource Adequacy Assessment (ERAA). Ember notes that ERAA 2025 preliminary values for demand side flexibility potential by 2030 (39 GW across the EU) are significantly lower than industry assessments, which anticipate around 160 GW and 130 GW of upward and downward flexibility respectively in the EU by 2030. Moreover, for the large majority of EU countries, the demand shifting potential from EVs and heat pumps by 2030 is assumed to be zero in ERAA 2025. [50] Meanwhile, ACER has critiqued the ERAA for assuming particularly steep increases in electricity demand (particularly in Germany), and called for more transparency in the tools used to predict demand growth, to enable a more informed public discussion.[51]

The FNA presents an important opportunity for Member States to take a fresh look at modelled trajectories for electricity demand, and address issues which have been previously highlighted. NRAs can work with TSOs and DSOs to consider how electrification plans for HVAC, industry and transport can be used to support a smarter, digitalised flexible energy system. At the same time, they must work to ensure that the data centre 'hype' does not lead to overinflated rates of projected electricity demand.

- **FNAs should include a climate-aligned understanding of electrification of heating, transport and industrial sectors** when considering future electricity demand – while at the same time considering how plans to decarbonise these sectors can contribute to a more flexible energy system. TSOs and NRAs can draw on a wider range of data

[48] https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/ACER-Decision-05-2025-FNAM-Annex-I.pdf
[49] https://www.eurelectric.org/wp-content/uploads/2024/06/necp-review_final.pdf ; https://www.ehpa.org/wp-content/uploads/2023/11/20231115-Analysis-of-heat-pump-measures-and-targets-on-Draft-NECPs.pdf
[50] https://ember-energy.org/app/uploads/2025/04/Ember_ERAA2025_consultation_response.pdf
[51] https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions/ACER-Decision-07-2025-ERAA-2024.pdf

to calculate potential uptake, and to understand how this demand might be used in a more flexible way.

- **FNAs should properly consider the risks associated with overstating potential increases in electricity demand,** particularly that related to growth in data centres – recognising excessive growth might challenge climate and renewables targets. Different scenarios should be modelled, with transparency of the assumptions and modelling used.
- **FNA should properly consider the increase in electricity usage due to a rapid electrification of demand.** The increase in electricity usage should be a result of the adoption of efficiency technologies such as, heat pumps, industrial electrification, and e-mobility.

## Cross-border coordination

Better interconnectivity between countries will be key to meet future energy demand in the cleanest, most efficient way. Better interconnection can both help lower electricity prices, and also support more stable and reliable overall supply across a region. If one country has a surplus of wind generation, it can export the power to a neighboring country that may be experiencing a lull in solar production. This would prevent the first country from needing to curtail renewables, and the second country from having to rely on expensive gas power.

This brings significant cost-savings. A recent study estimated that back-up capacity could be nearly 20% less in 2030 in an integrated European energy market, relative to isolated markets.[52] It is estimated that by 2040, every euro invested in expanding cross-border transmission capacity will reduce generation costs by more than two euros.[53]

On the flipside, if countries underestimate or fail to realise opportunities for interconnection, this could lead to a less efficient system, and could result in more gas plant reliance than would otherwise have been the case.[54] ACER has previously critiqued the ERAA for underestimating interconnection opportunities, but noted improvements in the most recent assessment.[55] However, at a national level, there is a tendency for countries to fall back on national resources. Indeed, Ember notes that 11 countries – representing nearly 80% of EU power generation – are set to fall short of the EU 2030 interconnection target.[56]

[52] https://www.bruegel.org/system/files/2024-04/PB%2003%202024.pdf
[53] https://tyndp.entsoe.eu/resources/tyndp-2024-infrastructure-gaps-report-for-consultation-1
[54] https://www.bruegel.org/policy-brief/europes-electricity-capacity-mechanisms-need-be-better-coordinated
[55] https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions/ACER-Decision-07-2025-ERAA-2024.pdf
[56] https://ember-energy.org/latest-insights/money-on-the-line-scaling-electricity-interconnection-for-europes-energy-future/

The FNA is recognised as a complementary tool to support interconnection targets and potential availability of cross-border flexibility. TSOs are assigned with the data collection regarding interconnections.[57]

There is a concern that if TSOs limit the amount of cross-border cooperation, this will have negative impacts. For example, in Poland's recent NRAA, ACER noted that the Polish TSO PSE applied "allocation constraints", which could limit electricity exports from Poland, even when its neighbours are in need. This has a stronger impact during Dunkelflaute events, i.e. when renewable energy production is reduced due to weather conditions. As a result, Poland's electricity prices do not reflect regional shortages effectively, limiting earnings for local generators and demand response providers.[58]

Thus, we encourage Member States to ensure the full benefits of regional coordination are captured in FNAs. Factors that could indicate success would include:

- **Optimisation of cross-border flexibility opportunities** to properly consider potential benefits and efficiency gains. In line with independent studies regarding interconnection, NRAs should ensure their FNAs properly reflect the full range of options that could help reduce costs and reliance on fossil gas.
- **Consideration of the 15% interconnection target and 70% cross-zonal electricity capacity target** to ensure optimal sharing of resources.
- **Regional collaboration between TSOs and NRAs to inform FNAs.** We encourage transparent information sharing and dialogue to assess the benefits, and navigate potential challenges, which could help realise opportunities.

[57] Including interconnections capacities (NTC); interconnections outages profiles; flow-based domains: RAM, PTDF, hourly assignment and exchanges with implicit regions. https://www.acer.europa.eu/sites/default/files/documents/Individual%20Decisions_annex/ACER-Decision-05-2025-FNAM-Annex-I.pdf

[58] https://www.acer.europa.eu/news/acer-suggests-better-reflecting-benefits-europes-internal-electricity-market-polands-national-resource-adequacy-assessment?utm_source=chatgpt.com