Changing the tyre while we’re driving: evolving a model at the same time as it is being used for live policymaking

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Ireland is located in Europe, bordered by the Atlantic Ocean to the west and the North Sea to the north. It shares land borders with Northern Ireland to the northwest and the Republic of Ireland to the south.
**Why?**

**Top-down:** Recommend appropriate carbon budgets for Ireland for the periods **2021-2025** and **2026-2030** based on consideration of the global carbon budget [addressing criteria: national climate objective, UN, Paris Agreement, science, climate justice]

  a. The **potential for negative emissions**
  b. The **role of different gases**
  c. The global carbon budget

**Bottom-up:** Consider what legislative requirements at national and EU level mean for emissions up to 2030, covering the first two carbon budgets. [addressing criteria: national climate objective, 51%, EU, inventories and projections, science, reporting, economy, and climate justice]

  a. The implication of required compliance with EU and National Targets (e.g. 51%) incl. treatment/inclusion of LULUCF
  b. Feasibility, competitiveness impacts, implications for investment
  c. Distributional impacts, jobs

Factors in green require a consideration of not just what size is the carbon budget, but how it is allocated over time and over sectors and how policies and measures deliver mitigation.
TIMES-Ireland Model (TIM)

TIM is an Energy Systems Optimisation Model (ESOM) which calculates the “least-cost” configuration of the energy system which meets future energy demands, respecting technical, environmental, social & policy constraints defined by the user.

Given
- Final energy demands  
  - e.g., passenger kms, home heating
- CO₂ constraints on energy  
  - e.g., carbon budget, annual target
- Technology, fuel costs & efficiency  
  - Existing & future cost and performance
- Resource availability  
  - e.g., on/offshore wind, bioenergy
- User-defined constraints  
  - e.g., speed of technology uptake, policies

TIM calculates
- “Least-cost” energy system meeting all constraints
- Investment and operation of energy technologies
- Emissions trajectories
- Total system cost
- Imports/exports
- Marginal energy prices
What questions can TIM inform in the short term?

- What energy system changes would be needed to meet given decarbonisation targets (budget or given year)
- For an “all-time carbon budget”, what is the “optimal” energy decarbonisation pathway over time and across sectors?
- What is the “effort gap” between current measures and what is needed, sector-by-sector?
- What is the impact of excluding mitigation options (or adding new options)? “Feasibility”

What can TIM not (yet) inform?

- What should the carbon budget for energy vs. agriculture emissions be?
- Who pays?
- What policies should be used to achieve the target?
- What are the interactions and trade-offs between energy, land-use and food systems for mitigation?
- Services and industry sectors in TIM are currently low-resolution

Additional considerations

- We can provide and run the tool – but the “recipe” (constraints, assumptions, etc.) need wider discussion – non-trivial
- Expertise needed for deep dives on different sectors and topics
- Long-term model maintenance, updating and development requires stable funding base, long planning horizon, and the ability to attract and retain top modellers.
Who?

- 1IM team
- ME!
- Carbon Budget Committee
- Climate Change Advisory Council
- Government
- 2nd EPA Fellow
- Other experts
When?

Model

- March 12-26th: Expert review stage
- March 29th-now: Model revision
- By April 16th: Early scenario results
- Summer 2021: Model stabilisation

Policy

- Feb-June?: Lawmakers pass Climate Bill
- Until Bill is passed: Preparatory work on budgets
- On passing of Bill: Finalise budgets
- After Bill is passed: Recommend budgets to government.
How? (i)

- Model to be fully **open-source** – documentation can be downloaded here: [https://tim-review1.netlify.app/documentation](https://tim-review1.netlify.app/documentation)
- “Best-practice” **development approach** – Git used for version control and integration, open web app for results analysis & diagnostics
- Developers with **international expertise** and links with global TIMES community, allowing knowledge-sharing
- Using **TIMES framework** – well-proven, high quality, continuously developed/maintained, open source code
- **Flexible integration** – Simultaneously maintaining “stable, policy-ready” model and development of research variants, allowing innovations in ESOMs, pushing state-of-the-art – leveraging across projects
- Strength of **systems approach** – automatic “sector coupling” by design – where is the best use of resources? What are sectoral trade-offs?
- Extensive **stakeholder review** ([https://tim-review1.netlify.app/](https://tim-review1.netlify.app/))
- Training PhDs, interns etc. & wider engagement integral for national **capacity-building**
- A focus on **alternate scenarios**, sensitivities, “what if” analyses
- **Dynamic integration** with national data sources and other national models (where possible)
  - Will allow for “low-effort” updates going forward
  - I3E/COSMO (macro-economy), PLEXOS (power system), LEAP/Car Stock Model (transport & residential sectors)
How? (ii)

- Set the client’s expectations early on
- Rapid iteration between modellers and client
- Embedding a client in the modelling team
- Embedding a modeller in the client team
On consistency

“But why should you keep your head over your shoulder? Why drag about this corpse of your memory, lest you contradict somewhat you have stated in this or that public place? Suppose you should contradict yourself; what then? It seems to be a rule of wisdom never to rely on your memory alone, scarcely even in acts of pure memory, but to bring the past for judgment into the thousand-eyed present, and live ever in a new day.

... 

A foolish consistency is the hobgoblin of little minds, adored by little statesmen and philosophers and divines. With consistency a great soul has simply nothing to do. He may as well concern himself with his shadow on the wall. Speak what you think now in hard words, and tomorrow speak what tomorrow thinks in hard words again, though it contradict every thing you said today.”

Ralph Waldo Emerson, “Self-Reliance” (1841)
https://archive.vcu.edu/english/engweb/transcendentalism/authors/emerson/essays/selfreliance.html