Questionnaire

'Anticipatory investments for grid buildout'

1. CONTEXT

Discussions on 'anticipatory investments' have frequently led to misunderstandings, even on its very definition, i.e. the expectation on what they refer to. Some actors have expressed in the past the view that every grid reinforcement covered in a network development plan is, by definition, anticipatory, i.e. it anticipates the need for the investment. Others have noted that, while such view is of course correct, anticipatory investments refer to accepting that it is necessary to consent to a higher degree of uncertainty to ensure the networks are ready for the energy transition. The present document refers to the latter understanding.

Very rapid deployment of renewables and electrification of demand, including sectoral integration – e.g. EVs, heat pumps – coupled with the fact that grids frequently take longer to be developed than concrete renewable or demand projects (with larger geographical scope, typically longer permitting and construction times, etc.). This, in fact, means that network development should be based on reasonable expectations of the future needs, and not only on existing connection requests. Otherwise, with electricity distribution and transmission networks not in place, the amount and waiting time for connection requests will continue to mount. This has to be addressed in parallel to issues related to financing, permitting, supply chains, procurement and skills affecting the rate of deployment of grids.

With such context in mind, the European Commission invites you to send your views to the present questionnaire. Where relevant, please include references to sources of information.

2. QUESTIONNAIRE

1. Do you have a different name for or definition of anticipatory investments in your in your jurisdiction or jurisdictions of which you are aware, or would you have one to propose?

Having a common EU framework for anticipatory investment is crucial in ensuring that national authorities have the same interpretation. As it stands more than 500 GW of potential wind energy projects across Europe are stuck in connection queues, some of the major reasons being- planning not forward-looking enough and delays in grid build-out. Currently most decisions to expand or reinforce existing grids are taken as per new grid connection requests. In many countries, national network development plans are also not adequate to deliver official national renewable energy targets. Therefore, the level of anticipation is not adequate.

When developing the anticipatory investment definition, certain elements should be considered:

Lead time of over 10 years: electricity grid lead time is around 10–15 years to be built, thus national authorities and system operators should adopt a proactive forward-looking approach, looking beyond 10 years, and not have a reactive approach only.

Alignment with relevant EU and national targets: anticipation of investments should be guided by national and EU targets for renewable energy deployment and electrification (and not only for emissions' reduction). National network development plans need to break down grid capacity needs into specific projects. In parallel, gas infrastructure decommissioning and repurposing need to be coordinated with planned electricity grid deployment and to reflect national climate and energy targets.

Technology and supply chain: network development should consider technology readiness and lead times to deploy various technologies and supply chain needs. This will also deliver the necessary planning security for grid equipment and cable manufacturers. Proactive planning should also be guided by efficiency and optimisation to guarantee grid capacity for all strategic technologies in a balanced manner.

Risk mitigation: the definition must also refer to acceptable risk and risk mitigation practices.

Considering the above elements, we propose the following definition:

Anticipatory investments in electricity grid infrastructure are proactive, long-term investments made with a forward-looking approach beyond 10 years to ensure timely grid development that:

- can deliver grid capacity underpinning national/EU energy and climate targets including announced national/EU targets for renewable energy deployment and electrification
- realistically considers supply chain readiness and lead times
- accounts for the cost of inaction in terms of climate and energy targets achievement paid by consumers and network users
- accounts for costs and risks currently bore by network users such as generators and system operators

2. How could the maturity/certainty of investments proposed by system operators before agreeing to their inclusion as a planned investment in the network development plans (investment plans) and, ultimately, the RAB, be assessed in a meaningful manner? Please explain your proposals.

Rather than attempting to define a strict "maturity/certainty" threshold, which could lead to varying interpretations, the focus should be on the justification for the investment. For anticipatory investments, if the justification is robust supported by comprehensive cost-benefit analysis and technical compatibility check with national/EU targets for renewable generation and electrification then the investment should be pursued.

The effective route to ensuring evidence based anticipatory investments is modelling a set of future scenarios depicting the range of probable developments and reflecting already announced energy policy targets. Following principles are recommended to meaningfully consider anticipatory investments:

- Guided by top-down regional and national renewable energy targets, spatial planning and 2050 net zero pathway, as well as bottom-up connection requests from generation, demand and flexibility providers.
- Eligibility criteria for investment proposals from top-down needs should be informed by spatial planning for generation, demand and flexibility. For example, designation of offshore sites, onshore renewable areas, renewable acceleration areas would result in new infrastructure investment needs. The national authorities shall ensure the spatial planning provides reasonable granularity at regional/local level.
- Eligibility criteria for investment proposals from bottom-up needs should be informed by the permitting and grid connection procedures in the jurisdiction, promoting coordinated approach among new and future network users, adopting future proof mindset that ensured a balanced allocation of grid capacity to all strategic technologies for the respective jurisdiction.

3. Do you have in your portfolio anticipatory investments that have been included in the RAB or are you aware of such investments being included in the RAB in certain jurisdictions (as per the description in this document) for electricity transmission and/or distribution projects? Please describe which kind of projects have been supported under an anticipatory investment approach. If not the case, please explain why.

4. What conditions do you consider to be minimum requirements in order to positively consider an investment as anticipatory (including that the risks are deemed acceptable for society) and obtain an agreement to the inclusion in the network development plan (NDP) as a planned investment?

Establishing clear conditions and minimum requirements for an investment to be classified as anticipatory is complex, given the potential for varied interpretations. The baseline condition is that any investment not classified as mandatory or urgent and that has positive economics for the system and society – including the cost of inaction in terms of climate and energy targets achievement paid by consumers and network users - should be considered as anticipatory.

The cost benefit assessment should properly compare the societal costs of having the network capacity unavailable when needed with the societal costs of having the asset underutilised during the first years. Such assessment should be comprehensive and not only account for congestion management costs and network tariffs for network users, but wider costs imposed to society due to non-achievement of decided energy and climate targets.

The decision for grid investment arises from the costs and benefits identified in the scenarios for the national development plans. If an investment provides advantages in multiple scenarios—long or short term —it can be considered needed (approvable by the regulator), with lower risk of becoming obsolete due to unforeseen future developments.

How effectively the infrastructure needs are anticipated will depend on updating effectively developed national Network Development Plans (NDPs) more regularly to underpin NECPs and breaking them down into specific grid projects not total capacities, both at transmission and distribution level. It is also crucial to monitor whether network development plans are in fact executed. In addition, this alignment must also consider the status of deployment of grid projects planned nationally and have strong bilateral feedback loop with the Ten-Year Network Development Plan (TYNDP) and its deployment status.

5. What would be the good practices for making the level of risk/maturity/certainty of anticipatory investments acceptable for regulatory systems?

Proactive forward-looking long-term network planning beyond 10 years must be carried out at both transmission and distribution level. This must be guided by top-down regional and national renewable energy targets including announced national/EU targets for renewable energy deployment and electrification, spatial planning and 2050 net zero pathway, as well as bottom-up connection requests from generation, demand and flexibility providers.

Close coordination between transmission and distribution levels and stakeholders to ensure optimised decisions and to avoid planning in silos.

Adaptation of required payback times to be fit for purpose for each type of investment. Some investments might bring the expected benefits much later than others.

Total expenditure (TOTEX)-based Cost Benefit Analyses (CBA) must be applied and improved to account for all benefits, constraints, short- and long-term costs. The impact of grid build- out delays on social welfare including CO2 emissions, electricity prices evolution and congestion management costs must be quantified.

Costs assessment should reflect new increased supply chain competition and volatility resulting from the global macroeconomic environment and move away from historical benchmarking and backward-looking approaches.

Staged funding for eligible anticipatory investments is also an alternative. For example, fundings could be released in stages for pre-construction, early development expenditures before the full construction and delivery expenditure.

The design of network tariffs is a key dimension while anticipating energy infrastructure needs. Network tariffs should be reflective of both of costs generated by network users but also benefits provided to each category of network users. Flexible connection agreements should for instance come with lower network tariffs as they reduce costs for the network but also benefits for the respective network users.

Intertemporal tariff approach can be applied for projects with high uncertainty and risk of underutilisation in a similar way as the provision for hydrogen infrastructure in the Gas Package. This could support system operators to spread the cost recovery over time and to ensure that future users contribute to initial development costs.

Network tariffs must be kept within a reasonable/assumable limit to reduce the risk of putting an unreasonable burden on consumers and to ensure affordability and public acceptance. The Commission and National Governments should in parallel look into new public and/or private tools for financing grid investments and potential revenue and risk sharing, public and/or private

Deepening stakeholder engagement from early planning stages will help to realistically assess anticipatory investments, technology readiness and supply chain capacity.

6. Is there any national regulation that encourages or prevents from proposing anticipatory investments for including in the network development plans (e.g. it could be encouraged by including conditions on time horizons of NDPs, requirements to assess alternatives to project proposals considering long-term needs, or others; it could be prevented by mandating network development to be solely based on existing connection request capacity amounts)? Please describe and explain.

The main barrier preventing anticipatory investments is the limited national regulatory frameworks explicitly enabling forward-looking anticipatory investments and including a concise definition, scope and return on investment methodology. Without such a framework, there is a barrier for system operators to propose and NRAs to positively assess proactive investments, as well as uncertainty regarding the return on investment, acting as a deterrent for both private and public investments.

- For example, France has introduced enabling legislation with Law No. 2023-175, adopted on March 10, 2023. Article 32 allows System Operators to carry out works that provide more connection capacity than required for a single user to facilitate future connections of other users. The French Energy Regulatory Commission (CRE) authorises and regulates these investments and determines how the costs will be shared among the users benefiting from the additional capacity in proportion to their connection demand. During a 10-year period,

grid users contribute to these costs, after that, the network operator covers the expenses for the unused capacity.

- In Portugal, no regulation explicitly prevents the proposal of anticipatory investments. As long as they have a strong support justification, such investments are generally accepted by the NRA and approved by the Government. National regulation governs the overall value of investments made by the system operator as outlined in the NDP and does not target individual cases. However, not all proposed investments are approved, as the NDP is subject to evaluation by the regulator, who can propose cuts or adjustments. Historically, the NRA has proposed cuts when investments are projected to increase grid tariffs, effectively acting as an investment cap.
- In Spain, there are annual investment limits on electricity transmission and distribution networks. As these binding limits were established over a decade ago, they do not reflect the scale and speed of transformations that are needed in the energy sector, deterring anticipatory investment. Transmission network annual investment limit at 0.065% of GDP, Distribution network annual investment limit at 0.13% of GDP (Royal Decrees 1047/2013 and 1048/2013 of 27 December). There are exclusions for the annual limit, e.g. investments for interconnections with internal market countries will not count towards the limit. The process also imposes penalties, where exceeding the allocated investment limit results in reduction in the remuneration. Additionally, network companies are further penalised with a decreased investment limit for the following year.

There are also some national policies and regulation that are more encouraging for anticipatory investments:

- In the Netherlands, as well as in other European countries, like the UK, it is a common practice for the TSOs to design and build the grid infrastructure with greater capacity than immediately envisaged. This includes measures, such as building substations with additional bays to accommodate future grid users, providing extra space for further interconnection on offshore platforms, and utilising DC cables for greater transmission efficiency and capacity. This proactive approach provides greater flexibility and scalability to meet future energy needs. It would be particularly beneficial for offshore transmission infrastructure as making significant changes in the future when the need arises, can be extremely costly or in some cases not technically feasible.
- In 2023, the Polish Regulator amended the Energy Law Act to expand its powers in developing guidelines for network development and implementation of priority grid investments. The recently issued guidelines for Polish DSOs set clear requirements regarding the format and detail of information that must be included in the network development plans and reports. This is a positive step for anticipatory grid investment because it encourages DSOs to take a more proactive and standardised approach to planning for future network needs.
- In Italy, Terna's Grid Development plan outlines goals and criteria for the national grid planning process, providing a comprehensive overview of all new initiatives planned for the Italian transmission grid over the next ten years. Their forward-looking expansion strategy considers all follow-up applications and projects that are in the approval phase. Additionally, it runs a cost-benefit analysis including all project applications when planning grid expansion.
- In Ireland, the Regulator included the following statement in its planned approach for the network companies next Price Control period (PR6, which will set the investment parameters for 2026-2030) which states: "Anticipatory investment: Network companies should anticipate

investment, delivering enhancements and strategically planned upgrades to the networks where justified, improving efficiency and providing benefit to customers. Network companies should approach network planning strategically, including via the CRU renewable hubs pilot, identifying additional drivers of investment (secondary, tertiary drivers, etc.) and developing solutions that drive the most benefit to customers."

- In the UK, the longstanding approach to network planning has been a cost-benefit analysis for network investments based on a "least worst regrets" approach, a methodology based on carrying out network investments which were common across multiple scenarios in order to minimise risk of stranded assets. The impact of this approach however is significant underinvestment in the electricity network. The approach to network planning in GB is being transformed into a more strategic, anticipatory approach, however the reformed approach to cost-benefit analysis is not yet clear. In addition, the energy regulator (Ofgem) has focused on achieving the best short-term costs for consumers – however, this discounts longer-term value, which is achieved by having a functional electricity grid which can support a greater degree of wind and solar projects, as well as electrification of heat and transport.

7. What changes do you see necessary to accommodate anticipatory investments in your jurisdiction or jurisdictions of which you are aware?

There are two main challenges that need to be addressed to accommodate anticipatory investments.

a) Clearly specify how anticipatory investments will be treated and recovered.
This is key as parties will be disincentivised to make grid investments if it is unclear or there is uncertainty regarding how those investments will be recovered.

b) Implement mechanisms to keep network tariffs within a reasonable limit & encourage other forms of private and public funding. Massive grid investments are needed to meet EU targets, nonetheless, consumers should not be unreasonably burdened. New ways of designing network tariffs must be explored.

Apart from anticipatory investments in grid infrastructure to address the lagging grid plans and facilitate renewables deployment over mid to long term, prompt actions in near term are needed for permitting, grid connection reform, supply chain.

- **Permitting**

Accelerated implementation of EU legislation such as the revised Renewable Energy Directive (RED III) and the EU Emergency Permitting Regulation to mitigate grid access issues and make grid permitting more efficient both at transmission and distribution level.

- **Grid Connection reform**

Moving away from the "first come first served" principle for granting grid access to new generation and demand. This principle has led to an unbalanced mix of technologies in certain areas and suboptimal use of the available grid capacity. Instead, they should apply:

  - Smart and dynamic management of grid connection queues with adequately high entry criteria, filtering, and prioritisation practices.
  - Filtering based on adequate maturity milestones and financial commitment to reserve grid capacity.

- Prioritisation for specific categories of viable (already filtered) projects contributing to energy system integration for instance with hybridisation, co-location with storage or advanced capabilities. Repowering projects which contribute to better use of the grid should be considered in this prioritisation process. Projects within these categories should then be treated with the first come first served approach and not be ranked against each other as this would be a very cumbersome process.
- Strategies to guarantee grid access for all strategic net-zero technologies in a balanced manner.
- Fair sharing of grid expansion and reinforcement costs between generators and System Operators. Also enabling frameworks for generators to develop the grid and hand it over to System Operators upon remuneration.
- Enabling grid connection rules for co-located renewables with and without storage (hybridisation) and fit for purpose revenue stabilisation schemes

- **Supply chain**

A more collaborative and forward-looking approach to procurement from the supply chain is essential to facilitate the delivery of anticipatory investments.

For example, in 2023 the TSO in the Netherlands and parts of Germany, TenneT, signed long-term agreements, worth €30bn. This is Europe's largest ever contracting package and aims to secure TenneT's offshore infrastructure equipment requirements for the next decade.

Ireland has also strengthened its commitment on supply chain collaboration in the recently published "Powering Prosperity: Ireland's Offshore Wind Industrial Strategy". The strategy outlines priority actions for 2024 and 2025 aimed at intensifying cooperation through existing MoUs with the UK, France and Germany, with a stronger focus on supply chain development. Ireland is also actively expanding its international collaborations, with significant efforts currently underway to strengthen partnerships with Spain and Portugal. Additionally, a MoU between the Irish TSO, EirGrid and the French TSO, RTE has been signed to help Irish companies gain experience in international projects that can be leveraged domestically in the long term. EirGrid also signed an MoU with the UK and Belgium to increase their cooperation on interconnection and renewables, including marine planning, biodiversity, grid connection, supply chain, ports and skills.

8. Are TSOs or DSOs expected to take particular steps to facilitate reaching a mutual understanding with NRAs on the greenlighting of anticipatory investments in your jurisdiction or jurisdictions of which you are aware?

System Operators should:

a) coordinate the proposals to consider both transmission and distribution reinforcement needs in an integrated manner.

E.g., In Germany, DSOs are obliged to create 'regional scenarios' for six planning regions that unite multiple DSOs. These documents serve as the foundation to determine the proactive network expansion needs.

b) Strive for improved information sharing and granularity.

System Operators should aim to have transparent and updated grid hosting capacity maps, and then to increase the granularity of these maps. This would improve the information NRAs receive to evaluate anticipatory investments and will provide transparency for all grid users and market participants.

9. Are there any particular pre-steps or actions from ministries or public authorities taken or expected? If so, what type (e.g. bilateral exchange, national plan, national strategy, a political declaration, public announcement or other).

- Ensure that network development plans (NDPs) are in line with national/EU energy and climate targets including announced national/EU targets for renewable energy deployment and electrification. Germany can be taken as an example, with the German TSO NDP based on a scenario framework that incorporates national and international targets, including RE installation; onshore and offshore, CO2 targets and EV & heat pump installation.
- Explore how to access public and private finance to meet the grid reinforcement needs necessary for the energy transition and to ensure these reinforcements are executed. Particularly assessing funding alternatives is key to limit the burden on consumers.
- Provide certainty regarding the treatment of anticipatory investments, while accounting for accounts for costs and risks currently bore by network users and costs of inaction.
- Ensure consultation with stakeholders throughout the process.

As for country examples where pre-steps are being taken into account:

- In **Ireland**, the Strategy for PR6 setting the investment parameters for 2026-2030 has been published (see also Question 6). In addition, the Commission for the Regulation of Utilities launched in 2024 the "Renewable Hubs Pilot", which aims to deliver a test of (initially) distribution connected renewable hubs that will be built in advance of connection requests (on the basis of expected project pipeline). "This pilot should enable the creation of additional anticipatory capacity to facilitate future connections and provide greater certainty to projects as to their costs by calculating shared costs using a per-MVA methodology, meaning that the full costs of the advance builds of Renewable Hubs will not be recovered until all capacity is taken up by connected projects (see also: https://cruie-live-96ca64acab2247eca8a850a7e54b-5b34f62.divio-media.com/documents/CRU2023131_Renewable_Hubs_Pilot_Decision_1.PDF)
- In **Poland**, the TSO produces regular analysis of sufficiency of generation, which also looks at network constraints and development needs. This is currently proposed to be integrated with the 10-year Network Development Planning process. Although without a clear formal link to the anticipatory investment planning, the document serves as an important analytical tool and reference for the DSOs, the market regulator and the network users.
- In **Italy**, the national strategy on energy aligned with the EU 2030 targets, the so-called National Energy & Climate Plan for Italy, recognizes the grid development plan proposed by Terna, considering that the development plan is approved by the central and local governments and by the Energy Regulator.
- In **the UK**, the previous government published a 'Strategy and Policy Statement' which informed the independent regulatory Ofgem how it should align its decision making with government policy. This required the regulator to recognise the cost of late network deployment. The regulator's remit was also amended to include consideration of delivery of Net Zero. Both of these will contribute to decision making which aligns with anticipatory investment and timely delivery of network infrastructure. In addition, the system operator

(NESO) will publish a centralised strategic network plan (CSNP) in 2026, which will provide a broad, whole energy system view on how the system will look in the future.

10. Are there any particular pre-steps or actions from other stakeholders (e.g. renewable developers) taken or expected?

Stakeholders should aim to provide the best possible visibility of their future needs to further facilitate the network development planning process. E.g., France can be seen as a good practice, with producers sharing a declaration in advance through a specific website.

As seen in Italy, when a developer submits a connection request the TSO provides solutions that include also works that are not yet listed in the grid development plan. The grid works proposed aim at building grid infrastructure useful to accept all capacity and energy injected. Depending on the connection requests on the same node/line, the TSO could also provide a connection solution to a developer with more grid works than needed for the single project, in order to anticipate future grid development to connect future projects. Usually to get a quicker permitting process, developers, upon request, can carry on the permitting process and afterwards transfer the permit to the TSO, to let TSO build the grid infrastructure. Since these works are not yet in the grid development plan, these might be seen as anticipatory investments too, maybe.

In Spain, as part of the stakeholder input in the Transmission Plan, RES developers provide comments to the TSO, indicating the areas of high interest of development, and even specific details of our developments (size of the project, point of connection, overall target commercial operation date etc.), and even propose specific developments to the TSO.

In the UK, renewable developers build the offshore transmission that links their offshore wind farms to the national electricity transmission system (NGET). These links are then divested (by law) to an offshore transmission owner once the wind farm is operational. The energy regulator (Ofgem) has introduced the ability for developers to utilise anticipatory investment if these transmission links are oversized in order to connect multiple projects at once. This ranges from small changes (coordinated onshore works, installation of cable ducts) to larger ones (shared cable corridor, shared offshore substation etc.) However, at this stage, any actions from developers to this end are tempered by the fact that they are in direct competition with other developers, and the issues surrounding co-ordination vs. competition have not yet been resolved.

11. Does any national authority play a coordination role among TSOs, DSOs and (generation) project developers for network usage in determining a positive decision on an anticipatory investments or determine/influence in any manner the assumptions taken for network development planning?

In Italy, the national legislator defines suitable areas to provide an indication on where RES should be developed considering also the network infrastructure and furthermore ranks winners in CfD auctions based on locational coefficients depending on the grid and energy market requirements.

In Germany, the site development plan is the maritime sectoral plan for offshore wind energy. It defines the sites for offshore wind turbines and their grid connections as well as the schedule for realising the national expansion targets. Interconnectors and areas for other forms of energy generation are defined. The Offshore Wind Energy Act and the existing maritime spatial plans form the main basis for the BSH's designations in the site development plan. The site development plan sets out standard technical principles and planning principles for offshore wind farms and their grid

connections. It is the central steering tool for the expansion of offshore wind energy. The German federal Maritime Office (BSH) regularly updates the site development plan. Authorities and the public are extensively involved in a multi-stage process. A strategic environmental assessment determines, describes and evaluates the potential impact of the plans on the marine environment.

In the UK, the National Energy System Operator (NESO) is expected to take much more of an active role in network planning, with the introduction of the Centralised strategic network plan (CSNP) in 2026. This may include positions on where best to undertake anticipatory investment.

In Portugal, both the NRA and the National Energy Authority play crucial roles in coordinating among TSOs, DSOs, and generation project developers regarding network usage and decisions on anticipatory investments. While the government ultimately approves the NDP, the NRA and National Energy Authority are responsible for analysing, influencing, and proposing adjustments to the plan. For investments that fall outside the NDP, the NRA assumes full responsibility for these roles. Also, the NDPs are subjected to public consultation by the NRA.

12. Are there any conditions, incentives and/or penalties to system operators after anticipatory investments have been approved in your jurisdiction or jurisdictions of which you are aware?

13. Is the process of approval for inclusion in the RAB the same as for any other infrastructure assets, or are there dedicated processes or particularities in your jurisdiction or jurisdictions of which you are aware?

14. How is the risk/likelihood of a project becoming a stranded asset assessed in your jurisdiction or jurisdictions of which you are aware?

The risk of stranded assets is fundamental to any decision about approving particular network infrastructure projects. Historically, this risk has been the dominant factor in decision-making, but in order to ensure network can be delivered in a timely fashion, the level of concern regarding stranded assets must be reduced. Given the significant growth in generation and demand for electricity, which is expected on the pathway to decarbonisation, the risk of assets being approved today that will become truly stranded is minimal. As we near complete decarbonisation of the economy, and the levels of electricity demand and generation begin to plateau, it may be necessary to reassess how investments in network infrastructure are approved. However, at this stage in the development timeline, the risk of underinvestment in grid far outweighs the risk of over investment.

Concerns of risks around anticipatory investments seems more because the cost of inaction to society hasn’t been considered adequately yet while planning and financing grids.