

# **EVALUATION AND DIAGNOSTICS SWG**

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Executive Members

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# The E&D SWG Charter

*The SWG on Evaluation and Diagnostics exists to foster activities that help describe, document and understand the performance of integrated assessment models so as to improve model performance and reliability and to make recommendations in the areas of priorities for community activities and standards of best practice.*

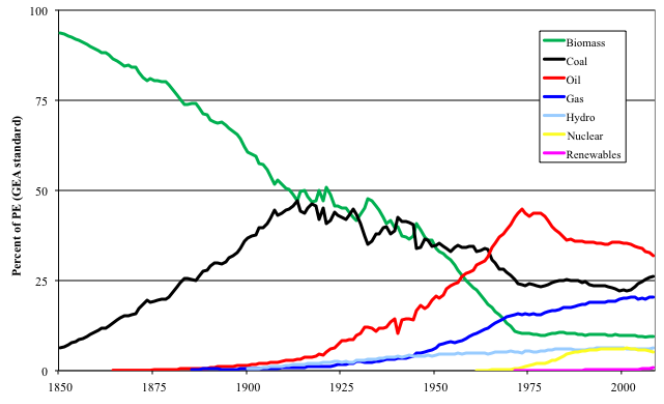
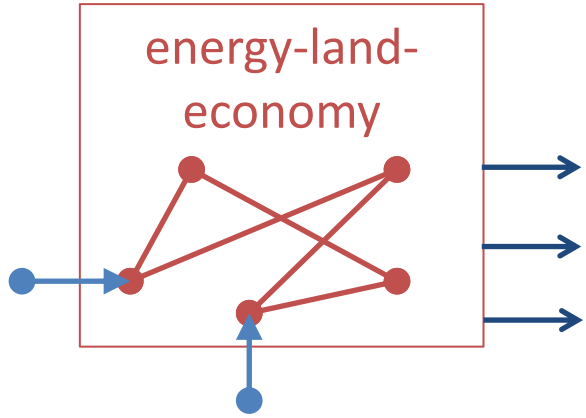


# IAM evaluation is an **open-ended process** of testing, learning & improving a model and its performance

## Evaluation criteria for IAMs

- appropriateness*** is model purpose and design consistent with the research question?
- interpretability*** are model results clearly interpretable in light of model structure and parameterisation?
- verifiability*** are model results repeatable or is model structure accessible to 3<sup>rd</sup> parties?
- credibility*** is model seen as good enough for its intended purpose by both users and modellers?
- usefulness*** do model insights help understand uncertainties, trade-offs, alternatives?

# Different **evaluation methods** are used with IAMs, particularly to test structural validity



**behavioural validity**

**structural validity**

model checks	model inter-comparisons	historical trends	historical simulations
transparent documentation	diagnostic indicators	generalisable historical patterns	
expert review	sensitivity analysis	simple models	

# Two E&D Activities In the Community



**Advanced Model Development**  
and **Validation** for the **Improved**  
**Analysis of Costs** and **Impacts**  
of **Mitigation Policies**

# PIAMDDI

# ADVANCE



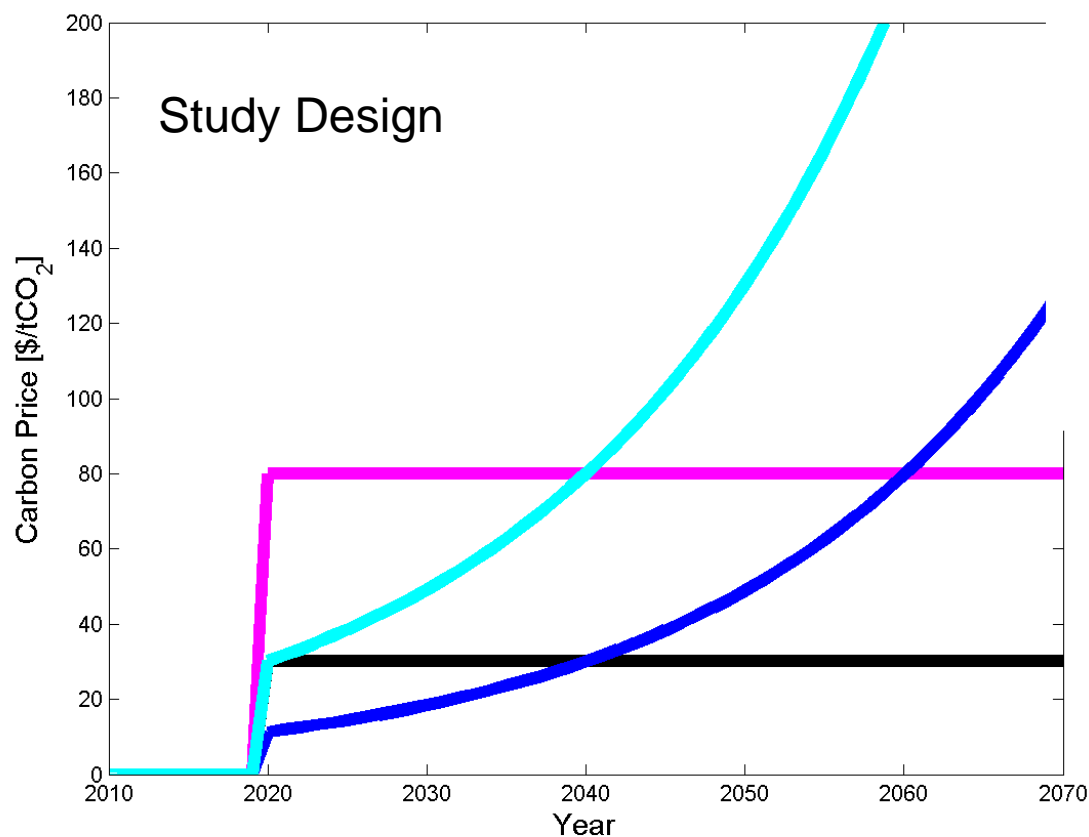
**Advanced Model Development**  
and **Validation** for the **Improved**  
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*ADVANCE diagnostics aims to characterize, compare and classify the behavior of models for climate policy analysis.*

# ADVANCE Community Diagnostics

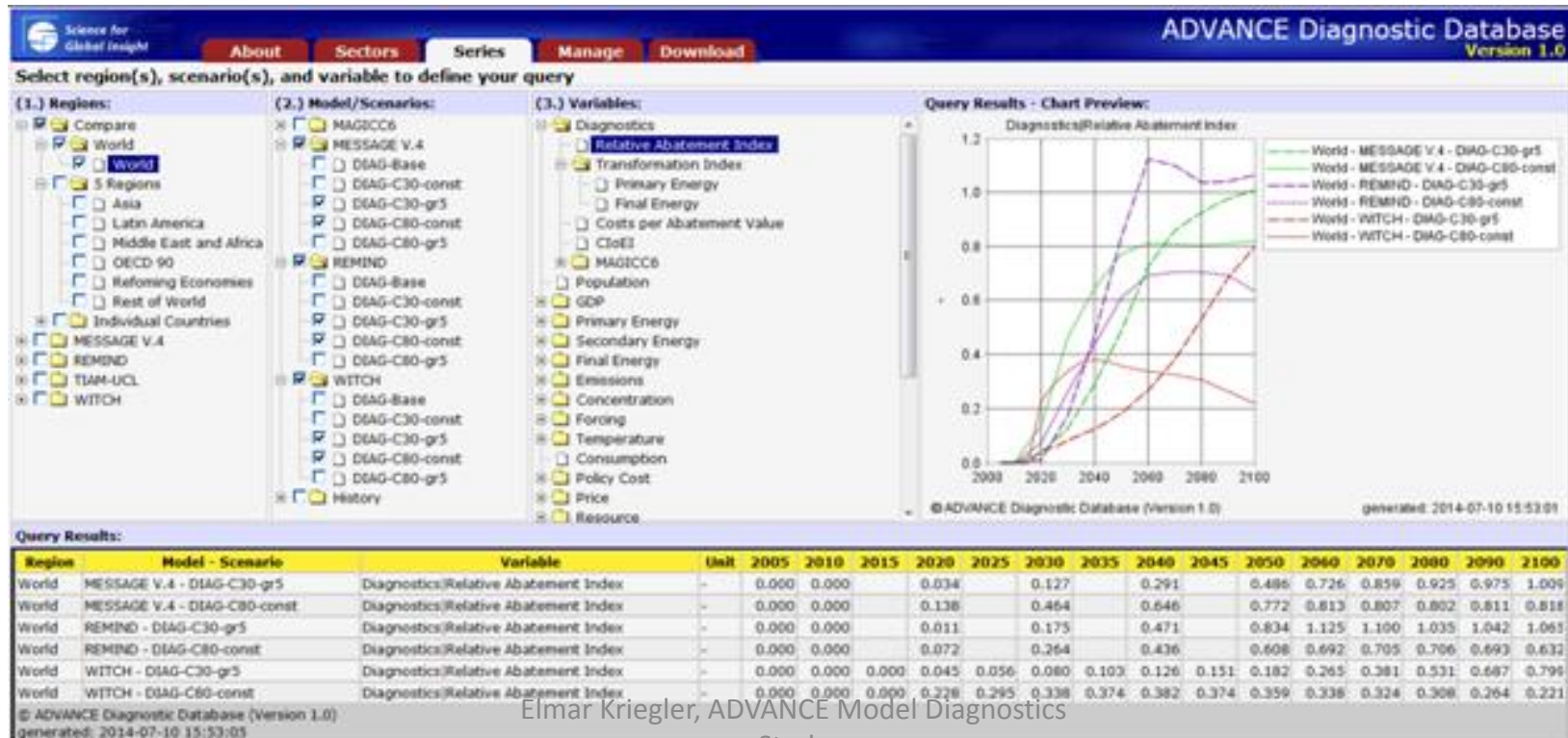
First round closed. Will be used as community resource for future diagnostics work.

AIM/CGE
DNE21+
FARM
GCAM
GEM-E3
IMACLIM
IMAGE
iPETS
MESSAGE-GLOBIOM
POLES_ADVANCE
PROMETHEUS
REMIND
TIAM-UCL
WITCH



# ADVANCE diagnostics infrastructure

- ADVANCE diagnostics database hosted by IIASA
- Includes automatic calculation of AMPERE diagnostic indicators and climate response (using the latest version of MAGICC)
- Graphical user interface allowing teams to compare results across models





# PIAMDDI

- Takes a different approach to model diagnostics and evaluation.
- Developing methods.



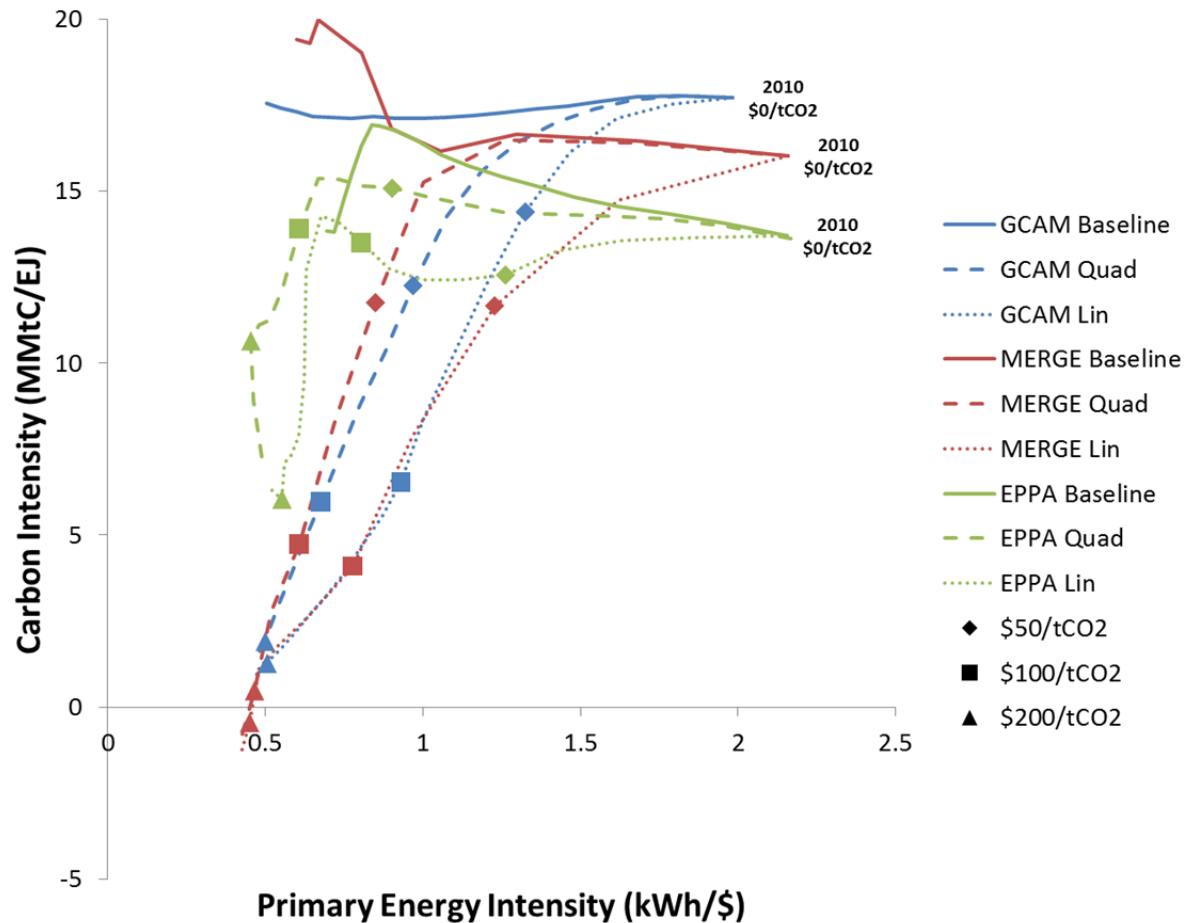
Stanford  
University

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# PIAMDDI

- How do energy and carbon intensities in IAMs adjust to carbon constraints?



# PIAMDDI-Phase 2

- Focus on integrated climate change impact analyses
  - For IAMs
  - For IAV
- Diagnostics will focus on
  - Impact sectors
  - Systems integration
- Will treat uncertainty systematically and comprehensively
  - Within modules
  - Between modules

# Potential Future Activities

- **Conceptual Framing of IAM Evaluation**
- **Information Exchange**
- **Model Validation Against Historical Data**
- **Model Evaluation Against Historical Patterns**
- **Developing standards**

# Evaluation and Diagnostics SWG Session This Afternoon

- This afternoon at 15:25 PM
- The Evaluation and Diagnostics SWG will
  - Discuss some of the activities that have gone on over the past year in this area
    - Review work under PIAMDDI
    - Review work under ADVANCE
    - Review work with GCAM
    - Survey further evaluation and diagnostics activities
  - Discuss future challenges that the community should consider.

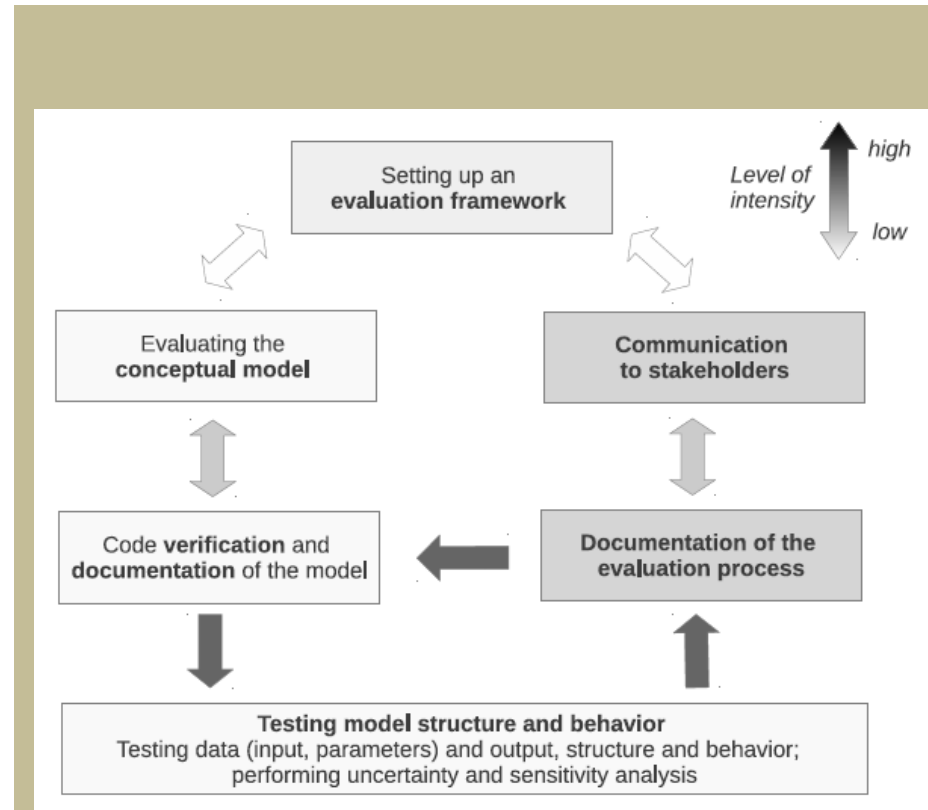


# DISCUSSION

# Evaluation & Diagnostics

Part of a larger process of model validation including:

- Documentation
- Intercomparison
- Evaluation & Diagnostics
- Behavior testing
  - Hindcasting
  - Stylized facts



Schwanitz et al., 2013, *Env. Mod. Software* 50, 120-131