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ODYSSEE-MURE webinar series on Energy Efficiency

The role of Energy Efficiency First in climate policy: A complement, not a contradiction

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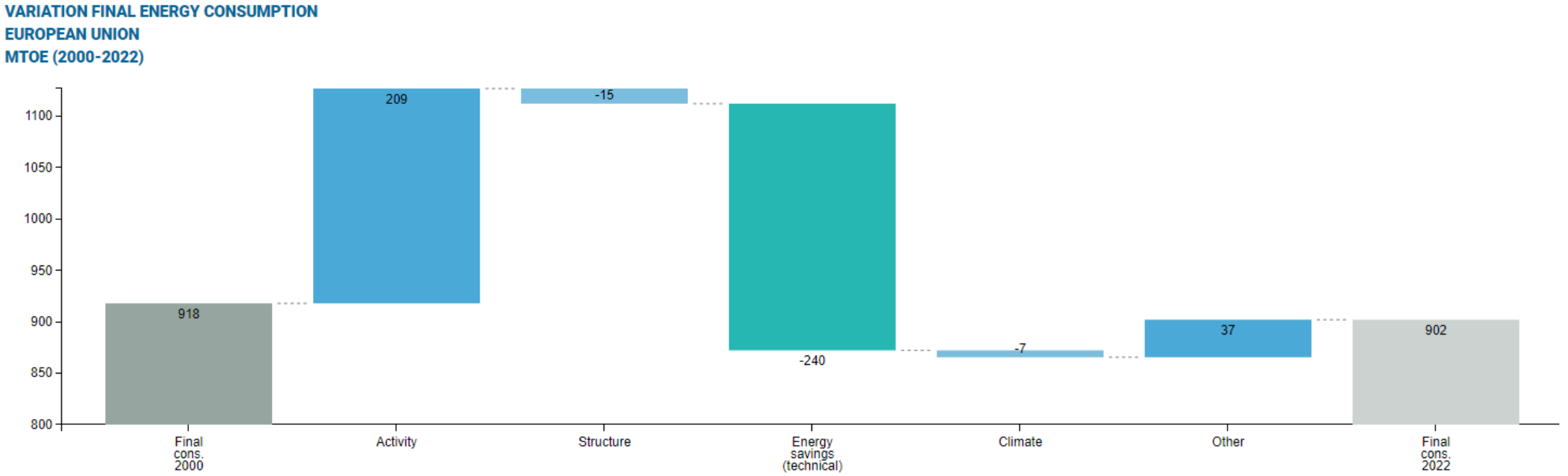
Key question of the webinar:

How to integrate the Energy Efficiency First Principle into overall decarbonisation?

Section 01

Setting the scene:
The contribution of energy efficiency to reducing energy consumption and CO_2 emissions and the Energy Efficiency First (EE1) Principle

The contribution of energy savings and energy efficiency to final energy consumption in the EU in the past decades

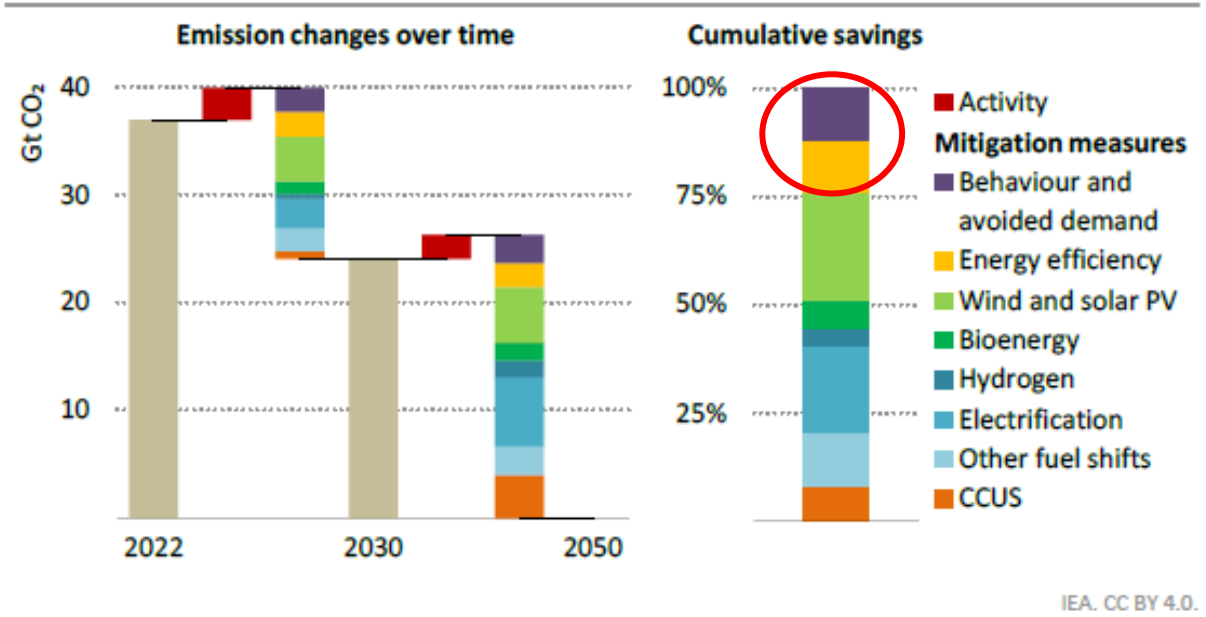


Source: ODYSSEE Database, Decomposition Tool. https://www.indicators.odyssee-mure.eu/decomposition.html

Result from the ODYSSEE database:

In the period 2000 – 2022, energy savings more than compensated a mainly activity-driven increase in final energy consumption in the EU. In total, this led to slight decrease in final energy consumption by 16 MTOE.

The contribution of energy efficiency and energy demand reduction to reaching the goal of climate neutrality in 2050



Source: IEA: Net Zero Roadmap. 2023 Update.
https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach

Result from the „Net Zero Emissions by 2050 Scenario" modelled by IEA:

At at least one quarter of the total cumulative CO_2 emissions reductions will be achieved by energy efficiency (including behaviour and avoided demand).

The scenario also includes a doubling of the rate of primary energy intensity improvement until 2030 (compared to the rate from 2022).
This goal was mainly justified by the resulting social and economic benefits of energy efficiency, the so-called “Multiple Benefits”.

The implementation of the Energy Efficiency First (EE1) Principle in the revised EU Energy Efficiency Directive (EED)

Article 3(5a) of the EED 2023

"In applying the energy efficiency first principle, Member States shall promote and, where cost-benefit analyses are required, ensure the application of, and make publicly available, cost-benefit methodologies that allow proper assessment of the wider benefits of energy efficiency solutions where appropriate, taking into account the entire life cycle and long-term perspective, system and cost efficiency, security of supply and quantification from the societal, health, economic and climate neutrality perspectives, sustainability and circular economy principles in transition to climate neutrality."

- The revised Energy Efficiency Directive (EED 2023) entered into force on 10 October 2023.
- Article 3 of the revised Directive establishes "Energy Efficiency First (EE1)" as a fundamental principle of EU energy policy → energy efficiency must be considered by EU Member States in all relevant policy and major investment decisions taken in the energy and non-energy sectors.
- Cost-benefit analyses are needed taking wider benefits of energy efficiency solutions into account beyond pure energy and energy cost savings.

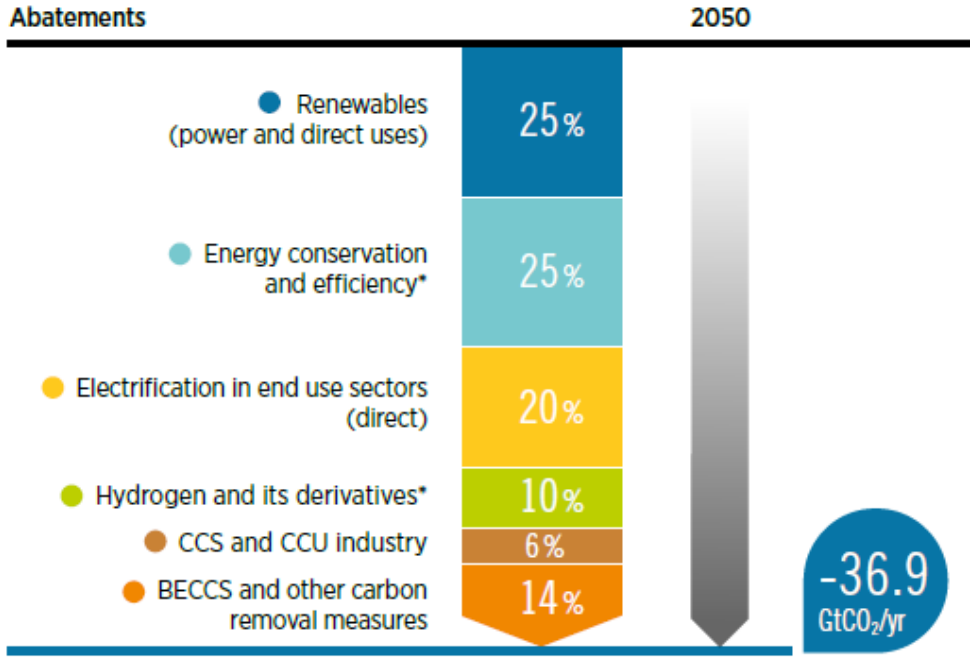
Section 02

How climate policies both promote and contradict the EE1 Principle

The contribution of energy efficiency and energy demand reduction to reaching the goal of climate neutrality in 2050 (IRENA)

Six pillars of the Energy Transition Strategy

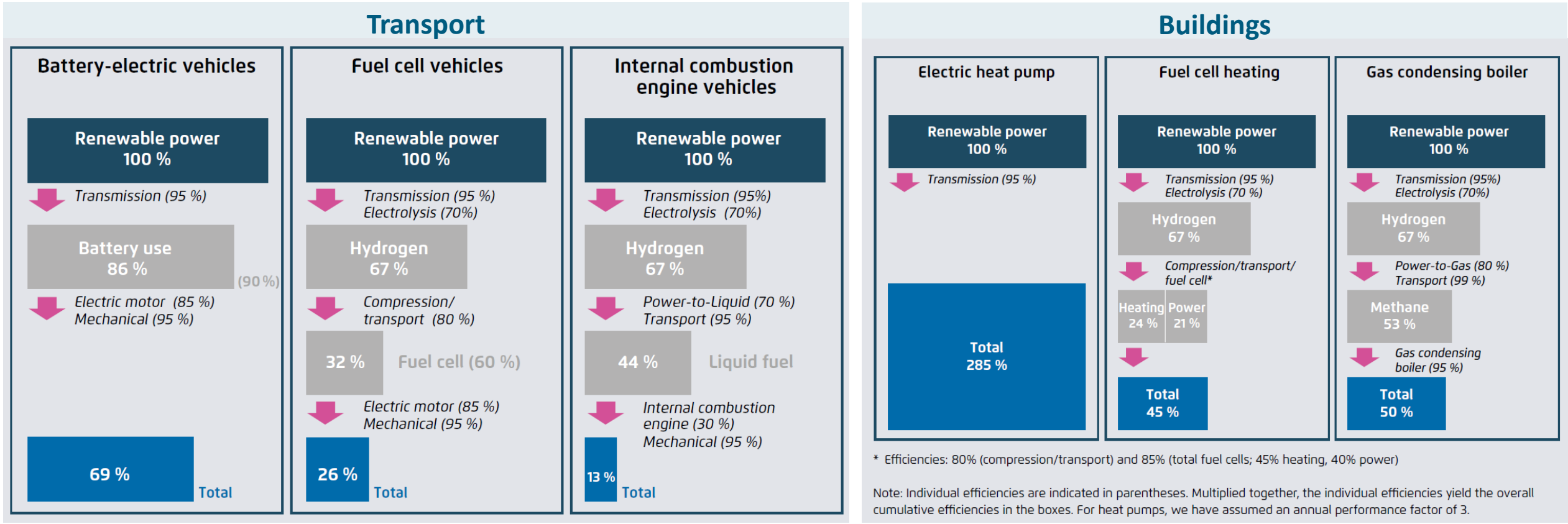
1. Energy efficiency & conservation
2. Renewables
3. Direct electrification end-use sectors
4. Sustainable BECCS
5. Hydrogen & derivatives
6. CCS / CCU



IRENA

Taking direct electrification into account, in addition to energy conservation, energy efficiency is contributing 45% to the overall GhG reduction

Examples why certain climate policies contract the EE1 principle: The conversion of energy carriers is associated with losses



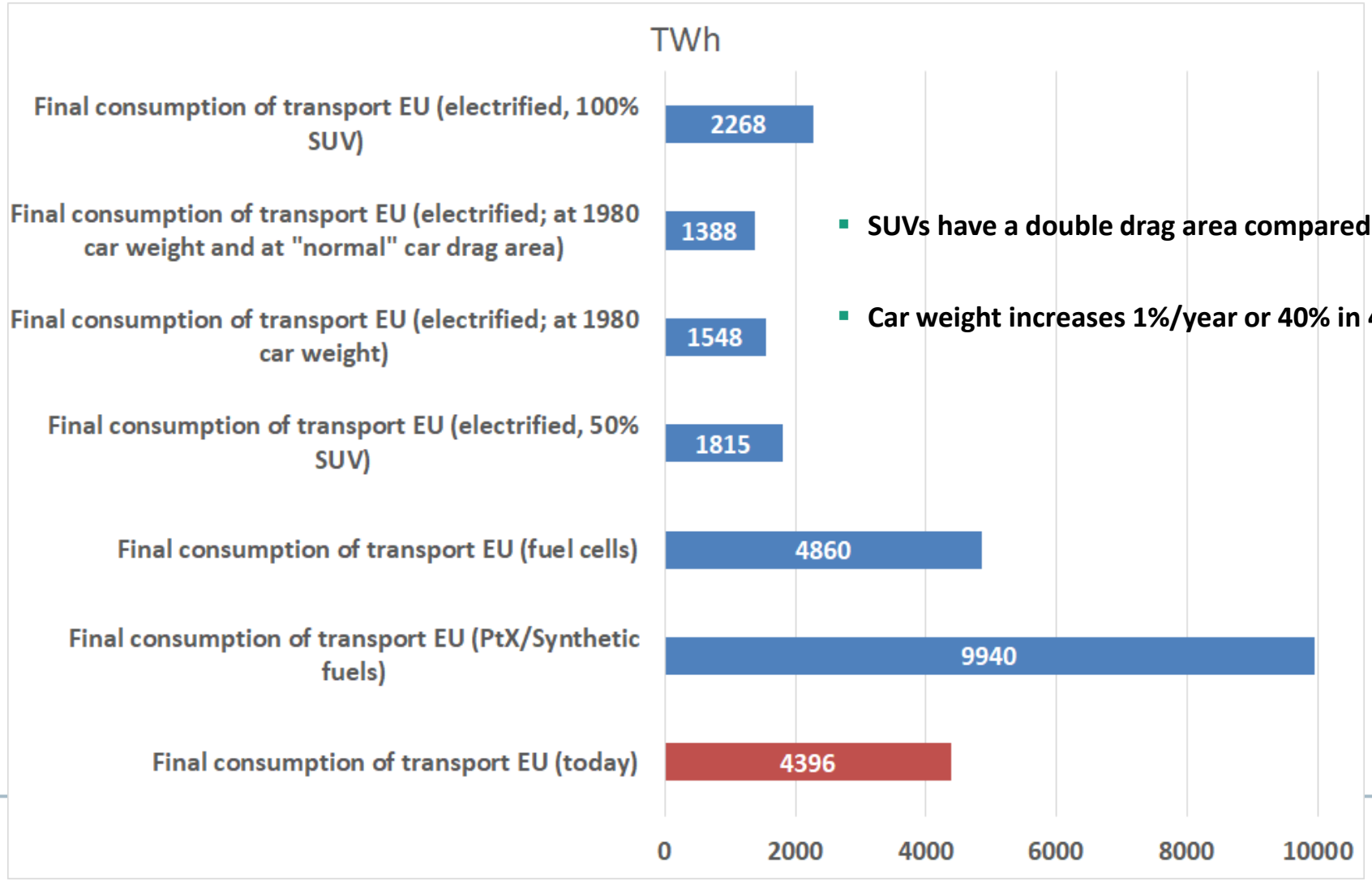
* Efficiencies: 80% (compression/transport) and 85% (total fuel cells; 45% heating, 40% power)

Note: Individual efficiencies are indicated in parentheses. Multiplied together, the individual efficiencies yield the overall cumulative efficiencies in the boxes. For heat pumps, we have assumed an annual performance factor of 3.

Source: Agora/Frontier Economics (2018)

Direct electrification of transport: why this is great for energy efficiency

...but not everything...



- **SUVs have a double drag area compared to „normal“ cars**
- **Car weight increases 1%/year or 40% in 40 years**

Source: Agora/Frontier Economics (2018)

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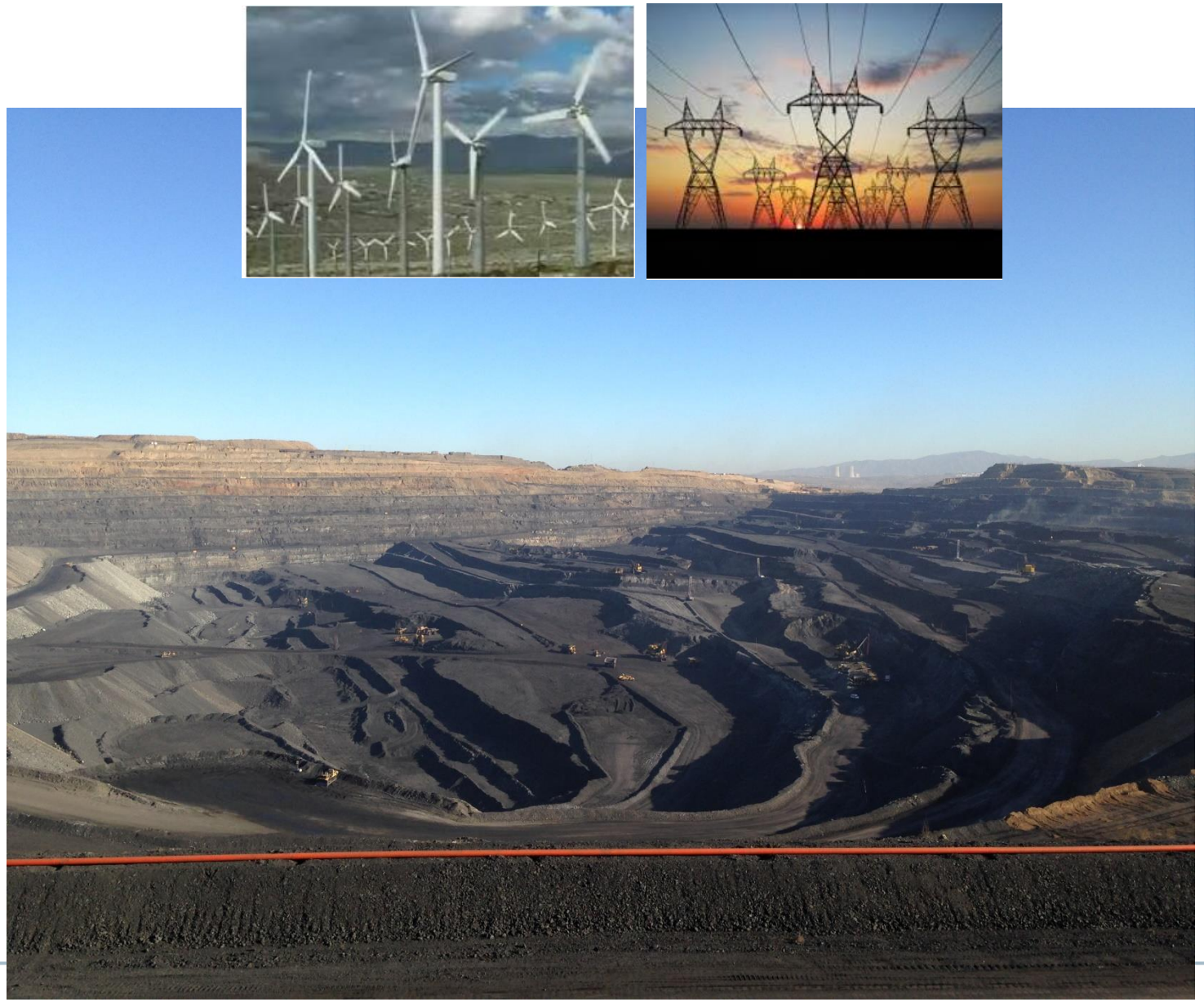
Environmental Impacts: Renewables (Multiple Benefits of Energy Efficiency)



Environmental Impacts: Direct Air Capture

Banks of fans blow air through a carbon dioxide–capturing solution in this direct air capture plant

Source: http://www.sciencemag.org/news/2018/06/cost-plunges-capturing-carbon-dioxide-air

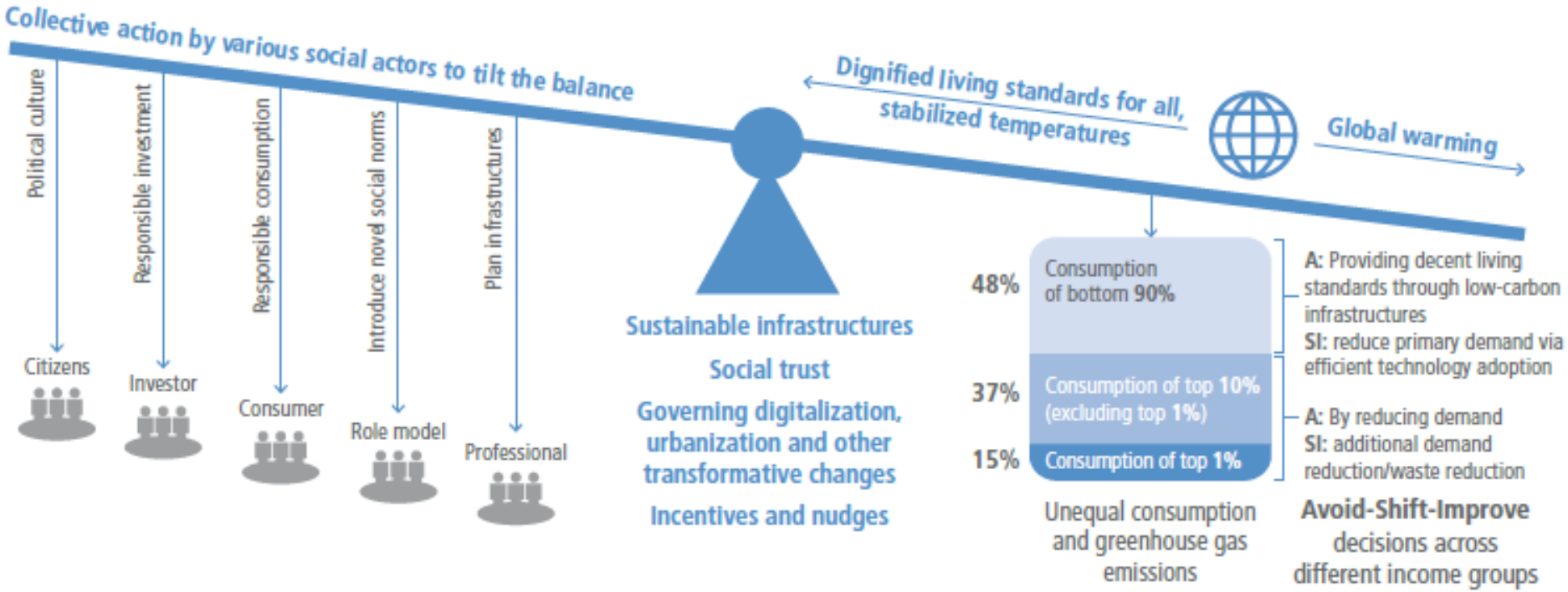
Source: Wietschel et al. 2021, HYPAT Working Paper 01/2021

Section 03

The role of energy efficiency and the EE1 Principle in climate policy – examples from recent climate assessment reports

IPCC Working Group III – Mitigation of Climate Change: Reducing energy demand via efficient technology adoption and decent living standards as a key mitigation strategy

Demand side mitigation is about more than behavioural change. Reconfiguring the way services are provided while simultaneously changing social norms and preferences will help reduce emissions and access. Transformation happens through societal, technological and institutional changes.



Source: IPCC (2022): Climate Change 2022. Mitigation of Climate Change. Technical Summary. Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. https://www.ipcc.ch/report/ar6/wg3/

European Scientific Advisory Board on Climate Change: Energy Efficiency (incl. its multiple benefits) and the EE1 Principle play a key role towards EU climate neutrality

The EU's target for final energy demand reduction is fit for net zero, but achieving it calls for energy efficiency – including its multiple benefits – to be better measured and understood, and for the energy efficiency first principle to be systematically put into practice.

Needs. The EU needs to substantially increase and accelerate energy savings in both primary and final energy consumption to reach the 2030 targets under the EED (see also Section 0).

Gaps. Energy efficiency is the only area where the EU made insufficient progress to achieve its 2020 target (which was met thanks to the impact of the COVID-19 pandemic). Progress was hampered by, among other things, insufficient understanding and measurement of energy efficiency and its multiple benefits as part of planning and reporting under the EED and energy retrofit investment schemes. Understanding issues also led to insufficient operationalisation of the energy efficiency first principle so far **(implementation gap)**. While the EED aims to reinforce the application of the energy efficiency first principle, it sets a very high investment value (EUR 100 million) threshold, which means that many relevant projects will be exempted from assessment of energy efficiency solutions, including demand-side resources and system flexibilities **(ambition gap)**.

Recommendation E2. To achieve the 2030 energy efficiency targets under the EED, EU policies should foster public awareness of the multiple benefits of energy efficiency, such as energy security and health, and increase common understanding and measurement of energy efficiency under the EED. To this end, policies should be informed by insights from the energy efficiency obligation schemes and the coordinated measures to reduce demand for fossil gas.

Recommendation E3. Putting the energy efficiency first principle into practice should be mandatory for all energy infrastructure projects advancing energy system integration. The investment value threshold set out in Article 3 of the EED should be lowered.

Source: European Scientific Advisory Board on Climate Change: Assessment Report 2024. January 2024. https://climate-advisory-board.europa.eu/reports-and-publications/towards-eu-climate-neutrality-progress-policy-gaps-and-opportunities

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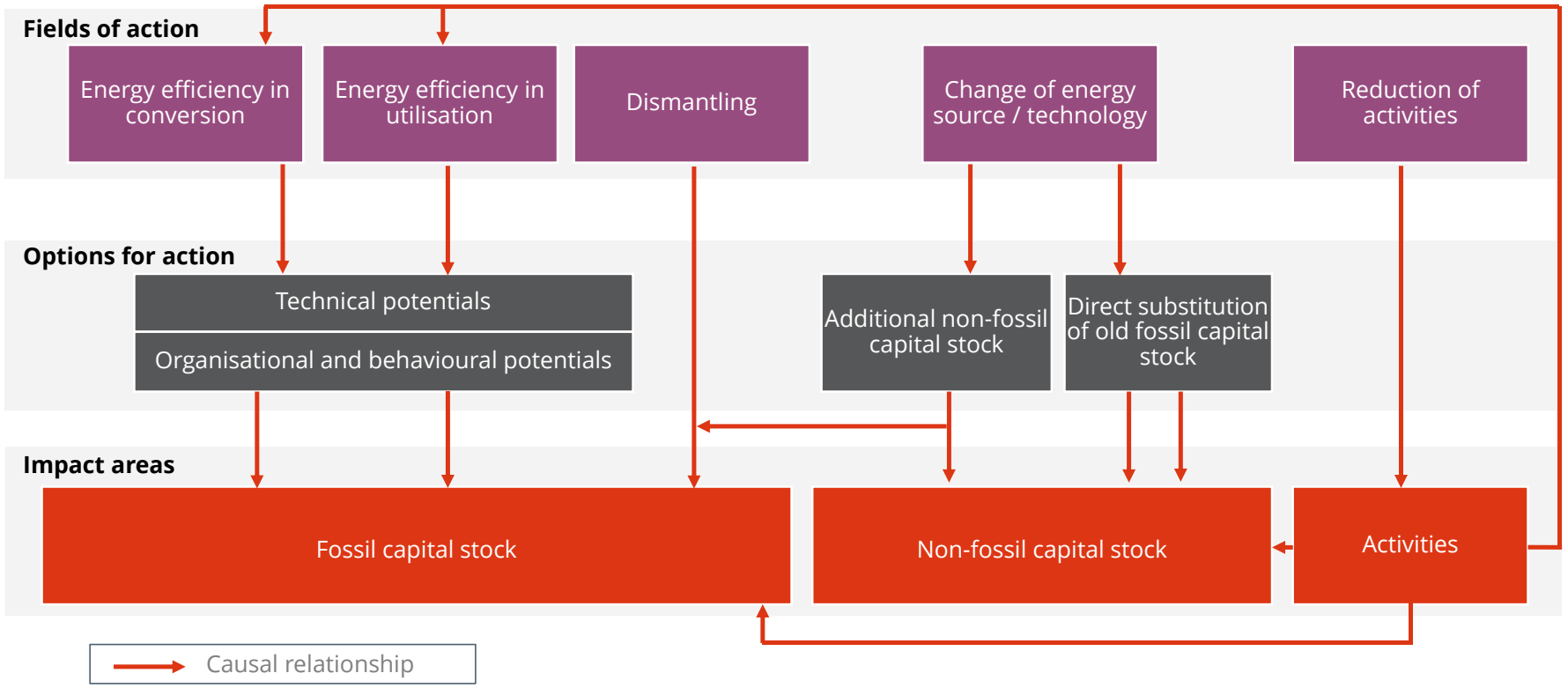
Approach of the German Council of Experts on Climate Change: efficiency improvement, substitution and activity reduction is considered at the same level



Source: Expertenrat für Klimafragen / Council of Experts on Climate Change (2022): Zweijahresgutachten 2022. https://expertenrat-klima.de/content/uploads/2022/11/ERK2022_Zweijahresgutachten.pdf .

Derivation of fundamental fields of action for the reduction of GHG emissions that can be influenced by energy and climate policies.

Section 04

How to overcome the contradictions between the EE1 Principle and climate policy

Development of an hierarchical principle generalising the Energy Efficiency First Principle in climate policies

The **environmental impacts of a number of climate policies (including renewables, the hydrogen economy, BECCS and CCUS)** - combined with low efficiencies from production to use – require its **integration into the governance structures** of the transformation of the energy system via a **hierarchical principle in four stages**:

1. The "Energy-Efficiency-First" principle to **minimize demand + sufficiency options**
2. Priority for **decarbonisation of the electricity** sector,
3. Giving **priority to** the use of **alternatives based on renewable energy** sources with similar services but with a **lower environmental impact**
   (e.g. direct electricity use, sustainable biomass/biofuels/biogas (potentially combined with CCUS), taking into account their limited availability and sustainability criteria)
4. Use of **hydrogen and synthetic products // CCUS** once the **first three stages**, where appropriate, have been **exhausted**

Integration into the governance structures of the transformation of the energy system for both “importing” and “exporting” countries (RES-E, hydrogen, PtX, CCUS)

How the ODYSSEE-MURE project helps to establish the hierarchical principle

ODYSSEE Database and Decomposition Tool

- Provides indicators for measuring the impact of energy efficiency improvement and activities on energy consumption.
- The Decomposition Tool shows the contributions of technical, behavioural and activity components and thus delivers a statistical basis for sufficiency policies.

MURE Database

- Provides comprehensive information on energy efficiency policies in all EU Member States, Switzerland and the Energy Community Contracting Parties (EnCs). Almost 40% of the measures also include an quantitative impact evaluation in terms of energy savings and CO_2 emission reductions.
- A certain number of measures is already characterized as (direct or indirect) energy sufficiency measure, an increase in their share is aimed for.

ODYSSEE-MURE Multiple Benefits of Energy Efficiency (MB:EE) Tool / MICATool

- Assesses and quantifies the multiple benefits of energy efficiency.
- A linkage to the multiple benefits of different climate neutrality pathways is aimed for in cooperation with the EU-LIFE project SEED MICAT (https://micatool.eu/seed-micat-project-en/).

Section 05

Conclusions and Recommendations

Conclusions

1. Introducing the Efficiency First (EE1) Principle into different transformations of the energy system (supply and demand) is an important task for this decade but it is not enough.
2. There are climate policies that both promote and contradict the EE1 Principle.
3. Such climate policies may be necessary for hard to decarbonise sectors.
4. However, this requires a broader frame of EE1 **and the integration of an hierarchical principle generalising the Energy Efficiency First Principle into the governance of climate policies**

5. Sufficiency-related energy savings will need to be a key policy target to take full advantage of this broader EE1 frame

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Thank you for your attention!

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