The background image shows a landscape with several white wind turbines in the foreground on a grassy hill. In the distance, a large industrial power plant with multiple smokestacks is visible, emitting white smoke into a hazy, blue sky. The IPCC logo and text are overlaid in the top right corner.

**ipcc**  
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

  
johnthescone

## **How to Deal with Risk and Uncertainty in WGIII /AR5**

IPCC Cross-Working Group Meeting on Consistent Treatment of  
Uncertainties, 6-7 July 2010, Stanford, California, USA

**Prof. Dr. Ottmar Edenhofer**



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- Remarks on the Policy-Science Interface
- How to Deal with Uncertainty
- Consequences for AR5

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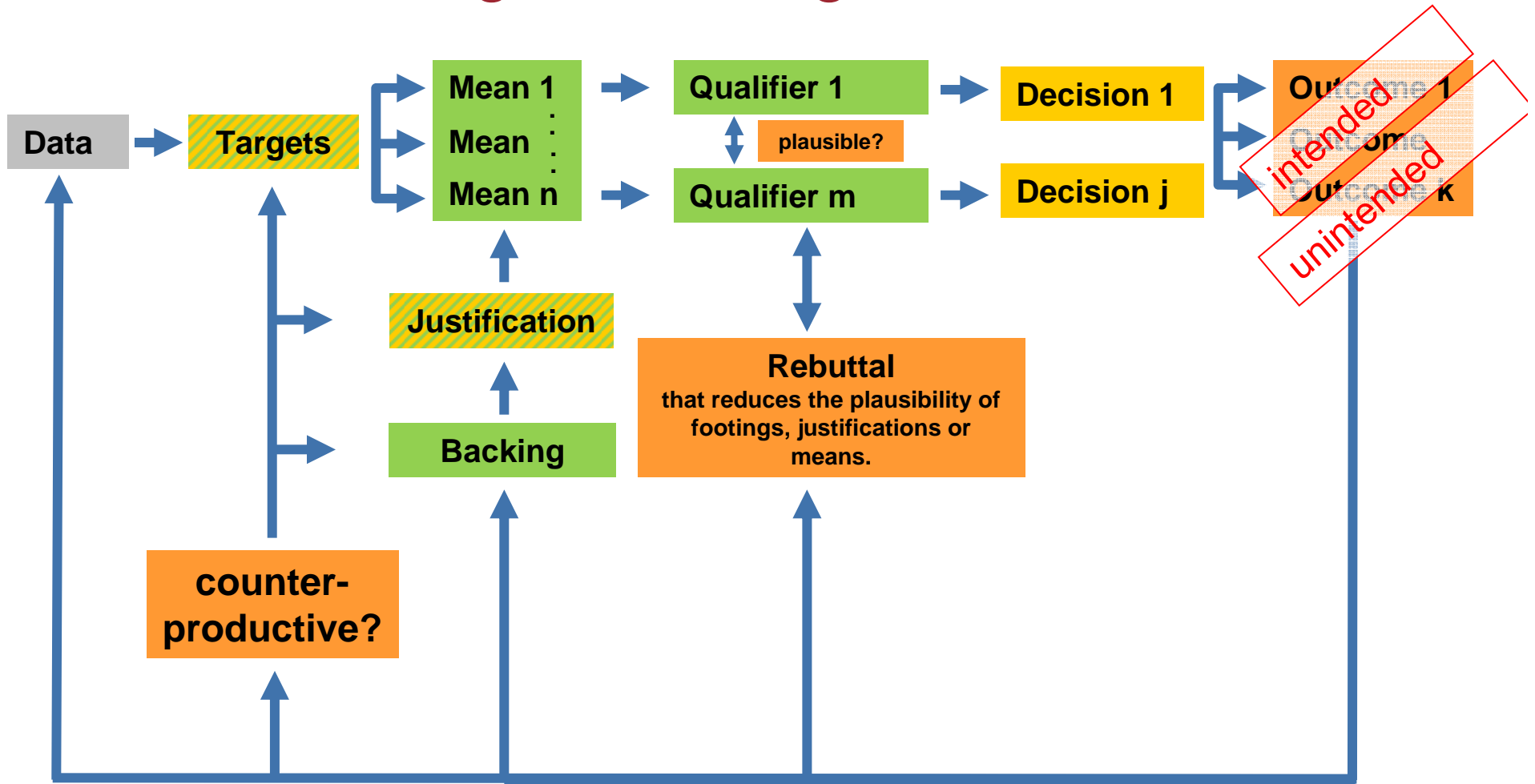
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# Remarks on the Policy-Science Interface

Three models how to organize the interface:

- Technocratic approach
- Decisionistic approach
- Pragmatic / enlightened approach

# The Pragmatic-Enlightened Model



**Legend:**

Policy Makers
Science
Outcome

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## The Representative Clients of AR5 in WG III

- International level: Negotiators, NGO's
- National Policies: Parliaments, governments, national agencies
- Regions: e.g. EU
- Sub-National Level: Cities

# How to Deal with Uncertainty

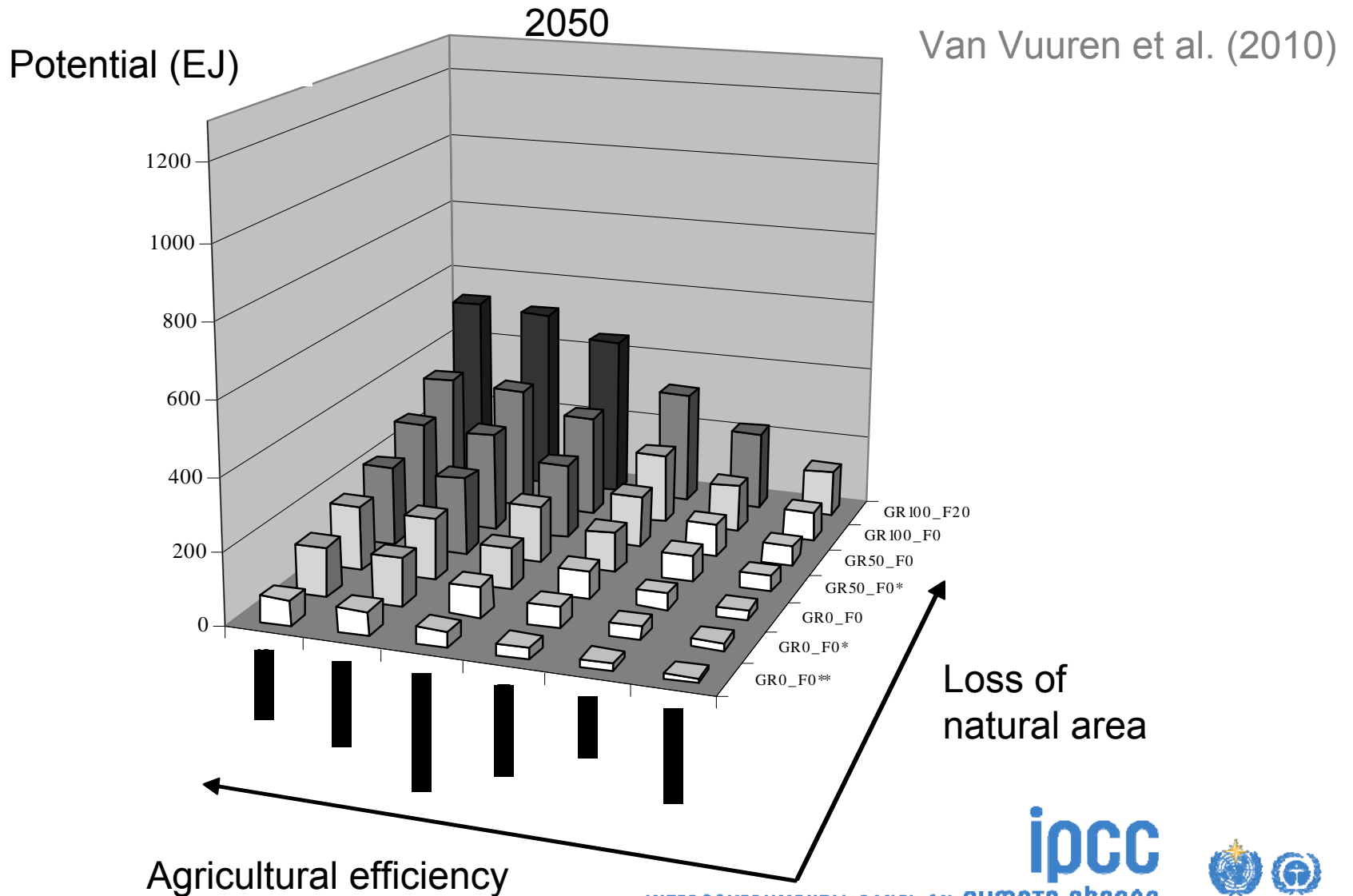
Types of Uncertainty	Method	Meaning within the Pragmatic Model
Parametric uncertainty	Sensitivity analysis, Monte Carlo Simulation	Exploring the importance of mitigation options/ policy instruments
Model uncertainty/ structural uncertainty	Modelling comparison	How robust are modelling results → getting a sense of robustness
Qualitative risk assessment	Expert judgment/ expert elicitation	Side costs/ benefits Iteration between target and means
Decision making under uncertainty/ risk management	Stochastic IPAs, IAMs	Risk management

# How to Deal with Uncertainty

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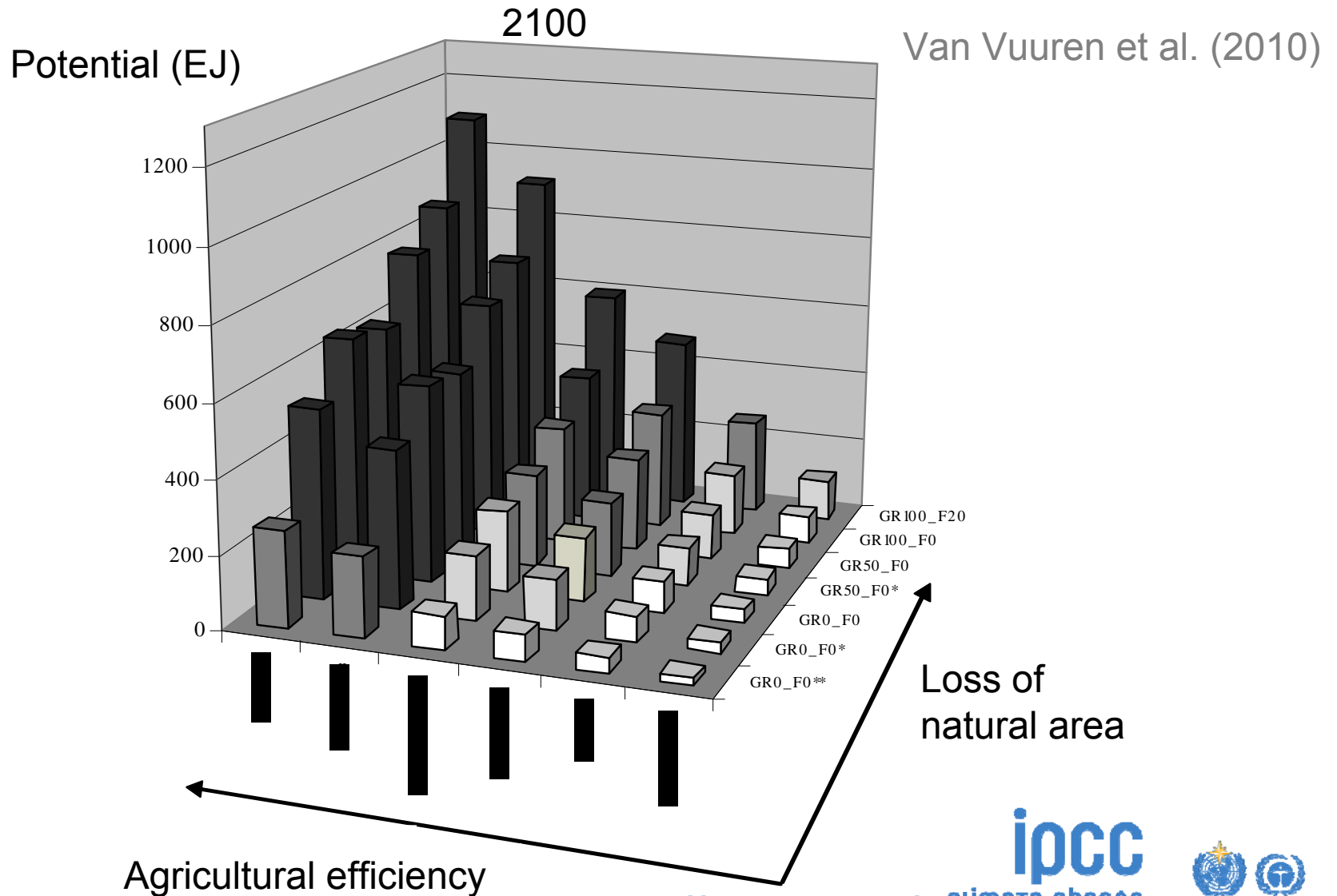
# Sensitivity Analysis

Combinations of different factors determining bio-energy potential



# Sensitivity Analysis

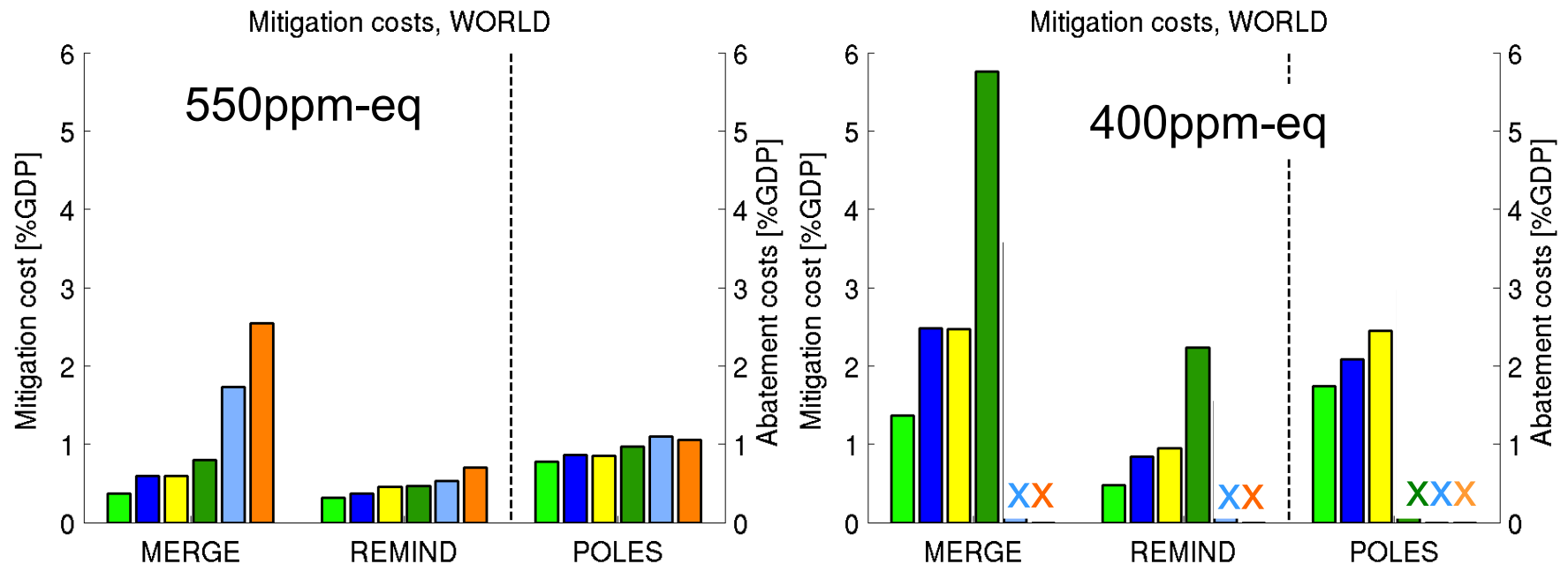
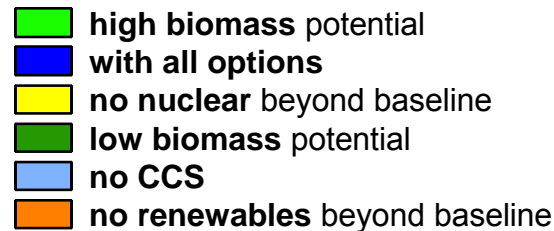
Combinations of different factors determining bio-energy potential



# How to Deal with Uncertainty

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# Exploring the Importance of Mitigation Options

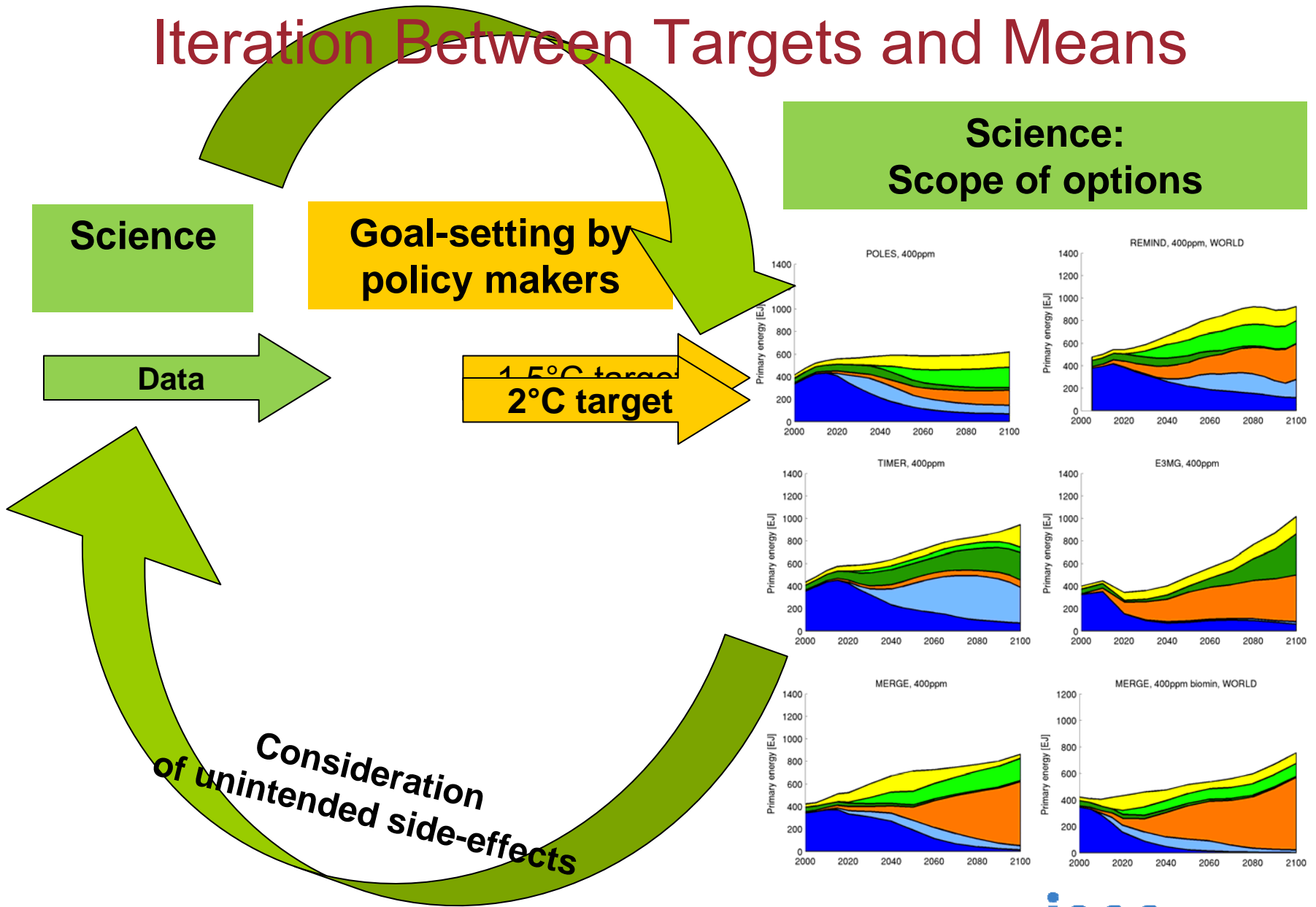


- ➔ Mitigation potential of nuclear is limited (but high use in the baseline)
- ➔ 400 ppm neither achievable without CCS nor without extension of renew
- ➔ Biomass potential dominates the mitigation costs of low stabilisation

# How to Deal with Uncertainty

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# Iteration Between Targets and Means



# How to Deal with Uncertainty

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# The Meaning of Risk

**Severity of Risk** = F[Probability, Scope, Intensity]

**Impact** = Scope \* Intensity

## **Risk Aversion:**

How much would decision-makers invest to eliminate/reduce this risk?

## **Response/Management:**

What kind of institutions are required for eliminating/reducing these risks?

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# Three Categories of Risk

- **Normal Risks**
  - Scope: Individual, local
  - Intensity: Endurable, reversible
  - Probability: Normal distribution
- **Large Scale but Bounded Risks**
  - Scope: Transnational
  - Intensity: Endurable, reversible/irreversible
  - Probability: Normal distribution
- **Systemic Risks:**
  - Scope: Transnational and transgenerational
  - Intensity: Terminal, irreversible
  - Probability: Fattened tail

# The Risk Matrix

Response Category	Market (Household Failure)	State/Third Sector (Market Failure)	Global Collective Action (State Failure)
Normal Risks	Gradual adaptation within sectors	Regulation of insurance markets	Regulation of reinsurance markets
Large Scale but Bounded Risks	Weather derivatives	Fiscal support to European heatwave/hurricane Katrina	Regulation of financial markets in 2009
Systemic Risks Catastrophies	No adequate response known	No adequate response known	Provision of global public good with different technologies (e.g. Weakest Link, Best-Shot)

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# Consequences for the AR5/ WGIII

- Exploration of the whole solution space
- Development of 2nd best scenarios + evaluation of modeling comparison exercises
- Identifying types of risk management
- A few pragmatic guiding questions
  - What are consistent ways to achieve stabilization goals?
  - What is the relative importance of mitigation options and policy instruments?
  - What are „threshold probabilities“ undermining your policy options?
  - Getting a sense of unmanageable risks
  - What can go wrong along specific transformation pathways?

Thank you for your attention!