Climate Action Network (CAN) Europe is Europe's leading NGO coalition fighting dangerous climate change. With over 170 member organisations from 38 European countries, representing over 1.500 NGOs and more than 47 million citizens, CAN Europe promotes sustainable climate, energy and development policies throughout Europe.

Clean Energy – Strategy for energy system integration

Submission by Climate Action Network Europe

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1. **What would be the main features of a truly integrated energy system to enable a climate neutral future? Where do you see benefits or synergies? Where do you see the biggest energy efficiency and cost-efficiency potential through system integration?**

In an integrated energy system, **energy supply and demand sectors interact more closely** in order to facilitate a reduced energy demand and the quick scale-up of renewable energy sources. Based on the interplay of generators and consumers in a well-connected energy infrastructure, inefficient fossil-based technologies and back-up capacities can be phase-out more swiftly. An advanced integration of sectors' energy demand prevents societal costs of stranded assets. It allows for the use of existing infrastructure more efficiently, harvesting the potential of demand side response and other flexibility options. Main features of such a system include:

a) Full ***compatibility with the goals of the Paris Agreement*** and climate neutrality by 2040.
b) ***Energy efficiency first***: including energy demand reduction across all sectors due to increased ambition and implementation of stronger energy efficiency policies and measures.
c) ***Electrification of the buildings, transport and industry sectors based on electricity sourced from renewables.*** The power sector can be decarbonised based on the full deployment of renewable sources. Heat supply should also be 100% renewable energy based. In this context, ***buildings must also be an integral part of the energy system*** after their upgrade through ***deep renovation*** measures to improve their energy performance. The same applies for the ***transport*** sector (mainly individual and passenger transport) which needs to be coupled to ***modal shift*** (road to rail, public

transport and cycling, car sharing). The sectors where reducing emissions is the most difficult such as the steel and chemicals sectors or aviation, long distance shipping and heavy duty road transport could partly rely on gaseous (renewable hydrogen) or liquid (synthetic) fuels sourced from renewable electricity. Falling wind and solar prices are making ***direct and indirect electrification*** sourced from renewables a solid pillar of a future energy system.

d) Mobilising ***demand side response together with other flexibility options*** such as electricity and heat storage or batteries facilitate the grid integration of the increasing (variable) renewable energy sources solar PV and wind energy.

e) In conjunction with the above measures, ***product design, production processes and business models*** need to be ***in line with EU climate-neutrality and circularity and resource efficiency objectives***. This extends to the materials used including reduced carbon and environment footprints of intermediary products such as cement, chemicals and steel; increased use of secondary raw materials; design for reuse, repair, upgrade and wider circularity; and shifts in energy sources away from fossil-based to renewables.

It is indispensable to take regulatory and economic decisions today in favour of a quick transition towards a fully renewable energy system. Rolling out quickly the infrastructure and the market design for a well-connected renewable energy system prevents higher costs from economic, health and environmental damages in case of inaction.

2. What are the main <u>barriers</u> to energy system integration that would require to be addressed in your view?

a) Remaining ***fossil fuel subsidies*** need to be phased out entirely (at national and European level).

b) ***Inappropriate energy taxation:*** Energy carriers are not taxed on the basis of their carbon content, therefore ***fossil fuels are currently not sufficiently taxed*** to incentivise the required and rapid switch to clean and renewable energy. In addition, carbon and energy taxation differs tremendously between Member States, leading to very high degrees of distortions across European energy markets. This favours the inefficient burning of fossil fuels in individual heating and in transport while the use of renewable electricity in these sectors is hindered through higher taxes and levies.

c) ***Network tariffs*** in many Member States reward rather a stable, non-dynamic energy consumption instead of ***incentivising a more flexible use of infrastructure***.

d) The ***lack of (demand responsive) energy storage***, particularly heat storage for district heating systems and the ***delayed mass roll-out of battery electric vehicles***.

e) ***Energy infrastructure planning*** in particular in the Ten Year Network Development Plans (TYNDPs) is not yet fully integrated but often considers the continued use and expansion of networks as sufficient. Instead of quantitative prolongation, grid operators need to look beyond pipes and pylons to ***optimise energy infrastructure*** with qualitative measures such as ***demand response*** and the interplay of different ***flexibility options***. In order to facilitate system integration, the ***investment into gas networks will need to be phased out***, whereas electricity and heat networks will need further support. Such a cross-sectoral optimisation of all infrastructure elements avoids inefficient use and public money invested in stranded assets.

3. **More specifically:**

- **How could electricity drive increased decarbonisation in other sectors? In which other sectors do you see a key role for electricity use? What role should electrification play in the integrated energy system?**

In addition to maximising the potential of energy savings the full deployment of various renewable energy sources is a precondition to move to a net zero emission society.

Electrification is key for using renewable electricity in all sectors (industry, buildings, transport) in the most efficient way, as using renewable electricity directly is far more efficient than converting it to renewable hydrogen (or renewable hydrogen based fuels). ***Renewables based electrification should be made a priority*** to achieve decarbonisation across all sectors by 2040. Recent studies indicate a potential for electrification levels of 50 to 85% by 2050[1].

- **What role should renewable gases[2] play in the integrated energy system?**

Some sectors and processes are not easy to electrify directly, such as the ***energy-intensive industries (steel, chemicals), aviation, shipping and parts of heavy freight***. Therefore, the need for energy carriers with high energy density will have to be covered by non-fossil gases and liquid synthetic fuels.

As the amount of sustainably produced non-fossil[3] gas and liquid synthetic fuels will be limited and as such gases and liquid synthetic fuels come at a certain cost, there is a ***need for a policy framework which prioritises the allocation of the limited amounts to:***

- balancing the energy system and for long-term seasonal storage and

[1] Greens-EFA and Öko Institut (2018). A Vision Scenario for the Energy Union; Wind Europe (2018). Breaking new ground; Eurelectric (2018). Decarbonization pathways; Energy Watch Group (2018). Energy Transition in Europe Across Power, Heat, Transport and Desalination sectors.
[2] For further information, please consult the **CAN Europe position paper on gas**.
[3] There is a lot of confusion over terms such as "renewable", "green" or "decarbonised" gases, which are in many cases misleading. That is why we use the term non-fossil gas to indicate clearly that in our view, only those types of gases which deliver genuine climate benefits and which do not originate from a fossil fuel can under certain conditions be considered as future source. Non-fossil gases must not only comply with a net zero emission society but also come from sustainable and renewable sources.

- those sectors that are most difficult to decarbonise and where it is most efficient to use them.

Any policy on non-fossil gas should be based on these principles and ***coupled to a clear phase out trajectory for fossil gas***. This means that the use of renewables based hydrogen for low grade heat supply to buildings or for passenger cars will not be part of the future energy system and that decommissioning of the EU gas distribution networks and by implication transmission systems should be a priority.

Demand for gaseous energy carriers in general can be reduced significantly by fully implementing policies that maximise energy efficiency in buildings, transport through electric cars and industrial processes. In addition to energy savings and the full deployment of various renewable energy sources through distributed generation, sector integration is an important pillar to move to a net zero emission society.

If non-fossil gases are being used, ***only feedstocks and processes that deliver climate benefits, in compliance with a net zero emission society***, can be considered. At the same time, these gases should also not lead to negative side effects regarding land-use, lock in to dependence on food waste. ***Hydrogen must be entirely based on renewable energy***.

For ***biogas, stringent sustainability criteria*** need to be applied. Biogas can only deliver genuine climate benefits when waste and residues are being used and no alternative exists to use this biomass in ways emitting less greenhouse gases. Biogas can be used on the production site for heat/electricity production. It can only be used in gas networks when upgraded to biomethane. Through this process, CO_2 is being released which can be reused to complement hydrogen and generate ***synthetic methane***. When producing biogas and biomethane, ***methane leakage risks*** need to be managed, as the impact of methane leakage of renewable methane production will be similar to that to fossil methane leakage[4].

- **What measures should be taken to promote decarbonised gases?**

Dedicated support schemes should incentivise ***additional renewable generation*** capacities to feed electrolysers that cover the increasing demand for renewable hydrogen.

Redirecting renewable electricity to ***renewable hydrogen production should not undermine renewable energy targets*** and related support schemes. The production of renewable hydrogen should not compete with the production of renewable electricity that could be directly used to decarbonise key sectors such as heating and transport.

General quota targets for different gaseous energy carriers would not target the ***necessary market introduction of renewable hydrogen***.

[4] For more information consult our **Joint NGO Paper on Methane** (May 2020).

● **What role should hydrogen play and how its development could be supported by the EU?**

Under certain conditions, ***renewable hydrogen can be considered as a Paris Agreement compatible non-fossil gas***. For the production of renewable hydrogen only renewable electricity must be used. Hydrogen production linked to nuclear power should not be supported. Hydrogen originating from fossil gas through steam methane reforming (also called 'blue hydrogen' or 'grey hydrogen' depending on the use of CCS) is certainly not renewable or 'green', is not sustainable and can by its nature not be compatible with a net zero greenhouse gas emissions economy. Hydrogen should not be used as a Trojan horse to promote ***gas infrastructure*** deployment, particularly given that the current gas grid is not consistent with the future sources and uses of non-fossil gases and will therefore need ***in most cases to be decommissioned***.

The higher the demand for renewable hydrogen, the higher the demand for renewable electricity in addition to the electricity used directly by different sectors. This risks increasing greenhouse gas emissions in the overall electricity system, as if there is additional demand in times without a fully renewable electricity supply, it may then be produced by fossil and nuclear power plants. Renewable hydrogen must therefore in any case use ***100% additional renewable electricity***. The additionality can be achieved in two ways: it can be surplus electricity (which would otherwise be curtailed due to grid congestion) or be produced through additional renewable generation capacities that cover the electricity demand for renewable hydrogen on top of the direct electricity demand in industry, buildings and transport.

Also, see reply under previous bullet point.

● **How could circular economy and the use of waste heat and other waste resources play a greater role in the integrated energy system? What concrete actions would you suggest to achieve this?**

The circular economy potential deserves stronger attention in the economic decarbonisation agenda, in particular in strengthening EU infrastructure on reuse, repair, remanufacturing and other product life-extension efforts, as well as on recycling. The ***increased use of safe secondary raw materials*** will greatly reduce greenhouse gas emissions as well as lowering pressure on habitats and therefore biodiversity loss.

Material circularity should be supported, whereas incineration should not - particularly incineration for bioenergy of resources that have other uses, or of agricultural or forest biomass other than fast-decaying wastes and residues. Despite waste-to-energy having been supported by EU waste legislation, such unnecessary burning of materials should no longer be supported or considered neutral in terms of greenhouse gas emissions.

Energy-intensive high-temperature processes in particular in the steel and chemicals industry currently burn fossil fuels that often are not used in the most efficient way. Modernisation of industrial production processes and fuel production offers the opportunity to ***couple demand***

for low-temperature heat with the excess heat from the high-temperature processes that otherwise would be wasted. In order to bring this waste heat to potential demand sectors in vicinity, access to district heat networks plays a key role.

Heat pumps also can efficiently mobilise ***waste heat potentials***, e.g. from data centres or wastewater for low-temperature needs of buildings and industry. A precondition for harvesting these waste heat potentials is an integrated urban planning that facilitates access to the unused heat resources and as well as their distribution to end consumers or through district heat networks. Administrative barriers would need to be removed on the local level to facilitate aggregators' engagement with stakeholders who are not aware of the demand potential related to their waste heat.

- **How can energy markets contribute to a more integrated energy system?**

By fully incentivising demand side response, ensuring that demand more closely matches the supply of variable renewable energy, and by ensuring that the price of polluting energy supply fully reflects the cost of greenhouse gas emissions and other environmental damage.

- **How can cost-efficient use and development of energy infrastructure and digitalisation enable an integration of the energy system?**

The fact that certain energy infrastructure already exists (for example the gas grid) is not a good argument for its continued use, or further investment in it, if it has no long-term future (known as the 'sunk costs' fallacy).

Energy infrastructure however - particularly that relating to the direct or indirect electrification of the economy - is a key component in Europe's fight against climate change. ***Energy infrastructure*** should neither become a ***bottleneck to the uptake of renewable energy*** nor should it deepen the ***EU's dependency on fossil fuels.*** Recent research has shown that Europe's fossil gas infrastructure is shock resilient to potential security of supply disruptions. Additional investments into new gas infrastructure would simply create a fossil gas lock-in and result in unnecessary investments.

The integration of energy infrastructure planning needs a lot of improvement in particular in the Ten Year Network Development Plans (TYNDPs). Better matching renewable supply and demand on the distribution grid level can also help easing the transmission grid. However, ***to enable an integration of the energy system, consideration of non-infrastructure solutions to energy needs should get higher priority***. Policies underpinning our future energy infrastructure need to look beyond cables and pipelines and focus much more on innovative decentralised solutions such as demand response, flexibility generation, storage technologies and more efficient grid management.

Currently, only European ***Transmission System Operators***, acting through ENTSOE and ENTSOG, are responsible for writing the TYNDPs, which in turn largely define the selection of priority projects. This creates an ***unacceptable conflict of interest*** resulting in high projections for future fossil gas demand and a lack of consideration of non-infrastructure solutions to energy needs. The future process for scenario development needs to build upon a consistent set of assumptions that take into account the ***full range of energy solutions, both on the demand and supply sides***. These ***independent and evidence based assumptions*** would help ensure more efficient and more coherent infrastructure decisions, better aligned with the Paris Agreement, the EU's climate and energy objectives, and relevant nature and environmental legislation[5].

1. **Are there any best practices or concrete projects for an integrated energy system you would like to highlight?**

The use of marine source heat pumps to supply district heating systems in cities such as Stockholm and Helsinki. Using such approaches (which can use 'spare' power generation from wind or solar at very high efficiencies and harness the thermal storage of the sea) could be a major part of decarbonising buildings in any coastal cities.

2. **What policy actions and legislative measures could the Commission take to foster an integration of the energy system?**

- Introducing ***policies in line with the Paris Agreement and the 1.5°C objective***, the European Green Deal and the climate neutrality objective. To define these policies and measures back casting modelling including a 100% renewables scenario needs to be developed.
- ***Increasing the ambition of the 2030 energy targets*** for renewable energy and energy efficiency to provide the strategic direction for the transformation of the energy system. This should integrate massive roll out and financing of:
    - deep renovation,
    - demand side response technologies,
    - thermal storage linked to district heating systems,
    - battery electric vehicles.
- ***Phasing out all fossil fuel subsidies*** awarded through different avenues such as state aid, tax exemptions, direct and indirect public financial support, which do not incentivise the required and rapid switch to clean and renewable energy.
- Policies underpinning the EU's future energy infrastructure should also explore more in depth how ***transmission grids could be eased by better matching renewable supply and demand on the distribution grid level.***
- Policies on ***renewable heat*** and on the expansion of EU wide ***renewables based district heating systems*** supplied by heat pumps, geothermal and solar thermal heat as well as sustainable biomass (produced from fast-decaying waste or residues without other uses).

[5] May 2020: **CAN Europe letter on Fossil free and nature-compatible Trans-European Energy Infrastructure**