Redefining the Energy Modelling-Policy Interface: Developing a Fully Open Source UK TIMES Model

Birgit Fais, Neil Strachan, Hannah Daly
b.fais@ucl.ac.uk

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UKTM – The UK TIMES Model

• **Overview**
  Integrated energy systems model - Least cost optimization
  - Partial equilibrium - Technology rich - sensitivity and uncertainty analysis
  **Successor of UK MARKAL**

• **New functionality of TIMES & UKTM**
  - All GHG emissions;
  - Storage, temporal flexibility;
  - Industrial & residential sector disaggregation;
  - Linkages with European & global TIMES models;
• Full and transparent data update.

• **Ongoing research development**
  - Behaviour & fuel poverty;
  - Land-Energy-Water nexus;
  - Spatial & temporal detail;
  - Macro-economic impacts;
  - Technology learning.
Strong involvement in UK energy and climate policy...


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<tr>
<th>RCEP</th>
<th>EWP 03</th>
<th>Energy Review</th>
<th>EWP 07</th>
<th>CCC report</th>
<th>LCTP</th>
<th>CCC Budgets 1-4</th>
<th>Carbon plan</th>
<th>Carbon budget 5</th>
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<td>-60% CO₂</td>
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<td>-80% GHG</td>
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Model type

- MARKAL
- M-Macro
- M-ED
- M-Stochastic
- UKTM (TIAM-UCL, ETM-UCL, Scottish TIMES)

Funding

- RCUK, DECC, CCC, Ofgem, NGOs, FP7
- UKERC
- wholeSEM

Rapid simple structured model development

Major 2 year UKERC programme; enhanced UK model with Macro extension

Elastic demand model development with major CCC and UKERC scenarios

Stochastic model, Global TIMES model, UKTM variants

... and DECC are improving their own modelling capacity
UK Government new focus: **Model Quality**

After West Coast rail bid fiasco

→ **DECC Modelling Integrity team**
  - focus on quality assurance
  - Formal Review of key DECC Models
  - best practice, guidance and tools
UKTM open source process

• Long-term (initially 3 years) contract with DECC
  – Series of expert workshops to get buy-in from other government departments, advisors and regulators
  – Embed DECC modeller into UCL team via wholeSEM Fellowship
• Expert user group via memorandum of understanding (MoU)
  – Sharing of “silver version” of UKTM in Sept 2014
• Development of a “gold standard” UKTM
  – Release in spring 2015?
• Version control controlled via a UCL Gatekeeper function
  – Model dissemination via UCL web portal (www.wholesem.ac.uk)
• Broader engagement via Stakeholder workshops
• Research vs production versions (model archaeology)
Why go open source?

• Energy modelling must be replicable and verifiable to be considered part of the scientific process

• The UK’s drive towards clarity and quality assurance in the provision of policy insights

• It’s not just open source modelling, it’s a new modelling-policy interface
  – Black-box energy models have not been able to clear the muddy water of policy insights where competing models give alternate findings
  – The cottage industry of energy modellers have not been open enough to broader modelling processes and methods
  – Open source has been done before but generally simple models, or just the model (not the results, interpretation, model development)

• Benefit from the wide range of modelling expertise in academia, industry, and government → user group

• IMPACT!!
Our challenges (to date...)

- **Who has final control of model**
  - What functionality and data improvements are essential?
  - What policies are included and do they all work?
  - Government assumptions = UCL assumptions (?)
- **Staff turnover of key analytical people in government**
- **Resources for full Q&A are very considerable**
  - Model plus backing spreadsheets
- **Fragility of interlinked model structure**
  - Under our version control and wiki platform (Huddle)
- **Access, and learning curve, in using TIMES and VEDA**
- **Some initial evidence of free riding in data collation, calibration, maintenance and documentation**
What will be open source?

Three-layered structure in Excel

- VEDA-FE input sheets
- Central backing spreadsheet
- Spreadsheets with datasources

“Light” version for download (user group still gets everything)?

Only for user group or as download for everybody?

Software licenses still required!
Conclusion: Risks and Gains

• Huge risks
  – Folks can take our model, never give us anything back, we lose our IP, we get outbid in future contracts, we don’t publish enough, discourages future model development
  – Can we hold the line for in a white hot political environment?
  – Will we drown in Q/A for a fully fledged energy system model?

• Huge gains
  – Modelling at the heart of policy making, sets the bar high for competing models
  – Brings together fresh insights and new expertise, helps solve the problem of maintaining and updating a complex tool