



FONDAZIONE ENI **20<sup>th</sup> ANNIVERSARY**  
ENRICO MATTEI **1989-2009**

Leading research on environment, energy and economics

## Discussion of “Technology Interactions for Low Carbon Energy Technologies”

Valentina Bosetti

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Snowmass, 2009 - Economics of Technologies Workshop

## The paper

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- Evaluation of **benefit** (as avoided climate policy costs) of carbon free/low-carbon technologies.
  - It is NOT a cost benefit valuation of technologies
  - It is NOT an evaluation of R&D portfolio
- Many examples of such analysis
- Novelty: Exploring COMBINED IMPACT
- Is the (very large) number of simulations worthwhile? Does this inform policy makers better than previous studies?

## Main Conclusions

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In line with existing studies:

- Technology is a significant factor in stabilizing costs
- The more stringent the scenario, the larger the impact of technology availability
- Technology breakthroughs in the non electric sector can have large impact on costs (transport!)
- Larger substitutability of technologies in the power sector
- CCS is a key player (multiple applications)

## Concerns on the Assumptions

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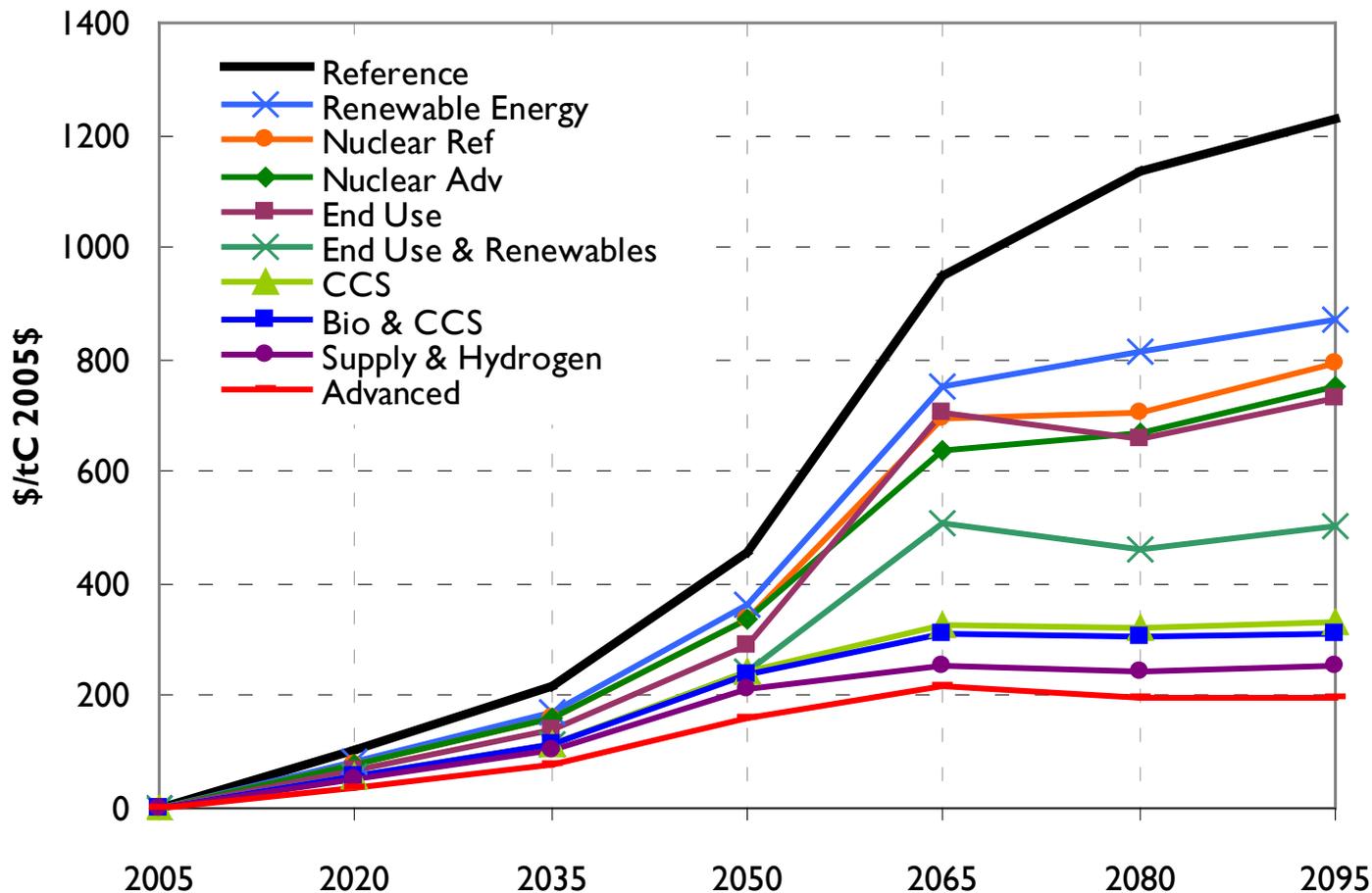
- Technological improvements from one scenario to the other are **incommensurable** (as authors admit). (See RECIPE analysis)
- What is **CCS**? Better distinguish between IGCC + CCS and Biomass +CCS?
- **Penetration rates** are one of the key determinants of policy costs, they are often related to the nature of the technology itself (infrastructure, public acceptance, etc.)
- Each state has equal probability!

## Concerns on the Analysis

- Most of the analyzed scenarios have very low probability attached (e.g., 450ppm no CCS, no nuclear, no solar and wind nor energy savings in buildings !!!!!). Results could change dramatically if **probabilities** were to be taken into account. **NO REAL DISTRIBUTION!**
- Probabilities are not necessarily given, **BUT (PARTLY) DEPEND ON ACTION**. Is **endogenous probability** stochastic programming a better way forward?
- Maybe a **smaller set of meaningful scenarios** could deliver more useful information to policy makers (value of technology in a technology rich and a technology poor scenario CCSP?!)
- **Dynamic perspective** would be crucial (what are key technologies in short/long term)
- **Regional perspective** would be crucial (what is the effect of assuming a second best world on value of technologies?)
- Is Climate Change the only policy objective?

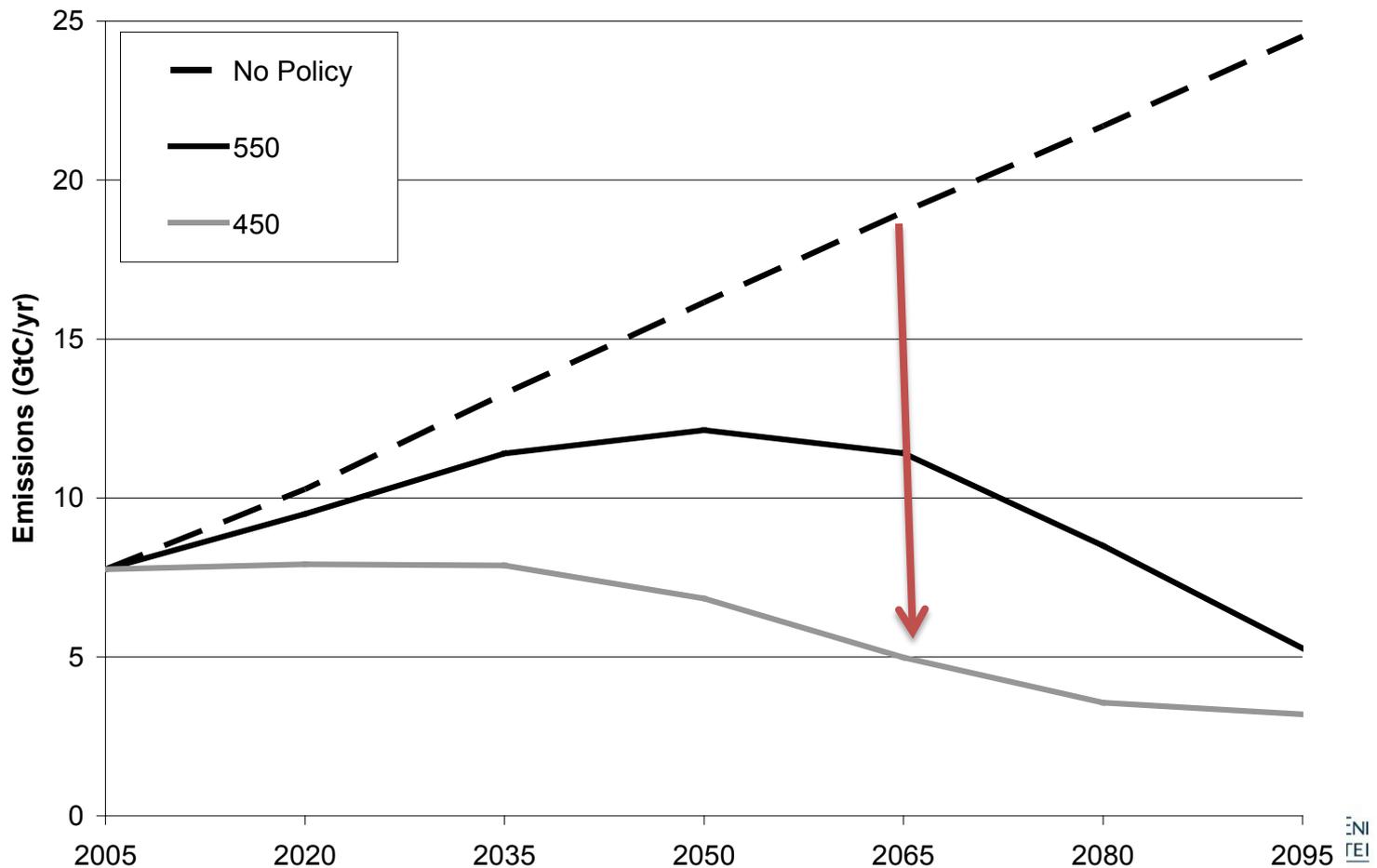


# Innovation and Policy Costs/1



## Innovation and Policy Costs/2

- Given assumptions in worse case scenario costs are not that high! Is GDP a proper metric?





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Innovation for  
Climate chAnge  
mitigation: a study  
of energy R&d, its  
Uncertain  
effectiveness and  
Spillovers  
ICARUS

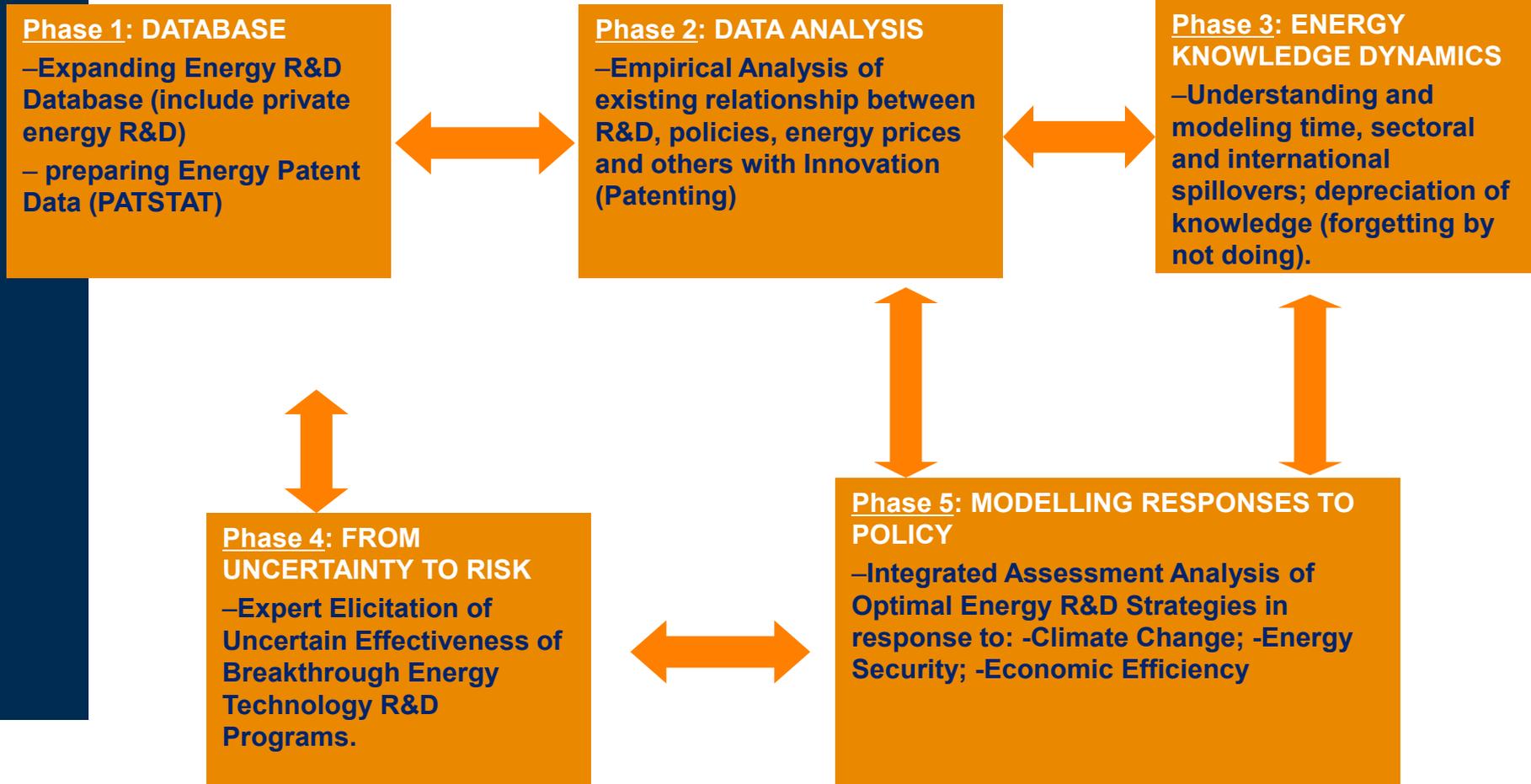
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ERC Starting Grants 2009  
Starting date: January 2010  
3 Years Project

# ICARUS Project

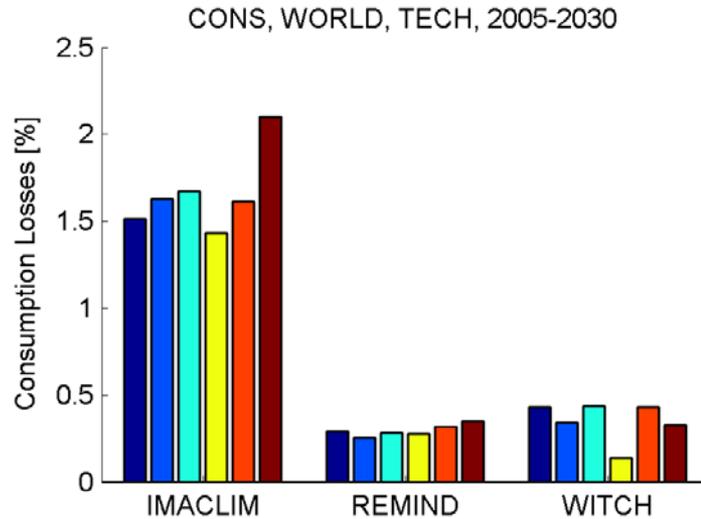


Online fully accessible datasets and results

ICARUS

# Option values of technologies (technology option indicated is foregone or limited to BAU levels)

(a)



(b)

