

How the UK built its 2050 Calculator

Beijing 2050 Conference

September 2012

Introduction

We want to show you:

- how we produced **our first version of the 2050 Calculator**
- how we **added outputs** and **developed** the tool
- how **you could adapt** the UK's 2050 Calculator **model** and **approach** to your country

Overview

The UK Calculator aims and approach **seemed ambitious**.

However, we think we were successful in achieving our aims.

It worked because we **took one step at a time**.

A lot of work has been done for you - you are **welcome to use** our approach and **model** and change it as you want.

Our journey

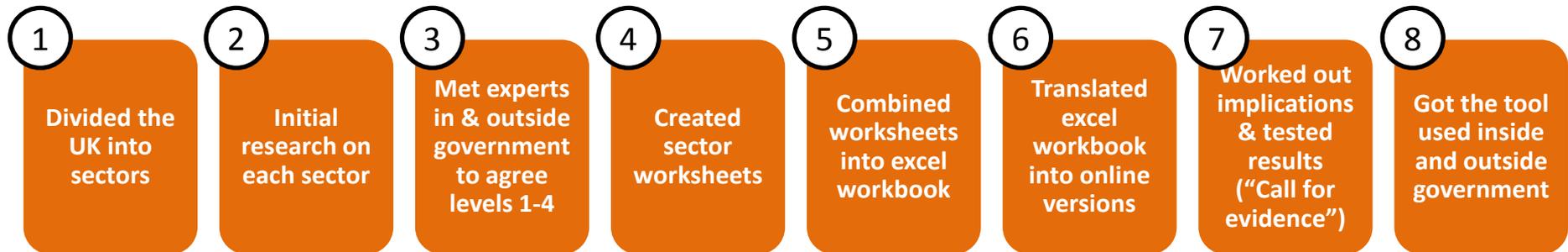
Our journey for building the Calculator was as follows:





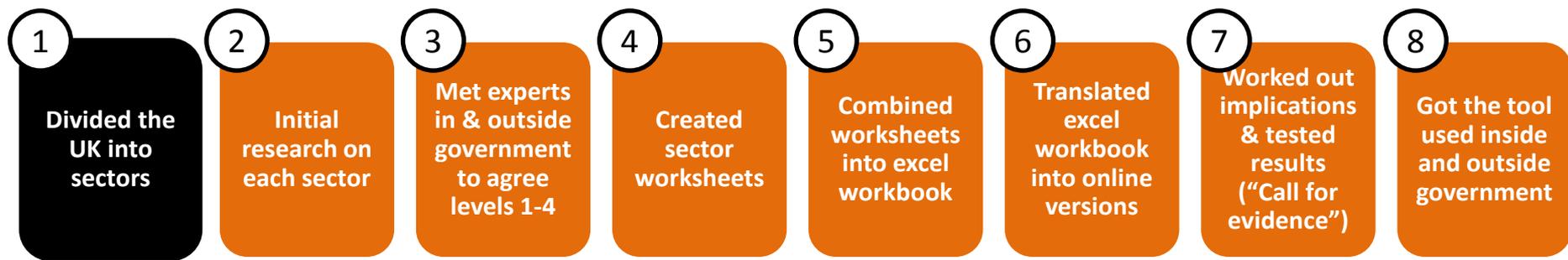
Production of our first 2050 Calculator

We used the following process to produce our first basic version. This **may work for you**:



This first version in July 2010 **did not have costs, land use or air quality**.

It was still **very useful** for answering our key questions, and was well-used inside and outside government.



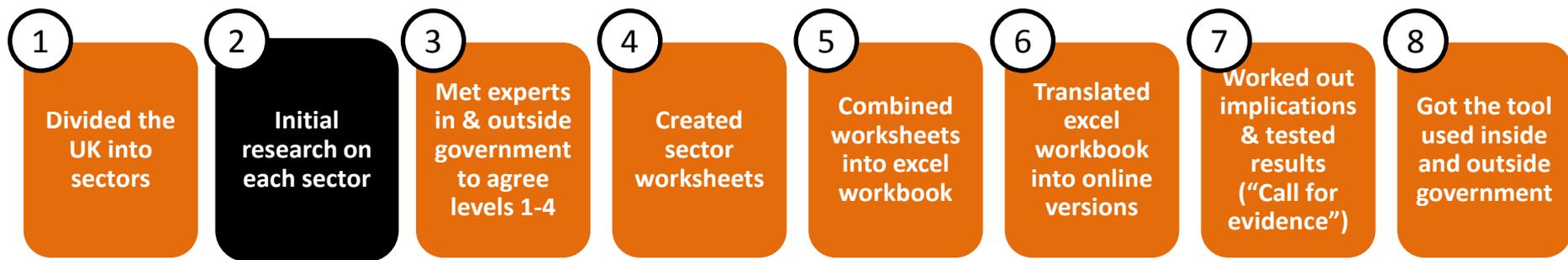
We **divided the UK into 40 sectors**, to reflect what people thought were **important choices for the UK**.

- This was to allow the tool to be **inclusive** (in practice many UK sectors have **small impacts** on the overall energy system, such as small scale wind (*see Webtool*). It is important to show this.)

You can have the same sectors as the UK Calculator or you can add or remove some.

- The **Republic of Korea** used similar sectors to the UK in its first version
- The **Belgian** tool included more **choices on industry**
- **China** added a **rural/urban split, different industries** and **inter/intra-city transport**

For example: see China's Webtool: <http://2050-china.greenonblack.com/>
see the Republic of Korea's *Webtool*: <http://61.250.224.141:3000/>



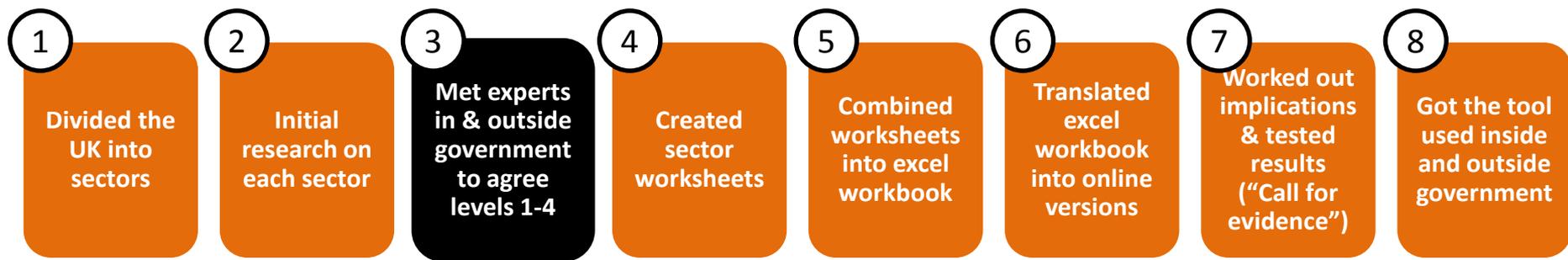
We started with **existing studies** of the potential to change energy consumption and energy supply and **used data in existing models**. We also looked at data from **international organisations** and **other countries**.

Where good quality and full data is not available:

- **It is better that the model tells you roughly what you want to know** rather than accurately what you do not – you can make the data fit the model you want
- The Calculator is not supposed to be a “truth machine” - **data can be approximated** and produced through stakeholder discussions
- You can look at the **data for other countries** as an approximation

For example, see the UK's one-page explanation of the nuclear sector:

<http://2050-calculator-tool.decc.gov.uk/assets/onepage/0.pdf>

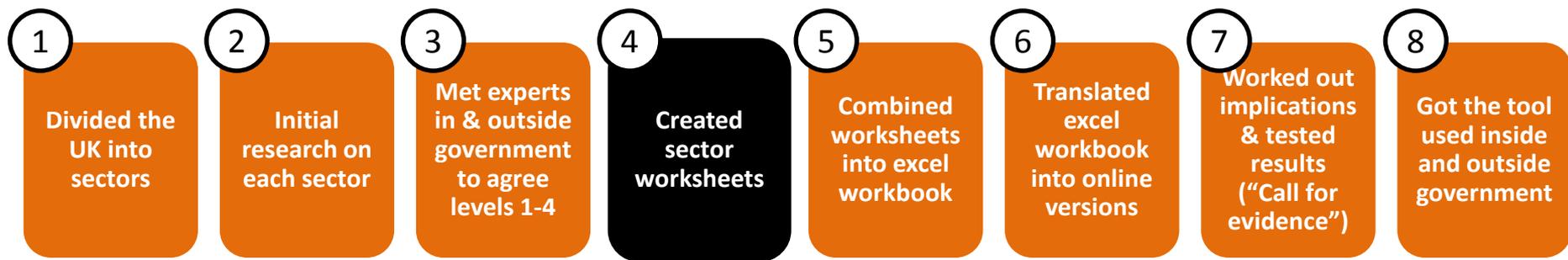


For each sector, we **met with experts from industry, academia, government, unions and non-governmental organisations** to agree levels 1-4.

This is relatively easy, because we are not looking for agreement on one number.

- Level 1 – **Normally easy**, just a matter of assuming that nothing happens
- Level 2 – What most **experts agree would be possible**
- Level 3 – There **will be a split between experts** – some will think this level is possible, and some will not.
- Level 4 – **Fairly easy**, take the most optimistic view and just check that it does not breach any laws of physics and that it is not based on flawed assumptions.

We found the results from **this stage to be really useful.**



Each **sector becomes one worksheet in an Excel workbook.**

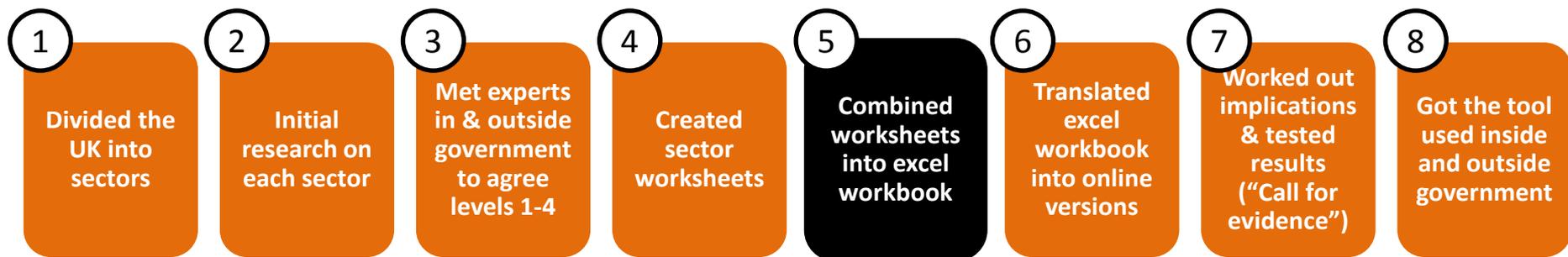
We built **simple models for each technology** (such as for electric cars,.. wind turbines)

- each starts with the number of items built, such as “50 million electric cars”
- the model then calculates the outcomes, such as “70 TWh/yr of electricity required”

You can use different technologies to the UK – but you do not have to

- You can build your model using the same technologies as the UK (cars, ... bikes)
- Or you quickly can add other technologies that matter to your country

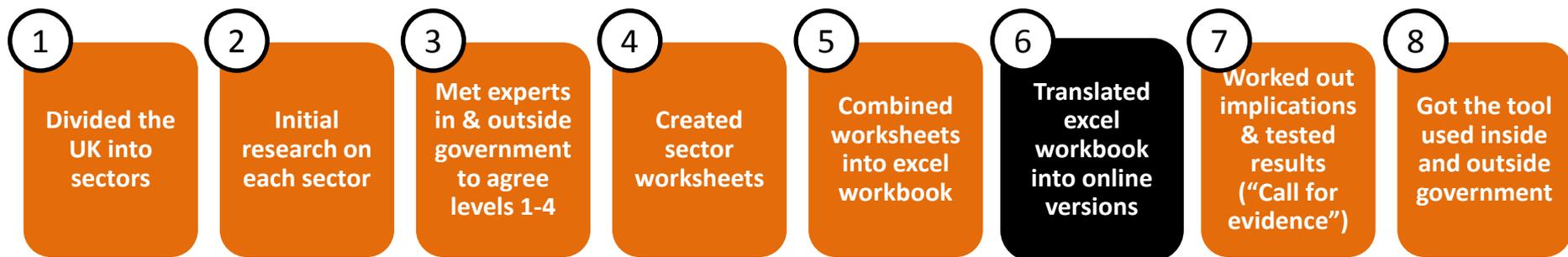
For example: see the UK’s transport technologies in the Spreadsheet, worksheet “X11.a”, rows 48 -59 <http://www.decc.gov.uk/en/content/cms/tackling/2050/2050.aspx>



Data from each sheet in the Excel workbook is then gathered in a time series – there are sheets at the back of the model, one for each five year period, to work out the outcome. These are then presented in the front few sheets.

Initially the only extra implications we worked out were **energy supply and demand and greenhouse gas emissions.**

You can start basic or **add new implications that matter to you.**

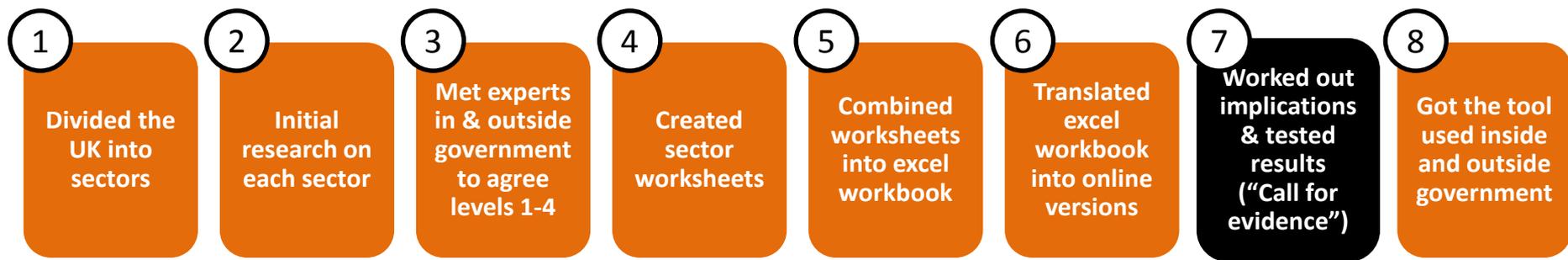


We have written some **software to translate the Excel version of the Calculator into the web front end**. This allows us to keep the Excel and the web front-end synchronised, and reduces the need for professional programming help.

We started with a very simple web front end, and later added **more outputs**. If you wish, you may want to add new visualisations:

- The **Belgium Calculator uses a similar approach but looks different and has additional outputs**. For example: see Belgium's Webtool: <http://www.wbc2050.be/>
- The **Chinese Webtool provides more detail on fossil fuels**.

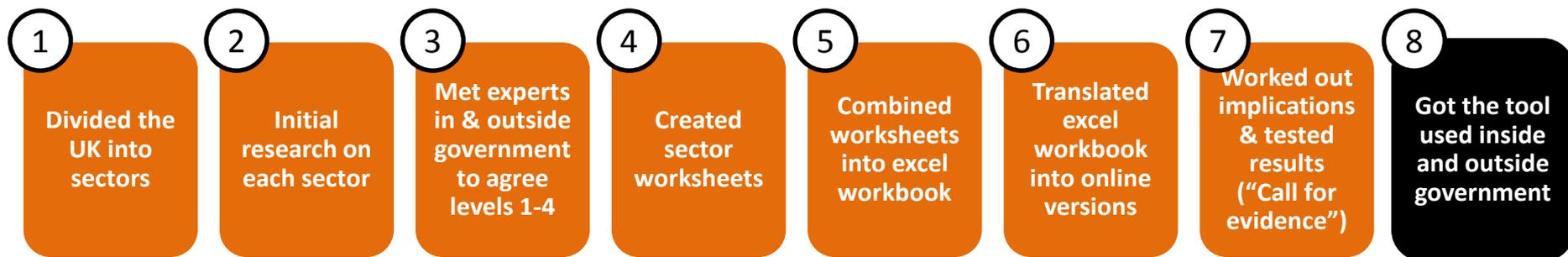
Later, we also produced an even simpler interactive front end for use in schools. This required much more programming effort (<http://my2050.decc.gov.uk>).



We tried to use the model to **answer questions we had as we went along**.

- This helped us to **spot problems**
- Once the problems were eliminated, we **analysed the results** and **published** them alongside our Excel model and web front end as a "call for evidence".

We received over a hundred written comments and corrections, which we used to **improve the tool**.



We worked hard to ensure that the tool became well used inside and outside government:

- **Events where we get people using the calculator:**
 - Individual workshops with Ministers and very senior government officials
 - Group workshops developing pathways with government officials at all levels
 - Public events where we get people to debate choices
- **Events where we raise awareness of the calculator:**
 - Hundreds of public talks
 - Press releases and working with journalists

Signs that it is well used:

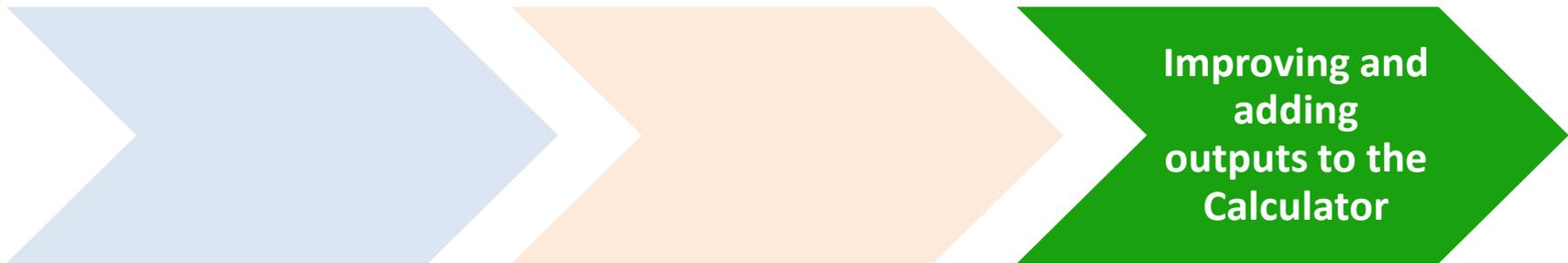
- We see the tool being used by government decision makers, and referred to in government publications
- Industry, non-governmental organisations and the public have sent us their preferred pathways

We were successful even with our basic model

After the **publication of the first basic tool**, the **UK 2050 Team met the Queen**.

We were awarded the Science, Engineering and Technology **award** at the Civil Service Awards, **Buckingham Palace**.





Improving and adding outputs to the Calculator

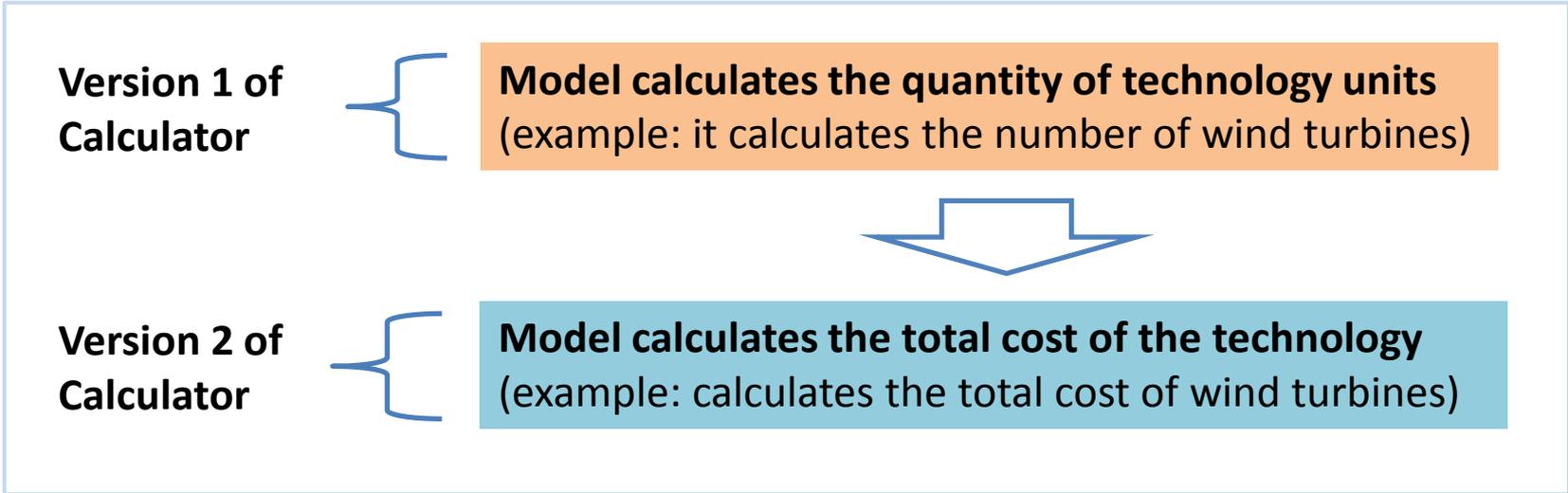
We **improved** the Calculator and **added outputs** to the basic structure **in steps**:



- The UK 2050 **Calculator has expanded** in what it can do, but it **started simple**
- **China** adopted a similar approach of **doing the work in steps**
- A stepped approach could **work for you too**

Each sector has the same simple structure

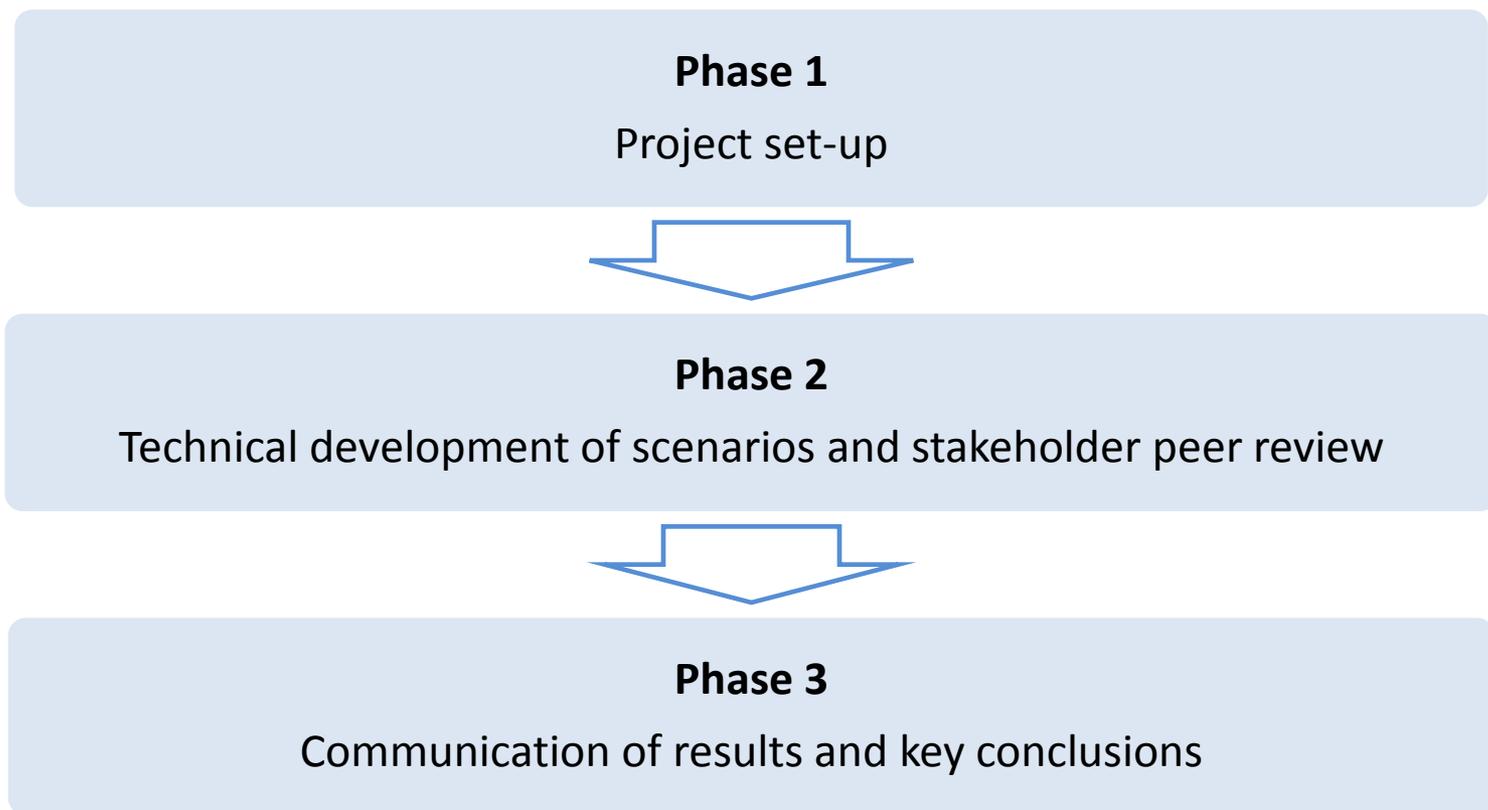
We found that it was quite **simple to add outputs**, such as **costs**, later.



Other **outputs were added onto the basic structure** in a similar way (such as land use).

How long could this take you?

There are 3 phases to developing a 2050 Calculator



Phase 1 – Project set-up

This should take around **3 months**



Set-up your team

- Can you obtain help from key stakeholders?
- Make sure that your Ministers are aware and supportive of the project.



Develop your project plan

- How can the Calculator fit in with other work you are doing on climate mitigation and energy policy?
- When should you aim to get results by?

Phase 2 – Technical development and stakeholder peer review

This should take around **6 months**



Define the structure of your model

- Which sectors?
- Undertake the analysis.
- Develop your levels 1-4 for each technology based on best available evidence.
- Develop your internet interface.



Share your results

- Informal sharing with stakeholders and experts.
- Use this process to improve your data and to gain support for the formal launch.

Phase 3 – Communication of results

This should take around **3 months**



Communicate your results

- Share your results within your government and to the media.
- Hold a formal launch event and use other forums such as the internet.

Reach out!

- You can be really creative with the approach. The UK has simplified the results of our Calculator so that it can be used by schoolchildren.
- An open-source approach means you can reach many groups – this is a useful source for further information.



Questions and discussion
