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# Making State Aid Work for Europe's Decarbonisation

*State aid rules and the support of energy  
efficiency, district heating & cooling and  
cogeneration*

Juliette Delarue, ClientEarth  
Andreas Graf, Agora Energiewende  
BRUSSELS, 17 DECEMBER 2019



## Objectives of the project

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- **Analyse** the Commission's decision-making practice on State aid cases relating to decarbonisation and the clean energy transition
  - Confront the decision-making practice with **realities** of the energy market and the necessary transition to a decarbonised European power system in line with **EU climate and energy targets**
  - Raise awareness of the **importance of State aid decisions for decarbonisation** and the need for **consistency**
  - Engage with **decision-makers** and **stakeholders** on how to provide that state aid decisions and market-forces work in support of decarbonisation and the clean energy transition
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## Project events in Brussels

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- Workshop #1 – Capacity Mechanisms (7 May 2019)
- Workshop #2 – Renewable Energy (22 October 2019)
- Conference – State Aid Perspectives on the ‘Coal to Clean Transition’ in Europe (14 November 2019)
- Workshop #3 – Industry Decarbonisation (3 December 2019)
- Workshop #4 – Energy Efficiency, District Heating & Cooling and Cogeneration (17 December 2019)

## Project website



The screenshot shows the homepage of the project website. At the top, there are logos for ClientEarth and Agora Energiewende. The main title is "State aid for a Decarbonised Europe". Below the title is a navigation menu with links for Introduction, Case studies, Latest news, FAQs, The team, Contact, and About this project. A large image of solar panels is featured in the center. Below the image, there is an "Introduction" section with text explaining the project's focus on EU State aid decisions and their impact on decarbonisation. To the right, there is a "Case studies" section with text about the project's analysis of recent State aid decisions. At the bottom right, there is a green button that says "Sign up for case study alerts".

- We have just launched a project website, which will serve as an online repository with communication material on EU state aid decisions relevant for climate protection and the EU's energy transition.
- The website will provide transparent, reliable and well-documented case studies analyzing the track-record of past state aid decisions and guidelines in driving the energy transition and identify the critical steps and elements in state aid decisions that should be improved to align EU state aid decision-making with Europe's climate and energy targets.

## Agenda - Topics selected for discussion

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### Part I:

→ Energy efficiency

### Part II:

→ District heating & cooling

→ Cogeneration



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# Energy Efficiency - Background

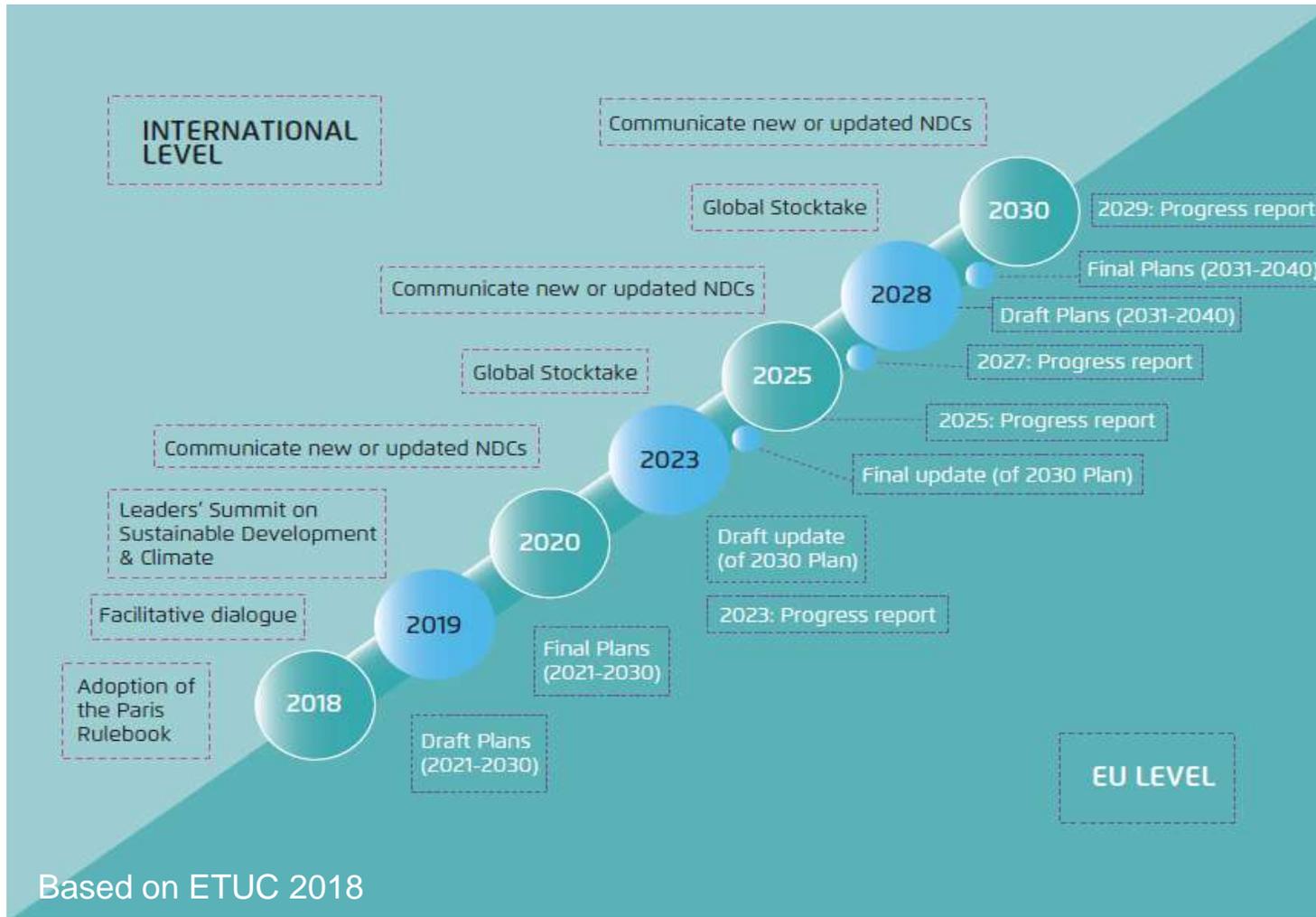


## Why are energy efficiency investments key to decarbonizing the energy system?



- Energy efficiency measures can be found across all sectors of the energy system: **Buildings** (eg. building renovations and use of efficient heating technologies), **Transport** (eg. electrification of transport), **Power** (eg. efficient appliances and lighting), **Industry** (eg. efficient motors and pumps), **Agriculture** (eg. efficient use of fertilizer)
- The EU's 2020 climate and energy target framework includes an EU-wide target to achieve a 20% reduction of primary and final energy consumption by 2020 (relative to a 2007 reference scenario). This target was later complemented by the adoption of the Energy Efficiency Directive (EED) and the Energy Performance in Buildings Directive (EPBD).
- The EU's Clean Energy for All Europeans Package has significantly raised EU ambition on energy efficiency by setting an EU-wide energy target of 32.5% by 2030, revising the EED and EPBD and making 'efficiency first' a guiding principle of EU climate & energy policy.
- Taken together the existing target framework means that **the EU has made energy efficiency a core pillar of its overall climate and energy policy.**
- At the same time, **individual Member States are currently at risk of missing their 2020 targets**, risking higher energy system costs and the failure of the EU targets as a whole.

# The new Commission plans to enshrine a 2050 GHG neutrality target into binding EU law and increase the 2030 target to -50%, possibly -55%.



- The Paris Agreement is aiming at „well below 2 degrees“ global warming, but current targets sum up to much more than that.
- Global warming tipping points demand that the EU reduces greenhouse gas emissions to net zero by 2050.
- The first review and ratcheting-up process under the Paris Agreement in 2020 is a crucial moment for climate diplomacy. The question is not *whether* to increase the 2030 climate ambition but *how much*.
- ***Raising climate ambition will require a further upward revision of the EU energy efficiency ambition to as much as -45%***

## European Green Deal (11 December 2019)

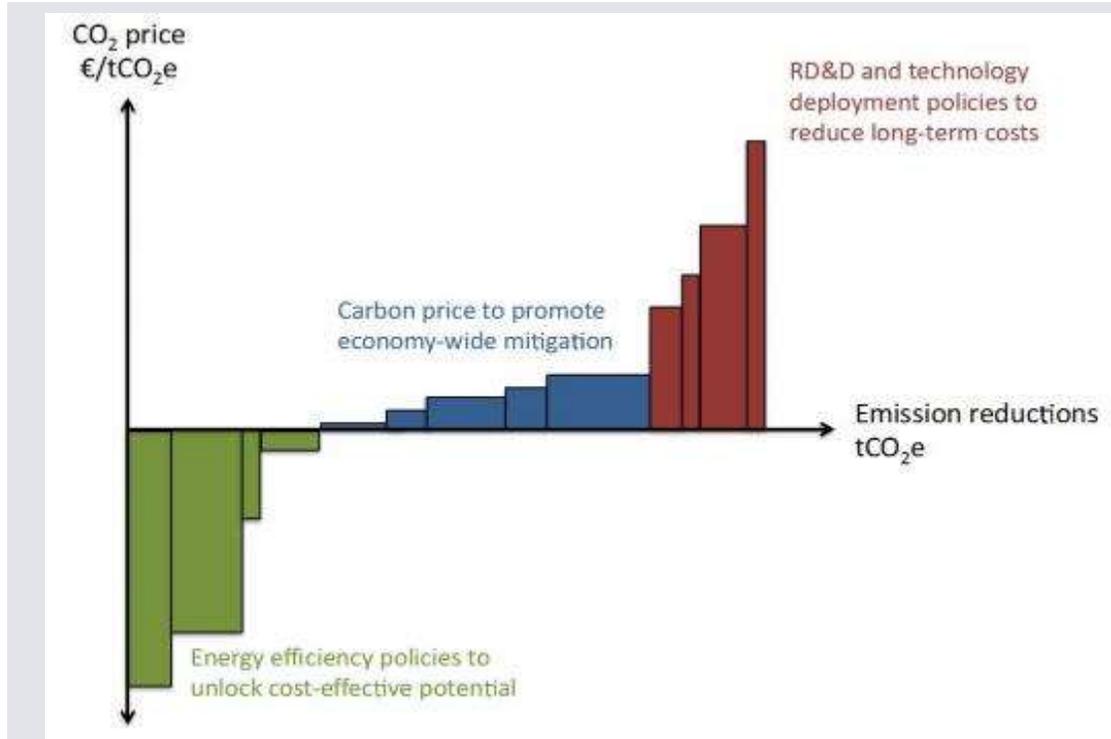


- Energy efficiency must be prioritised to further the decarbonisation of the energy system.
- Proposal for revision of the EED around June 2021.
- ‘Renovation wave’ initiative for the building sector in 2020 “to address the twin challenge of energy efficiency and affordability”.
- Rigorously enforce the legislation related to the energy performance of buildings. This will start with an assessment in 2020 of Member States’ national long-term renovation strategies.
- Launch work on the possibility of including emissions from buildings in ETS, as part of broader efforts to ensure that the relative prices of different energy sources provide the right signals for energy efficiency.
- Lift national regulatory barriers that inhibit energy efficiency investments in rented and multi-ownership buildings.

# Prioritizing energy efficiency – in particular in buildings – is key to affordably meeting ambitious 2030 climate targets and net-zero by 2050

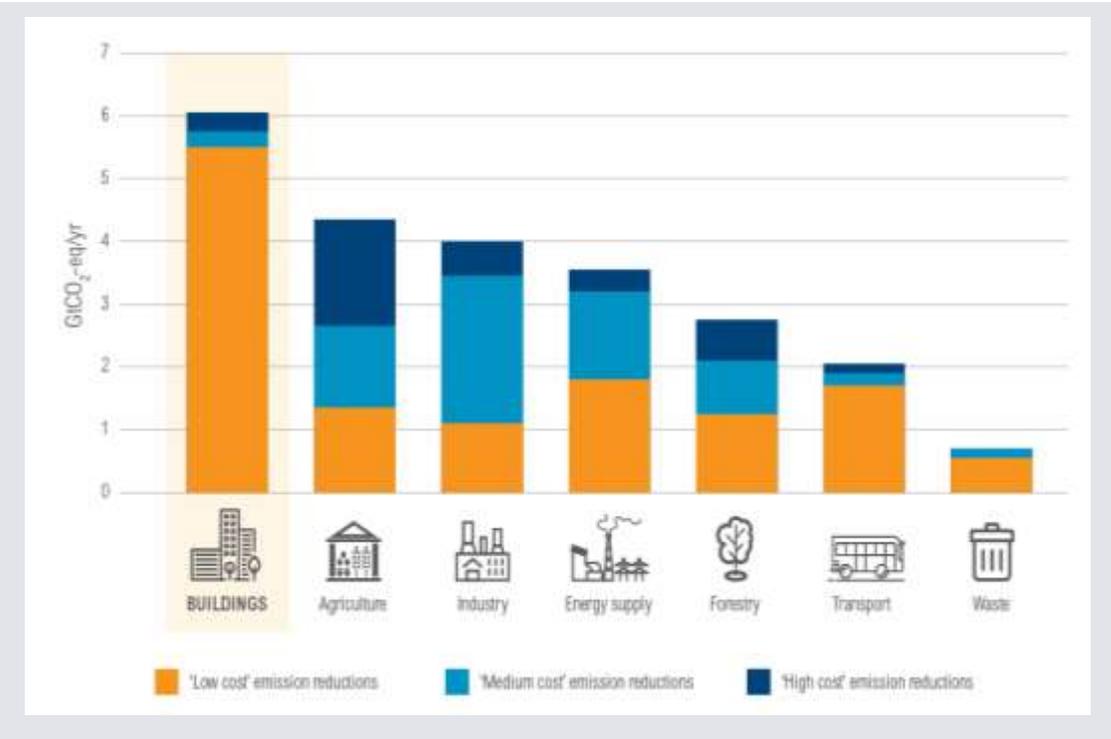


A simplified depiction of mitigation curves for clustered policy areas



IEA (2011): "Summing Up the Parts: Combining Policy Instruments for Least-cost Climate Mitigation Strategies"

Comparison of mitigation potential by sector and cost category

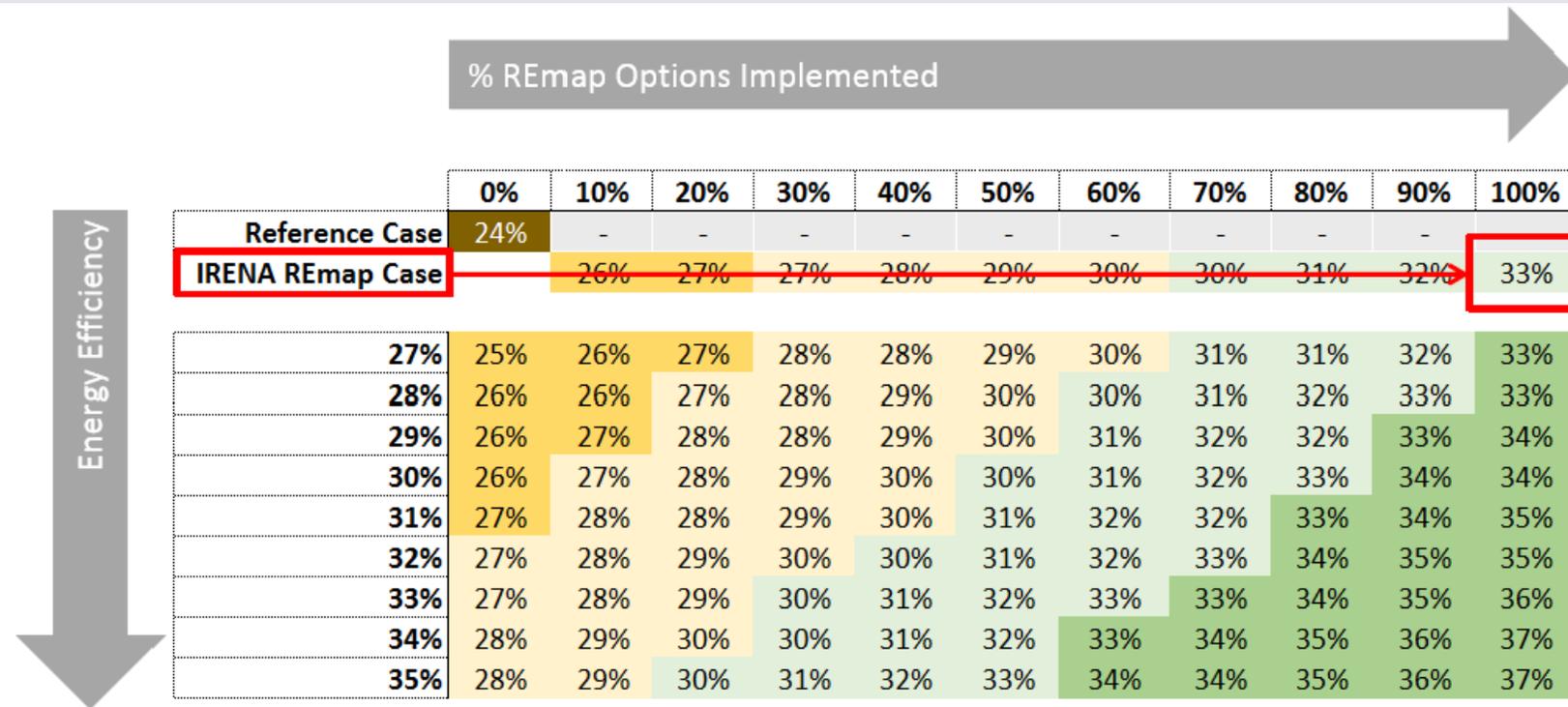


WRI (2016) based on IPCC 2007

# Energy efficiency & electrification (e.g. Heat Pumps/EVs) allow higher RES targets to be met at lower cost and without a large increase in bioenergy.



Impact of demand scenarios on final RES share, as well as share of economic potentials needed at each efficiency level



Source: IRENA 2018

# Implementation of existing legislation is the key element of meeting the EU's 2030 energy efficiency targets

Objectives	Sectors	Energy		Industry	Transport			Buildings	
		Utilities	Refineries		Aviation	Shipping	Road		
Greenhouse Gas Emissions	EU Emissions Trading System (EU ETS)								
	Industrial Emissions Directive (IED)				CAR	Climate Action Regulation (CAR)			
	Fuel Quality Directive				F-Gases regulation	CO <sub>2</sub> emissions standards for cars, vans and heavy-duty			F-Gases regulation
	Alternative Fuels Infrastructure Directive (AFID)								
Energy Efficiency	Energy Efficiency Directive (EED)								
	Ecodesign Directive								Energy Performance of Buildings Directive (EPBD)
									Energy Labelling Regulation
Renewable Energy	Renewable Energy Directive (RED)								
Internal Market	EU State Aid Framework								
	Energy Taxation Directive (ETD)				ETD			ETD	
	Electricity / Gas Market Directives & Regulations				Eurovignette Directive		4th Railway Package		
	Combined Transport Directive (CTD)								

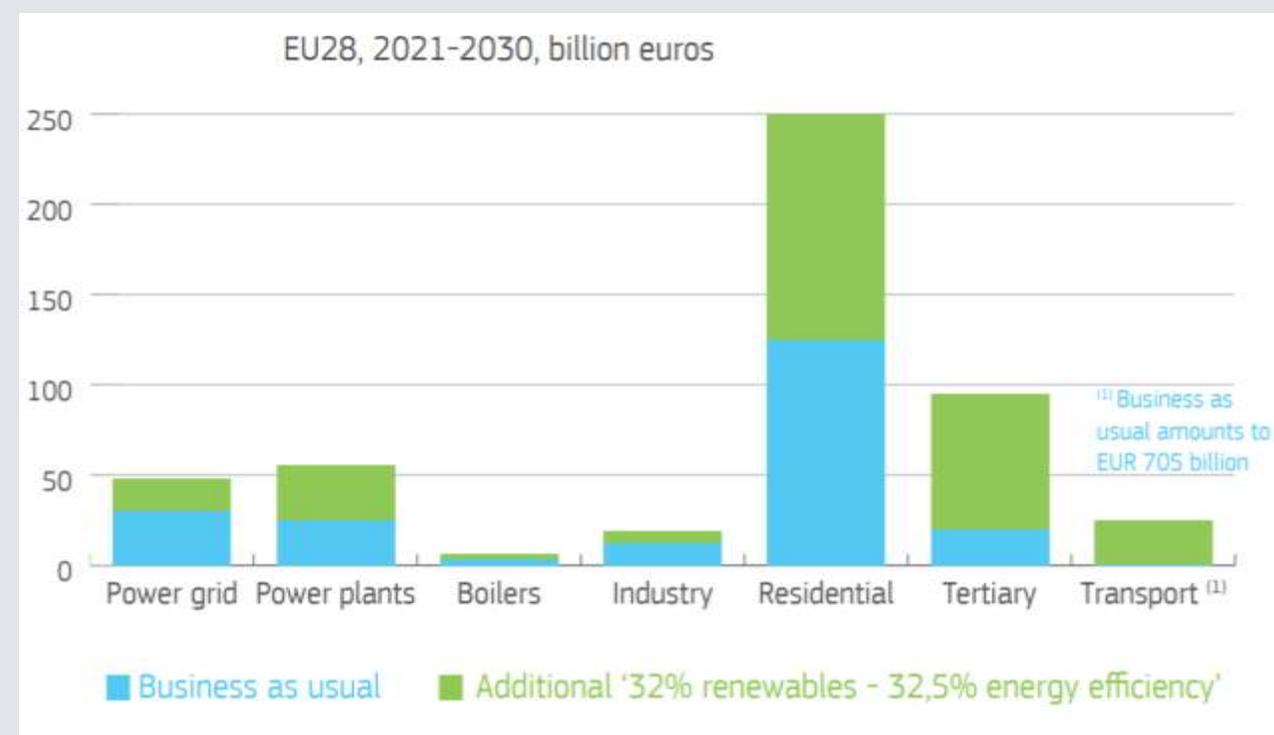
Governance Regulation

Putting these measures into practice will require:

1. the EU to agree on a range of implementing and delegated acts to settle specific questions.
2. Member states to transpose EU law into effective national legislation and implementation.
3. intensified cooperation between member states and a pro-active and supportive European Commission.
4. Effective EU enforcement and monitoring.

# Meeting the 2030 targets cost-efficiently means mobilizing significant additional investments into buildings

Average annual investment needs 2021-2030



EC (2019)

- Sufficiently energy-efficient buildings are particularly needed for:
  - An efficient use of **heat pumps**
  - A transformation of **district heating** that includes a reduction in network temperatures.
  - A later potential use of **hydrogen and electro-fuels** in buildings.
- The renovation of the existing building-stock progresses at 1% per year and must be more than doubled to reach the 2030 targets.
- On average more than €200 billion in additional annual investment will need to be mobilized over the period 2021-2030 in the buildings sector alone – largely for efficiency measures.

## State aid will be needed to mobilize energy efficiency investments at the scale needed to meet ambitious 2030 targets

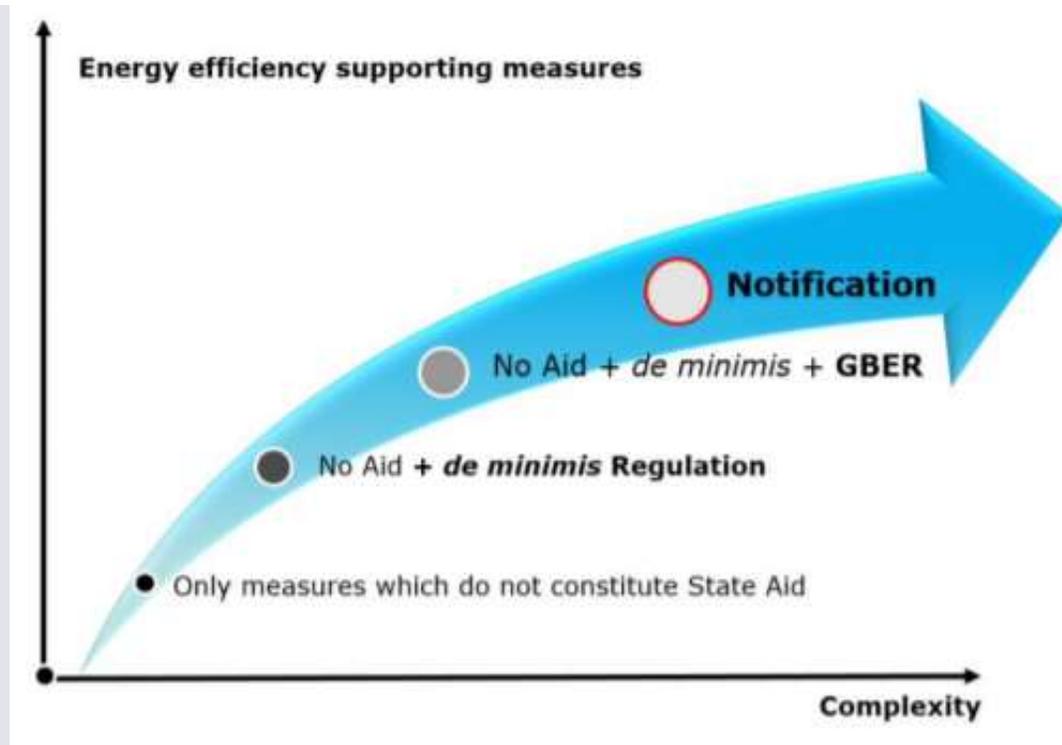


- Mobilizing this capital is possible. However, a number of economic and non-economic barriers continue to prevent the full potential of energy efficiency investments to be met.
- For example, the economic benefits of building renovations may not accrue to the building owner bearing the renovation costs, but with the tenant occupying the building ('split incentives') or to the energy system as a whole.
- These market failures can prevent energy efficiency investments from being made despite being cost-efficient from an individual or energy system perspective.
- As such, mobilizing investments at the scale needed to meet the 2030 targets requires setting ambitious standards, reducing barriers to financing and, where appropriate, providing state aid.
- The Commission has recognized in the EEA Guidelines that state aid may be needed to promote investments in energy efficiency to meet the EU's energy efficiency targets.

## What State aid rules apply?

- *Undertakings*: households are **not** undertakings. Landlords are (but *de minimis* rule often applies).
- *De minimis* rule: measures under the threshold of EUR 200,000 cumulative over the last three fiscal years per undertaking and per Member State **are not State aid > no restriction on the Member States**. Potential issue: the level of the threshold.
- *General block exemption Regulation (GBER)*:
  - **Investment aid for energy efficiency measures** (Article 38)
  - **Investment aid for efficiency projects in buildings** (Article 39): threshold EUR 10 million
  - **Investment aid for high-efficiency co-generation** (Article 40)
  - **Investment aid for district heating & cooling** (Article 46): threshold EUR 20 million per undertaking per investment project.
- *State aid guidelines for environmental protection and energy (EEAG)*, section 3.4: energy efficiency (incl. buildings), high energy efficient cogeneration (operating aid) and district heating & cooling

The degree of complexity of dealing with State Aid increases the more grant aid moves towards the requirement for notification.



Standoo et al. (2016): Financing energy efficiency: dealing with State Aid rules



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# Energy Efficiency – Case studies and issues



## General energy efficiency measures

- **Objective of common interest:** contribute towards an increased level of environmental protection. Indicators: amount of energy saved due to the better, lower energy performance and higher energy productivity or the efficiency gains by reduced energy consumption and reduced fuel input. (EEAG)
- Early adaptation to Union standards excluded from Art. 38 GBER > notification under EEAG
- **Need for State intervention / market failure:** the only example in the EEAG is the gain of energy efficiency benefits to the tenant as opposed to the building owner supporting the costs of renovation works > little concrete guidance for Member States. (EEAG)
- **Appropriateness:** Any form, including a repayable advance or financial instruments. (eg. accelerated tax depreciation on purchase of new equipment – see Finnish (general) case N159/2009) (EEAG)
- **Eligible costs:** extra investment costs relative to a counterfactual scenario (EEAG)
- **Aid intensity:** 50% SE / 40% ME / 30 % LE + 5% to 15% in assisted areas with abnormally low standards of living; or 100% if competitive bidding (Annex 1 EEAG and art. 38 GBER)
- **Proportionality of operating aid:** if it is limited to (1) the net extra production costs resulting from the investment, taking into account the benefits resulting from energy saving, and b) a **5-year** duration (EEAG). **No limit duration for investment aid.**

## Issues – Methodology to assess eligible costs not suitable for complex ownership and contracting models



- The methodology to assess eligible costs for energy-efficiency investment aid may not work well with complex ownership constructions (eg. contracting) to realize an energy efficiency project.
- The eligible costs in the case of energy efficiency are the extra investment costs necessary to achieve environmental protection through a higher level of energy efficiency. The GBER and EEAG define environmental protection as any action designed to remedy or prevent damage to physical surroundings or natural resources by a beneficiary's *own activities*.
- A major added value provided through **Energy Service Companies (ESCOs)** can be the ability to offer the service 'off balance' as 'asset-based solutions', i.e. the ESCO makes the investment and sells a service to the consumer, with no up-front capital expenditure on the consumer's side. This way companies can invest in environmental protection measures in a way that does not affect their balance sheet, ensuring a better return on total invested capital and thus better financing conditions. However, having direct access to financial support is fundamental for such business models.
- **Some submissions have suggested that Art. 38 GBER does not always provide a sound basis for ESCO models and a role for ESCOs as intermediaries should be explicitly acknowledged.**

## Energy Efficiency Projects in Buildings – art. 39 GBER



- Eligible costs are the overall costs of the energy efficiency project, which can be granted in the form of an endowment, equity, guarantee or loan to a financial intermediary (eg. an energy efficiency fund), which can fully pass it on to the final beneficiaries.
- The nominal value of the loan or amount guaranteed may not exceed EUR 10 million per project and beneficiary, and a guarantee may not exceed 80% of the underlying loan.
- Aid provided via an energy efficiency fund or financial intermediaries is subject to further conditions:
  - These funds must be managed on a commercial basis, the repayment of the building owner to a financial intermediary must be at least the nominal value of the loan and total loss assumed by the public investor is capped at 25% of the total investment.
  - The energy efficiency aid must also leverage a minimum of 30% of the total financing provided to the energy efficiency project from private investors.
- Early adaptation to Union standards seems to be covered (≠ art. 38 on general efficiency measures)

## State aid case studies

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- UK - Energy Demand Reduction (EDR) Pilot Programme, based on competitive auctions for projects aiming to reduce energy consumption through demand side reduction measures. Funding was provided in the form of subsidy for each kWh saved during the winter season. The pilot scheme was open for every type of beneficiary (SMEs, large enterprises, public authorities). State Aid provided through notification based on EEAG guidelines; meets both the objectives of security of supply & environmental protection
- UK - Green Deal Finance Company (GDFC) is a scheme designed to increase energy efficiency in the UK's housing stock. The concept is based on creating a non-profit company (by energy companies) which facilitates and provides the necessary finance to households. National funds were used in the form of subordinated loans. GDFC was an innovative scheme at the time and required an individual approval from the EC (under art. 107 because 2008 EAG did not specify energy efficiency measures). Eventually State Aid was provided under the GBER provisions.
- UK Gov. 23 July 2015: *“In light of low take-up and concerns about industry standards there will be no further funding to the Green Deal Finance Company, in a move to protect taxpayers.”*

## State aid case / Denmark

- **(2017)**: grants for partial coverage of **energy service providers' costs for purchasing heat pumps** that supply heat for individual heating in buildings or process purposes in business. The heat pump must be purchased for use in accordance with a **business concept**, where the energy service provider of the third party (building owner) offers installation, operation and maintenance of the heat pump and supply of heat. The heat pump must **replace** all or part of existing third party **fossil based heating systems**. Ownership remains with the energy service provider.
- Eligible buildings: rental properties, public buildings, private enterprise buildings in need of space heating and mixed purpose buildings.
- Eligible costs: Cost of factory of new heat pumps less any discount. Aid intensity: 45% above DKK 10,000 (EUR 1,338). Cap at DKK 100,000 (EUR 13,338).
- Call for grants: Assessment of 1) The cost-effectiveness of the project assessed in relation to the technical characteristics of the heat pumps; 2) The company's solidity; 3) The effect of the project in ensuring that the grant funds are used to the best possible extent and that **the business concept becomes available to as many buildings and companies as possible** [that are] using fossil fuels for space heating or process energy today.

## Reflections

- Aid intensity is generally low (50% SE / 40% ME / 30 % LE) compared to other areas. Not clear why and how this is justified.
- Lack of clear rules on specific state aid provisions is perceived by multiple stakeholders as an obstacle to the development of specific business models - in particular for ESCO models.
- At the same time, the rules are also generally viewed positively by stakeholders and seem to fulfill their purpose in most cases, providing Member States sufficient flexibility to develop aid schemes.
- Further assessment of real-world case studies is needed in order to assess the exact source of suggested problems and the potential need for targeted adjustment to the EEAG and GBER, in particular with regards to legal clarity.
- Some Member States (especially at local level) may also still be lacking experience and knowledge of State Aid provisions, which can be a barrier in successfully setting up energy efficiency programmes and implementing structural funds. Thus, there is a need for continued co-operation in the dissemination of information about State Aid requirements, including clear guidance from the Commission in interpreting requirements, the sharing of best practice between the Commission and the MS (local authorities) and successful and practical applications of State Aid provisions.

## Reflections – Release of costs of energy efficiency obligations schemes?



- “Member States shall assess and, if appropriate, take measures to minimise the impact of the direct and indirect costs of energy efficiency obligation schemes on the competitiveness of energy-intensive industries exposed to international competition.” (art. 7a EED)
- New form of reduction/exemption for EIUs, not currently in the EEAG > assessment on a case by case basis pending the revision of the EEAG.
  - Will the eligible industries be the same as in Annex III EEAG, by analogy?
  - What will be an acceptable aid intensity / level of reduction of costs?
  - How to incentivise these EIUs, which shall be the main target of energy efficiency schemes, to realise the adequate investment in energy efficiency? Giving them investment aid + exonerating them from the costs of energy efficiency obligation schemes is counter-productive.
  - Agreements with MS with energy efficiency targets are a poor fall-back solution.



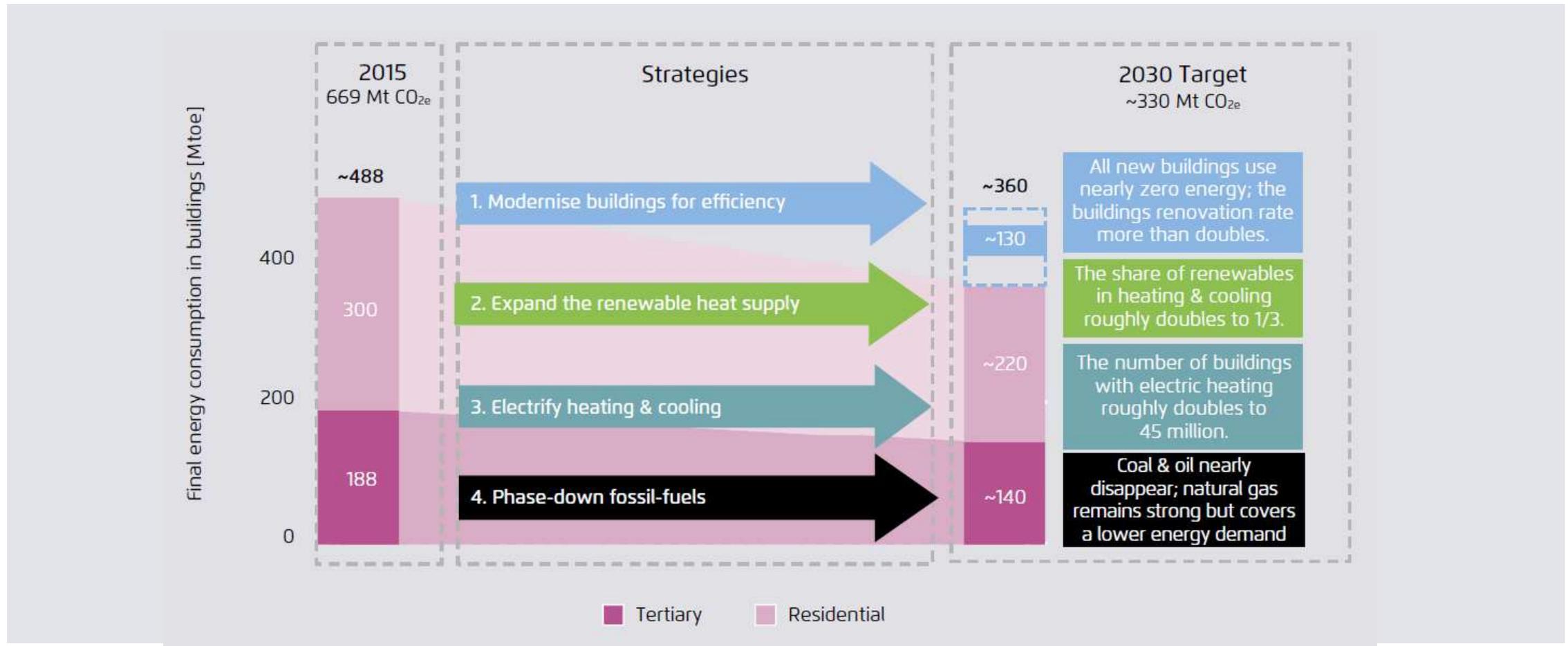
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# District Heating & Cooling and Co-generation - Background



# The current EU climate and energy framework for 2030 and EU long term strategy imply that all of Europe must embark on a heat transition.



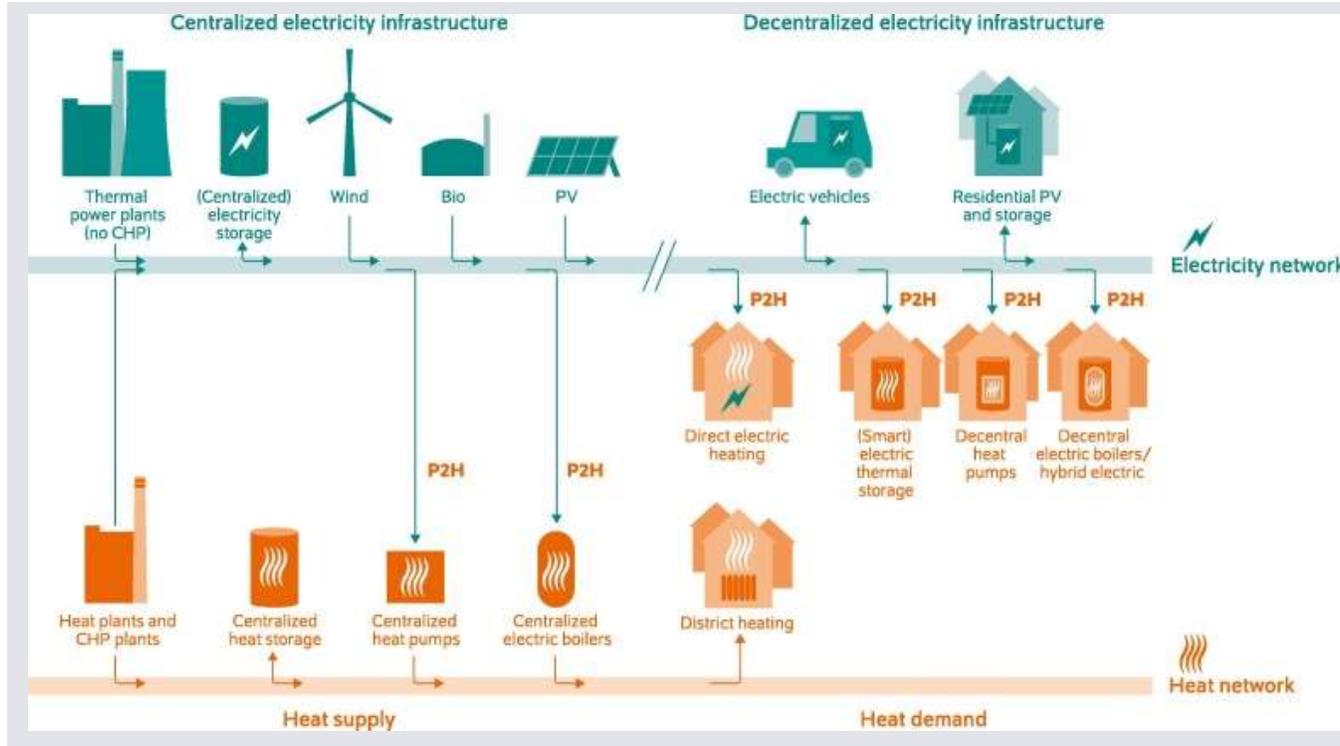
## District heating & cooling networks can play a key role in a net-zero energy system



- District heating comprises a network of pipes connecting buildings in a neighborhood, district or city, so that they can be served by centralized heat plants or a number of distributed heat units.
- In 2012, district heat provided about 9% of EU's heating needs. Currently, the bulk of district heat is produced with natural gas (40%) and coal (29%). District heating networks have a long tradition in many Member States with cold winters, in particular in more densely populated urban areas.
- District heating supplies about half of the national heat consumption of the residential sector in some northern Member States (42% in SE, 42% in DK, 37% in LT, 36% in EE and, 33% in FI), and accounts for a significant national heat market share in most of the countries in Eastern Europe.
- District heating can play a significant role in achieving a decarbonized energy system by efficiently providing renewable-based heat and domestic hot water to consumers.
- Studies have shown that district heating has the potential to supply 30% of the heating market in 2030 and 50% in 2050, provided that it continuously decarbonizes, becomes more efficient and is part of an integrated approach to heating that includes improving the existing building stock.

# District heating & cooling networks can also help to integrate wind and solar through power-to-heat solutions

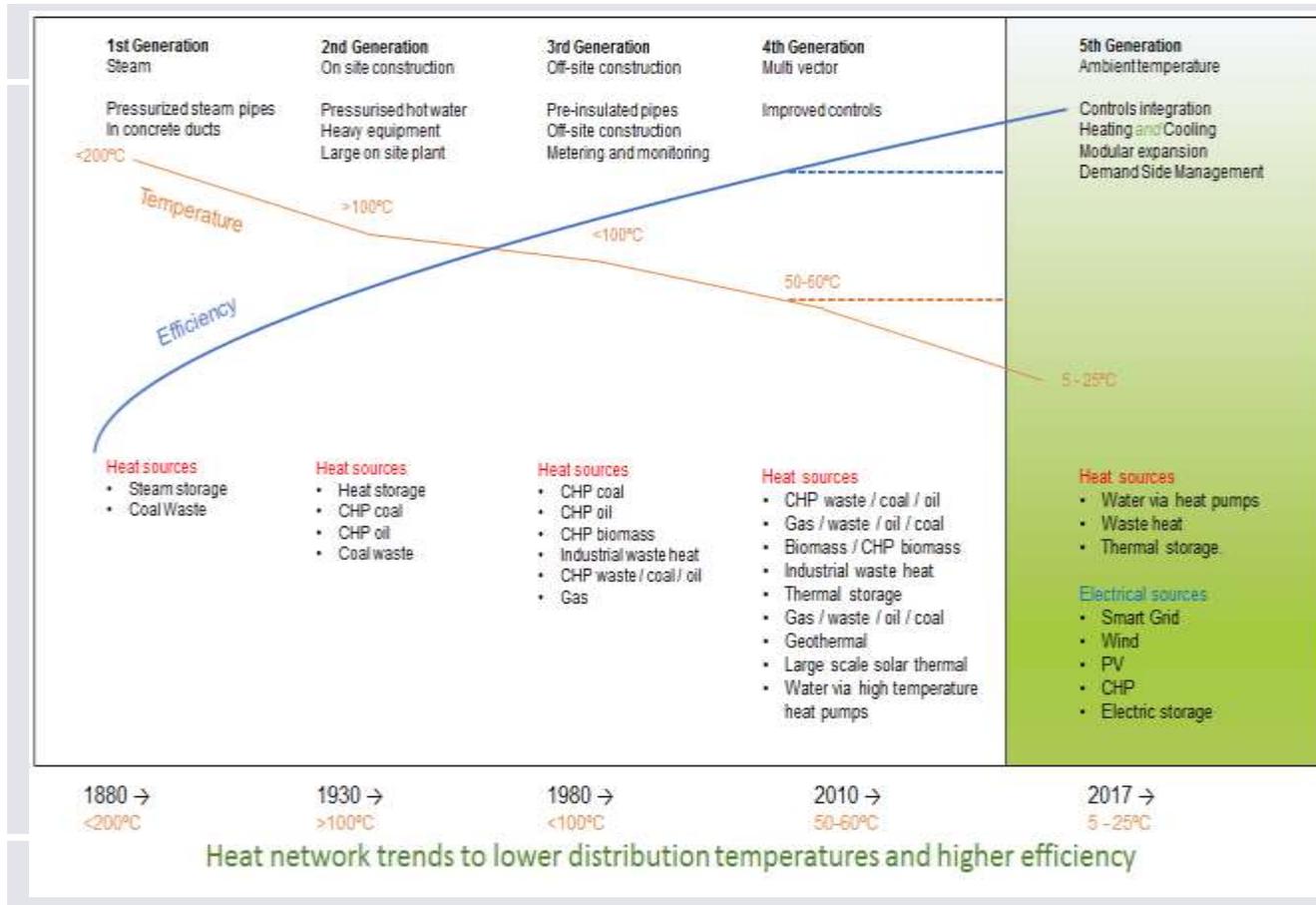
## Intersection of power-to-heat options with electricity and heating networks



- Heating networks can also offer flexibility to the energy system by cheaply storing thermal energy, for instance in hot water tanks, underground, in heating networks or in buildings.

Bloess et al. (2018)

# To play a key role in a net-zero economy, heat networks must transition to lower temperatures – requiring investments.



- Heating networks must evolve towards 4/5<sup>th</sup> generation district heating systems to ensure a phase-out of fossil fuels and the increased penetration of renewable electricity (through heat pumps), geothermal and solar thermal energy, waste heat and municipal waste.
- 4<sup>th</sup> generation district heating systems supply low-temperature space heat and domestic hot water while operating at a temperature that is 50-60C. 5<sup>th</sup> generation networks operate at even lower temperatures (5-25C)
- This is significantly lower than 3<sup>rd</sup> generation district heating systems that operate at temperatures below 100C.
- Operating at this lower temperature allows for 1) lower grid losses, 2) using renewable energy and waste heat from low temperature sources and 3) better integration of renewable electricity into a smart energy system.

## Combined heat & power delivers important primary energy savings, but is still largely fossil-fuel based.



- Combined heat & power (aka co-generation) is the simultaneous production of electricity and useful heat, allowing heat to be recovered for use in homes, businesses, and industry.
- Cogeneration plants can achieve energy efficiency levels of around 90% helping to lower primary energy consumption and greenhouse gas emissions relative to separate power and heat production.
- CHP generates around 11.3% of the EU's electricity in 2017 and can provide system services.
- Fossil fuels accounted for more than two-thirds of CHP fuel input – Natural Gas (42.7%), Coal (16.6%), Oil (5.1%) – vs. slightly more than a quarter for renewables and waste (27.9%) (Source: Eurostat).
- ~70% of CHP is connected to district heating networks, while roughly ~30% is used on-site (Source: COGEN Europe).

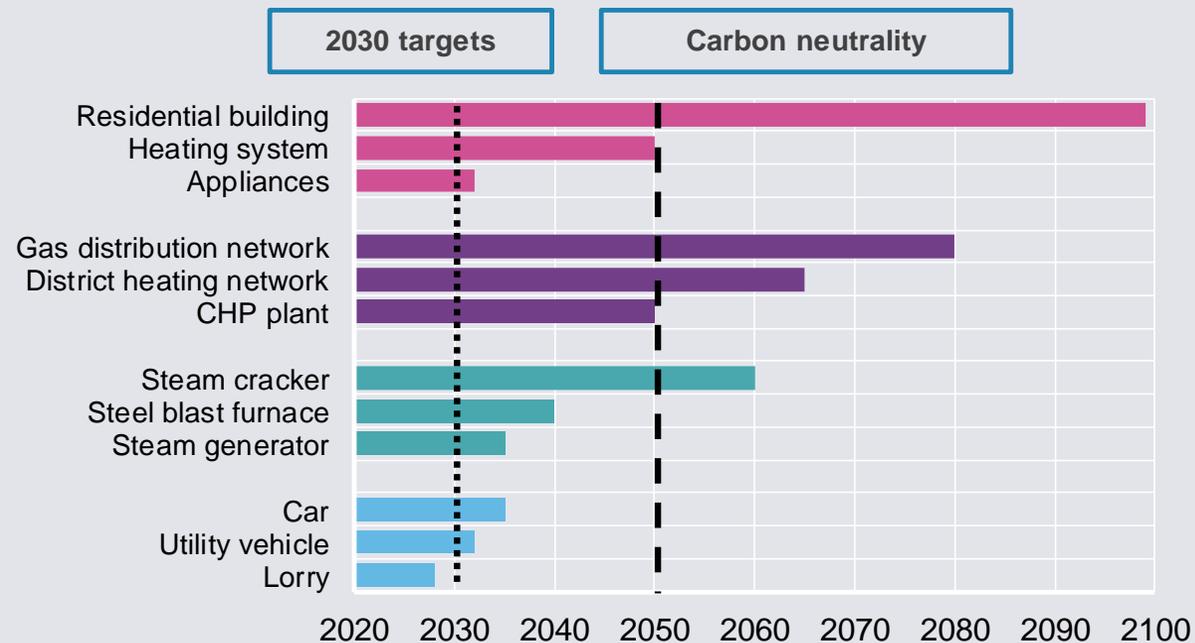
## **Combined heat & power will need to become more flexible and decarbonize to play a role in a net-zero economy.**



- In the short- to medium-term, regulatory conditions (eg. must-run status), operating practices and economic incentives of CHP plants must be adapted to enable renewables integration. For example, wind generators are now curtailed at times of high wind generation and CHP heat production in DE, resulting in unnecessarily high costs and CO2 emissions due to the inflexibility of CHP plants.
- Furthermore, to successfully accomplish the heat transition, coal-fired combined heat and power (CHP) units will also need to be retired.
- At the same time, largely replacing these CHP units with natural gas-fired CHP units in the short-term risks locking in stranded assets or making these units reliant on expensive green gases in a carbon-neutral world. Thus, where possible, plans will need to be made to phase-out or phase-down fossil-CHP in general.

# Due to the long lifetime of assets, investment cycles must be considered to avoid stranded investments in district heating & cooling networks and cogeneration.

Lifetime of specific technologies if reinvestment takes place in 2020



Own illustration

- Many investments of the upcoming years will still be used in 2030 and 2050 when climate targets are evaluated.
- Houses last 80-100 years, grids 50-60 years, heating systems 30 years; industrial installations 20-40 years,
- Efficient policies take these investment cycles into account and allow for direct and intelligent investments that are climate-friendly.
- If this is not guaranteed, investments may strand and expensive scale-ups will be required. This would neither be economically sustainable nor resource-saving.
- In this context, the Commission must support and encouraging cities and regions to adopt decarbonized district heating & cooling in line with investment cycles and climate goals.

**CO<sub>2</sub>-Pricing is currently missing in large parts of the heating sector putting district heating & cooling and large CHP plants at a disadvantage. This is a market-failure.**



### European Emissions Trading Scheme (ETS)

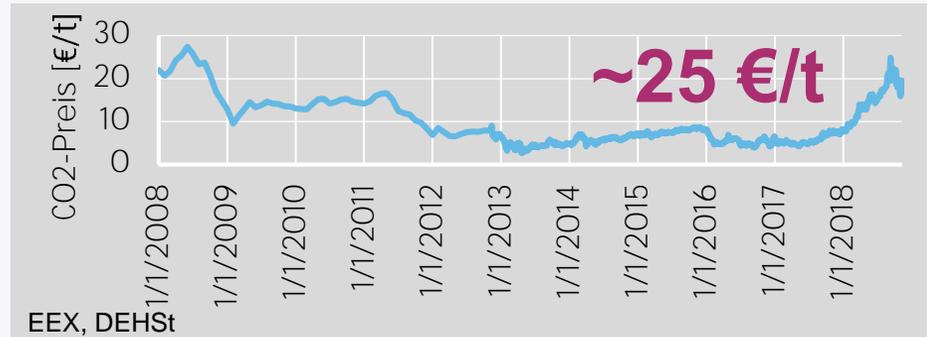
### EU *Climate-Action-Regulation*

CO<sub>2</sub>-Sectors covered

- Energy industry
  - Energy intensive industry (inter alia the iron-, steel-, aluminium-, cement-, chalk-, paper and chemicals-industry)
  - EU-Aviation
- ca. 50 %

- Transport (except EU air transport)
  - Buildings
  - Other industries and services
  - Agriculture
- ca. 50 %

CO<sub>2</sub>-Price



X

(so far no direct CO<sub>2</sub>-pricing in many Member States)

## State aid will thus be needed to help expand and modernize heat & cool networks and transition cogeneration to a net-zero energy system



### Examples of potential state aid relevant for heat transition w.r.t. DHC and CHP:

- Supporting investments in new 5th generation heat & cool networks.
- Additional cost of modernizing existing networks to 4th and 5th generation low-temperature systems.
- Additional cost of modernizing CHP plants, in particular switching from coal to gas.
- In lieu of a carbon price for the decentralized heat sector, supporting unprofitable, but efficient and less CO<sub>2</sub>-intensive gas CHP plants for a transition period.



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# District Heating & Cooling



## State Aid rules

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- “efficient district heating and cooling’ means a district heating or cooling system using at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of such energy and heat.” (EED 2012)
- GBER: “The definition [of efficient district heating and cooling] includes the heating/cooling **production plants** and the **network** (including related facilities) necessary to distribute the heat/cooling from the production units to the customer premises.”
- GBER, article 46 on **Investment aid for energy efficient district heating and cooling**
  - Threshold for investment aid for the district heating or cooling **distribution network**: EUR 20 million per undertaking per investment project.
  - Aid intensity for production plant: 65% (SE) / 55% (ME) / 45% (LE) + 5% or 15% in assisted areas
  - Aid intensity for investment aid in distribution network: 100% of the difference between the eligible costs (= the investment costs) and the operating profit.

## State Aid cases / GBER / Denmark

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- **Denmark (2018):** Subsidies for investments in electric heat pumps for the production of district heating (for building heating or heated domestic water) in order to displace existing heat production, which is based on fossil fuels at plants that are not covered by the CO<sub>2</sub> quota system.
- The heat pump must use renewable energy sources, including geothermal energy, as well as surplus heat from industry, service industries, wastewater systems and the like.
- The expected completion time of the project is less than two years from the date of procurement.
- Aid intensity: maximum of 15% of the eligible costs. Eligible costs are the investment costs necessary to establish an electric heat pump directly related to the attainment of the higher level of environmental protection in Article 41(6) [investment aid for promotion of RES] or Article 46 (2) [investment in efficient DH] GBER.
- The Danish Energy Agency decides whether applications for projects connected to the district heating network, where the heating price is estimated to exceed DKK 18,000 per year per standard household after the lapse of the basic amount and investments in new production units, must be rejected. The decision emphasizes the assessment of the risk of the closure of the concrete district heating network within the life of the heat pump or equivalent value-wasting risks.
- *Executive order entered into force on 1 April 2018 (adopted in March 2018) and covers projects initiated since 1 January 2018.*

## State Aid cases / EEAG / France

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- **France, Amiens (2019) - EEAG:** investment aid for extension of DH network, as part of a global project of investment in production units. Objective to distribute 2.8 times more heat and reduce heat losses by 10 percentage points. Cumulation with aid for heat production falling under GBER art. 42 (operating aid to RES). Co-financing by FEDER and FRAttri (both managed by Member States > State resources). Direct grant and repayable advance (7 years).
- COM: Objective to reach 63,5% of RES and re-use of waste heat > efficient as per the EED. Objective to reduce GHG emissions by at least 40%, reduce CO2 emissions by 54% > environmental protection.
- Necessary because of negative externality: « the downward trend in gas prices for several years strengthen the competitiveness of more polluting alternative solutions. Competitive pressure does not encourage market players to turn spontaneously towards solutions that emit less CO2 such as a network of very extensive district heating and mainly powered by sources renewable and recovery as envisaged in Amiens. »
- Incentive effect: calculation of the return on investment rate without aid: 2%, below market rate (in Lyon (2018): market rate calculated at 5.9%-7.4%).

## State Aid cases / EEAG / Poland

- Formal investigation open on 25 October 2019 for investments in 5 district heating networks in Poland. Projects involve existing systems where heat is generated by coal-fired and gas-fired boilers and recycled waste heat. *Deadline for comments: 6 January 2020.*
- Poland has explained that the replacement of the old district heating networks would bring environmental benefits by limiting heat transmission losses, and reducing emissions of CO<sub>2</sub> and other pollutants including fine particulates associated with coal-fired heat generation.
- Commission **doubts that the aid meets an objective of common interest:**
  - None of the projects meet the definitions of **efficient** district heating and cooling system set out in Articles 2(41) and 2(42) of 2012 EED (*no reference to the 2018 EED*);
  - “Upgrading the heating networks around fossil-fuel-based heating plants risks creating a **lock-in effect** (...) and thereby prolong the life of the power plants generating the heat (and pollution).”
  - “While the proposed projects do result in some improvements to efficiency these heating systems will continue to generate significant **pollution until the heat sources are upgraded**. Support to the networks connected to power plants that do not meet the ‘efficient’ definition could therefore prolong the use of fossil fuels for heating, **acting against any** environmental protection objective.”
- Compare with modernisation of the district heating network in Warsaw (no objection, 2013)

## Issues - District Heating & Cooling

- 4th & 5th generation district heating networks capital intensive. The notification thresholds that currently exist for district heating (€20 million) may thus need to be adapted and the current aid intensities assessed as to whether they are adequate to attract investment into DHC, in particular to allow for the modernization of existing 3<sup>rd</sup> generation grids to 4<sup>th</sup>/5<sup>th</sup> generation standards. **Euroheat & power suggests at least adjusting the threshold for inflation, Engie proposes €25 million.**
- The modernisation of a DHC system may take more than one investment decision. **Euroheat & Power** thus proposes extending the scope of Article 46 to cover any investment that leads to an increase in the efficiency of a DHC system when the investment is part of a broader project to upgrade the system to the level of efficient DHC. **Eurelectric** argues that excluding partial upgrades makes it almost impossible to upgrade heating networks in some less developed regions that cannot meet the efficient system criterion in the short-term.
- **Question: Should investments into marginal improvements be made possible under the GBER when there is a plan with a commitment and a timeline to turn an inefficient network into an EDHC?**

## Issues - District Heating & Cooling

- Support for OpEx will be needed to support and encourage the transition to low-temperature heat networks and support the injection of renewable heat and waste heat from industrial processes (e.g. steel mills, chemical sites) and from the tertiary sector (e.g. recovery of heat from a data center).
- For the moment renewable support for is only explicitly defined for the electricity part (3.3.2.1) and not for heat (renewable heat part). An implicit assumption could be that heat RES-heat could covered by rules on “Aid for energy from renewable sources other than electricity” (3.3.2.2). **COGEN Europe** recommends that support for cogenerated heat should be made more explicit and extended beyond the depreciation period.
- Article 43 of GBER currently does not explicitly cover renewable or waste heat. Euroheat & Power argue this may cause Member States to refrain from developing support schemes for this purpose.
- **Question: Should support for operational expenditures related to support renewable and waste heat be explicitly covered under the GBER?**

## Issues - District Heating & Cooling

- Thermal heat storage has a particular important role to play w.r.t. the integration of variable wind and solar electricity due to its cost-effectiveness.
- Currently *electricity* and *gas* storage infrastructure are excluded from the GBER (art. 48 on energy infrastructure) and thus need to be notified.
- There is **no exclusion** under GBER of storage of heat (nor, for CCS, for infrastructure such as pipelines for the transport of CO<sub>2</sub> to storage sites). But, heat storage is not expressly mentioned either in investment aid for DH infrastructure and it is thus not explicit whether it would fall under art. 46 on DH infrastructure or art. 48 on energy infrastructure
- Under the Commission decision on the German CHP law, state aid was granted in line with section 3.4 of EEAG (*Energy efficiency, CHP and DHC*).
- **Question: Should thermal heat storage be explicitly mentioned in future state aid guidelines or be part of a dedicated section on sector integration? How important is this for getting Member States to develop support schemes in this area?**



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# Cogeneration



## How is CHP dealt with in the current Guidelines?



- Aid for cogeneration of heat and electricity ('CHP') projects are considered compatible with the internal market if granted for investment (including upgrades) to highly-efficient CHP.
- Operating aid may be granted to such highly energy efficient CHP plants on the basis of the conditions applying to operating aid for renewable energy source, under the condition it is for:
  - 1) undertakings generating heat and power to the public at above market prices; or
  - 2) industrial use of CHP where the production cost can be shown to exceed the market price of conventional energy.
- State aid for CHP installations using waste is also permitted, provided that it does not circumvent the waste hierarchy principle.

## How are DHC and CHP are dealt with in the current Guidelines?



- According to **Art. 46 of the GBER** on *investment aid for energy efficient district heating and cooling*, eligible costs are defined as **the extra investment costs** needed to *construct, expand and refurbish generation units to operate as an energy efficient district heating and cooling and investments into district heating and cooling distribution networks*.
- According to **Art. 40 of the GBER** on *investment aid for high-efficiency cogeneration*, investment aid for high efficiency CHP shall only be granted for **newly installed or refurbished** capacity.
- To qualify as a high-efficiency CHP investment, a **new cogeneration unit** must provide *annual overall efficiency > 75 % (80% for combined cycle GT and condensing steam turbines) and overall primary energy savings of >10 in line with Article 14 of the 2012 Energy Efficiency Directive*, while the conversion of an **existing power generation unit** into a cogeneration unit must only result in *primary energy savings similar to the original situation*.
- Eligible costs are defined as the extra investment costs for the equipment needed to operate as a high-efficiency cogeneration installation compared to conventional installations of the same capacity or the extra costs to upgrade a high efficiency unit to meet an even higher efficiency threshold.
- In both cases, **aid intensity shall not exceed 45% of these eligible costs, but can be increased for SMEs and certain investments in assisted areas**.

## State aid case study – CHP Exemptions

- **Germany** - CHP-Surcharge Exemption: The CHP-surcharge is 0.445 € cent/kWh in 2016. The KWKG 2016 provides for reductions for users with high yearly energy consumption and certain energy-intensive industrial users. These reductions reduce the burden that these users would normally have had to bear and therefore constitute state aid within the meaning of EU rules.
- **Poland** - *Cogeneration surcharge reductions for energy-intensive users*: The Polish cogeneration support scheme is financed through a surcharge levied on final electricity consumers, based on their electricity consumption. Poland has also notified to the Commission plans to lower the financial burden on certain energy-intensive users (“EIUs”), which would benefit from a reduced CHP surcharge. The Commission found that the proposed reductions in surcharges for energy-intensive users are in line with EU State aid rules. The measure will ensure the global competitiveness of energy-intensive industries, without unduly distorting competition in the Single Market.

## Issues - Cogeneration

- The principle that operating aid for renewable heat in CHP installations must be granted following a competitive bidding process is arguably problematic due to specific risks of operating CHP plants and the low number of projects in smaller Member States.
- Member States (eg. Germany) have been able to successfully argue against the use of competitive tendering based on principles applied to RES support schemes.
- **Euroheat & Power** and **COGEN Europe** argue that Member States should have the possibility, as set out in current rules, to deviate from competitive bidding.
- **Question: Should Member States be allowed to deviate from competitive bidding and technology neutrality? Should this have an effect on maximum aid intensity?**

## Issues - Cogeneration

- A recent Decision on the German CHP law (2016) permitted aid to CHP plants with depreciated assets notified under Art 107.
- *„The Commission notes that the EEAG provide for compatibility criteria for aid to existing biomass plants after depreciation. The criteria set out in Section 3.3.2.3 of the EEAG aim in particular at ensuring the proportionality of the aid. The Commission finds it appropriate to use those criteria as guidance for the assessment of the proportionality of the notified aid to depreciated gas-fired highly efficient CHP installations. [...] the Commission intends to amend the EEAG in order to expressly provide for the possibility to approve operating aid to depreciated CHP installations in a comparable factual and economic situation as the installations examined under this section and under the conditions examined in sections 3.3.2.1 to 3.3.2.5 below. Pending the amendment of the Guidelines, the Commission will apply the same criteria as in the present decision to any similar case*
- **Question: Should depreciated highly efficient gas CHP plants be eligible to receive support? Under which conditions?**

## Issues - Cogeneration

- A fuel switch to renewable hydrogen would allow existing gas CHP plants to be converted to a climate-neutral fuel source. However, this may require a two-stage process that first entails applying for CHP support, and then subsequently for additional aid for the fuel switch to green hydrogen.
- *Siemens suggests:*
  1. Streamlining and clarifying the existing rules for the cumulation of aid, including a provision that generally allows the **cumulation of aid for climate-neutral technologies**.
  2. Permitting Member States to **calculate aid intensity for climate-neutral projects based on a reasonable financing gap analysis** rather than only on a rigid eligible cost approach in order to ensure that investors are able to cover the cost difference in demonstration plants over the entire life cycle (i.e. CAPEX and OPEX) and create a cost-competitive situation relative to fossil-based solutions (*eg. support could take the form of a Carbon Contract for Difference*).
- **Question: Are special provisions needed in the EEAG/GBER for the transition to climate-neutral technologies, and in particular with regards to CHP using green hydrogen?**



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# District Heating & Cooling and Co-generation - Reflections



## Reflections

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- Key questions for DHC include appropriate aid thresholds, the appropriateness of permitting state aid for marginal improvements in the efficiency of existing heating networks and the need for an explicit framework for thermal heat storage and securing a decarbonized energy supply, especially renewable heat, waste heat and green hydrogen.
- Key questions for CHP include the use of competitive bidding, establishing an appropriate framework for permitting support for depreciated gas CHP plants and ensuring a framework for a transition to climate-neutral CHP plants operating with higher-cost decarbonized fuels (i.e. green hydrogen).
- The evaluation of the existing provisions in the EEAG and in particular the GBER on DHC and CHP is overall positive. Comments by stakeholders largely pertain to maintaining existing flexibilities or future proofing the revised Guidelines for a changing investment landscape.
- Deeper analysis of these specific questions based on concrete investment cases will be needed to design an appropriate framework for the modernized EEAG.

## Reflections – Exemptions

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- **CHP:** The reasoning for the exemptions for EII for CHP surcharge is aligned with the reasoning with support for renewables.
- **Conditionality:** Exemptions for EII are likely to grow under ambitious climate policy. Should there be stricter conditionality with regards to obligations to investing in RES and EE in return? How can this be adequately safeguarded?



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**Thank you for your attention**

**Do you have further questions or comments? Please contact us at:**

[jdelarue@clientearth.org](mailto:jdelarue@clientearth.org)

[andreas.graf@agora-energiewende.de](mailto:andreas.graf@agora-energiewende.de)

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