

Annex XVI Aligning energy security with zero emissions energy systems

Prof. Brian Ó Gallachóir

Chair IEA ETSAP Technology Collaboration Programme
Director SFI MaREI Centre, UCC

ETSAP Winter Workshop Columbia University, New York

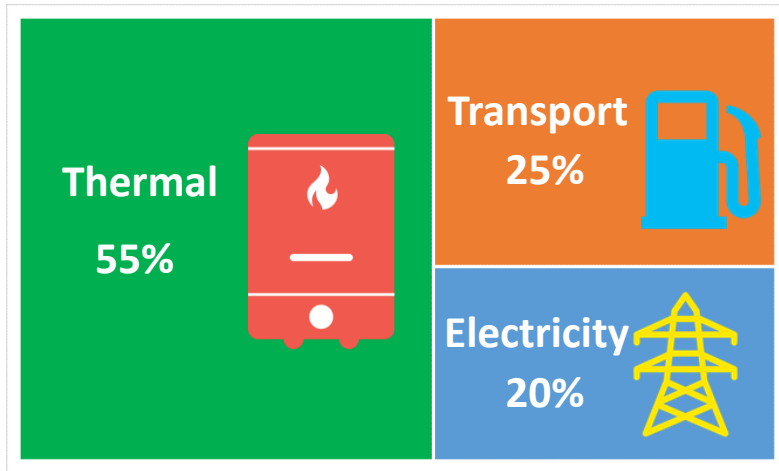
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What is IEA-ETSAP?

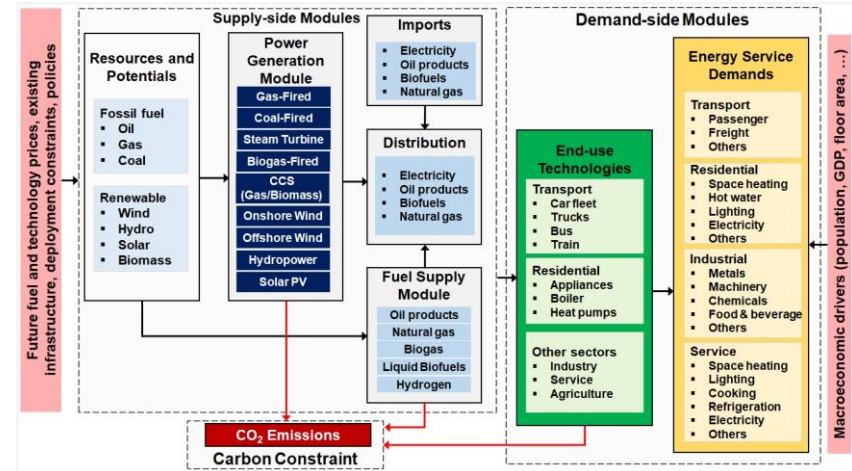
- One of 38 **IEA Technology Collaboration Programmes**
- 46 years international **cooperation** on energy **systems** modelling
- **Develop and maintain** (MARKAL and TIMES) tools (**model generators**)
- **Build** national, regional and global energy systems **models**
- **Assist policy makers** to model future **energy pathways** (~70 countries)
- Focus on key role of **technology** to meet goals ('000s of technologies)
- Biannual **workshops** and **training** – capacity building (75 trainees p.a.)
- Collaborative **research & analyses** (100 publications incl. 50 journal p.a.)

Why energy systems modelling for decision making?

- Energy policy and planning is more and more **complex** and **uncertain** (urgency of climate action, security of supply, impacts on economy and society).
- Energy systems **optimisation** modelling seeks least cost evolution of **whole** energy system using **TIMES** – technology rich (i.e. > 1,000 technologies).

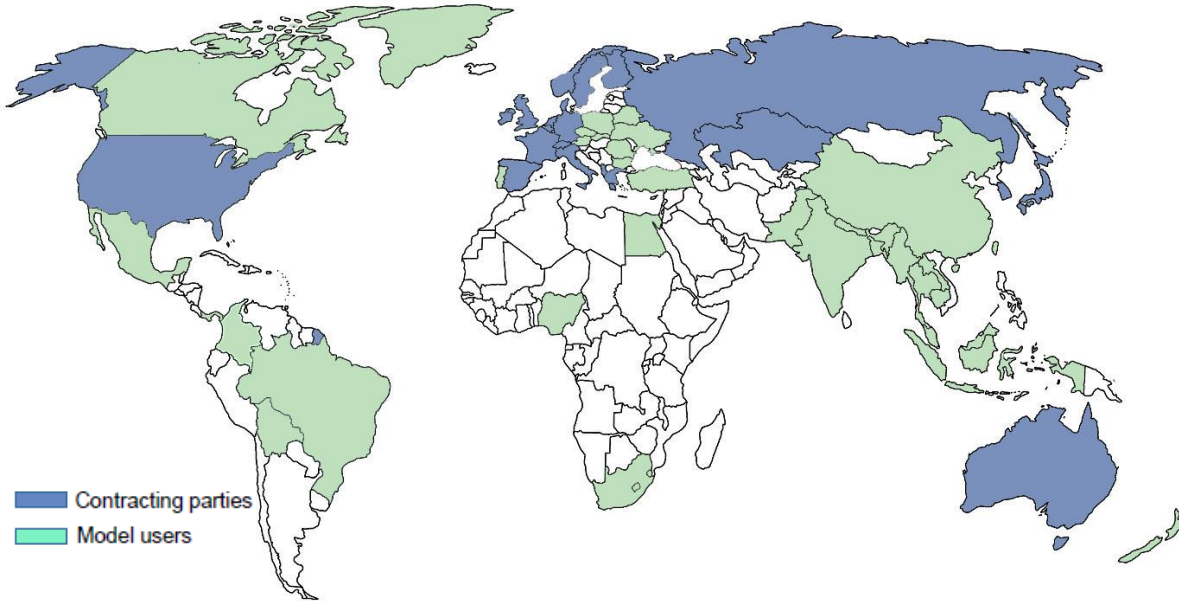


Global Energy Use



TIMES reference energy system

Who is IEA-ETSAP?



www.iea-etsap.org

Unique network of Energy Modelling teams from almost **70 countries** use MARKAL & TIMES models analyse energy systems and support decision making in energy policy.

Strategic Work Plan (2020 -2025)

1. Collaborative Analysis Informing Policy

aligns with objective 1, namely *enhancing and expanding analysis to inform policy makers decisions, **taking a whole-system perspective***

2. Collaborative Research and Innovation

aligns with objective 1, *support continued collaboration efforts for research, development and innovation, ... for long-term solutions.*

3. Capacity and Engagement

contributes to the mission, namely to *enhance the IEA's authoritative technology analysis and policy recommendations*

IEA Medium Term Strategy for Energy Research and Technology 2018-2022

Vision

Energy technology research and innovation ... pursued through effective multi-lateral collaboration, will ... serve as key enablers of a global energy transition

Strategic Work Plan (2020 -2025)

1. Collaborative Analysis Informing Policy

- collaborate with TCP Bioenergy, TCP GHG, TCP Hydrogen, TCP ECES, TCP Wind, ...
- collaborate with IEA, IRENA, Clean Energy Ministerial, World Bank, etc.

2. Collaborative Research and Innovation

- interactions between energy systems and materials & land use, water & agriculture
- interactions between energy system and social systems, structural change, circular economy and SDGs

3. Capacity and Engagement

- extend capabilities in ETSAP tools across low and middle income countries
- increase transparency, openness and affordability of TIMES

Annex	Timeframe	Title
XV	2020-22	Energy System and Sustainable Development Goals
XIV	2017-19	Facilitating Energy Transition to well below 2°C
XIII	2014-16	Tools for Analysis of a Future Energy Revolution
XII	2011-13	Policy Analyses Tools for Global Sustainability
XI	2008-11	JOint STudies for New & Mitigated Energy Systems
X	2006-07	Global Energy Systems and Common Analyses
IX	2004-05	Energy Models User's Group
VIII	2002-03	Exploring Energy Technology Perspectives
VII	1999-01	Contributing to the KYOTO Protocol
VI	1996-98	Dealing with uncertainty together
V	1993-95	Energy options for sustainable development
IV	1990-92	Greenhouse gases and national energy options
III	1987-89	International forum on energy environment studies
II	1984-86	Information exchange project
I	1981-83	Energy technology systems analysis programme
	1978-80	MARKAL Model generator development (BNL, KFA)
	1976-77	Analysis of tools for evaluating R&D strategies

Key Learnings Net Zero Scenarios

- **immediate mitigation** action is absolutely required.
- demand reduction, efficiency, renewables, electrification, nuclear, CCS
- negative emissions technologies (NETs / CDR) have a **crucial role**
- delaying action makes pursuing the **1.5 °C goals unachievable without** extremely high levels of NETs
- greater focus on emission reductions in the **demand sectors** is essential
- focusing only on technological development is **likely not to be sufficient**
- reducing **energy-service demands** is also essential

What policy questions can we address?

- How do we meet our **future energy needs** at least cost?
 - how will the energy system **evolve** (technologies and fuels)?
 - what are the **infrastructure** requirements?
- Implications of different future **emissions reduction goals**?
 - what will the **costs** be (investment, fuel, O&M) in different **sectors**?
 - role of energy **efficiency, renewables, nuclear** and **CCS** at different times?
- How can we ensure we maintain **energy security**?
 - which countries will **import** energy and from where?
 - implications of supply **restrictions** of individual fuels on energy supply?

Annex XVI Aligning energy security with zero emissions energy systems - Objectives

1. maintain, update and improve TIMES and VEDA;
2. increase the transparency, openness and affordability of the TIMES model generator, associated software and data sets;
3. maintain, extend and improve international and national capabilities on the use of ETSAP' tools, across developed and developing countries;
4. increase availability of online user's support systems including tutorials, user's forums, manuals and reference material.
5. build capacity through training courses (including online training options)
6. support research and development in order to advance state of the art in ...

Annex XVI Aligning energy security with zero emissions energy systems – Research topics (non-exhaustive)

1. Interaction of energy systems with **materials use**, with a particular focus on **critical minerals** and agriculture;
2. Integrate issues of **sustainability of biomass** in the analyses (e.g. biomass GHG overshoot problem);
3. Improved modelling of the **consumption side** of energy systems, demand side flexibility, integrating **societal aspects** into energy systems modelling;
4. Improved modelling of the interactions between the energy system and **social systems, structural changes** and **circular economy**;
5. New approaches to **energy security** and energy resilience;
6. Continued development and improvement of the Global Integrated Assessment **ETSAP-TIAM** model

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