

Why the UK Built its 2050 Model

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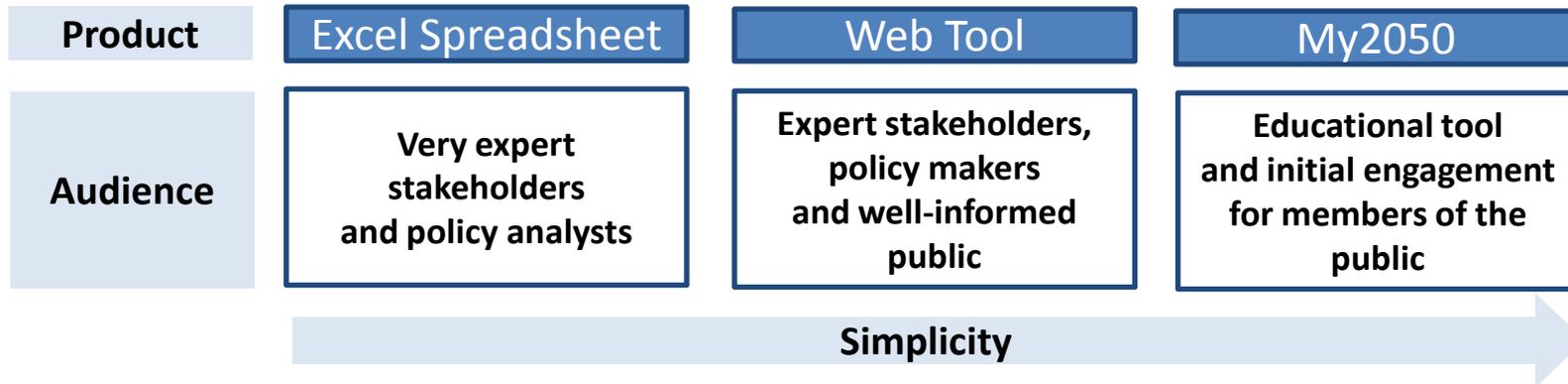
Situation in the UK before the 2050 Calculator

There was **an ill-informed debate** in the UK about our energy system and we wanted to **answer a number of questions** including but not limited to:

1. How much **energy** can we **supply** from different energy technologies?
2. How much **energy** do different sectors **use** and how can we change this?
3. What is the **cost** of different energy pathways?
4. Which sectors are the one we should **focus** on? Which are **less important**?
5. Can we **achieve our emissions target**?
6. What impact would different pathways have on our **air quality and land area**?
7. What could happen to our **energy dependency and security**?
8. What is **publically acceptable**?

The UK developed the 2050 Calculator to answer its questions

We developed **three tools** – they are all based on the same Excel spreadsheet:



- The **2050 Calculator** is a **model** for identifying the **range of physically possible scenarios** for cutting UK greenhouse gas emissions by 2050 and their **impacts**.
- **The user chooses what happens in each sector, ranging in effort from level 1** (do nothing to decarbonise) **to level 4** (maximum possible effort to decarbonise).

The UK decided to build the Calculator even though there were other options

There are **great options**. Some examples:

MARKAL /TIMES



Used already in the UK

LEAP



Not used in the UK

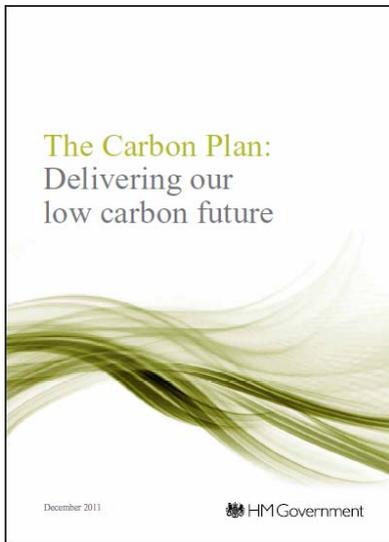
EFFECT



The UK felt that that a new model could be built to complement existing models and to use an approach that we wanted to adopt.

The UK has used the 2050 Calculator to complement its existing models

The **2050 analysis** for the **Carbon Plan** (2011) is an example of our “**joint model working**”:



We used **MARKAL** to produce a lowest cost pathway to 2050



We put this **MARKAL** pathway into the **Calculator**. From this we produced **3 other pathways**. The user-friendliness of the tool made it easy to **agree these across government**. We explored the **air quality** and **land use** implications.



We estimated the **costs** of these pathways using **MARKAL, Calculator and ESME models**. We compared the results to get a **full picture on costs**.

We feel that the 2050 approach is a **useful starting point** if you are at an early stage of **modelling** or a **useful complement** to existing models.

It was not enough to answer our questions - we wanted a specific approach

The UK felt it was important that our **model** would be **accessed, understood and used by all. We wanted an energy literate debate** – a common way to explore pathways to 2050. Our vision was:

The model will be...	Detail
User driven	It will be scenario based so that “what ifs” can be explored.
Open	The model , its assumptions and data will be documented and available for all . It will use universal software .
Simple	The model will be simple enough so that all government and non-government stakeholders will understand it . It will not be a “black-box” approach.
User friendly	Anyone will be able to use it and explore options in seconds . It will not alienate people, it will provide quick answers. It will allow efficient modelling .
Comprehensive	It will show the full range of what is technically feasible and include all green house gas emissions, energy supply and energy demand .
Inclusive	It will be built in collaboration with relevant internal and external people and groups, and incorporate all credible views so that everyone is in the debate .

Why the UK built the 2050 model

An overview of the 2050 Calculator approach

The 2050 Calculator is open

PROBLEM: Some models **cannot be seen** by the public or stakeholders outside the energy / environment ministries.

SOLUTION

- The Calculator is built in Excel software which is widely used – **anyone can use it.**
- All **assumptions** and **data are visible** in the model and explained in the wiki.
- This approach helps to **develop trust** and ensure that the model is **widely used.**

For example, see the wiki: <http://2050-calculator-tool-wiki.decc.gov.uk/pages/1>

The 2050 Calculator is simple

PROBLEM: Some models are complex and **hard to understand**. This can reduce engagement with the results from the tool.

SOLUTION

- It is not a “black box” and so results are intuitive and easy to explain. **Any one can understand it** and this **builds trust** in its messages.
- The UK Calculator is available in **three versions** to **appeal to different people**:
 - Detailed Excel workbook (“The Spreadsheet”)
[See http://www.decc.gov.uk/en/content/cms/tackling/2050/2050.aspx#](http://www.decc.gov.uk/en/content/cms/tackling/2050/2050.aspx#)
 - Internet tool (“Webtool”, shown earlier)
 - A simple “game” (“My2050” <http://my2050.decc.gov.uk/>)

The 2050 Calculator is user-friendly

PROBLEM: Some models are **hard to use** and **take time** to generate outcomes, especially for less-technically minded people.

SOLUTION

- The 2050 Calculator does **not require training** – **anyone can use it**.
- **Non-modellers / non-experts can engage** with the tool (such as the media).
- It only takes a **few seconds to generate outcomes** (we can quickly demonstrate trade-offs to senior officials and to our ministers. *Useful if there is a change in Government!*)

16,000 members of the public and government stakeholders have submitted their own example pathways. It is simple enough for anyone to use it ([See My2050](#))

The 2050 Calculator is comprehensive

PROBLEM: Some models do not cover **all sectors** or the **full feasibility** of what can be achieved.

SOLUTION

- Each **sector** shows what is **technically feasible**, with documentation for each sector
- The Calculator shows the impacts on **energy used and supplied, energy imports, costs, land use and air quality**
- The 2050 Calculator covers **all emissions** (those from the energy system, industrial processes, waste, land use and agriculture). [See the emissions in the Webtool](#))

The 2050 Calculator is inclusive

PROBLEM: There is disagreement about the potential to change the energy used or the energy supplied in different sectors.

SOLUTION

- Each of the levels 1 to 4 was developed collaboratively to **incorporate all views:**
 - **Level 1:** “little or no effort” to reduce emissions, save or supply energy
 - **Level 2:** effort that most stakeholders describe as “achievable”
 - **Level 3:** stakeholders view as significant change - “hard but can be done”
 - **Level 4:** effort that is extremely ambitious - change that is at the physical or technical limits of what can be achieved.

See onshore wind explanation: <http://2050-calculator-tool.decc.gov.uk/assets/onepage/5.pdf>

Re-cap and discussion

Re-cap

- The UK built a model **to answer its questions** about energy supply, demand, costs, **security** and the outcomes in terms of **emissions, land use and air quality**
- We built a model that we feel is **user-driven, open, simple, user-friendly, comprehensive and inclusive**
- We feel this model complements existing models and **could work for you**

Any thoughts or questions?