Ambitious Mitigation Scenarios for Germany: A Participatory Approach

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AGENDA

1. Introduction
2. Methodology
3. Scenario Definition
4. Scenario Results
5. Scenario Evaluation
6. Conclusion

1. Introduction

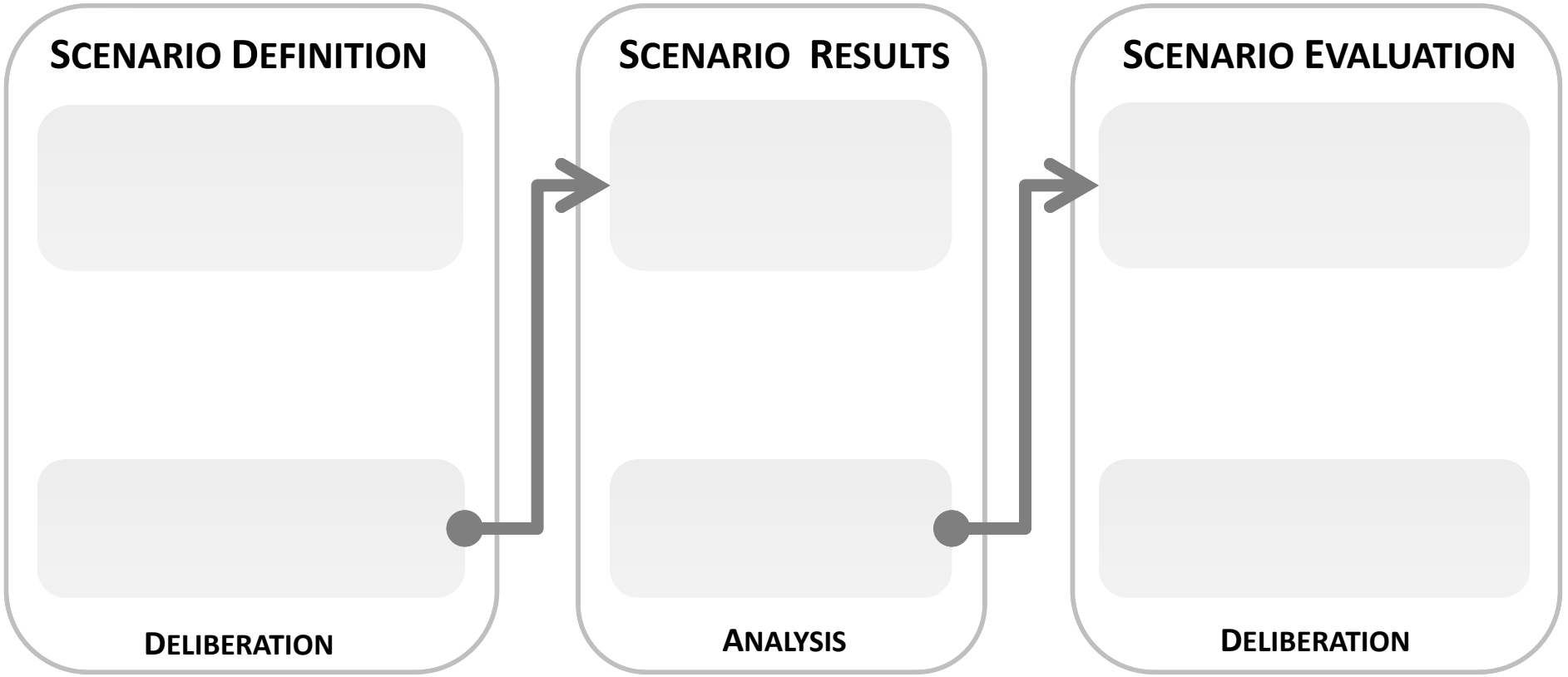
German Government:
Target of **80-95 %** CO_2 emission reduction in 2050 relative to 1990

- Existing technology-oriented scenario studies suggest achieving the target is technologically feasible
- Do the projected developments align with public preferences?
  Is there a danger of public refusal?
- Transparency and participation in design and development of scenario studies helpful for establishing public acceptance
- Apply analytical-deliberative approaches (Renn et al., 2011)

1. Introduction

We present a set of
model-based, long-term mitigation scenarios for Germany
that are defined and evaluated in a participatory process with civil society organization (CSO) stakeholders from the transport and electricity sector.

2. Methodology



2. Methodology

SCENARIO DEFINITION

Discuss mitigation options in the transport and electricity sector with civil society representatives, focus on likely/desirable futures

Translate judgments and preferences into coherent sets of parsimonious narratives

DELIBERATION

SCENARIO RESULTS

ANALYSIS

SCENARIO EVALUATION

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SCENARIO RESULTS

Run energy-economic model in 3 configurations corresponding to sets of parsimonious narratives

Analyze scenario results, identify sectorial trends and mitigation costs

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SCENARIO RESULTS

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ANALYSIS

SCENARIO EVALUATION

Discuss plausibility of scenarios, identify where projected developments could raise concerns about social acceptance

Identify socio-political externalities of technology-focused mitigation strategies

DELIBERATION

3. Scenario Definition

- Define parsimonious narratives for each scenario
- Parsimonious narratives consist of
  - Contextual information on anticipated key future developments
  - Quantitative projections for boundary conditions
- Developent of parsimonious narratives based on CSO stakeholder workshops results, corroborated by expert judgements
- Different scenarios consist of different parsimonious narratives

3. Scenario Definition

- Is an increase of total annual freight mileage unavoidable?
- Is multi-modality a viable option for decarbonizing the passenger transport sector?
- Which alternative low-carbon fuels ought to be dominant in the future?

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- Which alternative low-carbon fuels ought to be dominant in the future?

- Are landscape externalities of REG capacities and transmission lines problematic, and what are potential remedies?
- Which energy efficiency growth rate is feasible and what is the role of the rebound effect?
- Which thermal electricity generation capacities are acceptable in the next decades?

3. Scenario Definition

Model Constraint	Continuation	Paradigm Shift	Paradigm Shift +
Decoupling FT&GDP	No	Yes	Yes
PT share in MS	Constant	Increase	Increase
REG potential	Medium	High	High
Energy efficiency	Medium	High	High
Decommission Coal PP	No	Yes	Yes
CCS by 2025	No	No	Yes
Biofuel potential	Low	Low	High

All scenarios are subject to a strict CO_2 emission budget constraint.

4. Scenario Results

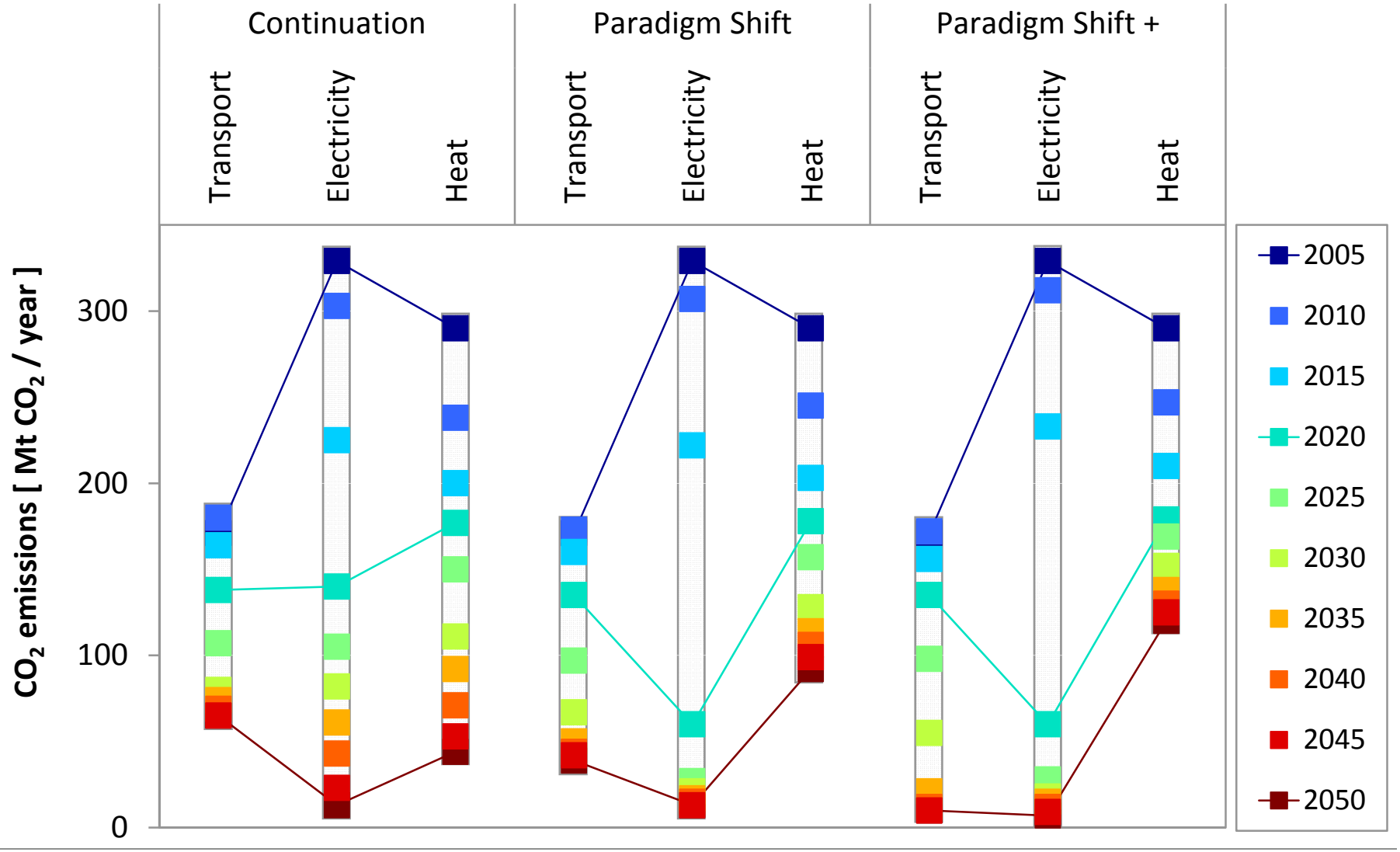
1. CO_2 emissions by sector

2. Transport sector

3. Electricity sector

4. Mitigation costs

4. Scenario Results - CO_2 Emissions by Sector



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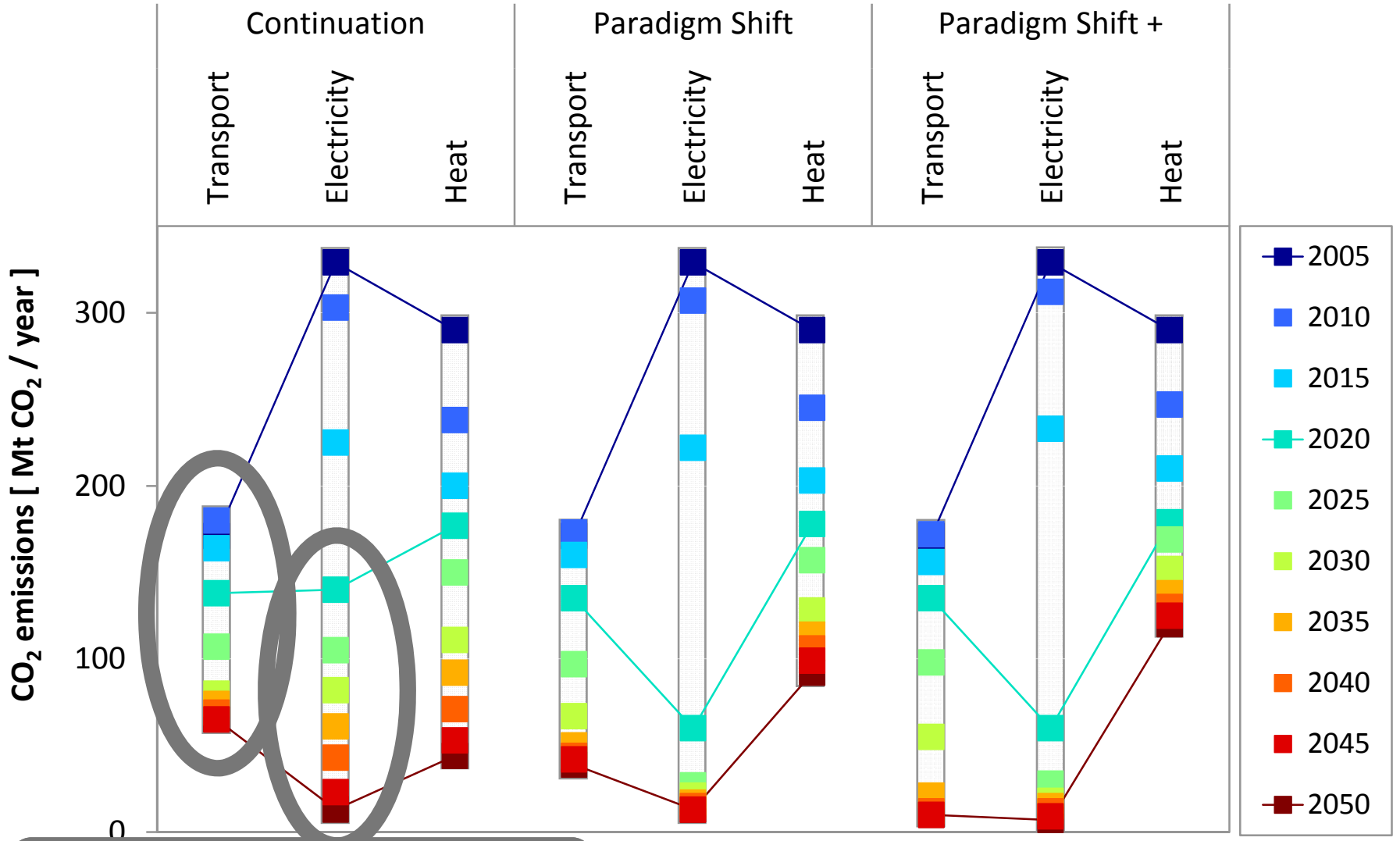
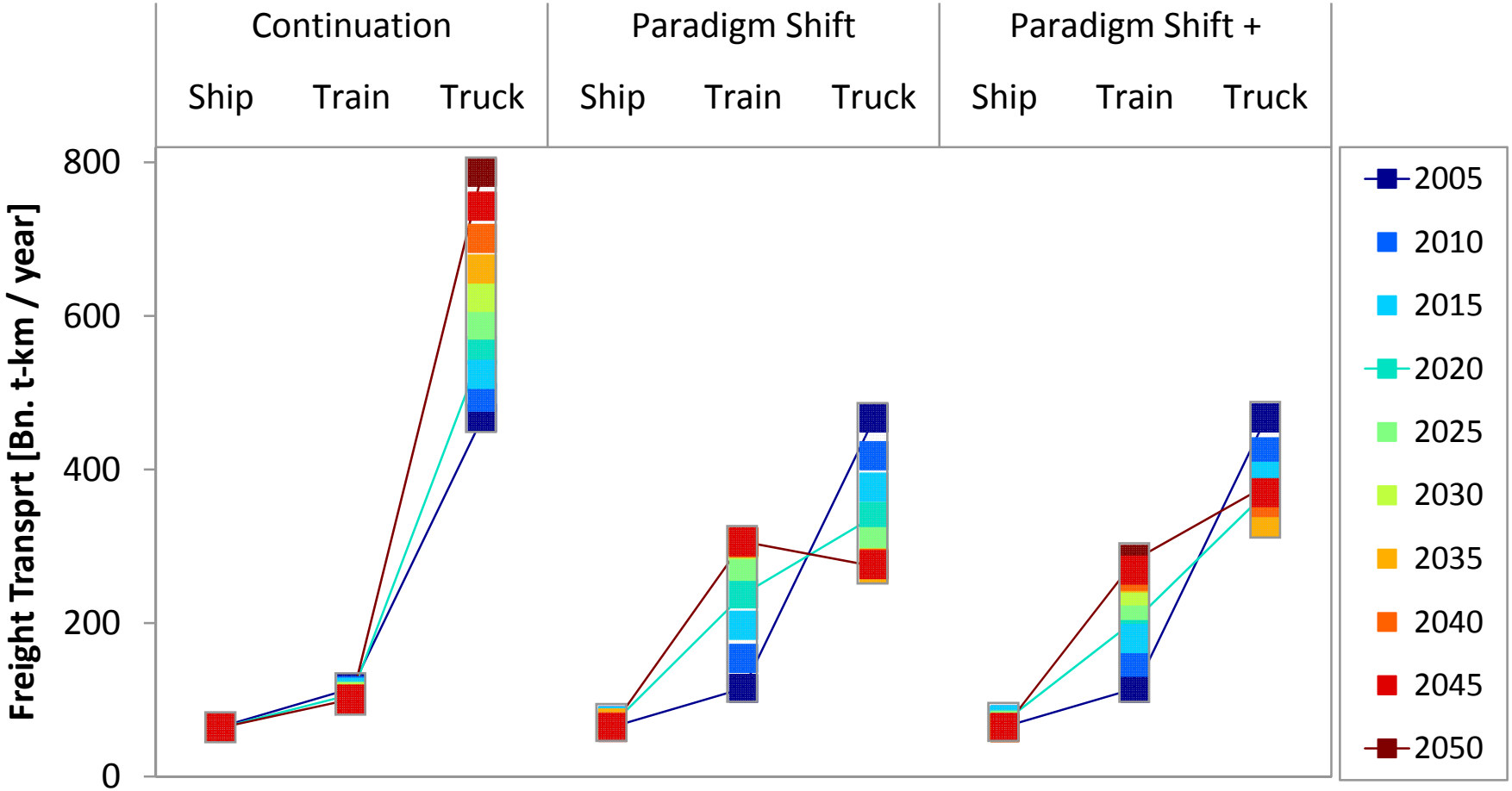


Carbon Lock-in

4. Scenario Results - Transport Sector



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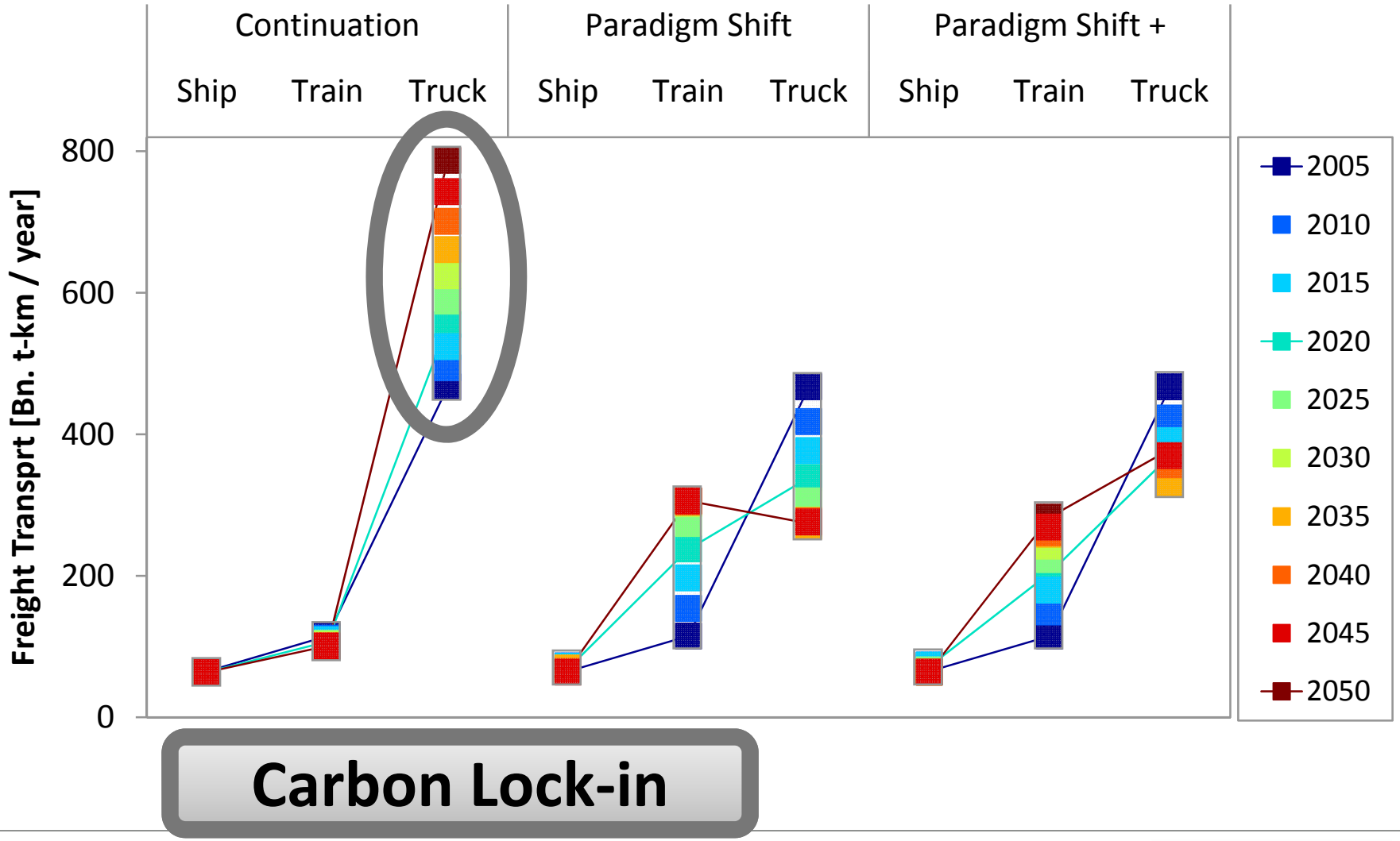

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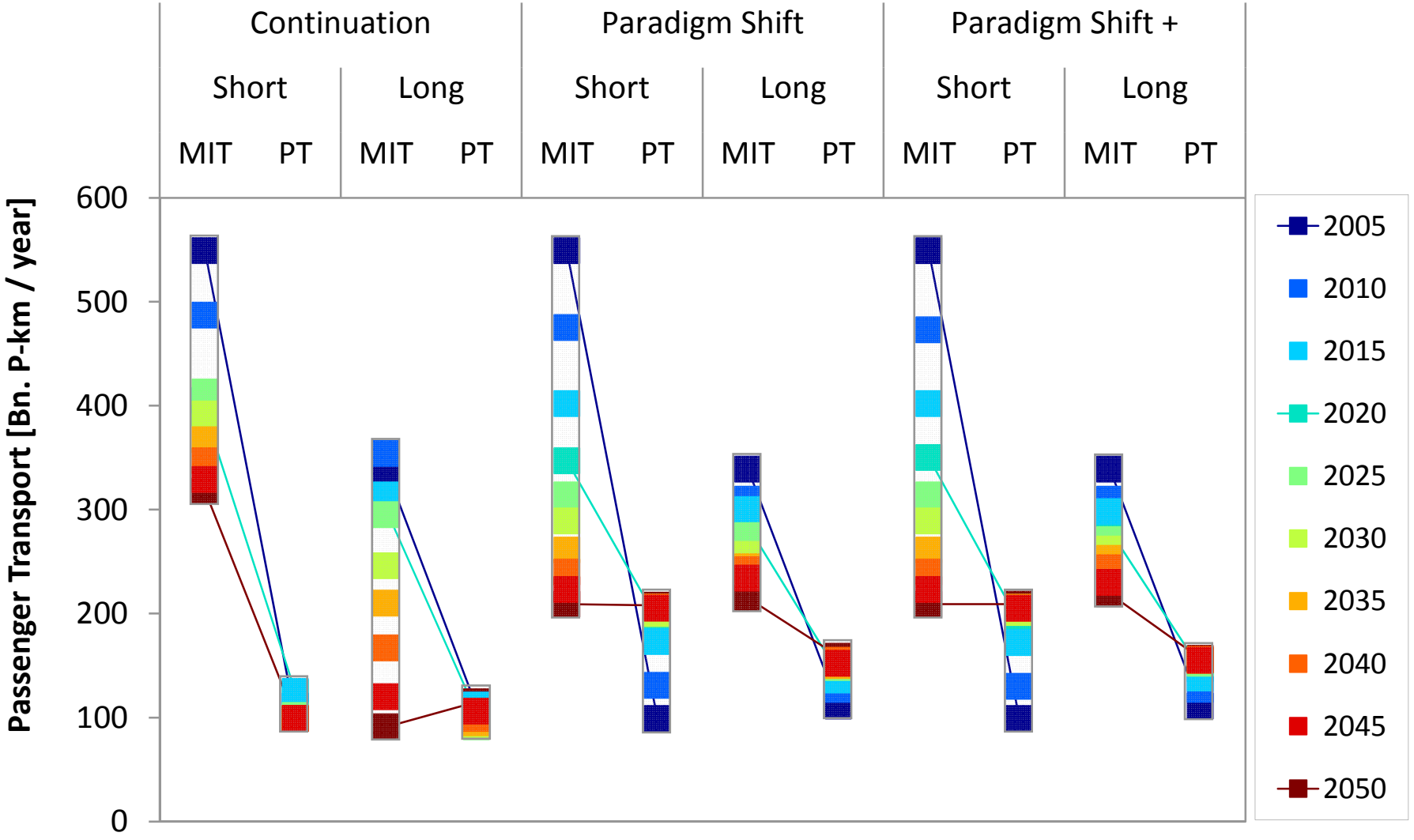

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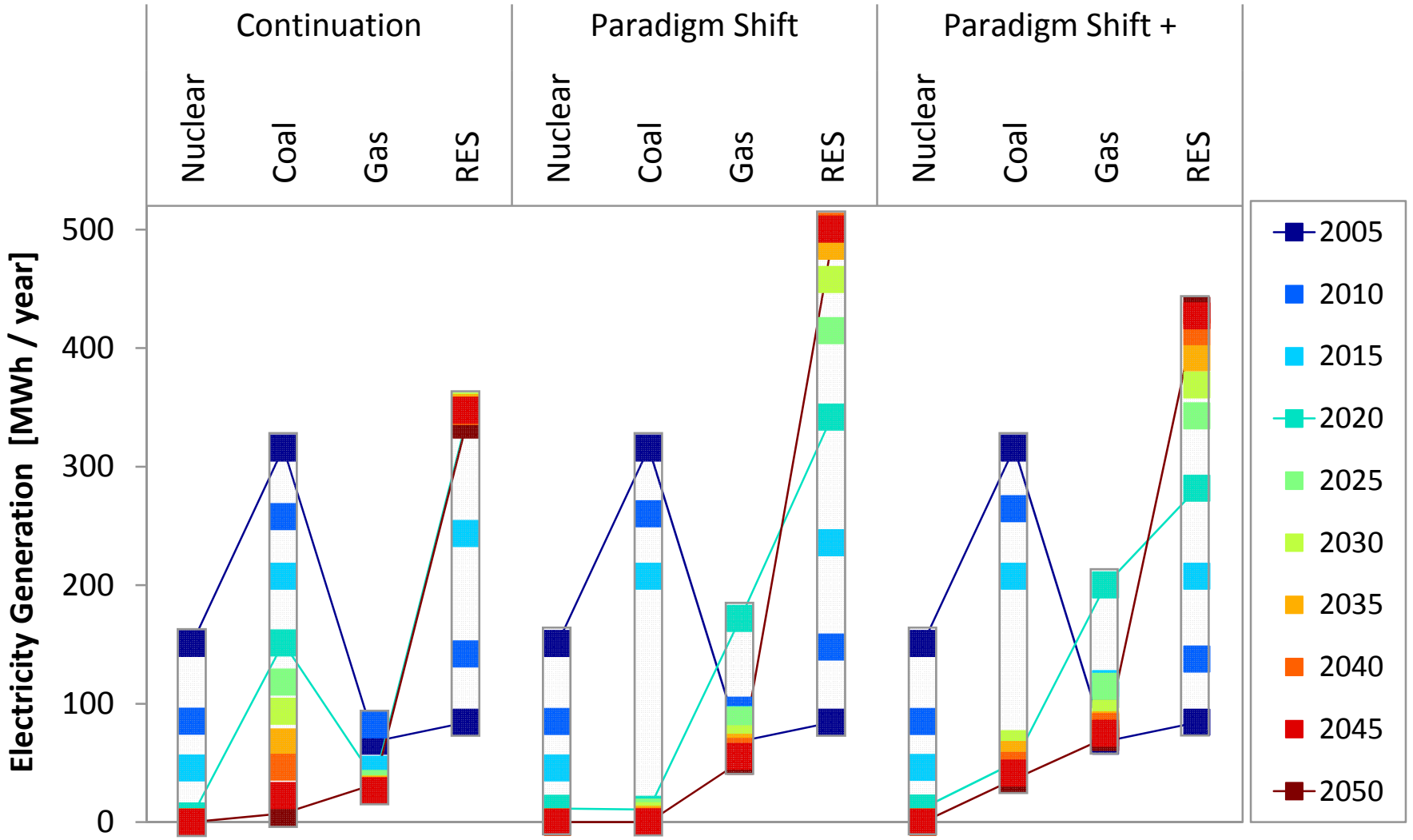

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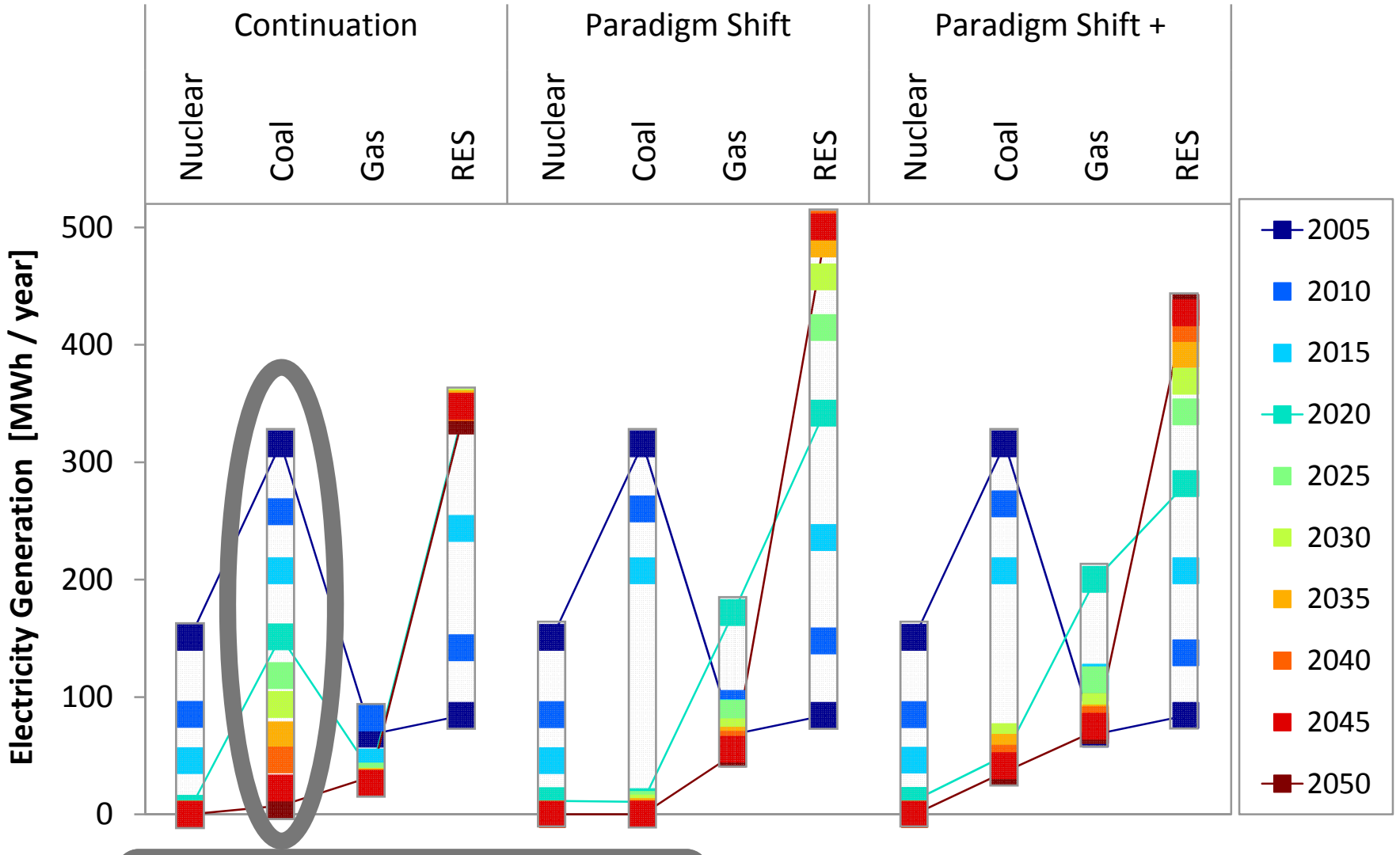
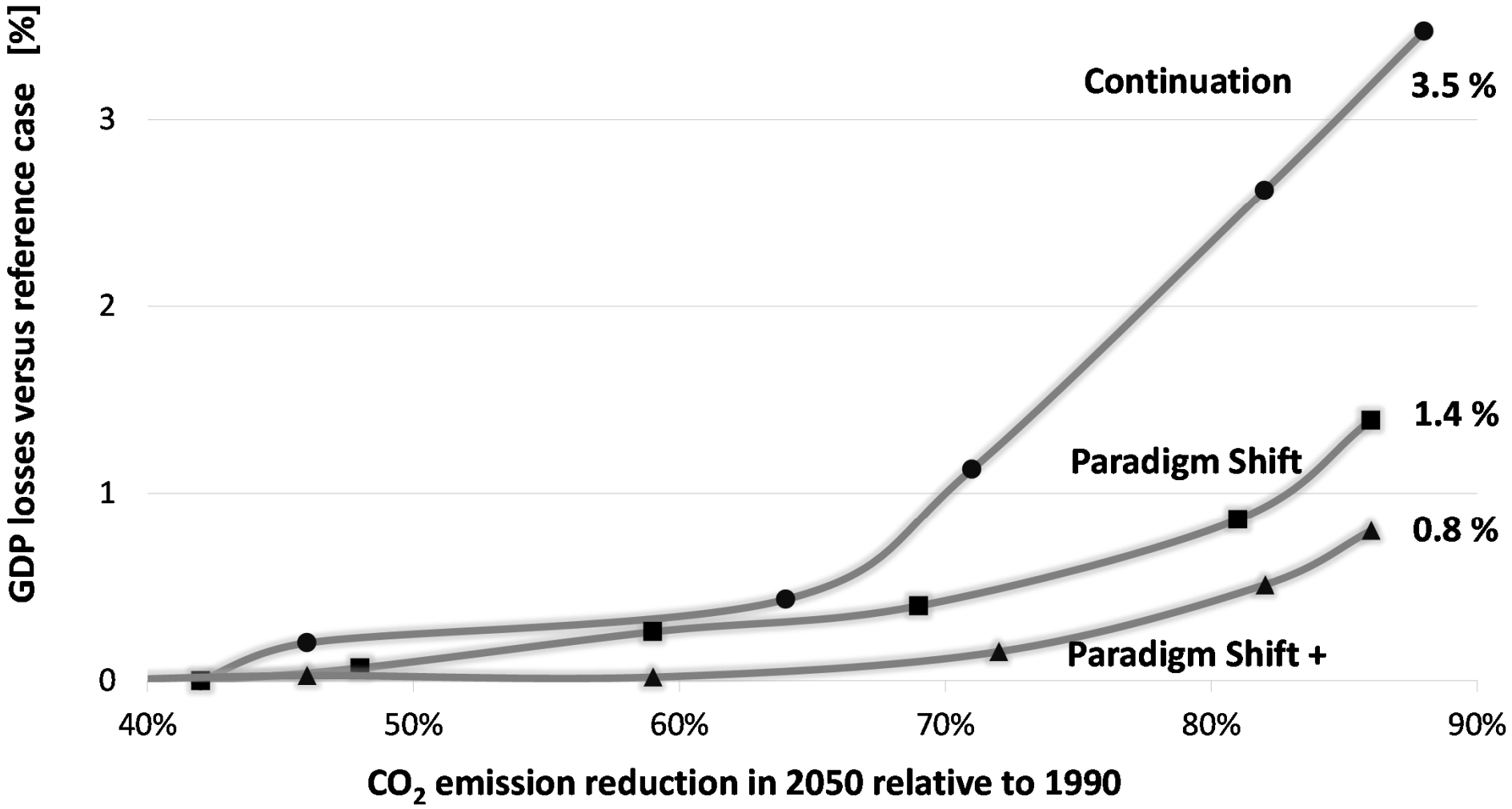


Carbon Lock-in

4. Scenario Results – Mitigation Costs



5. Scenario Evaluation

- CSO stakeholders perceive three projected developments in the '**continuation**' scenario as implausible:

  1. Strong decrease of motiorized individual transport (MIT) that is not compensated for by more public transport (PT) mileage
  2. Required electricity and heat demand reductions not politically enforceable
  3. Required CO2 emission reductions and efficiency improvements in the heat sector are not realistic

- These critical socio-political externalities motivate CSO stakeholders to assess the scenario as highly undesirable

- However, the carbon lock-ins are again judged as highly likely

5. Scenario Evaluation

- The ‘paradigm shift’ scenarios see the carbon lock-ins resolved

- CSO stakeholders prefer the ‘paradigm shift’ over the ‘paradigm shift + ‘ scenario as they predict substantial public protest against the large-scale development of CCS infrastructure and biofuel production

- Concerns raised with regard to the necessary structural changes:
  1. Quality of public transport needs to increase significantly
  2. Decommissioning of coal power plants may entail regional unemployment
  3. Fast deployment of renewable electricity generation and transmission line capacities are socially acceptable if procedural justice is high

- In order to deliver, the different policy arenas need to become more intertwined and resolve their conflicting goals

6. Conclusion

- Achieving an ambitious mitigation target of 85% CO_2 emission reduction in 2050 relative to 1990 is technically feasible
- Critical socio-political externalities may pose a significant barrier to achieving ambitious mitigation targets

6. Conclusion

- Deliberative stakeholder dialogues reveal strong discrepancies between likely and desirable future developments in the transport and electricity sector

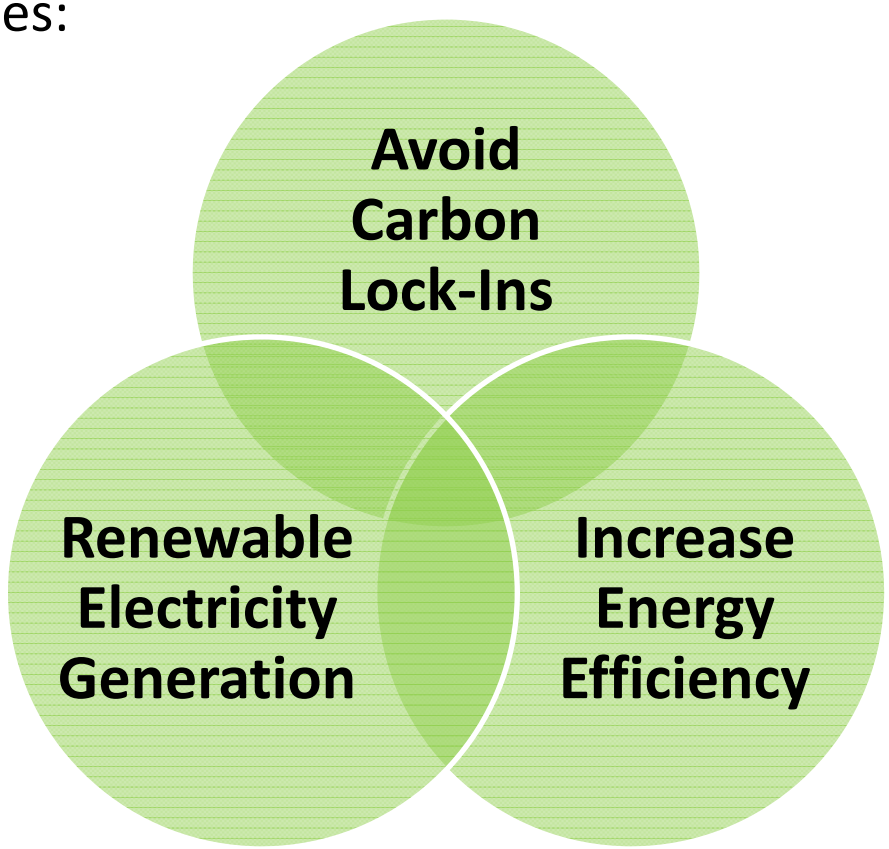
- Fossil-fuel based freight mileage and electrification of coal, deemed likely but not desirable, will lead to a cumulative carbon lock-in

- Model results indicate this carbon lock-in to be 8.8 Gt CO_2 until 2050, accounting for 55% of the total CO_2 emission budget

- Enforcing ambitious mitigation in the face of carbon lock-ins leads economic growth to slow down and bears severe socio-economic externalities

6. Conclusion

- Solution Strategies:



… require concerted political as much as societal will!

Please find more details in: