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Importance of energy efficiency to reach carbon neutrality

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Science Advice for Policy by European Academies

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Energy efficiency: A science advice perspective

EP Intergroup on "Climate Change, Biodiversity and Sustainable Development"

Webinar 28/3/2022

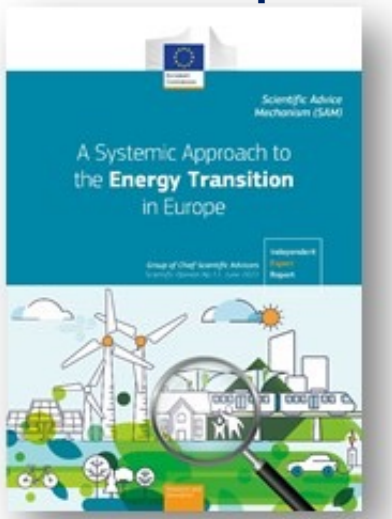
European Commission's

Scientific Advice Mechanism

Chief Scientific Advisors

SAPEA*

Scientific Opinion



College of European Commissioners

Policy challenge

Evidence Review Report

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Science Advice for Policy by European Academies

Scoping question

How can the European Commission contribute to the preparation for, acceleration, and facilitation of the energy transition in Europe given the present state of knowledge on the possible transition pathways?

(Considering the constraints from technologies, services, energy sources, economics, raw materials, social issues, environmental boundaries, etc.)

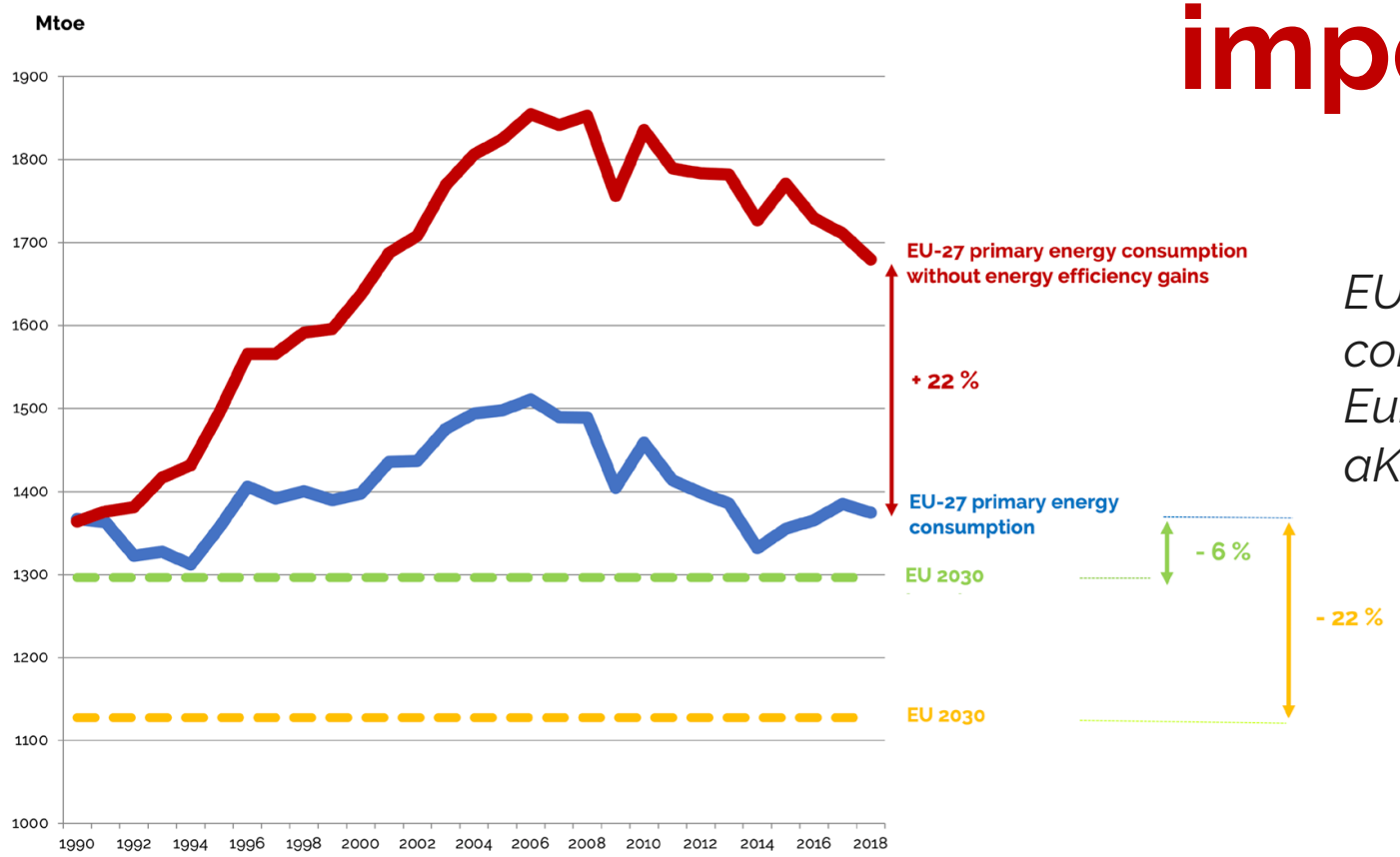
Key message

There are many possible pathways towards a carbon-neutral future. But this is not just a technical challenge. To make the energy transition a reality, we need to solve a huge systemic problem.

- A strategic direction needed enabling long-term infrastructure related investments required to avoid technology lock-in risks and facilitate highly challenging deeper decarbonisation
- Regulatory actions needed that combine with other European objectives & social principles
- But any successful policy must involve a carbon pricing mechanism
- Huge systemic problem ahead, which involves coordinating an almost countless number of individual voluntary decisions on investment, consumption, and behaviour in the EU

The report doesn't recommend an unequivocal policy package for EU, but rather a set of policy options addressing various facets of the challenge.

Improved energy efficiency is an important “fuel”

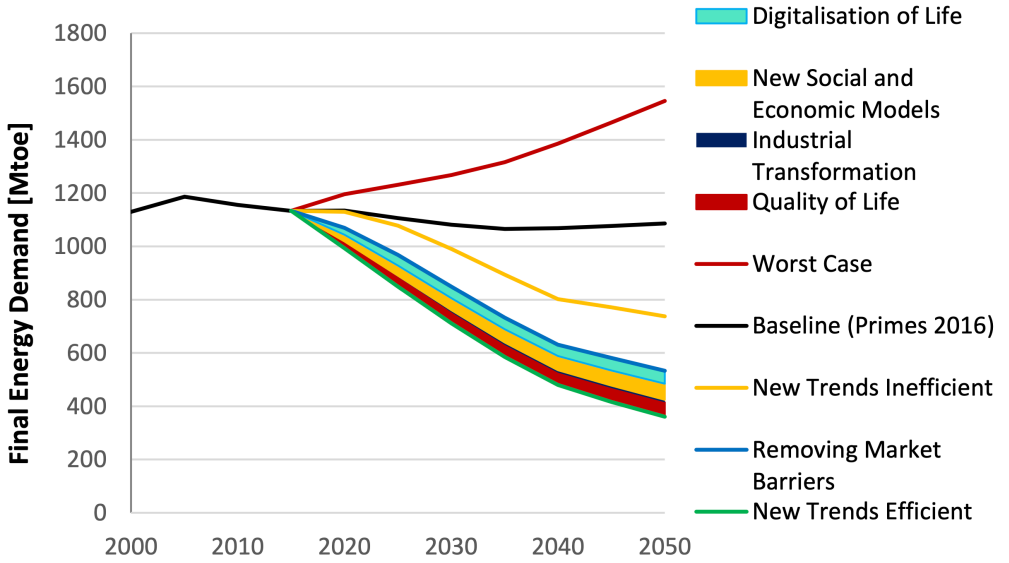


EU-27 primary energy consumption trends (Eurostat; European Environment Agecny; aK & Company)

- **Energy efficiency 30% primary energy savings in EU 1990-2016**
  - Gains from energy mix shifts (e.g. to renewables and gas)
  - Efficiency improvements in households (46% since 2000; transport & industry 25% each, services 4%)

Future outlook on EU energy demand

- Reduced demand reduces transition costs, increases energy security
  - Synergies between demand and supply chain and other impacts
  - Electrification may increase efficiency in replacing inefficient fuel conversion processes
  - Low Energy Demand (LED) scenario has not yet been down-scaled to the EU level
- Significant reduction in final energy demand is highly unlikely without strong policy measures
- Policy environment embedding societal and technological transitions
- Rebounds effects



Final energy demand (EU-28) in 4 scenarios and baseline from PRIMES model (from Brugger et al., 2021)

Opportunities for energy demand reductions and efficiency

- Efficiency improvements harder to achieve in the future
- New trends e.g. digitalisation, sharing economy and consumer awareness may enhance or counteract energy efficiency gains
  - Digitalisation will enable wide-ranging automation in buildings and transport, among others, that could save large amounts of energy
  - New 'smart' technologies aiming at systemic integration and feedback to consumers could contribute to higher levels of efficiency
- Urban systems could significantly reduce energy demand
  - Single largest energy demand category in EU countries is heating and cooling, which, when combined across both buildings and industry, accounts for around half of EU final energy
  - System level solutions (e.g. buildings as complete systems); energy-efficient retrofitting of buildings
- Expanding to other areas to bring down energy demand

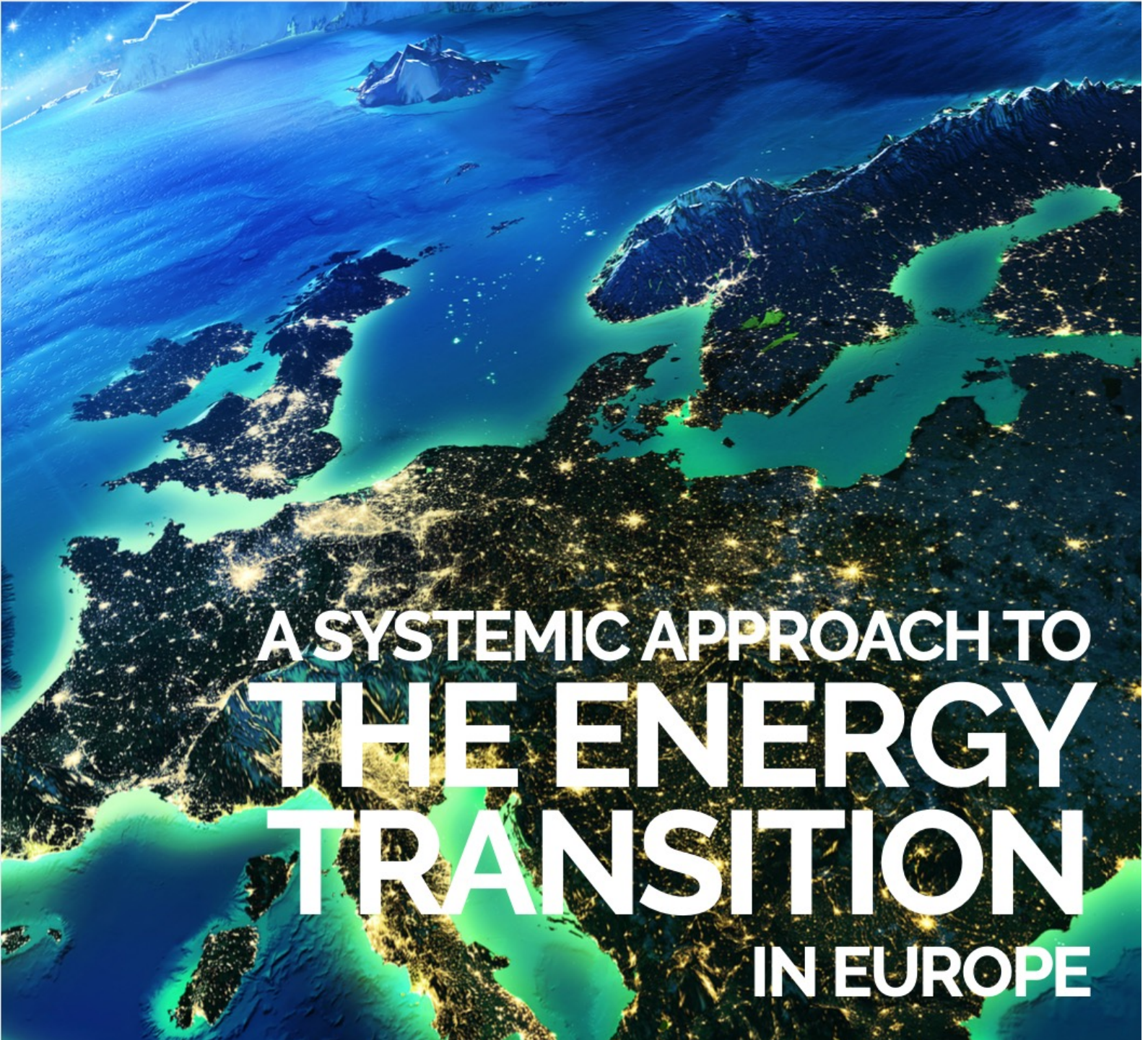
Economic and regulatory aspects

- Regulation in buildings and transport generally manages to avoid the interference potentially created by any parallel mechanism relying on economic incentives
  - Subjecting the buildings and transport sectors to the EU ETS and to an absolute reduction target via the ESR at the same time /OR/ including in EU ETS and excluding from ESR???
  - Low-income households often confront lack of access to money investing less in energy efficiency compared to high-income households
  - Standard practices of financial institutions need to be revisited reconsidering effective ways to facilitate fundraising by individuals
- Carbon taxes that increase energy prices are also important mechanisms to influence energy that avoids rebound
- There is need to further quantify, operationalise and implement the potentials for buildings, transport and buildings

Policy must stimulate behaviour alongside technology

Behaviour could be as important as developing new technology and would deserve a stronger role in the Green Deal policy framework

- There is often misalignment between policy and behaviour
- Consumers practically ignore energy efficient practices because they are not given accurate price signals about electricity consumption; intentional market distortions (such as subsidies) and unintentional market distortions (such as split incentives) prevent consumers from becoming fully invested in their electricity choices.
- View citizens as active participants whose lifestyles play a central (and disruptive) role in contributing to energy and climate problems.



Thank you for your attention!

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