



TEN/706

Between a trans-European super grid and local energy islands

OPINION

European Economic and Social Committee

Between a trans-European super grid and local energy islands – the right mix of decentralised solutions and centralised structures for an economically, socially and ecologically sustainable energy transition

(own-initiative opinion)

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1. **Conclusions and recommendations**

- 1.1 The question of how centralised or decentralised the EU's future energy system will be has not been settled politically. Neither the Commission nor the Member States have made any clear statements on this. The only thing that is clear is that it was only the emergence of renewable energies that made decentralised structures possible in the first place.
- 1.2 The European Economic and Social Committee (EESC) has pointed out in many opinions how important it is to recognise that the energy transition is not just a technological issue but also a profoundly social and political challenge. Workers, trade unions and consumers must be involved in the energy transition, as promised by policy-makers and strongly called for by the EESC. However, here too, the Commission and the Member States leave more questions open than they answer. Moreover, current energy policy initiatives will prevent rather than encourage broad participation from the public.
- 1.3 The EESC firmly believes that Europe's future energy system will have both centralised and decentralised elements. However, how this is organised must not be left to chance. A clear vision is needed as to whether priority should be given to decentralisation or centralisation. After all, Europe's energy transition first and foremost requires investment certainty for both public and private sectors, which can only be achieved if clear fundamental decisions are made.
- 1.4 System costs for decentralised and centralised energy systems are similar. However, the costs are incurred for different components: large facilities and transmission grids in centralised systems, compared to smaller generation facilities in decentralised systems and, primarily, flexibility options, which are also located where the consumers are. Moreover, distribution grids and, in particular, smart grids play a larger role, with the latter being prerequisites for smart markets and therefore for individual players adopting behaviour in the interests of the system. This technical development allows for more autonomy and for self-regulating decentralised network units.
- 1.5 This goes hand in hand with differences in how the creation of value is distributed and thus also with different economic and social policy ramifications. In a centralised system, value creation is typically concentrated on a small number of players. In a decentralised system, consumers can contribute to value creation as active customers, citizen energy communities, farmers, SMEs and municipal companies.
- 1.6 Therefore, the question of how the new energy system will be organised is much more than just a technical question, it is a highly political issue. In a just and fair transition, it is about who can (and should) play what role and thus – in a nutshell – who will be able and allowed to earn money through energy in the future and, consequently, who will be able to take part economically in the energy transition. This question will also determine the extent to which the energy transition will stimulate innovation.
- 1.7 The Clean Energy package sets out important indications as to the direction in which the development should go. It mentions an energy union intended to, among other things, reduce energy imports and "with citizens at its core, where citizens take ownership of the energy

transition, benefit from new technologies to reduce their bills, participate actively in the market" and become active producers and market participants.

- 1.8 However, in the EESC's view, the Commission and almost all Member States have failed to provide real clarity over the last five years as to future structures and division of tasks.
- 1.9 The Council has also so far contributed little to developing a sufficiently clear energy policy. In this regard, the EESC finds it regrettable that the German Presidency focuses only on technologies (such as offshore wind and hydrogen derived from renewable energies) but completely ignores the important structural issues involved. The EESC would like to strongly emphasise that the consequences of such technological preferences must be considered: a concentration on a small number of players and significant investment in transmission capacities, thus in natural monopolies.
- 1.10 A prerequisite for the full participation of new market participants is that they have access to all relevant electricity markets, particularly flexibility markets. This is not the case in almost all Member States. Member States are therefore urged to adapt their regulatory frameworks to fully reflect the basic ideas of the Clean Energy package and establish equal opportunities. This will also enable regional markets to achieve high-efficiency solutions thanks to digitalisation and, if they are smartly connected, contribute to stable and resilient security of supply.
- 1.11 With regard to the economic and social policy consequences, the EESC reiterates its position that decentralised energy systems provide major impetus for regional development and can lead to the creation of new, high-quality and skilled jobs in the regions¹.
- 1.12 Policy-makers may partly address the problems of vulnerable consumers and energy poverty, but no solutions have been identified and the issues have not been connected with the future design of the energy system. The EESC asks the Commission to propose introducing common criteria for the definition of energy poverty and common indicators at EU level to better measure this phenomenon. The Member States must develop more statistical tools to effectively target disadvantaged households. At the same time, it should be ensured that low-income households can implement energy efficiency measures to reduce their energy consumption as well.
- 1.13 As this critical power grid infrastructure is a natural monopoly, the fundamental question is whether it should not belong to the public sector in the interests of sustainable security of supply, particularly as it was created and expanded using a considerable amount of public funds. This issue should be further clarified in an EESC opinion.
- 1.14 Hundreds of billions of euros are now being invested in energy infrastructure and technologies through the recovery plan and the 2021-2028 multiannual financial framework (MFF). It must be ensured that these investments are used effectively to fund an energy transition focused on citizens rather than those who have so far been involved in the fossil-based energy system. The EESC calls on the Commission, the Council and the European Parliament to enter into broad-based

¹ See for example [OJ C 367, 10 October 2018, p. 1](#).

structured dialogue with civil society and local and regional authorities as soon as possible to provide clarity on the issues raised in this own-initiative opinion.

2. Background to this own-initiative opinion

- 2.1 Europe is in the middle of the difficult process of moving towards climate neutrality, which is expected to be achieved by 2050. This will require a major transformation of the energy system, encompassing fundamental technological changes, but also structural issues in production, trade and marketing, as well as social policy changes. However, the exact nature of the changes, and how far they should go, has not yet been fully spelt out. It must be recognised that the energy transition is not just a technological issue but a profound social challenge. Workers, trade unions and consumers must be involved in the transition.
- 2.2 In recent years, the Commission has issued a large number of political declarations of intent and adopted new rules. The EESC has commented on them and, in most cases, welcomed and supported them. At the same time, however, it has taken issue with the fact that many of these statements are too vague and imprecise.
- 2.3 Clearly, it was only the emergence of renewable energies that made it possible to discuss the issue of centralised or decentralised structures in the energy sector at all. Renewable energies (solar, wind and biomass) are decentralised, they are widely available and investments are relatively limited, whereas nuclear and coal power plants are large centralised structures.
- 2.4 It is unclear how the issue of renewable energies will be handled. In particular, it remains unclear whether the Commission is aiming to integrate renewable energies into the existing system or redesign the market.
- 2.5 The EESC has pointed out that, in its view, it cannot primarily be about "integration" of renewable energy into the existing electricity system, and that "a fundamental transformation" means far more than merely linking up national systems to a European network and significantly boosting renewables' share; which also implies that the current conventional energy sources (including natural gas) will play a bridging role only.
- 2.6 A completely new energy system will involve a much larger range of stakeholders. In particular, distribution grids take on a much more important role and must in any case become "smart grids": information on the relevant grid situation must be made available to market participants in a reliable, clearly understandable and very precise way, both timewise and, where appropriate, locally too. Smart grids are the prerequisite for smart markets that effectively incentivise behaviour in the interests of the system.
- 2.7 In its Energy Union package, the Commission speaks of a new role for the current "passive" consumer: "Most importantly, our vision is of an Energy Union with citizens at its core, where

citizens take ownership of the energy transition, benefit from new technologies to reduce their bills, participate actively in the market, and where vulnerable consumers are protected"².

- 2.8 What this actually means, though, is left open. This is not least due to the fact that no distinction is made between industrial and commercial consumers and private households, and in turn between those private consumers who are socially and thus also technically better placed and households that are less well equipped. One thing is clear: in future, consumers should no longer be only (paying) recipients of energy. They should not only be able to switch suppliers more easily and/or respond more flexibly to market signals. They should have access to all relevant electricity markets. Terms have been coined such as "active" customers, self-consumers, citizen energy communities and "renewable-energy communities" and these new players have been given certain rights, but without it being clear how they should actually participate in the market, i.e. how open and liberal the market should truly be and how to deal with consumers without the financial or legal means to participate in it (see point 5.6).
- 2.9 Likewise, the issues of vulnerable consumers and energy poverty may have been touched upon, but no real solutions have been identified. Moreover, the EESC asks the Commission to propose introducing common criteria for the definition of energy poverty and common indicators at EU level, which would be a first step towards better measuring this phenomenon. To adapt this definition to different national contexts, the Member States must develop more statistical tools to effectively target disadvantaged households.
- 2.10 In the EESC's view, the Commission has thus provided very little clarity over the last five years as to future structures and division of tasks. Above all, however, the Member States have also only adapted their regulatory frameworks very slowly, or not at all. In many Member States, consumers, as well as small businesses and citizen energy communities, still do not have access to electricity markets.
- 2.11 However, since the Commission – with its Green Deal – has put climate neutrality at the top of the agenda and is going to invest hundreds of billions of euros through the recovery plan in rebuilding the economy and in creating and safeguarding high-quality jobs in Europe, the EESC believes that it is imperative, in the short term (!), that a broad public and political debate be held to clarify how much "centralised structures" are needed and to what extent decentralised structures, where appropriate, seem possible and useful. The aim of this own-initiative opinion is to provide input in this regard.
- 2.12 The COVID-19 crisis teaches us that it is essential to take the right action quickly before a situation escalates. The Commission estimates that meeting the current climate and energy targets by 2030 alone requires additional investments of up to EUR 260 billion per year. This will not be possible without a massive expansion of public investment in the development of renewable energies, storage systems, thermal renovation, public transport, research and development, and so on, and without being organised in a socially just way. Here, the COVID-19 crisis points to new approaches. The temporary suspension of the European debt and deficit rules must also apply to

² [COM\(2015\) 80 final, 25.2.2015, p. 2.](#)

the management of the climate crisis. However, the funds must be used in such a way as to achieve the goal of putting citizens at the heart of the energy transition, thereby also boosting the regional economy.

2.13 In order to avoid bad and misguided investments, existing ambiguities and inconsistencies concerning the new energy system's basic structures, market architecture, market roles and market rules need to be addressed, and in particular the social impact on workers and consumers needs to be resolved immediately. A fair distribution of the investment burden plays a central role in this regard; the same applies to a fair distribution of any profits.

3. **The importance of a clear preference for or against decentralisation for the sake of investment certainty**

3.1 The new energy system is likely to include both centralised and decentralised elements, partly because categorising something as centralised or decentralised is not always clear-cut. For example, it is unclear whether an onshore wind farm with installed capacity of more than 30 megawatts can still be considered "decentralised". Nevertheless, if the transformation of the energy system is to be efficient, the question of whether the new energy system should be based on a decentralised or centralised approach is of considerable importance.

3.2 Depending on the answer to the question posed in point 3.1, different investment decisions must be prioritised and implemented by both public authorities and private capital providers and investors. The risk of "stranded investments" can only be prevented if policy-makers take a policy decision early and clearly on whether the energy transition should be based primarily on a centralised or decentralised approach.

3.3 The basic idea behind the current **centralised energy system** is the following: there should be no bottlenecks in the transmission of electricity and all market players should be able to act as if transmission within the system is possible without restrictions. This gives transmission grids a crucial role in the system. As well as the idea of a European "copper plate", i.e. a Europe-wide power grid without physical restrictions, it has even been suggested that Europe's interconnected grid be connected to South or East Asian grids.

3.4 As this critical power grid infrastructure is a natural monopoly, the fundamental question is whether it should not belong to the public sector in the interests of sustainable security of supply, particularly as it was created and expanded using a considerable amount of public funds. This issue should be further clarified in an EESC opinion.

3.5 In a centralised system, the place where production and flexibility options are located should therefore be irrelevant to how the market actually operates. Neither the place of production nor the place of consumption should in any case be determined by the transport infrastructure. Rather, the transport infrastructure follows the structure and places of production and consumption.

3.6 A **decentralised energy structure**, on the other hand, entails a system where the generation (and storage) of energy used for electricity, heat and mobility applications is located as close as possible to where it is consumed; renewable energy sources allow this. As a result, the transport

of electricity is largely minimised – something that is inherent in the system – with fewer transport losses. The volatility of electricity generation from renewable sources poses new challenges for power grids. As a result of decentralisation, distribution grids will thus play an increasingly important role in maintaining stability and security of supply.

- 3.7 In a decentralised system, bottlenecks in the network infrastructure are not, in principle, regarded as problems to be dealt with as a matter of priority. Rather, a decentralised system relies on local flexibility options that help to directly offset fluctuations in production. In addition to storage and measures to shift the burden from high-consumption to low-consumption periods, these flexibility options also include the generation of heat through electricity and e-mobility. Sector coupling plays a much greater role in a decentralised system than in a centralised one. Moreover, flexibility markets will play a much more important role than in a centralised electricity system.
- 3.8 In a decentralised energy system, there is more independence from the grid infrastructure, which, according to studies, also leads to greater resilience against external attacks, such as cybercrime, at least where stand-alone capability is achieved. Increasing investment in distribution grids would therefore ensure a stable supply and greater resilience against cybercrime.
- 3.9 The European energy policy must therefore answer the following questions:

- Should investors assume that the new energy system is built from the bottom up? This means that surplus local electricity and local shortages are balanced out primarily through local flexibility options. It is only in cases where this is not economically or technically possible that electricity is transported over longer distances.
- Or should investors assume that there is to be a top-down structure? This implies that development of transmission grids has priority. Virtually every kilowatt-hour produced must be able to be transported using this model. If fluctuations have to be offset, then the grid infrastructure indicates the location of the flexibility options. In essence, this means continuing the existing grid expansion policy while replacing fossil and nuclear power plants with alternative production sites that are as large as possible (examples: Desertec, offshore wind farms, very big onshore wind farms).

There is an urgent need to clarify these issues, as both approaches require massive amounts of investment but in different areas: money is primarily needed for transmission grids in a centralised system and for smaller, distributed flexibility options in a decentralised system.

- 3.10 Implicitly, the questions in point 3.9 address the structure and design of the new energy market. This is also recognised in Regulation (EU) 2019/943 on the internal market for electricity. However, it does not take a decision in this regard, but leaves it to the Member States.

It is highly questionable whether this is sufficient for a European energy transition to be effective. After all, in many Member States, the legal framework has so far not been clearly in line with the objectives underlying the Clean Energy package.

3.11 Behind the questions raised in point 3.9 is a highly political question: it is about who can and should earn money in the future in the new energy system, and who therefore can participate economically in the energy transition. For example, the German Presidency focuses only on technologies (specifically offshore wind and hydrogen derived from renewable energies). It does not take into account the fact that these technologies will lead to the market for producers being concentrated on a small number of players, will require significant investment in transmission capacities, thus in natural monopolies, and may also maintain or even increase Europe's energy dependence. However, the question of how to put citizens at the core of the energy policy is not on the agenda.

4. Decision-making criteria for or against a centralised or decentralised approach

4.1 The point made in 3.10 is central to social policy decision-making. However, it is not made openly and honestly in the political debate, but is always in the background hidden behind supposedly "rational" arguments:

4.1.1 The energy transition requires major energy companies to change their business models. However, many of these companies are evidently finding it easier to replace their old (centralised) large-scale power plants with renewable facilities that are nevertheless just as centralised and sometimes hardly have less capacity. This means that the associated distribution structures can also be kept. Decentralisation, on the other hand, would entail a lot of radical changes, making it much more difficult for major energy companies, unlike SMEs and municipal utility companies.

4.1.2 The same applies to transmission grid operators: they have no interest in transporting less electricity across Europe; ultimately that is how they earn their living.

The cost argument

4.2 How to achieve the greatest possible security of supply at the lowest cost is rightly seen as a key criterion. It is plausible to conclude, and modelling shows, that transport costs are higher in a centralised system than in a decentralised system. On the other hand, the costs of generation, storage and load shifting and redispatching in a centralised system are lower than in a decentralised system.

4.3 A number of studies have compared these cost differences. However, they do not produce clear results, as the differences between the cost benefits in a decentralised system and those in a centralised system are not particularly significant and, on a detailed level, depend on the underlying assumptions. It should be pointed out that, back in 2016, the EU's Joint Research Centre found that around 80% of Europeans could supply themselves with self-produced PV electricity more cheaply than electricity supplied from the grid; and since then there has been a huge fall in PV prices.

4.4 Simply looking at system costs, therefore, cannot answer the key question of whether investments should be prioritised in centralised or decentralised energy system projects and which guiding principles should be set by the regulatory system accordingly.

- 4.5 The question therefore arises as to which alternative criteria, beyond a mere consideration of cost savings, can be used in order to take the key decision – essential from the point of view of investors – in favour of a new energy system that is primarily decentralised or centralised.

Different types of value creation

- 4.6 The creation of value differs structurally: in a centralised system, it tends to benefit larger installations and natural monopolies. In a decentralised system, it is more likely to go to smaller installations and, above all, to be used for flexibility options, which are often employed in a decentralised system, e.g. battery storage, heat pumps, mini combined heat and power plants and bidirectional charging electric cars ("Vehicle-to-Grid"). Flexibility options will therefore very often be found in households. And electricity generation installations are often in the hands of private individuals, farmers, start-up SMEs, energy cooperatives, municipal companies, municipal utility companies, and so on. Thus, in a decentralised energy system, those who contribute to value creation are different from those in a centralised system: active consumers play a much bigger role here.
- 4.7 A decentralised energy system is barely feasible without such broad public participation. A more active role for the consumer, including the prosumer, is therefore characteristic of a decentralised system and makes sense not least for reasons of public approval and regional economic growth.
- 4.8 As the Commission seeks to create an Energy Union with citizens at its core and wants new jobs to be created at regional level and a boost to the economy via the energy transition across many regions of Europe, it must opt for a decentralised energy system. This is also important for dealing with the COVID-19 crisis.

5. Economic and social policy implications of a centralised vs. a decentralised approach

- 5.1 A decentralised system means the following in terms of value creation: consumers go from being payers to actors who participate in the value creation of the energy industry, i.e. they earn or save money. This is the reason why the question in point 3.11 – who in future may earn money from energy – must be openly and honestly debated.

With the broadening of the understanding of prosumption, both the concept and definition of prosumption were expanded in the Clean Energy package: henceforth, it is no longer only consumers with their own land and properties who can become prosumers. For example, prosumption is also becoming an issue for tenants or residents of apartment buildings, as well as for supplies to individual buildings and neighbourhoods, including commercial areas and industrial parks. It is precisely in these cases that smart networking of individual generation and storage capacities and of individual consumers in a virtual power plant or via a smart micro-grid is essential. This means that the requirements for local and regional distribution grid operators are constantly increasing.

- 5.2 Prosumers will only be an integral part of the energy system when they actually have access to all relevant electricity markets. Active consumers must be able to make the flexibility they gain from battery storage, demand-side management, electric cars, heat pumps and so on available to

the system too. This requires specially configured markets, which most Member States do not yet have.

- 5.3 An energy transition leading to a decentralised energy system is often referred to as a social-ecological transformation, not just an ecological one. After all, a decentralised energy transition will provide an important boost to the local and regional economy, jobs in small and medium-sized enterprises and increased local purchasing power. In light of this, it is even more significant that many Member States continue to have structures in their energy systems that hinder these positive effects. At the same time, it must be ensured that the jobs created are of high quality and have a high level of social protection.
- 5.4 In order for this impetus to really benefit all people in their regions and not just the resource-rich ones, priority should be given to projects leading to energy consumer communities where people with little capital, income or property can participate (see also EESC opinion TEN/660). Ideas for this already exist. However, their implementation needs to be promoted much more decisively in the Member States than is currently the case. This is a very urgent matter, as decentralisation must not lead to a two-tier energy society. To the extent that people on low incomes and with few resources are able to access energy-consumer communities, including through direct support, participation can be an effective means of combating energy poverty, as those who have so far been suffering as a result of high energy costs will be significantly relieved of the burden thanks to the rapid drop in the costs of renewables.
- 5.5 Vulnerable consumers and energy poverty are serious problems and are unlikely to be fundamentally solved in either a centralised or decentralised energy system. However, they can be mitigated more easily in a decentralised system than in a centralised one due to the decreasing costs of renewable energy facilities and electricity storage systems. After all, using renewable energies and storage systems as part of neighbourhood solutions can lead to a lasting reduction in energy bills and put an end to consumers' price dependence on energy companies and grid operators. However, this requires an active policy that supports the development of appropriate concepts. At the same time, it should be ensured that low-income households can implement energy efficiency measures to reduce their energy consumption as well.
- 5.6 Furthermore, extended participation options must not be used as a pretext to undermine consumer rights. They need to be strengthened and, where appropriate, adapted to new business models.
- 5.7 Finally, attention should be paid to consumption centres – big cities and large industrial consumers of electricity. In order to be able to supply them safely and at fair prices, they should be brought together with their immediate surroundings to form energy regions. The same applies to energy islands. The energy regions will take the form of concentric circles around the consumption centres. In order for the surrounding area to fulfil its full renewable energy potential, targeted incentives are needed. They may, for example, consist of reduced grid charges that apply when the energy region supplies itself. The positive consequence of this system architecture is the strengthening of regional economic structures – an aspect that could be particularly important for the post-COVID-19 economic system.

6. The energy system of the future

- 6.1 The new energy system should no longer be conceived "from top to bottom" (from large power plants to consumers) but rather ("from bottom to top") as a network of multiple production and supply islands for renewable electricity and heat (building energy), in which electricity and heat distribution and demand-side management (including storage) play a major role.
- 6.2 In this way, a sufficient and secure supply for all regions in Europe can be achieved.³ In connection with the desire for a new range of stakeholders, this will mean that, alongside established (wholesale) trading structures, there will be completely new decentralised forms of marketing and energy management systems.
- 6.3 Waves of innovation in the IT sector, in production and storage technology, in the distribution system and in buildings technology have given rise to many such "production and supply islands", which even a few years ago seemed inconceivable. Individuals, businesses, associations (such as energy cooperatives) and municipalities (municipal utility companies) have created their own self-sufficient or partly self-sufficient solutions, which means they are much less dependent on traditional supplies and trade flows. It is important to see the parallels between technical and social developments. Both are pointing in the same direction, namely towards greater autonomy and self-regulating decentralised network units.
- 6.4 Increased local production and direct marketing should therefore be welcomed because they can reduce grid losses. On this point, the German Federal Network Agency explains that⁴: "It is obvious that the transformation of the energy system can best succeed by close cooperation among all those involved. (...) We should welcome approaches maximising energy consumption at the source (...) as it keeps grid losses to a minimum."
- 6.5 The Commission therefore needs to think about the trading system in terms of the desired energy infrastructure without attempting to make the necessary changes to energy infrastructure compatible with the current trading system.

³ [OJ C 82, 3.3.2016, p. 13; OJ C 82, 3.3.2016, p. 22.](#)

⁴ ["Smart Grid" und "Smart Market" – Eckpunktepapier der Bundesnetzagentur zu den Aspekten des sich verändernden Energieversorgungssystems \[Smart grids and smart markets: Key issues paper of the Federal Network Agency on the changing energy supply system\], December 2011, p. 42.](#)

6.6 Account should also be taken, however, of the experience of many countries where some market players, such as strategic investors, have cherry-picked the most lucrative market segments merely to maximise their profits, whilst refusing to invest in security of supply, innovation and maintenance, passing these costs on to their customers.

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