Are economic assessments provided in the EPBD and EED compatible with long-term climate targets?

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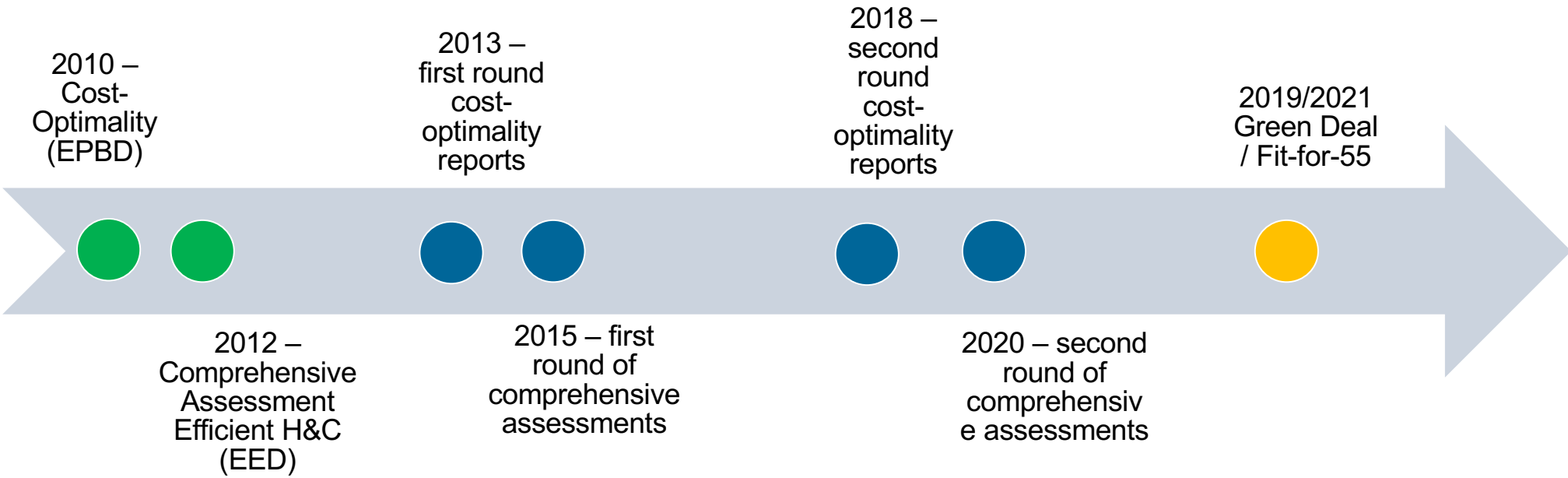
Economic calculations to frame energy efficiency policies



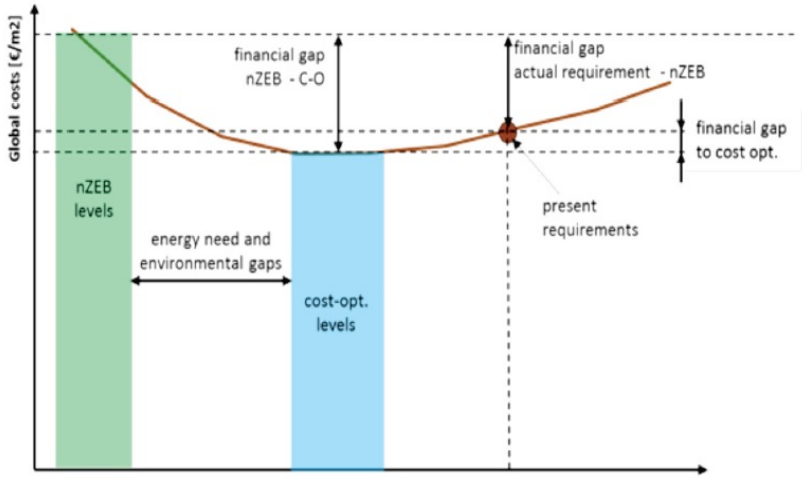
- Is the way how these calculations were carried out by different Member states compatible with and supportive of the target of full decarbonisation?
- Do they need to be revised and reframed in order to ensure compatibility with the overall policy framework?
- Are cost-optimality and cost-benefit analyses provided in the EPBD and EED as such compatible with the overall, long-term policy framework?

Method

- Identify key principles for economic assessments that can be derived from the existing long-term policy framework.
- Clarify and discuss the methodological framework proposed in the EPBD and the EED
- Comparative analysis of underlying assumptions in the economic calculations being done in selected countries.
- Show the impact of some of these assumptions by exemplary calculations and by the means of sensitivity calculations.
- Derive conclusions on the consistency of the provisions with long-term targets and possibly requested modifications

Methodological framework proposed in the EPBD and the EED for cost-optimality and comprehensive assessment

- Cost optimality calculations
  (introduced by the EPBD (2010/31/EU) and corresponding regulation (244/2012, amended 2013)
  - Minimum energy performance requirements set with a view to achieving cost-optimal levels
  - Financial vs. macroeconomic calculations



Source: Atanasiu et al, 2013

- Comprehensive assessment of the potential for efficient H&C
  (introduced by the EED 2012/27, regulation 2019/826, recommendations 2019/1659)
  - Cost-benefit analysis for MS' territory: identification of the most resource- and cost-efficient solutions to meeting H&C needs.
  - Financial vs. economic analysis
  - Under the header "Efficiency in energy supply" => demand scenarios should be the same in the baseline and alternative scenarios

- Energy efficiency first principle
  - Proposal for a revised Energy Efficiency Directive, 2021, "Member States shall promote and, when cost-benefits assessments are required, ensure the application of cost-benefit methodologies that allow proper assessment of wider benefits of energy efficiency solutions from the societal perspective"

Key principles of long-term EU policy framework

Key targets relevant for the economic assessments in the EPBD and the EED:

- Climate neutrality by 2050

- Targets 2030: at least –55% GHG emissions reduction (agreed), 39% energy efficiency target in PEC & 36% in FEC (proposed), 49% RES in buildings (proposed)

- EPBD current vision for building stock by 2050: "*highly energy efficient and decarbonised building stock*" (80-95% GHG emissions reduction compared to 1990)

- EPBD proposal: proposed fossil fuel phase out by 2040 delivered by Member States in their national Building Renovation Plans + Zero Emission building stock by 2050 (=100% RES)

- Energy efficiency first principle

⇨ Criteria for economic assessments?

Criteria for economic assessments in order to be in line with long-term policy frameworks

- Are fossil reference system and technology options considered as option or excluded?
  - Only in baseline or also target scenario?
  - If yes, which CO2-price or external costs?
- What is the band-width of energy prices in order to deal with uncertainties?
  - Considering possible energy price fluctuations (like the ones since autumn 2021)?
  - Considering risks and energy supply security?
- Energy efficiency first principle: Are the cost, mutlitple benefits and potential for increasing efficiency integrated?
  - Are different (useful energy) demand scenarios considered?
  - Are multiple benefits of energy efficiency considered?

Result 2 (a): To which extent do economic assessments from selected MSs comply with the criteria defined above? (EPBD – cost-optimality)

MS	Cost-optimality calculations EPBD		
	Criteria 1 (use of fossil reference systems?)	Criteria 2 (if indicator 1 yes: level of CO2-price)	Criteria 3 (Energy price uncertainties considered?)
AT	Yes	No (financial perspective)	15% higher energy price
DE	Yes	No (financial perspective)	Sensitivity with lower energy prices compared to the Commission‘s reference scenario
FR	Yes	39€/t, 100€/t in 2030; 450 €/t in 2050)	
ES	Yes	19€/t, 42€/t in 2030; 58€/t in 2050	additional 1.5% annual price increase
DK	Yes	20€/t, 41€/t in 2030, 125€/t in 2050	additional annual price increase 1.4% (natural gas)
IT	Yes	EC reference: 16.5 €/t, 36€/t (2030), 50€/t (2050)	
PL	Yes	EC reference: 16.5 €/t, 36€/t (2030), 50€/t (2050)	
PT	Yes	45.4 €/t	

Result 2 (b): To which extent do economic assessments from selected MSs comply with the criteria defined above? (EED – comprehensive assessment)

MS	Comprehensive assessment EED		
	Criteria 1 (use of fossil reference systems also in the alternative scenario?)	Criteria 2 (if indicator 1 yes: level of CO2-price)	Criteria 3 (Energy price uncertainties considered?)
AT	2030: yes, 2050: no	(2030: 81-121€/t, 2050: 183-296€/t; external costs: 300€/t)	Gas price 2030: 30-38 €/MWh
BG	Yes	50-150 €/t CO2	30% increase
CZ	Yes		
DE	Yes	Macro-economic: 222.5 €/tCO2 (variation to 700€/tCO2)	Carbon price variations, leading to 12% price incrase for gas;
FI	Yes	26€/tCO2 (2020) – 55€/tCO2 (2040)	Gas price 2030: 38-56 €/MWh
FR	Yes	(1) 43€/t vs (2) 250 €/t (2030); 500€/t (2040), 776 €/t (2050)	+/- 10%
SE	Yes	80€/t (2030) – 140 €/t (2050)	

Summary – so far

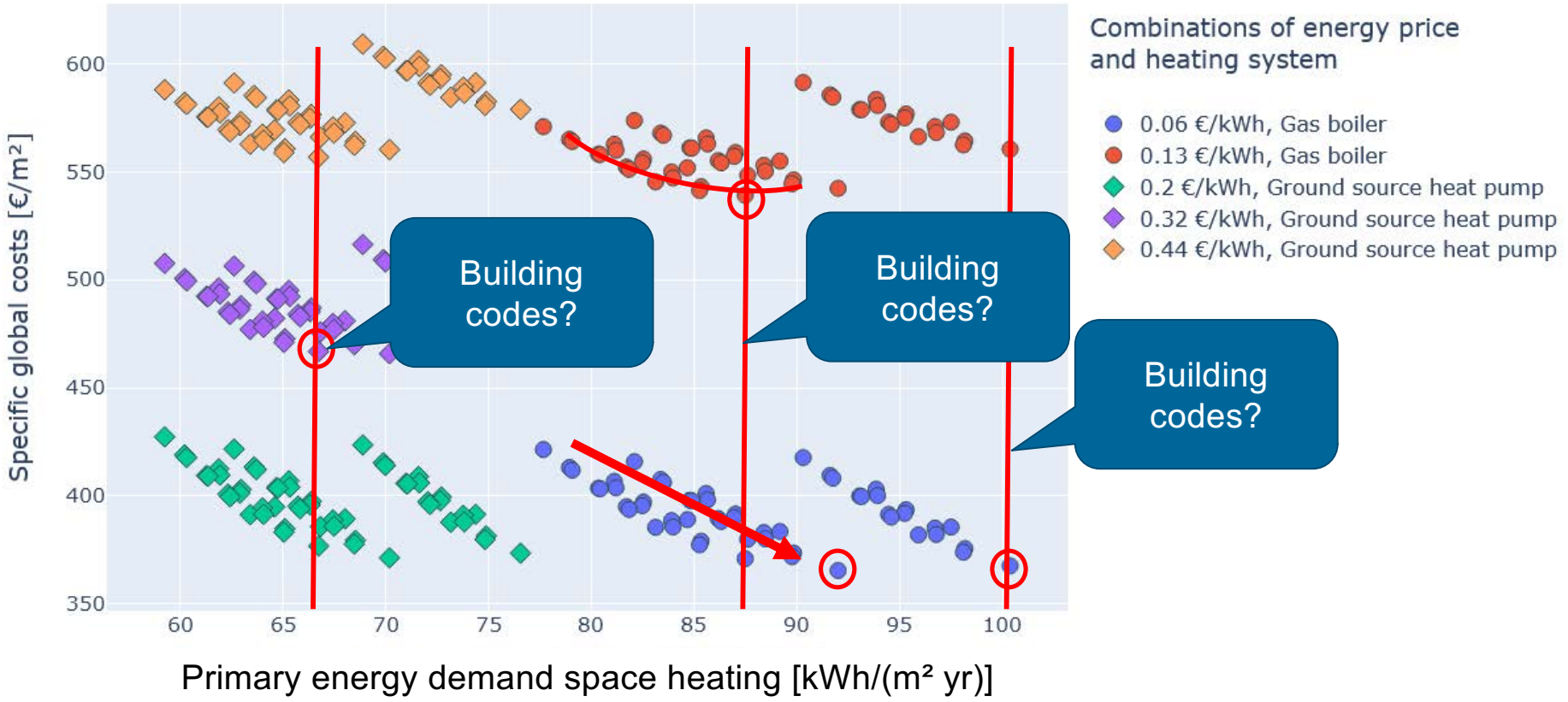
- Are fossil reference system and technology options considered
  - In almost all cases fossil energy carriers are still considered as options (also for alternative scenarios, 2050).
  - Considered CO2 costs vary between <20 €/t CO2 and >700 €/t CO2.
  - Most studies consider increase of CO2 costs (€/t), thus, reflecting a **CO2-price, not external costs**.

- Energy price band-width and dealing with related uncertainties
  - Sensitivities mostly foresee variations in the range of 10-30%, partly up to 50% of gas prices.
  - No sensitivities in the range of current (2022) energy prices.

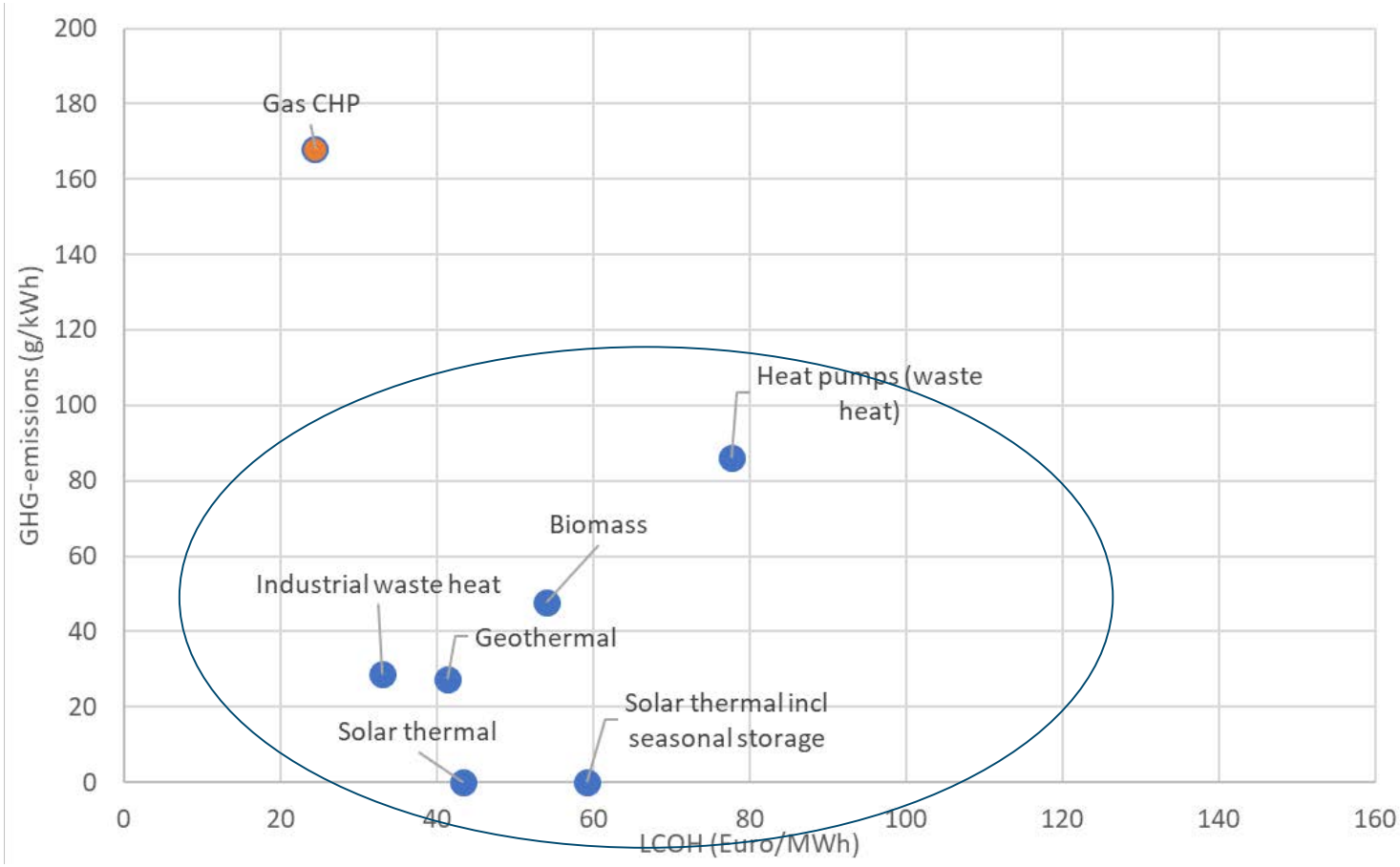
- Energy efficiency first principle: Are the cost, benefits and potential for increasing efficiency integrated?
  - Multiple impacts only rarely discussed or even monetized.

What are the impacts of energy and carbon price assumptions?

Result 1: Price sensitivity of building renovation in global cost analyses of the EPBD, exemplary cases for SFH in Germany



Result 2: LCOH of Gas-CHP in comparison to renewable district heating, Germany



Source: based on Steinbach, 2022

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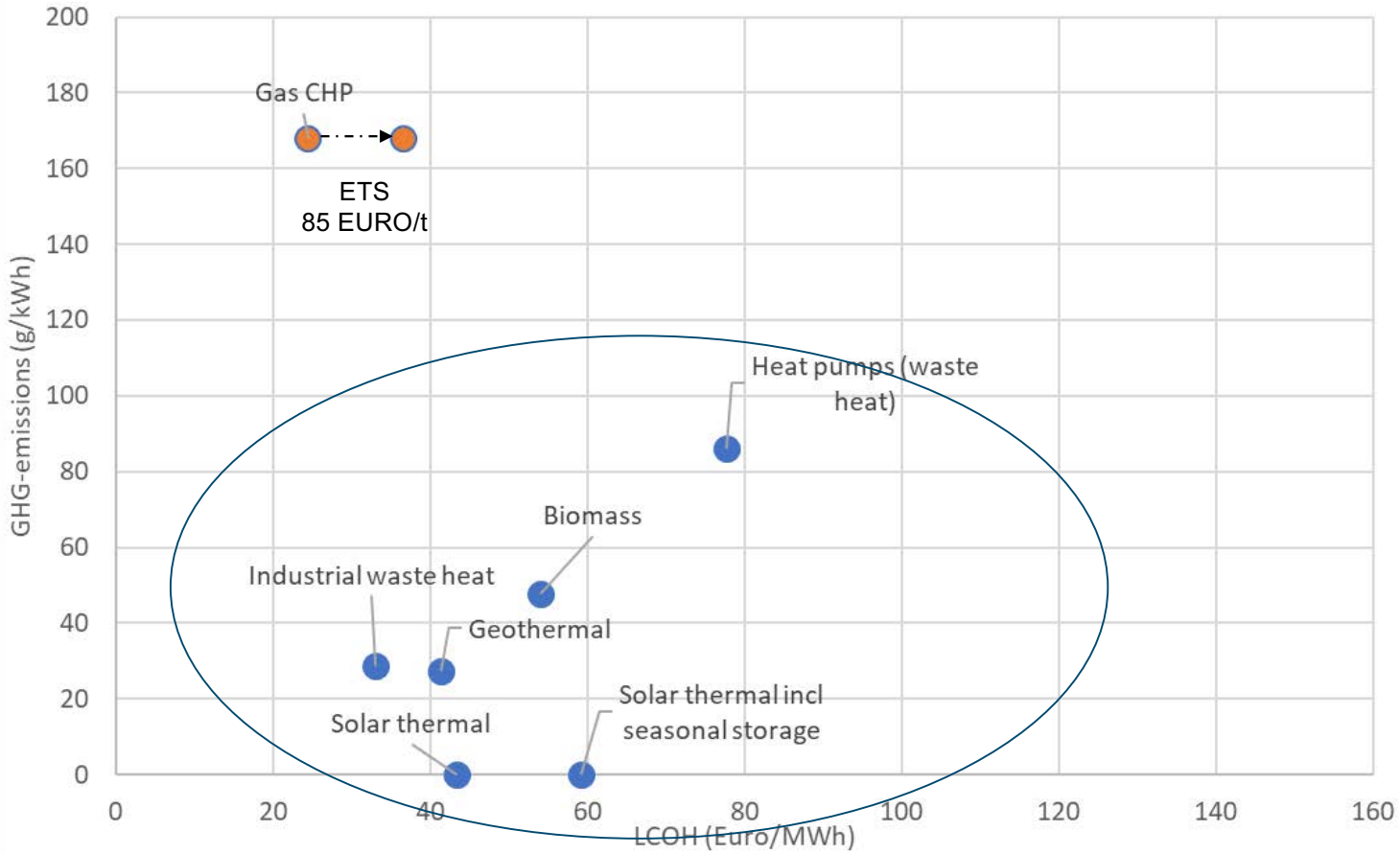

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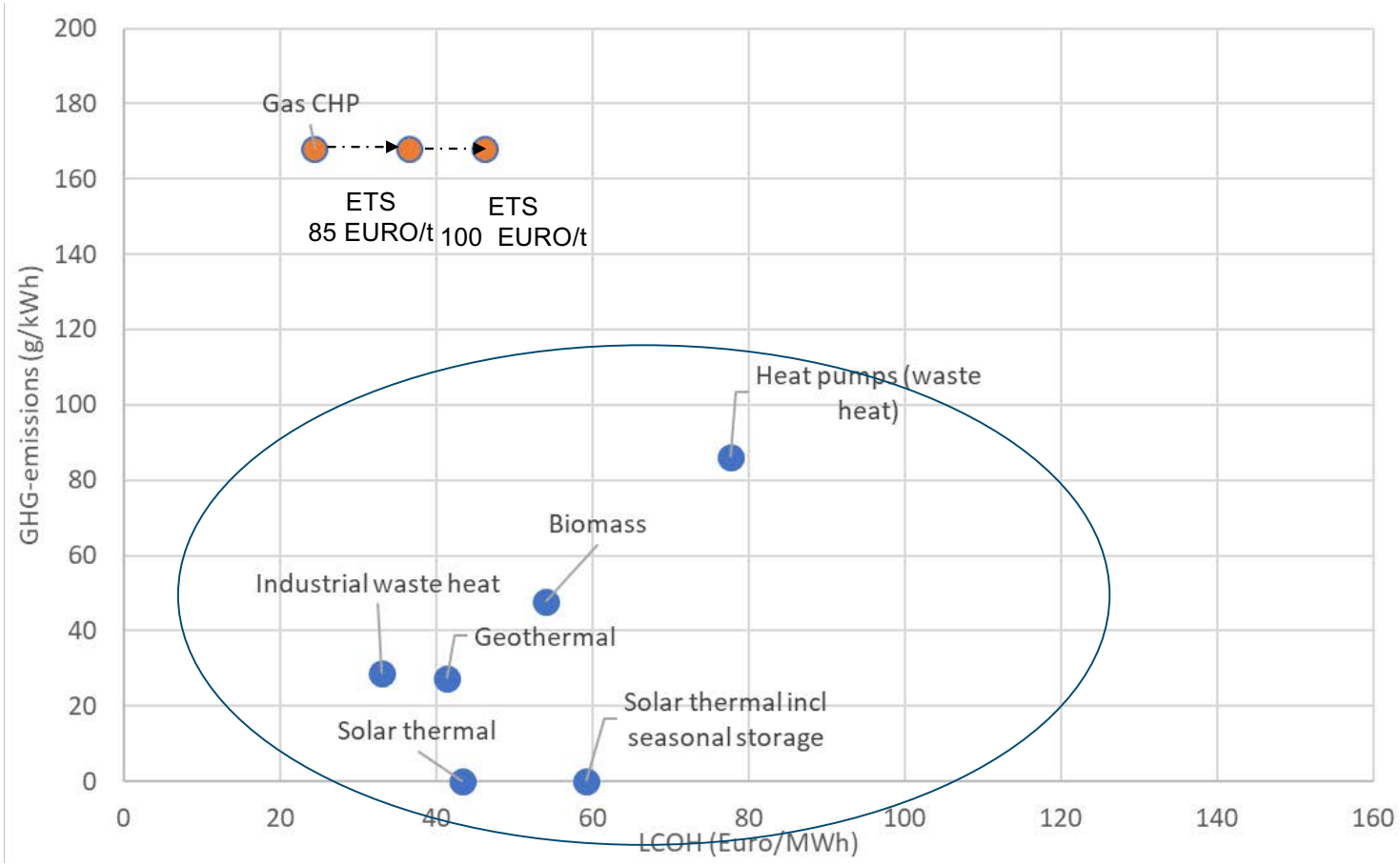

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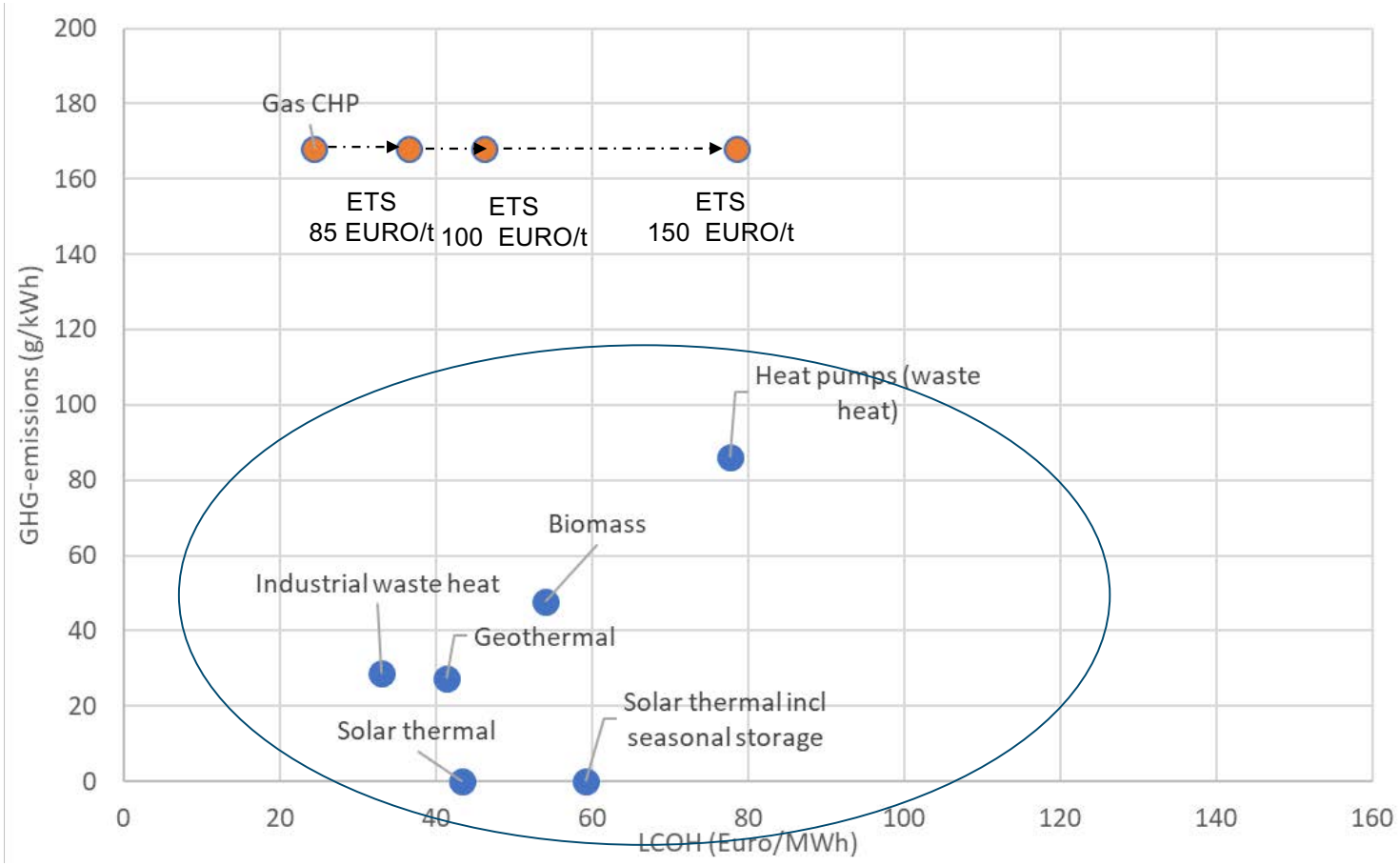

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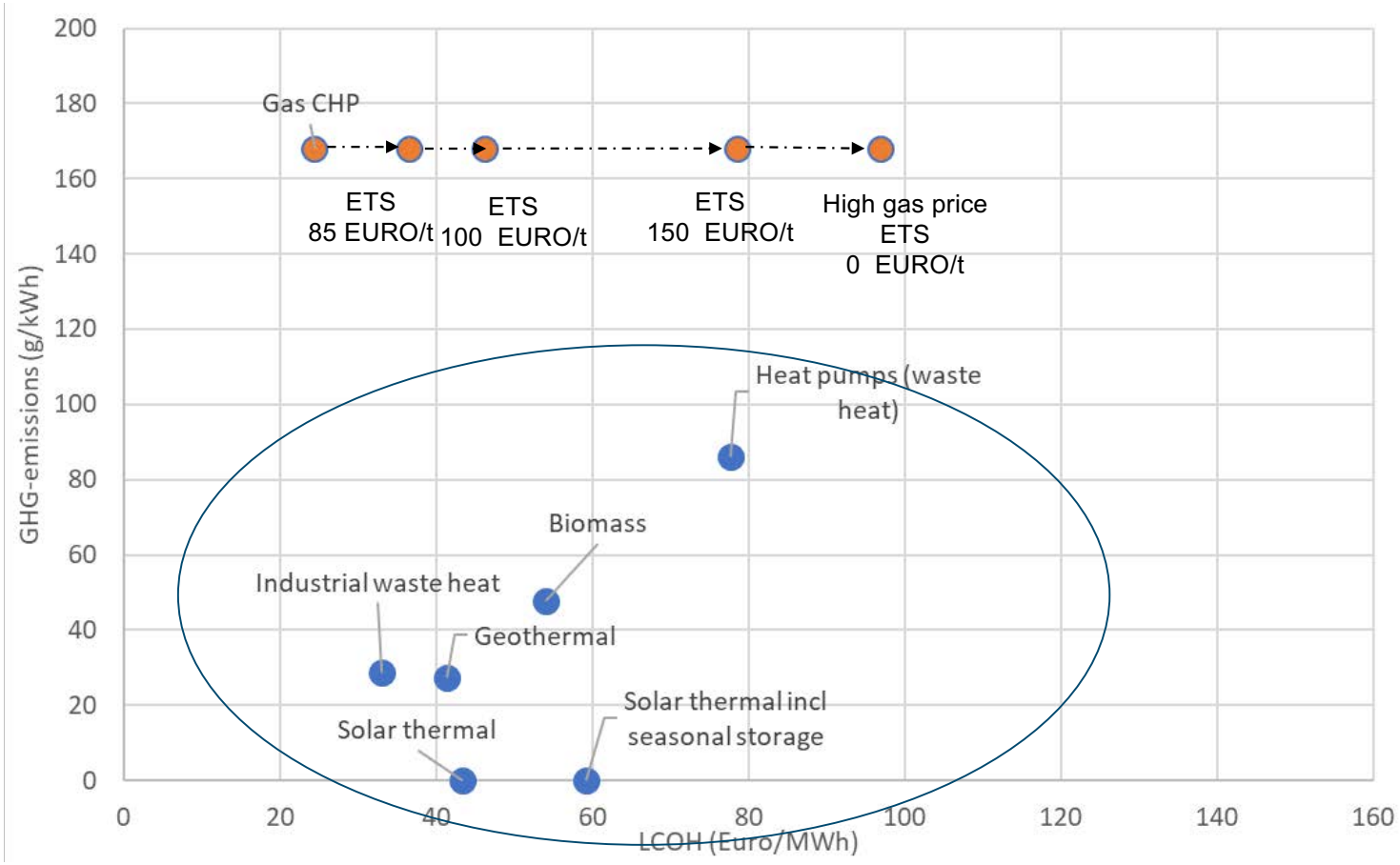

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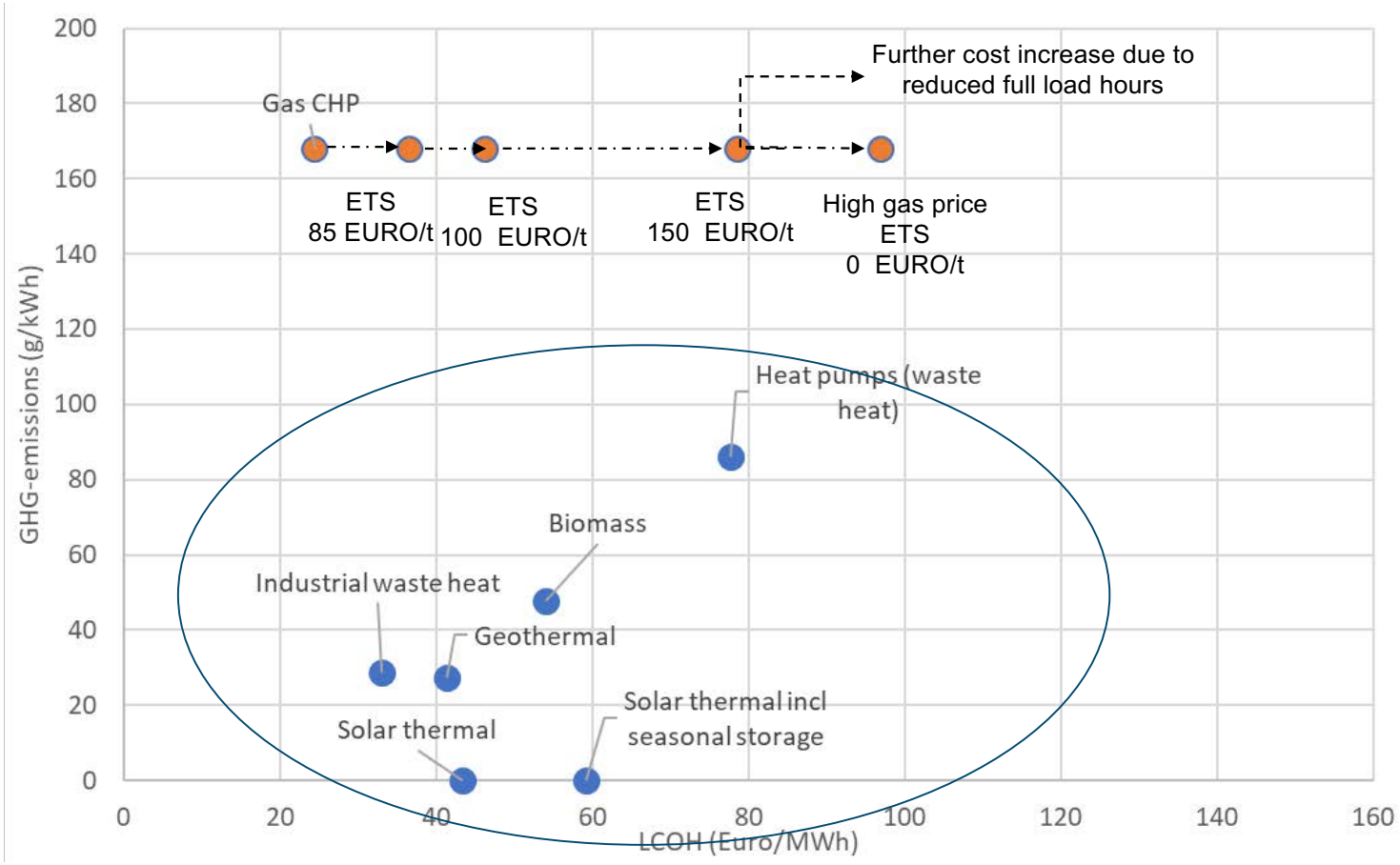

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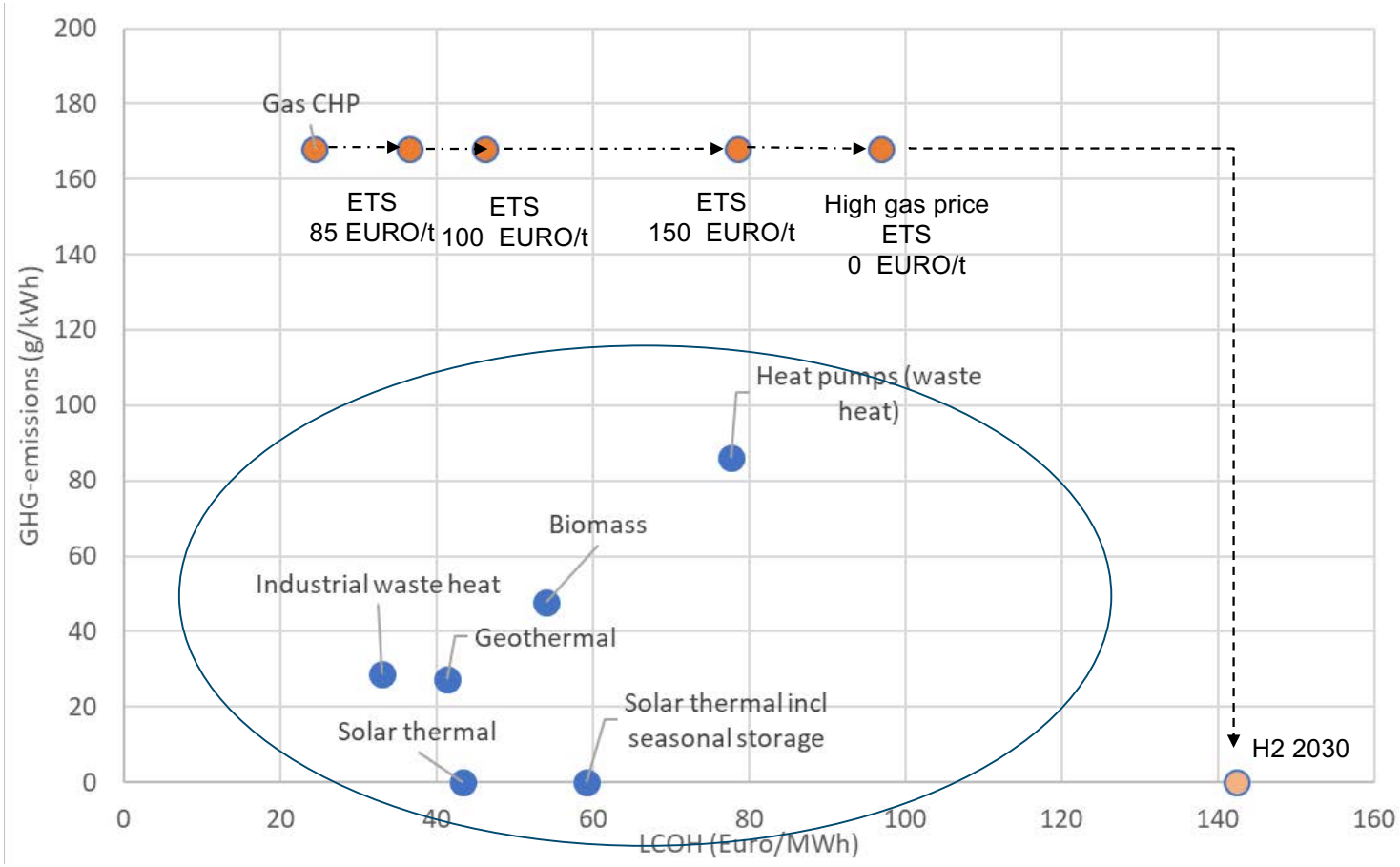

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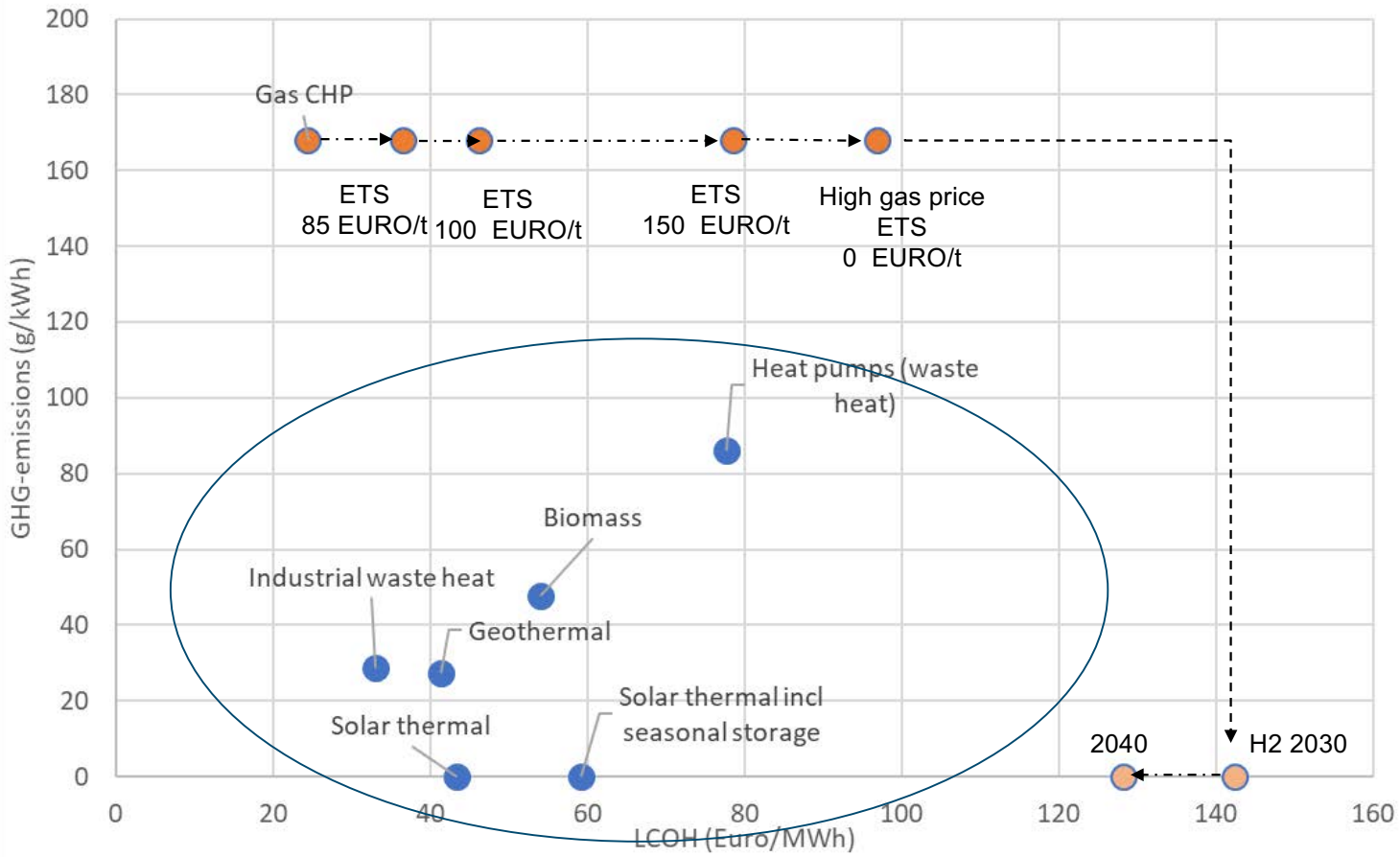

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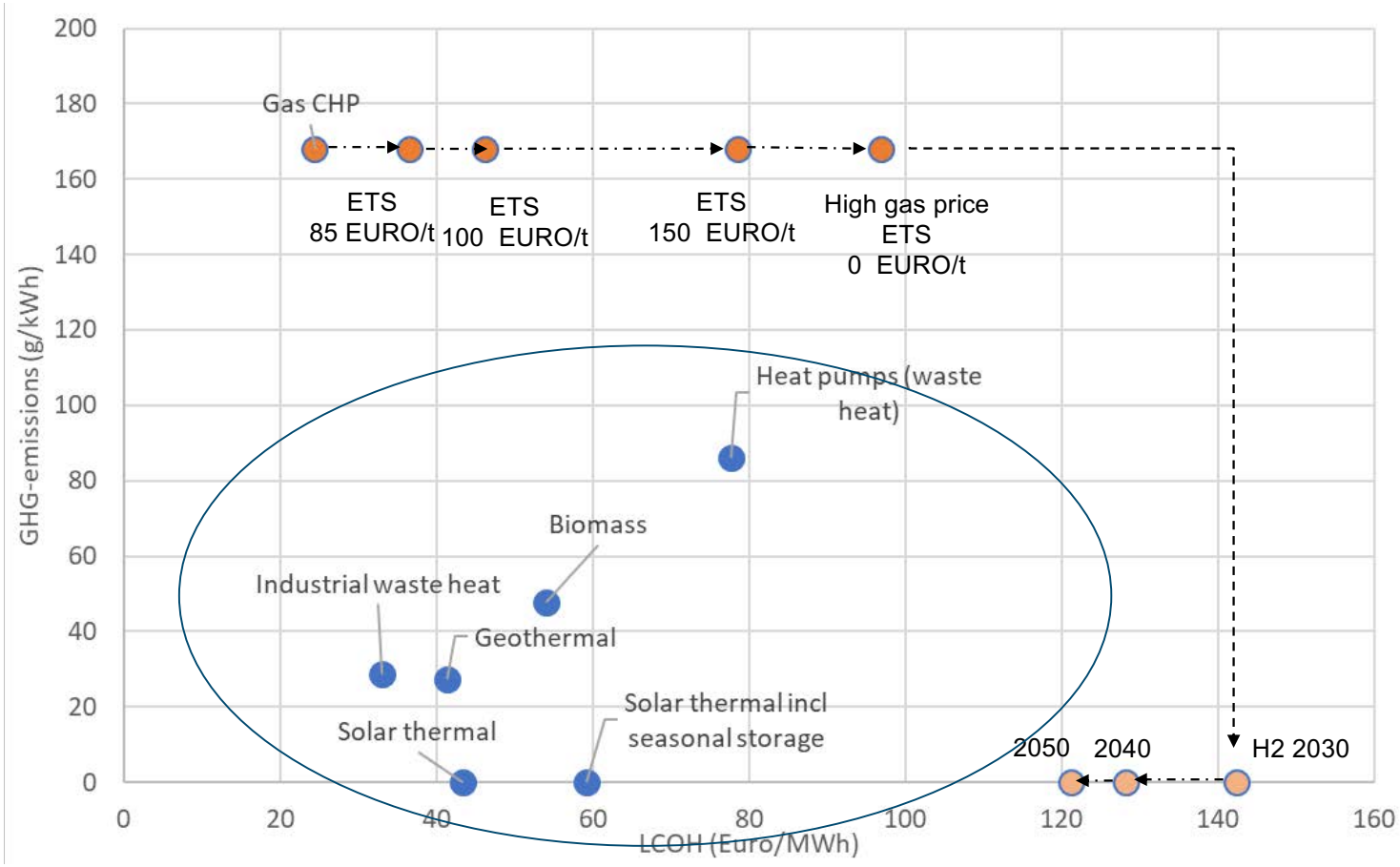

Source: based on Steinbach, 2022

Conclusions (1)

Are economic assessments provided in the EPBD and EED compatible with long-term climate targets?

In most cases: no, because …

- … analyses mostly still consider fossil fuels as an option (even on the long-run)
- … analyses mostly do not assume target-compatible CO2-prices/costs
- … sensitivity analyses do not reflect possible price shocks
- … analyses do not discuss sufficiently multiple impacts (e.g. regarding energy supply security)

Conclusions (2):
Selected issues with economic assessments for long-term strategic decisions

- Consideration of systems which are per definition not compatible with long-term targets?
- Price uncertainties
  - Sensitivities, stochastic modelling approaches
  - Should decisions be made based on the basis of mean values or „fat tailes“? (i.e. potential high impacts in case of certain, even unlikely energy price shocks)
  - Frequency of updates? (considering recent developments vs. frequent changes of long-term decisions?)
- Multiple impacts
  - Uncertainties and moral questions (monetizing deaths due to air pollution)
  - Methods for assessing e.g. security of supply?
  - Distribution of benefits?
  - Is it possible to identify the most relevant benefits?
- Financial vs macroeconomic analysis
  - Include external costs: how to assess them?
  - Exclude taxes and subsidies: usually done for energy carriers, but much more difficult for materials and (labour intensive) investments
  - Social discount rate?

Conclusions (3) - What is a “right cost benefit analysis methodology”?

(proposal for revised EED regarding the EE1st principle)

Adapt existing approach

- Target compatible external costs of CO2-emissions (CO2-Prices)
- Macro-economic/societal perspective
- Quantify multiple impacts
- More rigorous sensitivity analyses

Long-term target compatibility

- Exclude (fossil/conventional) systems which by definition are not part of the long-term target
- Target compatible CO2-prices (or external costs) (*)

Robust, resilient systems

- Focus on uncertainties,
- Focus on „fat tailes“
- Focus on resilience

▸ (Realistic) role of economic assessments in long-term strategic policy decisions?

(*) only for pathway to consider cumulated CO2-emissions, not relevant for investment in new (fossil) systems

Conclusions (4)

- Myopic economic considerations are no good advisor, when it comes to long-term decisions.
- Rather: assess scenarios, technologies and mix of technologies in terms of risk mitigation and contribution to a decarbonised system, future proof buildings and resilience, not (myopic) cost-optimality.

Questions / Discussion

- Do you have evidence of the real impact of e.g. cost-optimality calculations on improved building codes in some EU Member States?
- Do (did) CBAs / economic assessments help to make policy decisions more transparent and more rational?
- How to overcome the identified issues of applying economic assessments for long-term strategic policy decisions?
- Considering the announced revision of cost-optimal methodology (EPBD proposal): What would be most important improvements? (Currently suggested: consideration of cost of GHG allowances, environmental & health externalities of energy use)

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