Possibilistic Foreknowledge and Policy Recommendations

Stakeholder's Contribution

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Research Focus of the SRG Lobster

- **Shared Research Group "Limits and Objectivity of Scientific Foreknowledge: The Case of Energy Outlooks" at Karlsruhe Institute for Technology**
  - Energy system has to be decarbonised.
  - Transformation decisions require foreknowledge:
    - Usually decision makers commission scientists to provide the relevant foreknowledge which is used in order to support political recommendations.

Research Questions of the SRG Lobster

- Which kind of foreknowledge about the relevant properties of the energy system do we possess?
  - Which kind of foreknowledge can we gain?
- How does this foreknowledge justifies political recommendations?

My claims

- **I shall doubt that stakeholder can improve the epistemic quality of our foreknowledge.**

- **I shall argue that they can help to better take into account the range of possible future developments.**

Structure of the Presentation

- **Theory:**
  1. Types of Foreknowledge;
- **Practice:**
  2. We have merely possibilistic foreknowledge about relevant properties of the energy system;
  3. Difficulties with justification of political recommendations on the basis of possibilistic foreknowledge
- **Stakeholder's contribution**
  4. What we should not expect from stakeholder's involvement;
  5. How stakeholders could help justify political recommendations

Types of Foreknowledge

- **Deterministic foreknowledge:**
  - „X will be the case at t.“
- **Probabilistic foreknowledge:**
  - „X will be the case at t with probability p.“
- **Possibilistic foreknowledge:**
  - „It is possible, that X will be the case at t.“

Practical Relevance of the Foreknowledge

- **Should I take an umbrella for the walk?**
  - I know that it will rain today.
  - I know that it will rain today with probability 0.2.
  - I know that it is possible that it will rain today.

Epistemic Stance in the Case of Energy Outlooks

- **Kaya-Identity:**
  - CO_2 emissions from energy = Population x (GDP/capita) x (energy use/GDP) x (CO_2 emissions/energy use)

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- **Kaya-Identity:**
  - CO_2 emissions from energy = Population x (GDP/capita) x (energy use/GDP) x (CO_2 emissions/energy use)
    - Foreknowledge about:
      - Population: merely possibilistic;
      - GDP: merely possibilistic;
      - Energy demand: merely possibilistic;
      - Technological development (efficiency): merely possibilistic

Scientific Approach: Scenario Building

- **Scenarios:**
  - Set of exogenous parameters representing some relevant properties of the involved social systems
- **Integrated energy models:**
  - Set of mathematical equations solving a certain problem (e.g. optimization)
    - By the means of scenario modeling we calculate logically necessary consequences of the scenario assumptions and the assumptions of the models about systems dynamics and agents behaviour.

Scenario Modeling: What do modeling results mean?

- **Logical reconstruction of a statement gained by scenario modeling:**

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– **Logical reconstruction of a statement gained by scenario modeling:**

1. Necessary (If scenarios and models assumptions will be the case then modeling results will be the case)	1. Necessary (If p then q)
2. Possibly (the assumptions of the model and the scenarios will be the case)	2. Possibly (p)
3. Thus: Modeling results will *possibly* be the case.	3. Thus: Possibly (q)

Possibilistic Foreknowledge: Nothing New

–Scenarios describe some possible future developments

Possibilistic Foreknowledge: Nothing New

- **Scenarios describe some possible future developments**
- **That is well acknowledged in the scientific community:**
  - "Scenarios provide a plausible description of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces and relationships" (SRRES 2011, Ch.10, p. 11)

Sources: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation (SRRES), 2011, Edited by O. Edenhofer et al.

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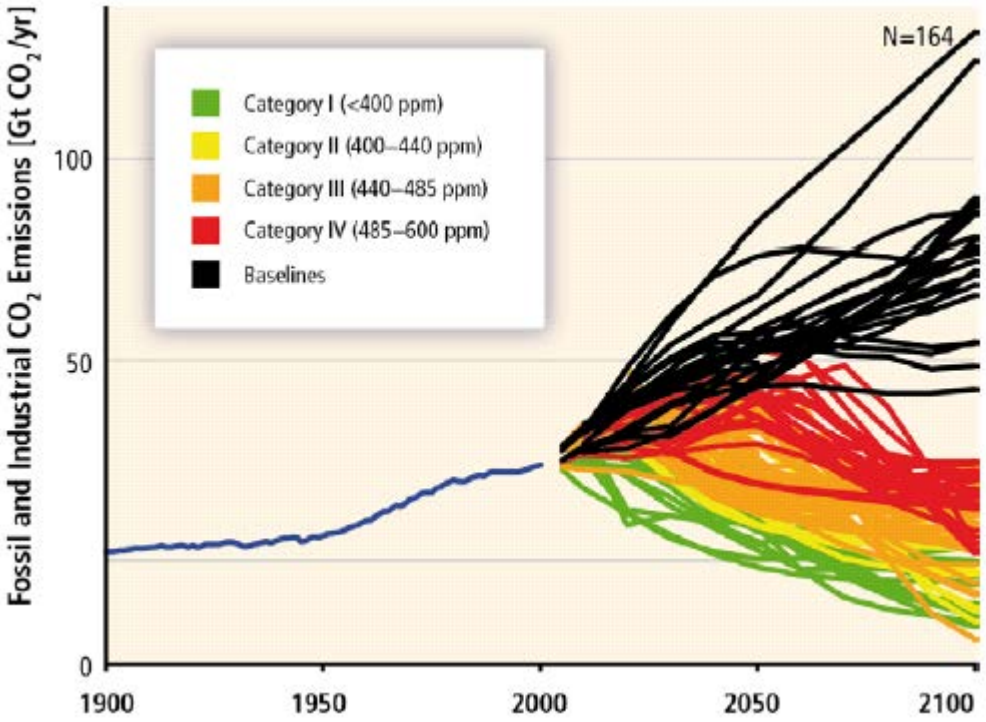

Sources: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation (SRRES), 2011, Edited by O. Edenhofer et al.
Figure: taken from SRRES, Ch. 10, p. 15

Problems from Possibilistic Foreknowledge

SRRES writes:

"Although the 164 scenarios are clearly not exhaustive of recent literature, nor do they represent a truly random sample, the set is large and extensive enough to provide **robust insights** into current understanding of the role of RE in climate change mitigation." (SRRES, Chapter 10, p. 12).

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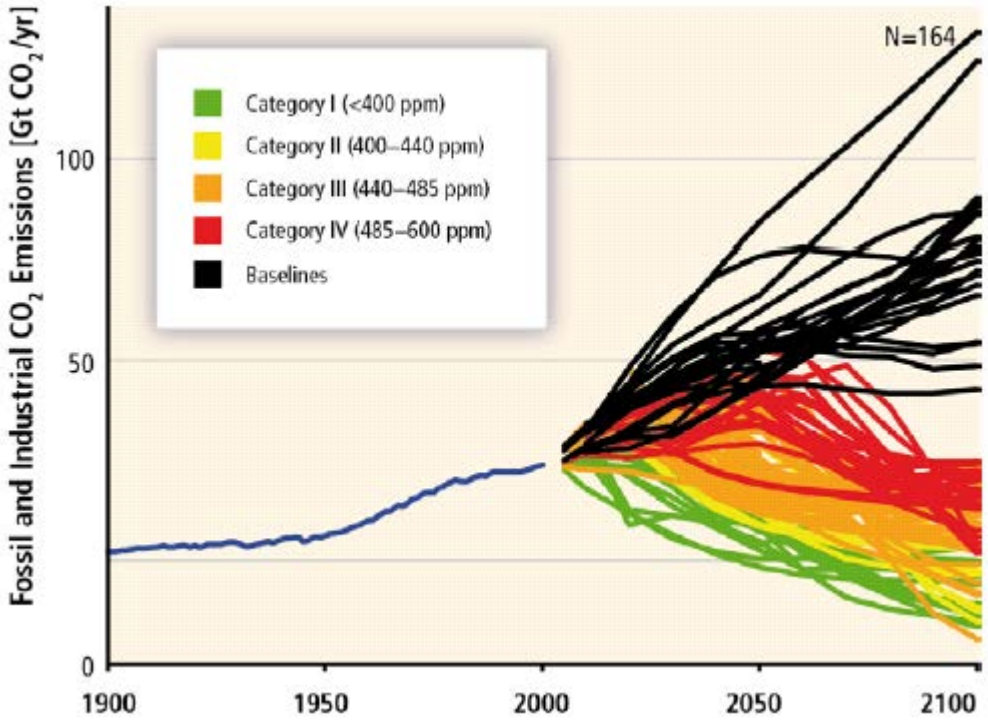

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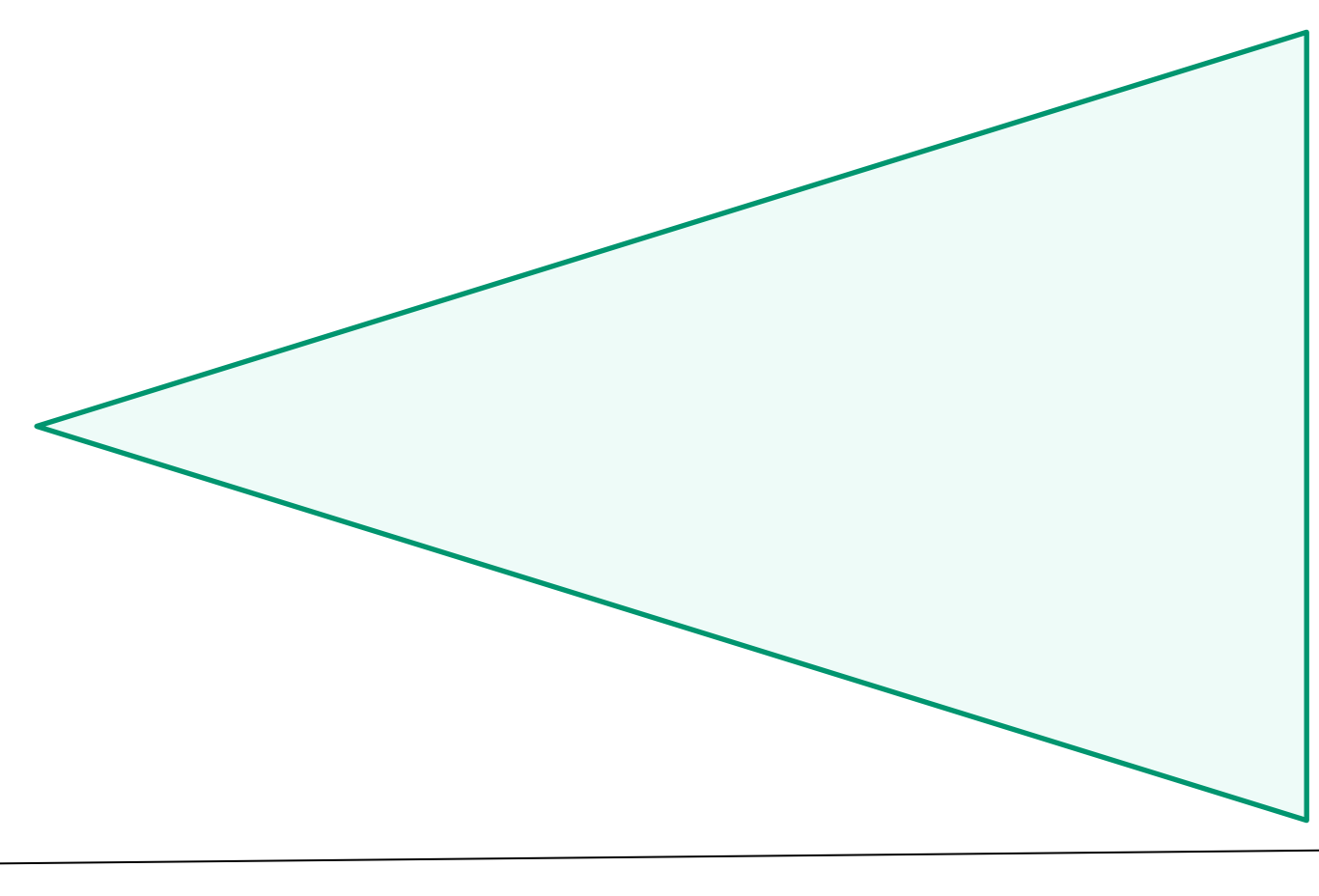
Possibilities space for energy consumption at t



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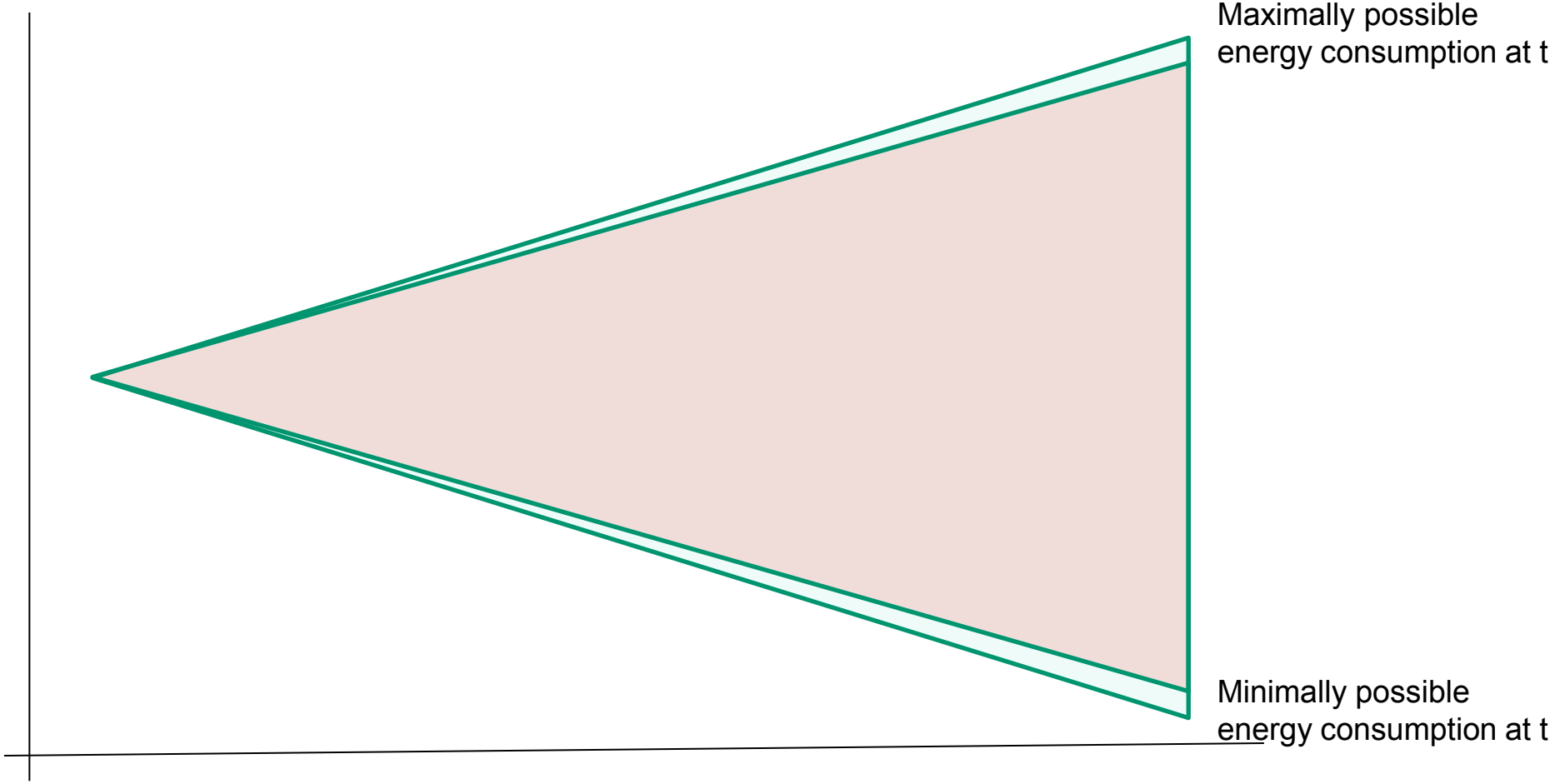

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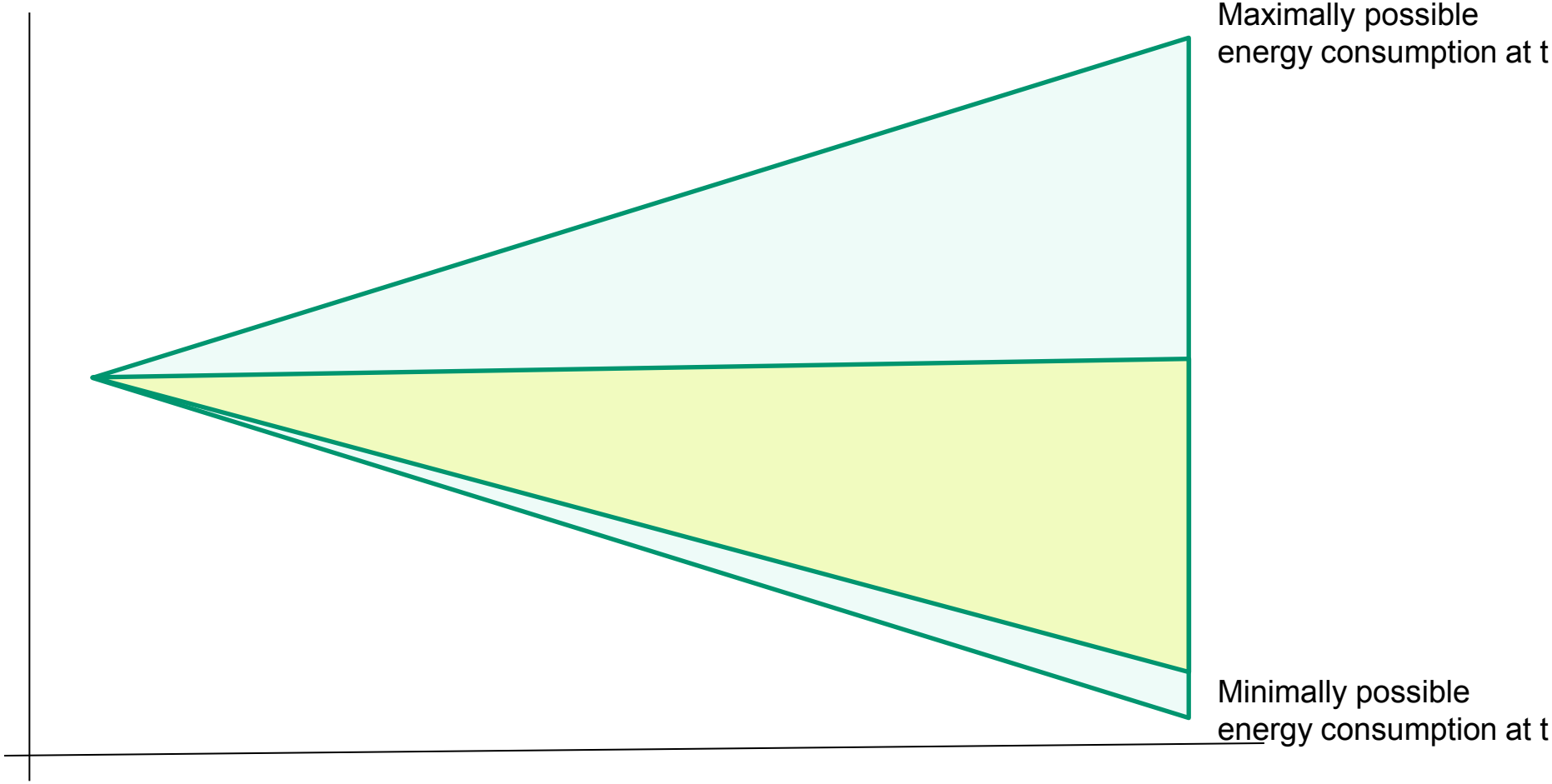

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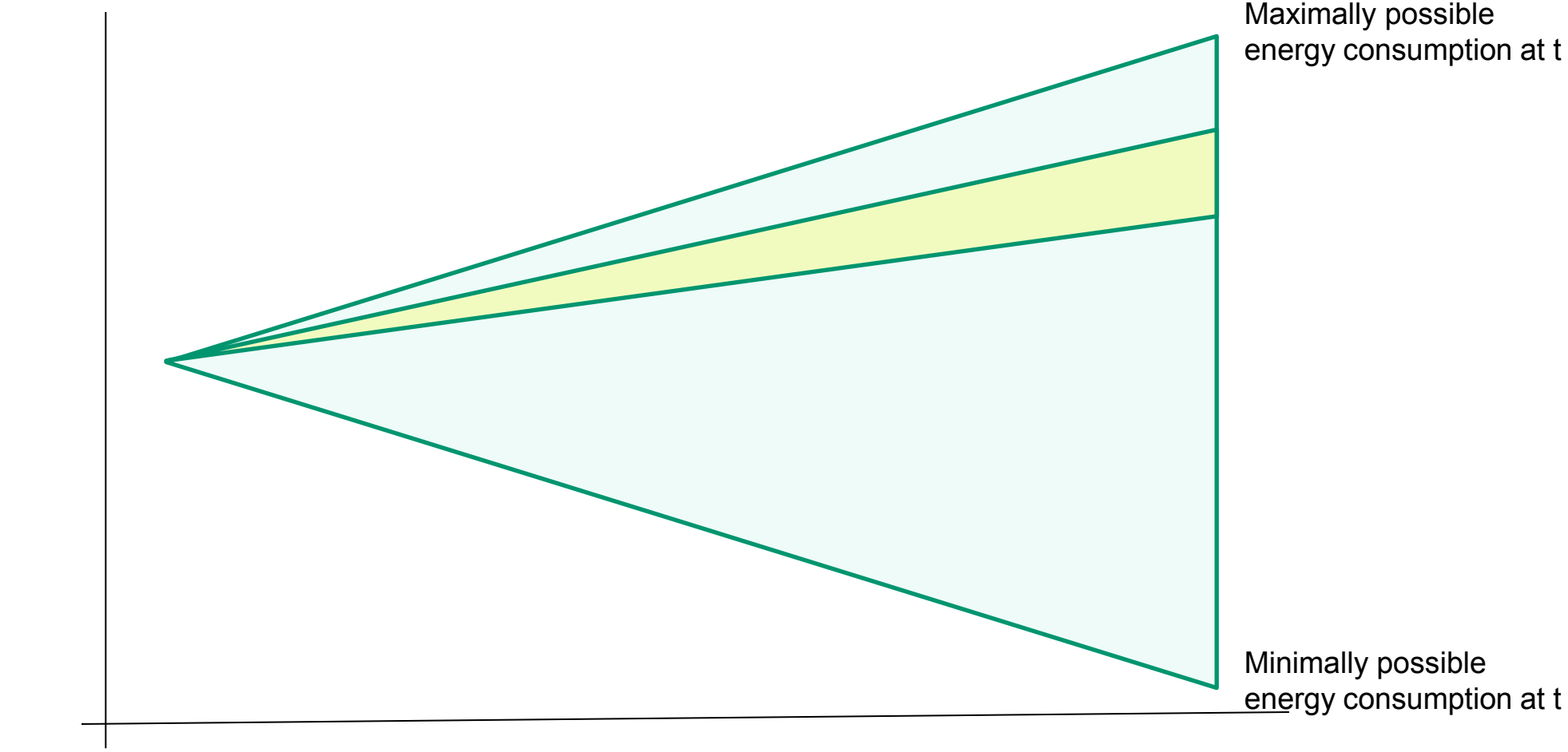

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- **Merely possibilistic foreknowledge about the relevant properties of the energy provision system.**
- **Thus:**
  - It is fallacious to derive policy recommendations on the basis of some scenarios;
  - It is fallacious to derive "robust knowledge" from a set of scenarios about which we do not know whether they span the range of all possible future outcomes

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- **Stakeholder's involvement: where does it help?**

Stakeholder: how can they help?

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- **I doubt that they can improve the quality of our foreknowledge.**
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Plausible Scenarios by Stakeholders?

- **Sources of uncertainty:**
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  - GDP: merely possibilistic;
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  - Technological development (efficiency): merely possibilistic
- **Do stakeholders can judge which future developments of these properties are plausible and which not?**
  - I cannot exclude that there are some parameters about whose future development certain stakeholders possess epistemic authority.

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  - They pursue different normative goals, interests etc.:
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    - Imported solar energy
    - Substitution of fossil energy sources by nuclear power plants
    - Further ideas, visions, hopes...

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    - Radically decentralised energy generation provided by small suppliers
    - Imported solar energy
    - Substitution of fossil energy sources by nuclear power plants
    - Further ideas, visions, hopes...
      - A priori we do not know whether these ideas are possible, i.e. whether they are consistent with our background knowledge
      - A priori we do not know under which circumstances these visions are possible

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  - the radical the possible
  - the implausible the better
- **By the means of modeling the visions can be verified**
  - If the verification suceeds:
    - We learn that stakeholders visions are (under certain assumptions) consistent with our background knowledge
      - Thus they describe a serious political option;
  - If the verification does not suceed:
    - We do not know whether the visions are possible

Conclusion: Stakeholder's contribution

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- **About these options we merely know that they are possible**
  - We know some circumstances under which they will be the case.

Conclusion: Stakeholder's contribution

- **In order to make a decision on the basis of merely possibilistic foreknowledge it is important to know the maximally possible set of options.**
- **Stakeholders help to extend the range of political relevant options for future energy provision.**
- **About these options we merely know that they are possible**
  - We know some circumstances under which they will be the case.
- **On the basis of these possibilities we have to rationally decide which option to choose**
  - Public debate

Thank You.

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