

Energy Efficiency First: A Key Principle for Energy Union Governance

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“Energy Efficiency First” is a principle with growing visibility in European energy and climate policy. The concept has been championed by the Commissioners in charge of the Energy Union and further introduced in proposed amendments to the Governance Regulation, the Energy Performance of Buildings Directive, the Energy Efficiency Directive, and market design legislation.

This briefing note will aid understanding of what it means to incorporate the principle of Energy Efficiency First across the five dimensions of the Energy Union in the context of National Energy and Climate Plans.

The European Parliament has proposed the following definition:¹

“‘energy efficiency first’ means the prioritisation, in all energy planning, policy and investment decisions, of measures to make energy demand and energy supply more efficient, by means of cost-optimal energy end-use savings, demand-side response initiatives and more efficient conversion, transmission and distribution of energy.”

This definition helps clarify footnotes 56 and 58 in the European Commission’s proposals to the Governance Regulation. The Parliament has further proposed that:

- Member States “take into account the interlinkages between the five dimensions of the Energy Union, in particular the energy efficiency first principle” in drafting their National Energy and Climate Plans;² and,

¹ European Parliament. (2018, January 17). *Amendments on 17 January 2018 on the proposal for a regulation of the European Parliament and of the Council on the Governance of the Energy Union*. Strasbourg. Retrieved from:

<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2018-0011+0+DOC+XML+V0//EN>

² Id., Amendment 59. *Proposal for a regulation*. Article 3(3)(b).

- The Commission include in its State of the Energy Union report “an overall assessment of the progress towards the full integration of the energy efficiency first principle and fair treatment for energy consumers.”³

What would this mean in practice? As a principle, Energy Efficiency First is meant to provide a compass to guide decision making, rather than to prescribe certain actions. To understand what these proposals mean, therefore, it is important to:

- Grasp the reasoning behind the principle; and
- Develop an understanding of how the principle would apply in practice, while accepting that actual application will need to be worked out case by case.

Why Make Energy Efficiency First a Priority?

Energy Efficiency First is a necessary decision tool to ensure cost-effective decarbonisation of the economy, including enabling the transition to a future powered by renewable energy. Across energy systems, it asks the question: Would it be cheaper or more valuable to help customers invest directly in energy-saving actions and demand-side response, rather than paying more for supply-side networks, fuels, and infrastructure? The result is a more cost-effective allocation of resources across the energy system, including in the many emerging opportunities for customer engagement.

In this way, Energy Efficiency First provides what has been a missing link in fully implementing two other guiding principles of climate and energy policy: cost-effectiveness and consumer protection.

There are many reasons to strengthen the focus on energy efficiency:

- Innumerable analyses have identified energy efficiency as the cheapest source of carbon abatement;⁴
- Experts, policymakers, and system planners increasingly understand that energy efficiency must go hand in hand with renewables development to control costs and maximise consumer welfare;⁵
- Identifying and animating synergies between customers and the broader energy system is becoming necessary and possible with digitalisation and the growing convergence of the electricity, transport, and heat sectors. For instance, the deployment of electric vehicles is an important strategy to improve energy efficiency of transport, but

³ Id., Amendment 191. *Proposal for a regulation*. Article 29, paragraph 2, point j a (new).

⁴ See, for example, McKinsey and Co. (2009). *Pathways to a low-carbon economy*. Retrieved from <https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Sustainability%20and%20Resource%20Productivity/Our%20Insights/Pathways%20to%20a%20low%20carbon%20economy/Pathways%20to%20a%20low%20carbon%20economy.ashx>; and Rosenow, J., Eyre, N., Sorrell, S., and Guertler, P. (2017). *Unlocking Britain's first fuel: The potential for energy savings in UK housing*. Retrieved from the UK Energy Research Centre website: <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

⁵ See, for example, Gielen, D., Saygin, D., Wagner, N., Petrichenko, K., and Tsakiris, A. (2015) *Synergies between renewable energy and energy efficiency*. Retrieved from International Renewable Energy Agency website: <http://www.irena.org/publications/2015/Aug/Synergies-between-Renewable-Energy-and-Energy-Efficiency>; and Wunsch, M., et al. (2014). *Benefits of energy efficiency on the German power sector*. Retrieved from Regulatory Assistance Project website: <http://www.raponline.org/wp-content/uploads/2016/05/agora-ecf-rap-positiveeffectsee-en-2014-mar-19.pdf>

cost-effective integration of electric vehicles at wide scale relies on improved efficiency of other electric end uses and “smart charging.”⁶

Energy Efficiency First complements existing energy efficiency policies and helps overcome the many institutional, market, and behavioural barriers to energy efficiency and demand-side response. For instance, applying the Energy Efficiency First principle can:

- Help identify valuable energy efficiency and demand response potential in congested areas of electricity transmission and distribution networks;
- Lower the cost of reducing carbon by targeting cost-effective abatement options on the demand side; and
- Ensure that energy savings potential is considered as part of an energy security strategy, lowering dependence on natural gas imports.

Applying Principle to Practice

Implementing the principle is largely a matter of sequencing: It means considering energy efficiency and demand-side response first, followed by network and supply-side efficiency. Due to the deep market barriers to energy efficiency investments and powerful incentives for supply-side solutions, failing to follow this sequence can lead to over-investment in supply-side and network infrastructure and, ultimately, to stranded assets.

The examples below demonstrate how Energy Efficiency First might be applied in National Climate and Energy Plans, based on examples of how it has been implemented in Europe and other countries in five areas: climate policy, energy security, renewables support, energy markets, and research and innovation.⁷

Climate Policy and Energy Security

A mix of policies is needed to deliver carbon emission reductions to consumers at least cost. One application of the Energy Efficiency First principle in climate policy is to apply revenues from emissions allowance auctions to boost energy efficiency programs and overcome barriers to investment. Several Member States already do this: France, Estonia, Latvia, Germany, Croatia, Slovakia, and the Czech Republic all report that they apply a high portion of revenues to energy efficiency programs.⁸ In the Czech Republic, it is estimated that for every Czech crown spent in the New Green Savings Programme, an additional 2 to 3 crowns are invested by a building owner. Thus, the public investment is returned to the state budget via taxes and social and health insurance of the workers. Carbon-funded housing retrofit programs have supported

⁶ Hogan, M., Kolokathis, C., and Jahn, A. (2018). *Treasure hiding in plain sight: Launching electric transport with the grid we already have*. Retrieved from the Regulatory Assistance Project website: <http://www.raonline.org/knowledge-center/treasure-hiding-in-plain-sight-launching-electric-transport-with-the-grid-we-already-have/>; and Eurelectric. (2015). *Smart charging: Steering the charge, driving the change*. Retrieved from https://cdn.eurelectric.org/media/1925/20032015_paper_on_smart_charging_of_electric_vehicles_finalpsf-2015-2301-0001-01-e-h-FD3A00EA.pdf

⁷ For more examples of the application of the Efficiency First principle in Europe, see Rosenow, J. (2016, 14 November). *Energy Efficiency First: From principle to practice* [blog post]. Regulatory Assistance Project. Retrieved from <http://www.raonline.org/blog/efficiency-first-principle-practice/>

⁸ Eionet Reporting Obligations Database. *Deliveries for use of auctioning revenue and project credits*. Retrieved from <http://rod.eionet.europa.eu/obligations/698/deliveries>

more than 115,000 projects since 2009 and delivered 8,000 to 10,000 new or sustained jobs. The expected cost-effective avoided gas consumption through retrofitting of the residential housing stock to 2030 is calculated at 1.084 million cubic metres – 63 percent achieved through the carbon revenue investment scheme.⁹ That is, energy savings reduce carbon emissions and improve energy security by reducing dependence on imported gas.

Renewables Policy

Energy efficiency is a necessary complement to renewable energy. A recent report by the International Renewable Energy Association calculates the importance of energy savings to achieve renewable energy targets and cost-effectively decarbonise the energy sector. While it is not necessary to incorporate energy efficiency into every renewables policy, it is important to consider where there are synergies. For instance, in the UK, a minimum energy efficiency requirement applies to households who want to install solar panel modules on their buildings and claim the full feed-in tariff rate. A similar requirement applies in Flanders in Belgium. An analysis of the feed-in tariff scheme in the UK found that households with solar photovoltaic installed were much more likely to have energy efficiency measures (such as wall insulation or double glazing) installed. Thus, they were combining the opportunity to self-produce with the opportunity to minimise consumption. An important element of such schemes is to build off incentive and support schemes to avoid erecting cost barriers and ensure vulnerable consumers can benefit.¹⁰

The Internal Energy Market

The power sector is one of the most important—and complex—areas to integrate energy efficiency. There are many decision points where energy efficiency and demand-side management¹¹ should be considered as part of the planning and investment process. In competitive markets, it is important to remove barriers to participation of customer resources (energy efficiency, demand response, distributed generation) and to explicitly allow it, including through aggregators. Many of the current proposals to European legislation on the Internal Energy Market go in this direction. One example is the proposal by Parliament and the Council clarifying that energy efficiency and demand response must be eligible to participate in capacity mechanisms. The French, British, and (planned) Polish capacity markets all allow for demand response to bid, though energy efficiency is not included as a qualifying resource. In the United States, energy efficiency and demand response can bid into regional capacity markets. A detailed study found that customer savings in just one of those markets (PJM's capacity market) exceeded \$12 billion in a single auction period.¹²

⁹ Based on calculation of the cost-effective gas savings potential in single-family homes to 2030. For more on the programme, see <http://www.sanceprobudovy.cz/>.

¹⁰ Rosenow, J., Bayer, E., Rososinska, B., Genard, G., and Toporek, M. (2016). *Efficiency First: From principle to practice—real world examples from across Europe*. Retrieved from the Regulatory Assistance Project website: <http://www.raponline.org/knowledge-center/efficiency-first-from-principle-to-practice-with-real-world-examples-from-across-europe/>

¹¹ “Demand-side management” is used here interchangeably with “demand-side response” and refers to all forms of managing the timing and volume of electricity consumption on the “customer side of the meter.” While in some jurisdictions end-use energy efficiency is considered to be an element of demand-side management, it is explicitly referred to throughout this text to avoid ambiguity.

¹² Monitoring Analytics. (2010). *Analysis of the 2013/2014 RPM base residual auction*, p. 52. Retrieved from http://www.monitoringanalytics.com/reports/Reports/2010/Analysis_of_2013_2014_RPM_Base_Residual_Auction_20090920.pdf

Research and Innovation

New technologies and sector coupling are creating fertile ground for disruptive business models in the energy sector.¹³ A rising share of electric vehicles, for instance, is creating opportunities for balancing electricity networks, as well as challenges for managing local distribution systems. Will electric vehicles help or threaten power systems? The answer will largely depend on whether demand-side management is successfully integrated with electric vehicle uptake and whether growth in electricity demand for electric vehicles is offset with more efficient electric end uses elsewhere. In the Nordic region, the projected demand increase from electric cars to 2030 is 9 terawatt-hours, with possible additional increases of 15 TWhs from services, and 12 TWhs of energy savings from energy efficiency measures. In the United States, Hawaii has one of the most aggressive renewables, energy efficiency, and electric vehicles policies in the nation. Electric vehicle uptake is helping to integrate solar PV, while renewables targets are combined with EE targets to meet 70 percent of demand by 2030.¹⁴

Energy Efficiency First in Planning and Investment

Applying the Efficiency First principle requires consideration of where, in a decision process, efficiency is overlooked or undervalued. It then requires the introduction of rules to ensure the costs and benefits of energy efficiency and demand-side response are compared with other options. In the case of networks, which are regulated monopolies, this means introducing rules requiring the network companies to assess demand-side alternatives to traditional infrastructure and ensuring proper regulatory oversight of proposed investments. The figure on the next page illustrates how this decision-making process might look, compared with a more traditional approach to network investment. The outcome should be the least-cost combination of consumer resources (energy savings, demand-side response, distributed renewables, and storage) and traditional infrastructure (poles, wires, substations, etc.) to ensure secure system operations.

One illustration of the financial savings resulting from deferred investment costs comes from Consolidated Edison (Con Ed), the electric utility serving New York City and its northern suburbs. Con Ed recently estimated that including the effect of its systemwide efficiency programmes in its ten-year forecast reduced capital expenditures by more than \$1 billion. Similarly, the New England Independent System Operator has identified more than \$400 million of deferred investment in previously planned transmission investments in New Hampshire and Vermont beyond a ten-year planning horizon.¹⁵

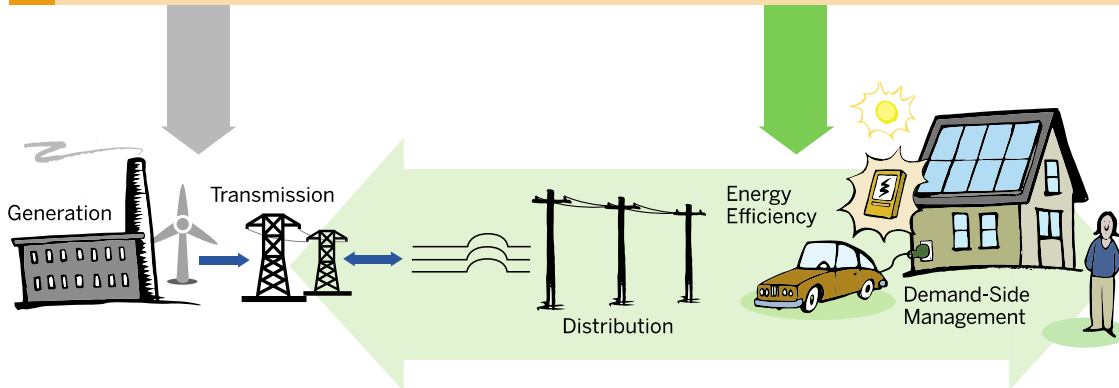
¹³ Gielen, 2015.

¹⁴ Walton, R. (2018, April 2). Electric vehicles to dominate Hawaiian roads by 2045, HECO predicts. *Utility Dive*. Retrieved from <https://www.utilitydive.com/news/electric-vehicles-to-dominate-hawaiian-roads-by-2045-heco-predicts/520394/>; and National Renewable Energy Laboratory. (2018). *Hawaii clean energy initiative 2008-2018* (DOE/GO-102018-5063). Retrieved from <https://www.nrel.gov/docs/fy18osti/70709.pdf>

¹⁵ Neme, C., and Grevatt, J. (2015). *Energy efficiency as a T&D resource*, p. 12. Energy Futures Group for Northeast Energy Efficiency Partnerships. Retrieved from http://www.neep.org/sites/default/files/products/EMV-Forum-Geo-Targeting_Final_2015-01-20.pdf

Business-as-Usual vs. Energy Efficiency First in Networks

	Business-as-Usual	Energy Efficiency First
Mandate	The Law Requires:	Network companies to ensure secure operation of the network
	... by making investments in cost-effective necessary network infrastructure	... by making investments in the most cost-effective mix of network infrastructure, energy efficiency, and demand-side management measures
Network Development Plan	The Network Company:	Forecasts need and identifies network investments to respond to need
		... and demand management options (energy efficiency, demand response, distributed generation), such as through competitive tender
	Conducts cost-benefit analysis	
	... of network options	... of all options on both the network and demand side
	Proposes investment plan with price tag (revenue requirement)	
Regulatory Review and Approval	Regulator Asks:	Are demand projections reasonable?
		Does plan address needs?
		Are investments cost-effective/reasonable, considering:
	... proposed investments in network options?	... proposed investments in all options, on both the network and demand side?
		Budget approval
Investment	The Network Company:	Plans, tenders, contracts for work to implement investment plan
	... focused on network infrastructure	... focused on all options, both network infrastructure and demand-side management measures



Conclusion

Evidence from many countries in Europe and around the globe demonstrates the value of Energy Efficiency First: lower bills; easier uptake of variable renewables; least-cost carbon abatement; improved energy security; and many broader health and societal benefits. Yet these benefits won't appear just because we want them to. As the examples here demonstrate, delivering these benefits requires deliberate consideration of efficiency's potential at various decision points in energy policymaking, planning, and investment. For this reason, it is necessary to include the principle not in the introductory recitals alone, but as a legislative mandate grounded in transparency and accountability. The Governance Regulation aims to streamline and align planning and reporting across the five dimensions of the Energy Union. The introduction of Energy Efficiency First into this framework is a necessary organising principle to deliver on the goals of the Energy Union and secure a fair deal for energy consumers.



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