

Business Case and Intervention Summary – Sept 2012

Intervention Summary

Title: International 2050 pathways partnerships and Global Calculator

What support will the UK provide?

1. Following a project model developed with the Chinese government, a dedicated team in the Department of Energy and Climate Change's (DECC) Strategy Directorate will provide direct technical support to 10 priority countries (working with Ministries of Environment and Energy) to develop their own in-house version of the UK's [2050 Calculator](#) - an interactive, open sourced tool for developing energy and emissions scenarios - and use it to generate stakeholder support for the low-carbon development pathways open to them. This will enable them to make a positive and informed contribution to the post-2020 debate that will take place at the 2015 COP. The DECC team will also consider extending the calculator methodology for a global version of the model, and will report back to the ICF in autumn 2012 with a full set of options here following a scoping exercise they are carrying out over the summer to determine its unique selling point.

Why is UK support required?

2. Developing countries are now drawing up their own low-carbon development plans which need to be analytically robust, but also have the support of a wide variety of actors within their society. It is therefore vital that developing country governments are able to make a convincing case to their society that this is desirable and feasible. By helping priority governments develop tools to make their plans credible, transparent and that link them with other development goals, we increase the chances that national decision makers will support and implement them. These tools can also support international efforts to reduce emissions, as countries are able to communicate externally exactly how they plan to develop over the coming decades.
3. Where countries do have access to modelling tools that focus on the long-term (beyond 2020/2030), these are often "black boxes" only understood by a small group of technical experts. These complex econometric models have their strengths, such as being able to identify the cheapest low-carbon pathways, but it is not easy to communicate their results to decision makers, who lack the time and technical training to be able to interrogate the results. This can lead to an impasse between technically competent modelling teams, and the high level decision makers, whose involvement is a prerequisite for a successful low-carbon development plan. Furthermore, for a low-carbon development strategy to be fully accepted within most societies, it is not enough to achieve a government level consensus on the way forward. Business organisations, NGOs, civil society and the media are also important actors which need to be convinced of the viability of a low-carbon future. Therefore tools that are viewed as legitimate in the eyes of government and wider society, that are accessible and open to all, not just an expert community, can play a role in generating stronger buy-in for low-carbon development plans.
4. In the 2050 Calculator the UK has developed a methodology that has been applauded for its transparency and simplicity in outlining the different options available to a country as it looks to develop its economy and energy system. It has impacted policy making, as one of the analytical tools used in the recently published Carbon Plan which outlines how the UK will deliver the 4th carbon budget, and levels of ambition for different technologies in 2050. And it has fostered an energy-literate debate, being used by journalists, the private sector, politicians and leading experts as a reference tool and for expressing their vision of the future.
5. The Calculator has already been tested in an emerging country context following a successful cooperation with the Chinese government who have already developed their own version of the model with a view to it influencing their policy making and communication of their energy and emissions challenges (teams in South Korea and Belgium have also successfully adapted the methodology). It is not clear yet the extent to which the Chinese Calculator will have a

transformational impact at a policy level. But there have been clear benefits from a capacity building perspective and providing their government with a dialogue tool that can be used as a stepping stone towards wider change.

6. The 2050 Calculator methodology could also have a powerful impact at a global level. Whilst there are a number of models that attempt to create interactive pathways for global emissions, these are either very energy focused (IEA) or very policy centric (MIT C-Roads). And none are fully open-sourced. The 2050 team in DECC is in a unique position to lead a consortium of institutions from developed and developing countries to create a user-friendly, open-sourced Global Calculator showing that collective action is still both necessary and feasible to mitigate against the worst climate change impacts. DECC is currently undertaking a scoping exercise to determine the detail of this global level project, and will report back to the ICF in autumn 2012 with a more developed proposal.

What are the expected results?

7. Ten developing countries, which could represent over a third of global emissions and over half the current population, will have access to an open-sourced 2050 Calculator, and will also receive support to use this to lead a public debate on how to combine economic development with low-carbon emissions pathways. This support their plans for how they plan to grow in a post-2020 world.
8. Based on having already completed this work with China, we can expect this tool to be used both to inform national level policy making, and to illustrate the choices facing developing societies. The Chinese have stated they will use their Calculator to inform their 2015 position, and as a training tool for senior members of the Communist Party. It is also an extremely useful tool for external observers seeking to understand China's current and future emissions. We will aim for similar high impacts in the other countries which develop a Calculator. We recognise that the policy and political context will vary from country to country and we will seek to tailor our approach accordingly.
9. Each country Calculator will be delivered for under £140k, making the most of existing UK government knowledge, without the need for external consultants. It will build developing country capacity to conduct scenario analysis beyond the lifetime of the project, and provide open-sourced examples to other developing countries, not involved in this intervention, to learn from and replicate.
10. All the developing country teams will form part of a virtual working group, allowing them to engage in direct South-South learning, but also developing a mutual understanding of their respective capabilities for managing or reducing their emissions. This will begin with a 2050 International Pathways conference in Beijing in September 2012, but will continue throughout the lifetime of the project.
11. This intervention supports the overall ICF theory of change, by demonstrating the **viability of low-carbon development at a national level**, through an open-sourced and transparent method currently not available to developing countries. It will **make debates on low-carbon planning more inclusive, and more evidence based, providing a tool for governments to engage their stakeholders and the public**. Given its simplicity it can also be used to challenge incorrect claims on future energy and emissions pathways, in a way that can be understood by non-experts. It does so by **developing capacity within developing country governments**, another ICF priority, who will be the developers and owners of their Calculator, meaning that the results of the project should last well beyond its lifetime.

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List of associated attachments

~~Risk register, log frame, budget profiling and summary of scoping work.~~

1 Strategic Case

1.1 Context and need for ICF intervention

12. In order to achieve the UK's goal of limiting a rise of global temperatures to two degrees, significant emissions reductions must be delivered over the coming decades, by both developed and developing countries. Whilst immediate action is required to make this possible, countries must also focus on the long-term, to ensure that they are not locking themselves into a high carbon future. Long term strategies out to 2050 are therefore essential to deliver the levels of emissions reductions that are necessary, and these must be based on the best possible evidence. These strategies need to be understood and accepted by major players within each country, and thus should be transparent and easily communicable.
13. Given the lifetime of much of the energy system infrastructure and the lead-in times required for many technologies to gain a foothold within a country, it is not sufficient to think just about the coming 20 years. Longer time horizons out to 2050 are needed to fully understand the changes needed for achieving low-carbon development. The UK and many other countries have recognised this through the setting of long term emissions reduction targets, which give important signals as to the level of effort required in the medium term given the dangers of "lock-in" to high carbon infrastructure. This is all taking place in the context of the UN negotiations on climate change – which reach a critical point in 2015. Developed and developing countries are expected to agree a new treaty that will move away from the current distinction between Annex 1 and Non-Annex 1 (i.e. developed and developing), towards a system where from 2020 most countries will undertake some form of mitigation activity. It is therefore of vital importance that national governments, and not just negotiating teams and modellers, have an accurate understanding of what their energy needs and mitigation possibilities are ahead of this critical period.
14. Many developing countries are drawing up their own low-carbon development plans under various guises. Whilst they have varying levels of access to different tools for understanding long term emissions pathways, these are often "black box" econometric models e.g. MARKAL, MESSAGE, AIM, whose assumptions and workings are only understood by a small group of experts. It is therefore difficult to communicate their results outside of this expert community (which may only be based within one government department), meaning that sections of government and civil society are distanced from the policy debate over which low-carbon pathways are feasible and desirable in the context of the country's overall development strategy.
15. If there is limited high quality long-term modelling capability across government, and if this is only understood by a small group of technicians the chances that this knowledge will be reflected in the actual policy decisions and plans of developing countries are reduced. National governments need credible, accessible and easily communicable, information to be able to show that low-carbon development is possible. The options need to be communicated to, and interrogated by, decision makers so that it can be communicated to policy makers, including those who are not directly involved in low-carbon planning, as well as to the private sector, to NGOs and other influential actors within civil society.
16. Capacity building for developing countries to enable them to make the case within their own society to follow an analytically robust low-carbon development pathway is therefore vital, not just for their own development (ensuring increased access to electricity and highlighting potentially high cost lock-in to carbon intensive fossil fuel infrastructure) but for the global effort to reduce greenhouse gas emissions. It is not just a case of paying for external consultants to produce the "right" answer for developing countries, leaving them to implement the conclusions.¹ Providing support for countries to develop their own tools, which can evolve and be updated by teams within their national governments long after the initial intervention has occurred, offers a much higher chance that the results will be owned and communicated to all actors in their system whose support will be needed to deliver low-carbon development. A country-led approach is therefore

¹ OECD: [Greening Development, Enhancing capacity for environmental management and governance](#) – February 2012

21. The Chinese project provides a model for future 2050 pathways partnerships and the ERI team themselves have suggested that DECC should look to replicate this project with other major emitters. Output 1 of the ICF looks to “Demonstrate the viability of low-carbon development at a national, sub-national and sectoral level”. Supporting other developing countries to build their version of the 2050 Calculator is a practical way of doing this. It has the potential to bring about transformational change at a national **scale** (the UK version of the Calculator has been used in national level policy making, and to frame a national debate on the energy sector), although the extent to which this will materialise will depend heavily on nationally specific circumstances. The 2050 model has already proven itself to be **replicable**, given its success in China and Belgium to date. The creation of additional Calculators in other developing countries will only add to the open-sourced evidence base, enabling other countries who are not part of this intervention to benefit from this project as they will have access to examples of models more suited to the structure of their economies. Encouraging developing countries to conduct an open debate on their energy and emissions future, via publically accessible tools is an **innovative** way of engaging their key stakeholders in the debate on the scale of the challenge and the trade-offs it entails. The IEA recently praised the 2050 Calculator as an “admirable”⁵ way of communicating the possible choices for the future in the UK. The flexibility of the tool is one of the main features that convinced the Chinese government that it was worth investing a considerable amount of time and staff resource in developing it. Beyond the development of the Calculator in other developing countries there is considerable scope for **leveraging** in other activities once it is complete. The UK experience shows that the Calculator can be used as an educational tool, for media engagement, for working with stakeholders and for a range of other engagement activities, which are very low cost. We have also contacted the World Bank’s ESMAP team to discuss including examples of the developing country Calculators on their forthcoming energy modelling Wiki – which will act as a market place for countries looking to develop their energy modelling capability, and we will also look to promote this work through the Low Emissions Development Strategies (LEDS) network run by CDKN.
22. This project will support 10 developing countries (selected by a steering group of DECC, FCO and DfID officials) in developing their own version of the 2050 Calculator. A dedicated team in DECC’s Strategy Directorate will work with in-country teams in the FCO and DfID to identify capable and enthusiastic teams within each of the priority countries. The 10 country figure was selected as it allows for coverage of most major emitting developing countries (BASICS) whilst allowing for a number of others to be included to provide a geographical spread across continents (South East Asia, Latin America and Africa). We will over the course of a 12 month development period provide them with technical and project advice to enable the in-country teams to build their own model in Excel. Where possible we will look to take advantage of existing project structures, and involve knowledgeable regional/international actors such as regional development banks (we are already in touch with the Asian Development Bank who would like to incorporate the 2050 Calculator as part of a wider project they are delivering to produce Low-Carbon Development Plans for Indonesia, Malaysia, Thailand, the Philippines and Vietnam). We will also look to maximise the information that Country Calculators contain on non-emissions issues, such as water use or levels of fossil fuel imports that have important impacts on economic development. We will also make use of work already underway in this field, such as the EFFECT model.
23. The selection process for the countries that should form part of this list of 10, will be undertaken by the project steering group, which contains representatives from DECC, FCO and DfID. Countries will be selected on the basis of size, importance, assessment of their ability to complete the work (data availability, but more importantly capacity of local team), and their interest in taking the work forward. This will be carried out with the help of FCO and DfID in-country teams and will help to mitigate the risk that in-country project teams fail to deliver functioning Calculators within the timeframe of the project. Developing countries will be expected to provide staff to take forward the work, supported by DECC, with this project only financing the secondment of additional team members where a clear resource gap has been identified. The work has already started following the first meeting of the project steering group, and a scoping exercise carried out with the help of the FCO’s and DfID’s overseas climate network. The Chinese project was particularly successful thanks to a well connected and engaged British Embassy in Beijing, a committed government

⁵ p. 38 Energy Policies of IEA Countries – The United Kingdom 2012 Review: <http://www.oecd-ilibrary.org/docserver/download/fulltext/6112021e.pdf?expires=1340981205&id=id&acname=ocid72023236&checksum=40EFBDB5DB41CCF4DE8916E3AF526264>

partner in the ERI that was able to commit sufficient staff time to the project and a regular and fluid contact at a technical level between the ERI and DECC.

24. We are also proposing to develop a Global Calculator which will extend the basic approach used for the UK 2050 Calculator to a global level. It would be available on-line, completely open-sourced, with a user-friendly interface making it instantly accessible. Whilst we already have a worked example when it comes to working with other countries to develop their own national version of the 2050 Calculator, we believe that the Global Calculator would benefit from further scoping work. We therefore propose to undertake a short scoping project within DECC's Strategy Directorate to refine the proposal, and will then present **an update in autumn 2012 to the ICF Secretariat**. This will either provide more detail on what this element of the project will deliver, or, could conclude that there is not sufficient need for carrying out this work.

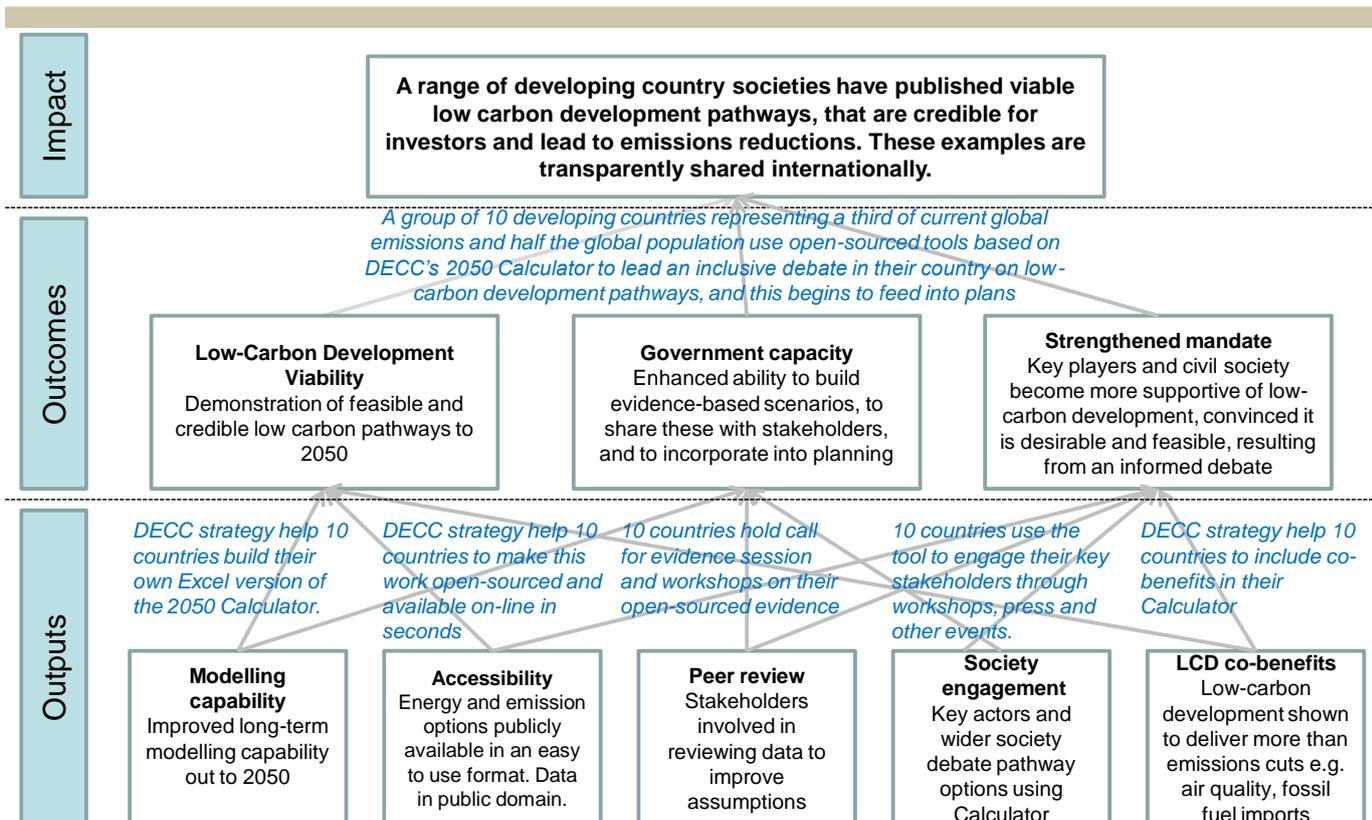
25. This Global Calculator scoping exercise will look to focus on:

- i. Gap in the market: We are doing this by exploring what global climate and energy models currently exist, the questions they are capable of answering, the audience they are aimed at, how open-source, how user-friendly and accessible they are and other pros/cons.
- ii. Structure: We are also looking at, if we were to build a Global Calculator, how we would structure it (e.g. by country / sector?).
- iii. Resources: To build it what size of team and what expertise would be needed? To what extent would ICF funding cover this and how much resource would HMG have to provide?
- iv. The risks and opportunities of building it e.g. Risks associated with data availability; opportunities such as timely international negotiations we could influence.
- v. Stakeholder mapping: Which international organisations would we need to have bought into the project to ultimately make it a success? What do they think about sharing their data? Are they receptive to idea of Global Calculator? Would they consider seconding someone to a Global Calculator team?

1.2 Impact and Outcome that we expect to achieve

26. In the strategic case we outlined the need for further work to develop transparent tools to enable governments to consider long-term low-carbon development scenarios which can be understood and used by non-specialist policy makers and stakeholders. The following theory of change outlines how improved tools can improve the credibility of low-carbon development plans in developing countries and their integration into national planning.

Theory of change – International 2050 pathways partnerships



27. **Outputs:** Existing tools are not sufficiently accessible, open-sourced and user-friendly to meet all the needs of decision makers, but additional modelling tools are insufficient on their own to generate confidence in low-carbon development pathways. For these tools to be credible outside of the expert community that builds them, a process is needed to share their results as widely as possible. The following outputs are necessary according to our theory of change:

- i. **Modelling capability:** Modelling capability is a pre-requisite for developing evidence based long-term low-carbon development plans, due to scope and timescales (economy wide and over many decades). There are a range of modelling options available to developing countries, which have their own strengths and weaknesses. Cost optimising models (e.g. MARKAL) are good at answering the “What is the least cost pathway to 2050?” question, but are less suited to performing scenario analysis and their “black box nature” makes them difficult to communicate to non-experts. Scenario based models such as LEAP or EFFECT are better suited to testing combinations of technology choices, but do not take into account feedback loops in the economy (e.g. impact of energy price increases on demand). Given that it is national governments who will be looking to lead the debate on what low-carbon development looks like in their country, it follows that modelling capability should be easily accessible for them, and ideally within national ministries. By improving the modelling capability within developing countries we improve their ability to present viable low-carbon development pathways. Improving it within national governments themselves increases the likelihood that the results will be viewed as legitimate, and will ultimately be used to inform policy and planning.

Output – International 2050 pathways: National teams in 10 developing countries will be supported by a team in DECC Strategy Directorate to develop their own version of the 2050 Calculator. This will adapt the UK's methodology to their own economy, but will follow the basic principles of the Calculator to provide a simple scenario-based model, built in Excel but accessible over the internet through its user-friendly front-end webpage. National teams will need to commit their own staff to this work, and whilst some resource can be made available to support the secondment in of knowledge or skills where there are gaps the focus is on supporting existing teams to develop the Calculator, rather than providing them with a finished version. The Calculator is available under an MIT open-sourced license⁶, which follows standard government policy of allowing government departments to use any open-sourced license⁷. This clearly states that DECC will not accept any liability for how the knowledge is used by other organisations and individuals, and this will be reflected in the MoU that DECC signs with each national team.

- ii. Accessibility: Improving modelling capability alone, is not sufficient. One of the criticisms that can be levelled at some of the modelling options available is that they are not accessible, making it more likely that there will be a degree of distrust of their results. Therefore attempts should also be made to improve the understanding of how the models produce their results, through good documentation, simple explanations of the assumptions that they are based on, and in some cases simplified structures that are easier for non-experts to understand. Improving access to these tools also forms part of this output, as many models are only available under license. Making them available under open-sourced agreements, including the underlying data can help to improve coordination between different institutions, inside and outside of government.

Output – International 2050 pathways: Countries will display clear documentation of the results and workings of the model on government websites. This may not follow the UK example exactly, but will ensure that data is available to as wide an audience as possible. In countries where such levels of transparency are at odds with normal methods of working, the minimum we will look to encourage is the release of the Excel version of the model under a password protect basis to an agreed group of institutions. DECC will work with FCO/DfID to identify opportunities for ministers, and senior officials to raise the profile of projects where appropriate.

- iii. Peer review: Models are only as good as the data they use to produce their results. One way to improve their credibility, and gain access to private held sources of information, is to open-up their assumptions to external peer review from stakeholders from a broad range of backgrounds. This can apply to assumptions on the improved performance of technologies over time, reductions in their costs or the maximum technical potential that could be installed in a particular country over a particular time period. The internet offers a forum that can be exploited for this purpose, by making information open to anyone with a computer. Opening up assumptions to peer review can also improve the legitimacy of the models results even if it does not lead to any major changes in the data being used. Inviting people to contribute data and information for inclusion in the model has the added bonus of both increasing the credibility of the model amongst these key stakeholders and encouraging them to become champions of the it, once built.

Output – International 2050 pathways: As part of the model development process national government teams will undertake an open call for evidence process to share their findings with experts. This will follow the UK example where stakeholders were invited to suggest improvements to the assumptions in the Calculator by offering up alternative sources. This will improve the data in the model, but will also increase its credibility with stakeholders not directly involved with its initial development.

⁶ <http://opensource.org/licenses/MIT>

⁷ <http://www.nationalarchives.gov.uk/information-management/government-licensing/licensing-software.htm>

- iv. Society engagement: Following on from the process of external peer review, it is crucial for modelling results to be understood by as wide as possible an audience both within government and beyond. Developing countries will rightly need to debate to the implications of low-carbon development, and tools can facilitate this process. Technical modelling teams will ultimately not be responsible for making the major policy decisions needed to set a country on a low-carbon pathway. Models can however be used to good effect to provide an evidence based framework for policy discussions between government, business, NGOs and civil society. The extent to which they are suitable for this purpose comes back to how transparent they are, how much training they require to run and how quickly they can produce results. The more transparent, easy to run and quick they are the wider the potential audience for their results, and the more they can be used to facilitate an evidence based debate.

Output – International 2050 pathways: Each national team will have a small amount of resource to use their finished version of the Calculator to run events with stakeholder groups that they view as being important for developing their low-carbon development plans. We will work closely with FCO/DfID in-country teams to maximise their impacts. The UK continues to use its Calculator two years after its public launch, and developing country teams will be encouraged to continue to use it as an engagement tool beyond the lifetime of the project. In the UK it has been used by journalists, NGOs and other public figures, and part of this project involves the sharing of the UK team's experience of using the model as an engagement tool. As well as being highly visible the Country Calculators will count on the endorsement of respected experts and academics in the field of energy and climate change. Ideally this will result from them having been engaged during the "Call for Evidence" phase of development of the Calculator. The most enthusiastic independent experts will have agreed to make public their preferred choice of a pathway to 2050.⁸

- v. Low-Carbon Development (LCD) co-benefits: Modelling tools focusing on energy and emissions pathways as a prerequisite need to provide information on tCO₂ emitted, coal consumption, MWh renewables produced etc. but the more information they can provide on other areas that are linked with the low-carbon debate, the more useful they are for developing countries that are trying to balance multiple issues as they look to grow. Therefore models that are able to provide information on issues such as air quality, water usage and land-use are more useful, particularly if one of their roles is to facilitate a debate on the viability and desirability of different low-carbon pathways.

Output – International 2050 pathways: The UK 2050 Calculator already provides information on the impact of pathways on land-use, air quality and their respective costs. Developing country modelling teams will be encouraged to incorporate these once they have completed the energy and emissions sections of the Calculator, and these will then be incorporated into the user-friendly version of the webtool.

28. **Outcomes**: By improving modelling capability in an accessible way, and using this to promote an evidence based dialogue with key stakeholders we support two of the ICF Theory of Change objectives:

- i. Demonstrating the viability of Low-carbon Development: By enhancing developing country modelling capability we improve their ability to demonstrate viable low-carbon development pathways. If this work is carried out in an accessible and inclusive manner, then these pathways are more likely to be viewed as legitimate by a wider group of stakeholders, beyond the expert modelling community. And by making the data open-sourced we encourage the sharing of information, both across government and beyond.

⁸ The ERI are already considering including expert academic pathways in their webtool version, including UK researchers from the Grantham Institute at Imperial College, and Tsinghua University who have been extensively involved in energy and emissions modelling in China.

- ii. Enhancing the capacity of developing countries through the provision of knowledge and monitoring tools: If this modelling capability is enhanced through capacity building with teams based in developing countries, then it can provide a lasting legacy beyond the project timescales. Improved modelling tools, particularly if they are owned by teams within governments and not produced by consultants, provide an analytical basis for future policy decisions.

We also have the opportunity to:

- iii. Strengthen mandate for low-carbon development resulting from informed debate: Providing simple, evidence based tools that can be used to engage stakeholder groups, can strengthen the support base that low-carbon development is possible. In the case of the UK its Calculator received 65,000 hits in two years, received positive coverage in the national media and has been used by experts to debate how the UK should decarbonise. The Chinese ERI were attracted to the simplicity of the Calculator as they feel it will enable them to lead a public debate on the energy choices China will need to make in the future. And the Korean team in Sejong University, who already use a range of 2050 models, are looking to use their Calculator to spark a debate on what would represent a realistic long-term greenhouse gas reduction target for South Korea. This is an opportunity, rather than a guarantee of success. The extent to which a 2050 Calculator can have a direct impact on policy formulation is unproven, and will depend heavily on national circumstances.

29. **Impact**: The long term impact of this intervention is for a group of priority developing countries to have published low-carbon development pathways, that are credible with investors and lead to carbon reductions. They are in part able to do this thanks to the provision of open-sourced and transparent tools, that enable them to lead an inclusive debate across their society. The ambition of this project is to work with 10 developing countries, and given our scoping work to date there is initial interest from a group that represent over a third of current global emissions, and over half of global population.

1.3 Specific outputs of the International 2050 pathways partnerships

30. Our scoping work to date has revealed considerable interest beyond the group of countries we have identified as our first phase priorities. However given the capacity of the 2050 team in DECC Strategy we propose a phased approach to selecting which countries should be included in the list of 10 that this project will support. Priority countries will be agreed with the project steering group (details of its composition in the Management Section).
31. Each country level intervention will include the following steps – to support them in building the Excel model, convert it into a user-friendly interface and to provide the resources to share the results with a wide range of stakeholders. For a fuller description of the steps for each country intervention please refer to Annex 1:
 - i. Assessment of ability of national government to deliver work – working with the FCO/DfID.
 - ii. Negotiation with national government and FCO/DfID to determine what additional technical resource may be needed to deliver a working Calculator.
 - iii. Signing of MoU
 - iv. Kick off visit from DECC team (one week) to draw up project plan with in-country team and provide initial training on the approach and methodology.
 - v. Regular skype/videoconference sessions to track progress and quality check results.
 - vi. Visit of lead modeller to London to develop webtool. This involves learning how to adapt the open-sourced code developed by DECC to the new excel

model created to create the user friendly front-end that is one of the Calculators key differentiating characteristics.

- vii. Support in developing stakeholder engagement plan and advice on using tool in low-carbon development planning, to identify data and shape the model inputs, including funding stakeholder workshops to sense check findings and generate buy-in before public launch.
 - viii. Visit to London of senior figures responsible for using the model to learn from how the UK has used the Calculator for engagement and policy making. This was vital in providing high level support for the Chinese calculator.
 - ix. Financial support to develop [My2050](#) simulation – a flash player version of the Calculator, which expands the range of users.
 - x. National launch event – working with the FCO/DfID to ensure high level attendance and coverage.
 - i. Becoming part of an international network of 2050 modellers – from both developed and developing countries.
32. *2050 conference with China*: As a result of DECC's cooperation with the Chinese, their government has offered to host a conference for major developing country emitter countries to showcase the model of working we have developed with them. This will act as the kick-off point for contact with South Africa, Brazil and India, as well as being an opportunity to establish a virtual working group between these major economies to share experiences of working to adapt the model to their specific circumstances. ERI have agreed to act as host for a conference in Beijing in mid September. In addition to these countries the Chinese have suggested that the ADB group of countries should be invited as observers given their interest in the project, and invitations will also be extended to a team in South Korea who have developed their own version of the 2050 Calculator (although they will have to cover their own costs for attending). Work is already underway with these countries (in conjunction with FCO Posts), to identify potential delegates, with the aim of having both the right technical minds present as well as senior level participation.
33. *2050 International Group*: Following the 2050 Beijing conference we aim to establish a virtual working group comprising of all of the modelling teams developing Calculators. They will be able to support countries less advanced in the process in adapting the methodology to their own national circumstances. They can also provide comments at the Call for Evidence stage to act as a critical friend to others within the group, and provide advice on the best way of conducting the stakeholder engagement needed to make the project a success. The virtual grouping will be led by staff from DECC Strategy – meeting via teleconferences and Skype sessions. We will take a view in 2013 whether a further conference would be useful to kick-start work with the third wave of countries developing a Calculator. At the end of the project we anticipate a final conference for all the countries that have completed a Calculator to showcase their findings and discuss on-going engagement plans. This could potentially take place at the 2014 COP.

2 Appraisal Case

2.1 What are the feasible options that address the need set out in the strategic case?

34. The Strategic case outlined the need for developing countries to produce low-carbon development plans that are analytically robust and communicable to key stakeholders in their society. To do this they will need to develop their own modelling tools to provide a macro-level picture of how their economy will evolve over the coming decades and the emissions which would result. In addition to modelling capability, according to our Theory of Change, there needs to be transparency, stakeholder review of the results and assumptions, stakeholder participation in developing viable pathways and the ability to highlight the co-benefits of low-carbon growth.

35. The following approaches could seek to influence this:

Option 1 - Do nothing counterfactual: There are already a significant number of long-term modelling options available – including MARKAL, MESSAGE, LEAP and EFFECT. Many of these are well established, and are being used by developing country governments. This do nothing counter-factual assumes that existing tools are sufficient for delivering credible low-carbon development plans, that have stakeholder buy-in, in key developing countries.

Option 2 - DECC bilateral support – 10 Country Calculators: Building on the model of working developed with China, DECC's Strategy Directorate is proposing to maintain a small team staffed to support 10 countries in taking forward their own version of the 2050 Calculator (one part-time Grade 6, three Grade 7 project managers with the support of two Grade 7 modellers). We propose to support 10 countries, as this is an ambitious but feasible number given the DECC resources available to provide analytical and project support. It would allow for a comprehensive geographic spread of countries involved in the cooperation, and potentially mean that a third of global greenhouse gas emissions could be covered by a country Calculator by the end of the intervention (based on 2005 levels). This DECC team would provide technical advice on both the dynamics of the model and assumptions for specific sectors, as well as offering the in-country team support for sharing their results with a wider audience, building on the UK's experience of open-sourced modelling and engagement. Ideally the in-country team will be based within central government, and teams will not be reliant on consultants.

Option 3 – Develop a new tool: If existing models are not sufficiently user-friendly for them to be used by non-expert policy makers and stakeholders, then a third option is to begin work on a completely new tool that enables developing countries to undertake scenario analysis in a more transparent and open-sourced way, which in turns allows them to engage their key stakeholders in a dialogue on the low-carbon development pathways available to them. This could be developed by a range of organisations with a track record of working with developing countries on energy and emissions issues e.g. ESMAP, CDKN or the Stockholm Environment Institute.

2.2 Assessing the strength of the evidence base for each feasible option

36. Many developing countries are beginning the process of producing low-carbon development plans.⁹ Therefore evidence is limited on the relative merits of the different modelling options available to them, and which of these will be the most effective for making sure the plans are respected, understood and implementable. We have therefore chosen to assess each of the three options against the 5 outputs that we identified in our Theory of Change.

⁹ The ADB South East Asia project only kicked off in April this year, and South Africa are starting their analytical work on mitigation potentials in September 2012.

Option 1 - Do nothing counterfactual

37. Developing countries have already made extensive use of existing long-term energy models such as MARKAL/TIMES, LEAP, EFFECT and MESSAGE e.g. South Africa¹⁰ and China¹¹. So there is evidence that they are being used. The effectiveness of these models in influencing policy or convincing their society that low-carbon development is desirable is less clear. At the launch of the Chinese Calculator the Director of their Energy Research Institute acknowledged the merits of existing models, but also highlighted that they were black boxes that were poorly understood outside a small group of experts. They often failed to convince non-expert audiences of the scale of the challenge. And many of them are not open sourced.
38. Analysis of modelling energy systems highlights the need to carry out significant adaptations to models created for industrialised countries if they are to be used in a developing country context to take into account issues such as levels of electrification, rural/urban impact on demand, tendency for high levels of transmission losses and structural shifts in the economy.¹² The analysis also cautions against the use of optimisation models given their assumptions of perfect markets and optimal consumer behaviour is only of limited use in developing countries where large parts of the economy are non-market based. And models that require minimal training to use are preferable, given that users do not have the same financial and training possibilities when compared to developed countries. It is therefore reasonable to conclude that there is a market for simple and open-sourced scenario models adapted to a developing country context, which is not a feature many of the models in use at present.
39. Whilst there are many different modelling options available to developing countries¹³ we have chosen to focus on two groups of models, cost optimisation models and bottom-up simulation models that are often used for studies of low-carbon development at a national level.
40. Cost optimisation models such as MARKAL or TIMES are used to optimise energy investment decisions by finding best solutions. Optimisation models assume perfect markets and optimal consumer behaviour which do not always exist in real life, and are less prevalent in developing countries. Urban¹⁴ observed that *“the use of optimisation models for developing countries might be limited, (because) the assumption of perfect markets and optimal consumer behaviour is only of limited use (as) large parts of the economy are non-market-based and where consumer behaviour accounts only for a (small) part of the population”*.
41. That said cost optimisation models are best suited to answering questions like “What is the cheapest low-carbon pathway to 2050?”. They are also useful for policy analysis as they allow the user to see how a price shock could feed through the energy system (e.g. the effect of fossil fuel price increases on energy demand and supply), given their inclusion of feedback between energy supply and demand. The MARKAL family of models is already widely used by developing countries.
42. The second group of models are bottom-up simulation models such as EFFECT or LEAP (the UK 2050 Calculator would fit into this category too). They use technology information to map out long-term pathways of energy supply, and match this up with simplified assumptions on project demand. Urban¹⁵ finds that *“they tend to be rather useful for developing countries, because they neither assume perfect markets nor optimal consumer behaviour, but allow scenario analysis for future pathways. The disadvantage of simulation models is their complexity, because they may require excessive data inputs and advanced user skills.”*

¹⁰ Long term Mitigation Scenarios – University of Cape Town – October 2007 -

<http://www.environment.gov.za/hotissues/2009/LTMS2/LTMSTechnicalReport.pdf>

¹¹ China's energy technology options out to 2050 – Met Office – June 2011 -

<http://www.lwec.org.uk/sites/default/files/AVOID%20China's%20energy%20technology%20options%20to%202050.pdf>

¹² Modelling energy systems for developing countries – F Urban et al – Energy Policy 35 (2007) 3473-3482

¹³ Ibid

¹⁴ Ibid

¹⁵ Ibid

43. Simulation models are widely used in developing countries. LEAP has been adapted for 150 countries, and EFFECT¹⁶ is already in use in 7 with plans to roll it out further in the future (including a project that will look to use its data to support the creation of 2050 Calculators for countries in South East Asia). They are usually easier to obtain access to than cost optimising models, as LEAP is available free under license to organisations in developing countries. However as Urban points out they tend to be complicated, require extensive amounts of data (EFFECT contains over 1000 technologies), and this complexity means that they are still relatively complicated to use for non-experts.

- i. Modelling capability: Given that Option 1 is accepting the status quo, it will not do anything to improve modelling capability within developing countries. However existing models are already widely used in developing countries so this may not be a problem if they are deemed to deliver against the other criteria in our Theory of Change.
- ii. Accessibility: Cost optimisation models are not accessible. They are frequently described as black boxes, even by teams that have considerable experience using them. They are also not open-sourced meaning that access is often limited to particular organisations or governments. Access to simulation models is wider, given that LEAP is available free under license, and EFFECT can be requested via ESMAP. However given their complexity it is still difficult to fully interrogate their assumptions, or even run the model without first undergoing some sort of training course. In the case of EFFECT an e-learning course is recommended, or a month-long part-time course facilitated by a World Bank expert. It is not something that can be mastered quickly by an interested policy maker that has limited Excel skills, or no experience of modelling. Furthermore no existing model has a front-end webpage that enables the user to carryout scenario analysis.
- iii. Peer review: All existing models benefit from some sort of peer review of their underlying data, however the scope of this review is related back to the level of accessibility of the model. Cost optimising models are often based on old data, and the sheer quantity of assumptions makes regular updates time consuming (it is possible to delve into their assumptions but there are so many that it is unlikely to be done by anyone other than a technical expert). Quantity of data is also an issue for the simulation models, although the fact that they are easier to obtain access to makes scrutiny and improvement of assumptions easier.
- iv. Society engagement: Given the black box nature of cost optimisation models there is little evidence of them being used to facilitate interactive stakeholder dialogues. The sheer amount of training required to run MARKAL means the group of people able to create their own scenarios using the model is necessarily small. Their use tends to be more for creating scenarios and data for reports which can be used to trigger a debate on low-carbon development – however this relies on stakeholders accepting these models as legitimate sources of evidence. EFFECT is used to create a dialogue between different government ministries in developing countries (India is a successful example of this) but again this requires a significant amount of training before representatives from each organisation are able to create their own scenarios. The lack of a front-end internet interface also means that a degree of experience working with Excel is required for this to be possible – excluding many individuals and organisations from participating.
- v. Low-Carbon Development co-benefits: Cost optimisation models provide detailed information on the relative costs of different low-carbon pathways, depending on the technology constraints and emissions reductions targets. LEAP provides results on local air pollution levels according to different energy and emissions

¹⁶ ESMAP website:

https://www.esmap.org/esmap/sites/esmap.org/files/DocumentLibrary/ESMAP_LowCarbonDevelopment_Planning_Tools_RES_IZED.pdf

pathways. EFFECT also provides data on other air pollutants relevant for local air quality.

Option 2 - DECC bilateral support – 10 Country Calculators

44. The 2050 Calculator has already been used by the UK government to inform the pathway analysis in the Carbon Plan which assessed how the UK would meet its fourth carbon budget whilst also meeting its 2050 target. Over a hundred expert stakeholders from business, academia, campaign groups and government were engaged during the model development phase, and for the first time all stakeholders have been able to use a readily-accessible common evidence base to engage in a debate about the options available to the UK over this time horizon. Unlike many models, the 2050 Calculator can be grasped in minutes by anyone with an internet connection and enables immediate exploration of different problems and questions, rather than requiring the commissioning of expensive and timely model runs. Since 2010 over 65,000 people have explored online their own vision for the UK future and the 'My2050' simulation has led to 14,000 individual submissions of pathways. It has received positive coverage in the UK media (FT, The Guardian, BBC, Press Association) and has been endorsed by prominent NGOs and Businesses (Friends of the Earth, ARUP, Atkins).
45. The DECC team that would lead the development of 10 Calculators has already successfully supported a team in Wallonia, Belgium, in developing their own working version of the model, which has been used to produce 2050 pathways for the region.¹⁷ They have also led work with the Energy Research Institute in China's NDRC to develop a Chinese version of the Calculator, which was launched in Beijing in June 2012. We would expect that taking forward the 2050 project would deliver a similar experience with 10 more countries.
- i. Modelling capability: Supporting 10 developing countries to develop their own version of the 2050 Calculator, would certainly add to the range of tools at their disposal. It would provide a further simulation tool, suitable for scenario analysis, which has been identified as being particularly useful for developing countries. Furthermore the proposal looks to work with national governments, with the focus on providing support for them to create their own version of the Calculator, using staff from within Ministries rather than looking to external consultants. Given that the model is open-sourced it will not only be used by governments, but will also ensure that research organisations, NGOs or private citizens can have access to the model.
 - ii. Accessibility: Accessibility and transparency are fundamental to the 2050 Calculator. It is fully open-sourced, and its web-based front-end means that users only need to be competent users of a web explorer to be able to use it. All of the assumptions are fully documented, either through easy to follow 1-page explanations, or in more detail in the Excel model which forms the basis for the calculations for the scenarios it generates. It has been praised for its openness by a range of organisations including the IEA, NGOs, and journalists.
 - iii. Peer review: Part of the development process of the 2050 Calculator includes carrying out extensive conversations with experts on the data used by the model, with a particular focus on the level based scenarios (1= no effort – 4=maximum technical potential or effort) that form the basis of the model. This is useful for improving the data, but also creates a support base for the methodology before it is launched. The simplicity of the model, and the comparatively low numbers of technologies it holds (130) make this an easier process to manage than updating EFFECT or MARKAL.
 - iv. Society engagement: The ability to engage non-technicians is perhaps the key strength of the 2050 Calculator. In the UK the tool has been used to engage local decision makers, politicians and even school children (through the development of a tool kit for school teachers). DECC's Chief Scientist David Mackay has led an

¹⁷ www.wbc2050.be/

interactive session with members of the public at the Hay Festival, where in one hour, they were able to come to a consensus on a low-carbon pathway. The Chinese government have recognised this strength of the Calculator too, and plan to use it as a training aid for senior government officials, and the South Korean team at Sejong University who are in the process of developing their own version plan to undertake extensive stakeholder activities using the tool in the second half of 2012.

- v. Low-Carbon Development co-benefits: Since its launch in 2010 the 2050 Calculator has been updated to include information on the impact that scenarios have on air quality and their respective costs. Work is underway on the UK version to explore the inclusion of water usage and impacts on biodiversity. The Chinese government has adapted its version to highlight the impact that scenarios have on the level of fossil fuel imports the country will require.

Option 3 – Develop a new tool

46. If existing modelling options are deemed to be insufficient to the Theory of Change we have outlined, then a third option would be to build a completely new tool better suited to delivering transparency, stakeholder peer review, dialogue and highlighting LCD co-benefits. There are a range of organisations that could take this forward, including ESMAP (developers of EFFECT), the Stockholm Environment Institute (developers of LEAP) or CDKN (given their extensive links with developing countries looking to develop low-carbon development plans).

- i. Modelling capability: Adding another modelling option, would certainly increase modelling capability in developing countries. However the main shortcoming of existing models was not their inability to model specific pathways or policy impacts, but rather that their complexity and lack of transparency acts as a barrier to having an inclusive dialogue on low-carbon development.
- ii. Accessibility: A new tool could certainly be as accessible and transparent as the 2050 Calculator, and there would be potentially further options to increase transparency either through further simplification of the choices available, or potentially by the use of other technologies to document even more clearly the assumptions that the tool uses.
- iii. Peer-review: Part of the design phase of the new tool, could involve extensive peer review from experts, and policy makers/stakeholders who could provide their views on what they would like to see the model focus on. However if the goal remains to do this in multiple developing countries it could make it difficult and costly for the organisation designing the tool to take into account varying priorities.
- iv. Society engagement: Again a new tool specifically designed with stakeholder dialogue in mind would be as strong as the 2050 Calculator.
- v. LCD co-benefits: Of the five outputs this is perhaps the area where a new tool could provide real benefits above and beyond the 2050 Calculator option. The Calculator focuses on a national level, meaning that it is less suited for more locally specific issues such as air quality or water usage. Adding the capability to more accurately account for local variations in water usage or air pollution would be an improvement, however this would have to be traded off against maintaining the simplicity of the tool.

47. There is only limited evidence available to test the validity of these assumptions, and therefore supporting this intervention will also serve as a test case. A similar style of intervention was the UK government support for the Regional Economics of Climate Change (RECCs) reviews which followed the methodology of the Stern Review, providing evidence of the economic impacts of climate change and the costs of mitigation for most global regions. In total around £3.6 million of HMG money was provided to support this work, which was carried out by a range of institutions

including the World Bank, and regional UN bodies, as well as local consultants and experts. The impacts of this intervention were difficult to measure, but the Mexican project was directly cited by Mexican President Calderon when announcing a long-term emissions reduction target. There are therefore examples of where support in the development of information and tools have had a direct impact on the approach of a national government.

Table – Evidence assessment of options

Option	Evidence rating
1. Do nothing counterfactual	<i>High – there is good evidence for the relative strengths and weaknesses of existing models, and that they are widely used by developing countries. There is also a good understanding of their relatively accessibility and ability to engage stakeholders.</i>
2. UK bilateral 2050 Calculator support – 10 countries	<i>Medium – there is certainly evidence of demand from developing countries for the Calculator, first from China, and then from the scoping exercise already carried out by DECC Strategy. There is less evidence of how a completed version of the Calculator will be used in these countries. China are planning to use it for more traditional modelling work, but also for training and wider stakeholder engagement. These results will only become clearer over the next year. The UK already has wide experience of using the tool for engagement as well as strategic planning.</i>
3. Build a new tool	<i>Low – Given that a completely new tool would need to be created for this option, there is little existing evidence.</i>

2.3 What are the costs and benefits of each feasible option?

Resource costs of options

The additional direct financial costs of each of the three options are as follows:

Option	Cost in £ over 4 years
1. Do nothing	£0
2. UK bilateral 2050 Calculator support – 10 countries	£1.55 million <i>Fully costed – full details in the financial case</i>
3. Develop a new tool	£1.97 million +. <i>At a bare minimum contracting a private organisation would increase the country cost of building a tool in each developing country as Option 2 does not include any DECC staff fees. The Belgian 2050 Calculator cost around £180k to build by a group of consultants, as opposed to the £137k budgeted here per country. However this involved following an open-sourced model structure, and with support from DECC.</i> <i>We have therefore assumed a minimum cost of at least £1.97 million which replaces the £137k with £180k. In reality significantly more would be required to pay for the model design.</i>

Benefits and disadvantages of options

48. The matrix below looks rate the three options against a range of criteria, that all feed into the Theory of Change, particularly on transparency and the ability to use the tools to promote a

stakeholder dialogue. We have also included whether the options have already been tested in a developing country context, as this will impact on their implementability.

		Additional cost	Scenario based	Open-sourced?	Can be used by non-expert?	User-friendly front end?	Stakeholder engagement	Used by developing countries already
Option 1 - Do nothing - Existing models	MARKAL	£ -	No	No	No	No	No	Yes
	LEAP	£ -	Yes	No. But under password protect, available free under license for developing countries	Requires training course.	No	No	Yes
	EFFECT	£ -	Yes	Model can be downloaded as a zip file after signing into the ESMAP webpage.	Requires e-training course.	No	Yes (following training course)	Yes
	MESSAGE	£ -	No	No	No	No	No	Yes
Option 2 - 2050 Calculator		£1,537,000	Yes	Yes - both Excel model, data and programming code for the webtool are open-sourced.	Yes. Webtool can be used without any training	Yes	Yes	Yes
Option 3 - Build a new simple open-sourced tool for developing countries		£1,970,000+ (does not include new tool design)	Yes	Yes	Yes	Yes	No	No

Option 1 - Do nothing counterfactual

49. Benefits: A clear benefit of Option 1 is that it does not require any new resources. There are a wide variety of existing models and tools that allow developing countries to undertake long-term analysis of their emissions and energy systems. The cost optimisation models provide information on the potential policy impacts of instruments such as a carbon tax, and the simulation models allow for multiple scenarios to be run to test out different hypothesis regarding the potentials of particular technologies. Research has shown that allowing developing to undertake this scenario analysis is particularly useful given the structure of their economy. There are already established expert communities to provide support to countries that currently lack access to these models, and many (e.g. EFFECT or LEAP) are available free of charge.

50. Disadvantages: The main disadvantage of continuing with the status quo is that current models are not accessible, particularly the cost optimising ones. Where the data is more transparent in the case of LEAP and EFFECT, these are still complex models that require lengthy training courses to be able to run. None of the existing tools provide a front-end internet based interface that can be used by anyone with experience of using a web browser. This feeds into the extent to which they can be used to facilitate a dialogue on low-carbon development with stakeholders, and to which they are able to clearly highlight the potential co-benefits of reducing emissions. Cost optimisation models are too complex to be understood by more than a small community of experts, and the simulation models, whilst slightly simpler to interrogate, still do not provide a tool that can be used without significant amounts of training.

Option 2 - DECC bilateral support – 10 Country Calculators

51. **Benefits:** The 2050 Calculator has already been tried and tested, both in developing and emerging economies. Its structure has been shown to be flexible (the Chinese have revised the Industry and Heat sectors to fit their local circumstances), and easy to adapt to another country (Sejong University in South Korea, have been able to deliver a working version of the webtool in less than six months). It also comes with an inbuilt process for sharing the data and peer-reviewing the assumptions to further enhance its transparency. It is well suited for scenario analysis, which has been identified as particularly useful for developing countries, and above all is extremely easy to use. It is the only model available of its kind that provides an intuitive front-end webpage, that can be used by groups, or individuals with little or no experience of climate change policy, making it ideal for facilitating a dialogue with a broad range of groups within a society. And it does this on the basis of sound analysis, with a structure that has been subject to close scrutiny in the UK.
52. The DECC team that would provide the support for this project, already have experience of supporting China, Belgium and South Korea in adapting the model to this methodology, and they have already conducted a scoping exercise to test demand for the Calculator in developing countries. Given the support of DECC staff, the project will not rely on consultants, and the focus is on supporting teams within developing country governments to create their own model, rather than just offering them something already built. The potential for a strong legacy after the end of the project is there, through improved in-government capacity.
53. **Disadvantages:** The 2050 Calculator alone should not be promoted as being the one tool that developing countries use to develop their low-carbon development pathways. It should be used in conjunction with cost optimising models, which offer their own insights particularly on policy choices. There is also the risk that the fact that the model was created by a developed country government may detract from its legitimacy in the eyes of stakeholders in the countries involved in this project. And there is a potential reputational issue for DECC if the models that are produced by developing country teams are not sufficiently analytically robust, or are incorrectly used as part of the policy making process.

Option 3 – Develop a new tool

54. **Benefits:** The clear benefit of developing a new tool is that it could be specifically adapted to the Theory of Change we have already outlined. By involving an institution which already has experience of working with developing countries this could serve to mitigate some of the disadvantages identified for Option 2. And by not directly involving DECC, there would be less reputational risk at stake for HMG.
55. **Disadvantages:** Developing something new, and then rolling it out to 10 developing countries would be considerably more expensive than Option 2. The cost estimate we have included here is extremely optimistic, as it does not include cost of designing a completely new tool. Commissioning another organisation to take forward this work, would also fail to capitalise on the success of the 2050 project in China, which was an extremely effective way of taking advantage of the in-country resources that the UK has invested on climate change and energy through the FCO's climate network. Another organisation might lack the in-country resources to ensure that not only was the modelling work done to a high standard, but that the results were communicated to a range of influential stakeholders.

2.4 What measures can be used to assess Value for Money for the intervention?

56. It is difficult to ascribe specific numbers to the three options such as tCO₂eq abated, jobs created or numbers of households connected to the electricity grid, given that a whole host of other factors would contribute to a government making a decision on low-carbon development. However a number of more qualitative measures related to the Theory of Change can be used to appraise the Value for Money of the intervention.

Value for Money indicator	Option 1	Option 2	Option 3
Builds developing country government capacity?	No	Yes	Maybe
Facilitates low-carbon dialogue?	No	Yes	Yes
Uses existing resources?	Yes	Yes	No
Uses consultants?	No	No	Yes
Enhances UK reputation as leader on LCD	No	Yes	Maybe

57. **Option 1** would not add to developing country government capacity to demonstrate the viability of low-carbon pathways, as it assumes that the status quo is sufficient. It would not provide additional tools or options for enabling developing countries to undertake an inclusive dialogue on low-carbon development. Given that it is a do nothing option, it would not involve using consultants, but would avoid reinventing the wheel by making use of existing resources. It would do nothing to enhance the UK's reputation as a developed country committed to supporting developing countries to achieve low-carbon development.
58. **Option 2** is a strong example of supporting developing countries build capacity, ideally within government, by providing them with a simple tool that can be easily updated beyond the lifetime of the project. It is also perfectly suited to facilitating a low-carbon dialogue. It builds on existing resources, that have been created independently of this project, and specifically focuses on not using consultants (developing country teams are expected to provide the majority of the staff time to create their model). It can also harness the UK's reputation as a leader on LCD.
59. **Option 3** could potentially improve capacity within developing country governments, depending on how the project was structured and whether the onus was on helping them to create their own tool, or just to provide them with a ready-made model. It would be well placed to facilitate a low-carbon dialogue. But it would be starting from scratch, and would most likely involve using consultants (DECC staff time in Option 2 would **not** be funded by the ICF). It could help to enhance the UK's reputation as a lead on LCD, but the branding would not be as strong as in Option 2, where there is a government to government working relationship.

2.5 Summary Value for Money Statement for the preferred option

60. Option 2, the preferred option, provides excellent value for money by building on existing knowledge, and a project structure that has already been tested in China. Given the relatively small sums required for each national level intervention (£137k), this represents good value for money.¹⁸ By making the most of teleconferences, Skype and email, travel costs are kept to a minimum; as are the use of consultants as DECC staff will provide the technical assistance for building the model. One of the goals of this project is to build capacity, not just deliver a ready-made tool developed outside of government. As set out in the next section, we aim to transfer the budget to FCO/FfID posts where possible, and we anticipate that this will help us to secure realistic on-the-ground assessments of the cost estimates we receive, as well as using their existing project management structures to help with the monitoring and reporting necessary to account for spending. This will give us more robust local information about likely costs and bolster our ability to challenge national government teams, where necessary, over cost estimates provided.
61. Comparing the budget with the costs of the already completed, Regional Economics of Climate Change studies, Option 2 is around a third less expensive, whilst providing a similar geographic impact. There is also perhaps more scope for the Country Calculators to continue to play a role long after they are launched if they are used for policy making exercises and continued

¹⁸ The Belgian version of the 2050 Calculator currently being developed by consultants is expected to cost around £180k and this does not include the capacity building aspects of this project, and requires none of the travel costs given that the consultants are based in Belgium.

engagement activities. As already outlined, we would like to conduct further work to determine the nature of the Global Calculator, and will submit an update in autumn to reflect this work.

3 Commercial Case

Direct procurement

3.1 Clearly state the procurement/commercial requirements for intervention

62. The project will be managed by a small team in DECC's Strategy Directorate who will be responsible for all procurement and contractual issues arising over its lifetime. The annual budget as set out in the forecast would be transferred to Strategy Directorate's cost centre under a separate project code. We have already confirmed with DfID's ODA statistics team that this project fits their ODA criteria providing that the countries that participate fit on the OECD DAC list. This is because it will contribute to capacity building in these countries, which clearly is to the economic development and welfare of recipients.
63. 10 Country Calculators: It is proposed that the funding of each of the country calculators be awarded by way of an accountable grant, as this is contributing towards research and development that will be made publically available (given the open-sourced nature of the 2050 Calculator).
64. There are three main delivery options for this, outlined here in order of preference.

- **Devolve to Post (FCO/DfID)**: Where possible we will look to transfer the country level budget for each of the 10 Calculators to the FCO/DfID post. This will facilitate our interface with national actors and payment systems, and will also bind the post into the successful delivery of the project (vital as we look to maintain long-term political support for the work). DECC will retain Accounting Officer responsibility for the project (made clear in the MoU), and will receive monthly updates from Post on progress made against objectives, actual spend to date and projected spend. Funds will be transferred following an invoice for activities carried out, either monthly or following key activities (to minimise administrative costs). These updates will be used to inform DECC Strategy's monthly reports to the ICF team on actual spend, forecast and milestones reached.

At the beginning of each national calculator project, we will work with the FCO/DfID in-country team to determine the area of government most suited to taking forward work on the Calculator, and make the best use of their local knowledge to determine how capable they are both in terms of data availability and staff time. This will form part of our selection criteria for which countries to include in the list of 10 countries, to avoid working with government teams that are either not sufficiently committed to the project, or are so lacking technically that this project model will not work.

Before entering into this relationship DECC Strategy will discuss the drafting of the MoU with colleagues in DECC finance, procurement and legal. The FCO/DfID would provide payment according to their standard procedures (i.e. following an invoice and the completion of the given activity), and will ensure that they follow their standard procurement practices used for other projects.

- **Regional body**: In the case of South East Asia, we have begun discussions with the Asian Development Bank, who are interested in including our work on the 2050 Calculator as part of a wider project they are taking forward with five countries (Indonesia, Thailand, Malaysia, Philippines and Vietnam). Where these regional structures exist, and UK Posts are not resourced, we look to transfer the budget to the regional partner under an MoU. Monthly reporting against objectives and actual spend, will be used to inform DECC Strategy's submissions to the ICF team. Payments will be made following an invoice, upon the completion of project milestones.

Before entering into this relationship DECC Strategy will discuss the drafting of the MoU with colleagues in DECC finance, procurement and legal.

- **Other third party organisation (university, think tank):** In the event where a national government lacks the direct capacity to carry-out the detailed modelling work needed to produce a working version of the Calculator, we may look to work directly with a research institution such as a university or think tank that has the capability to take forward the technical aspects of the work. This would involve a establishing an MoU with the research institution, and ideally the national government as well. Where institutions are within the EU then we will need to be mindful of State Aids issues when selecting partners.

Before entering into this relationship DECC Strategy will discuss the drafting of the MoU with colleagues in DECC finance, procurement and legal.

Whilst each country project will differ given national capabilities we envisage that the breakdown of spend will be as follows. This follows the project structure used with the Chinese:

Activity	Cost (£)
<p>DECC staff kick-off visit (2 staff for a week) Detailed teach-in sessions to the already established project team (prior skype sessions and contact with the FCO are required to maximise the impact of this visit), on how to structure their work, what data should be collected, and how to ensure that they are following the Calculator methodology. Covers flights, accommodation, and workshop costs. All travel will be made in economy class</p>	9,300
<p>Visit to London of lead programmer (1 week) Given the complexity of converting the Excel work into the programming language required the webtool our experience is that a full week of face-to-face contact with DECC modellers is needed to deliver a working webtool. Covers flights and accommodation. All travel will be made in economy class</p>	2,000
<p>Stakeholder workshops * 8 It's the responsibility of each core country team to develop the initial figures that go into the Excel sheets for the range of technologies and behaviours included in the Calculator. However it is equally as important that these numbers are scrutinised by experts from other government entities, business, think tanks and academic institutions. Covers eight day-long workshops with small groups that will focus on specific sectors of the Calculator e.g. energy supply conventional, energy supply renewables, energy demand, transport and agriculture/forestry.</p>	10,000
<p>Director level visit to London (4 people - 1 week) Experience from our work with China suggests it is important to re-engage high level participants in a Calculator project, as it comes to its conclusion. All travel will be made in economy class.</p>	10,000
<p>Launch event in country (2 DECC staff + event) Again following the Chinese example, it proved extremely useful to have a DECC presence at the official launch event of their Calculator. DECC staff were able to explain how the UK had used its model for policy making, and how it has been developed and refined since its first launch. DECC staff will also use the trip to provide training to government staff in how to facilitate stakeholder events using the model using techniques developed during the UK's use of the Calculator, and will provide similar training for FCO/DfID in-country staff so that they are able to include the Calculator in future projects.</p>	6,000

Covers flights, accommodation and event costs. All travel will be made in economy class	
<p>Personnel costs for in-country staff</p> <p>This represents a threefold increase on the staff costs incurred in the Chinese project. The ERI was prepared to devote considerable staff resource time to producing their Calculator (one full time modeller and three workstream leaders). They were able to do this as they frequently host recent graduates in long term internship programmes. We estimate that other countries may not be able to rely on such a structure, and we have therefore increased the budget for personnel costs. Given that each project is expected to take a least a year to complete this could be used to finance two to three year long secondments into the government team carrying out the work. Covers salary costs of two to three secondees.</p>	59,400
<p>Communication workshops</p> <p>This was not included in the original FCO budget for the Prosperity project in China, but has been included to provide a small amount of resource to support further engagement using the tool, beyond the national launch event. There would be no involvement of DECC staff, but FCO/DfID in-country who participated in the previous facilitation training workshops could attend. It will aim to provide bespoke sessions for influential groups such as business, NGOs, parliamentarians, journalists and youth groups. In some countries where federal structures make regions particularly influential, these could also be included. Covers the costs of staging at least five events.</p>	10,000
<p>My 2050 (software for public engagement)</p> <p>Converting the excel data into an even more simplified simulation than the webtool opens up further opportunities for expanding the audience of the work.. The UK version of the My2050 flash player site cost £60k to develop, and we have obtained a quote from the same company who could adapt this work for another country for £30k.</p>	30,000
Total	136,700

65. Global Calculator: Currently we envisage that model development work will be undertaken by a small number (~5) of targeted secondments with key institutions that have the technical capacity and credibility to support a successful Global Calculator. We are currently proposing that these secondments are supported through a direct relationship with these institutions potentially providing grant funding for that body to recruit individuals to take this initial work forward. There may be the potential at subsequent stages to tender commercially for specific parts of the engagement or communications activity. As stated already, we will provide the ICF with the results of our detailed scoping work on the Global Calculator in autumn 2012.

3.2 How does the intervention design use competition to drive commercial advantage for DECC?

66. One of the main selling points of this project is the creation of capacity directly within developing country governments to develop and manage their Calculator. Therefore the scope to use competition will be limited as the partner organisation in most of the countries will be the national government, or an organisation that they have selected to support them in the delivery of the model.

67. However for the development of the My2050 simulation that will be part of the offer to each of the 10 countries there are opportunities to obtain savings through the appointment of one software developer on a call-off basis to deliver a bespoke country version. This should provide economies of scale, both in terms of price and administration costs, as it will negate the need to go out for tender on an individual country basis for a service which is relatively similar.
68. For the Global Calculator, whilst initial development work is likely to be through a direct relationship with key institutions with the correct mix of skills and international credibility, there may be the opportunity for subsequent sections of engagement and outreach work to be tendered commercially.

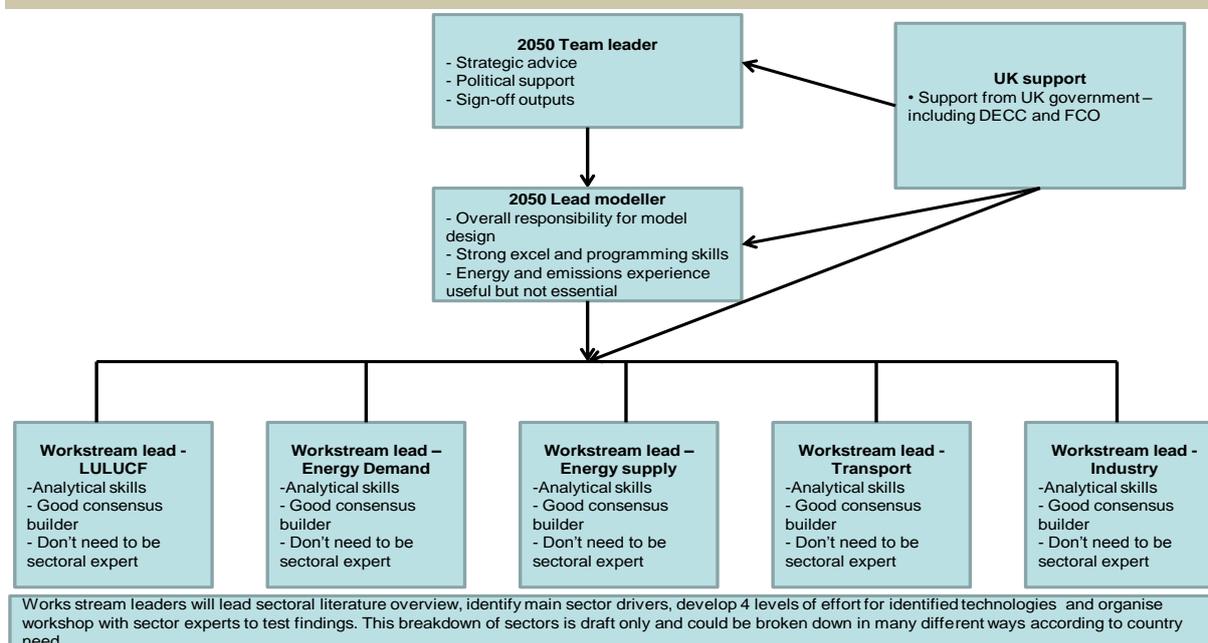
3.3 How do we expect the market place will respond to this opportunity?

69. The UK version of My2050 was developed by [Delib](#) who we would anticipate applying for any future opportunities in this area. However there is also a strong argument for identifying in-country software developers who would be able to adapt the My2050 idea to their own national culture – particularly in countries so culturally different such as China. There therefore is likely to be competition between an experienced UK developer of the service, and in-country developers who may be better placed to target their own domestic market.
70. Any procurement carried out with an EU supplier will need to be mindful of State Aids rules, and we will liaise with DECC procurement and legal advisors nearer to the time of commissioning this work. Given that the Flash player element of the tool is developed right at the end of each national Calculator project, we are not in a position to be more precise on what the most appropriate option for each country will be at this stage.

3.4 What are the key cost elements that affect overall price? How is value added and how will we measure and improve this?

71. At a project level the main impact on the overall price is the number of national Calculator's we look to support. The easiest way to influence the budget would be to scale up or down the number of countries we look to include.
72. At a country level the biggest element of cost is the £60k of personnel costs (as previously mentioned the Belgian Calculator was delivered for almost three times this). We will consult with FCO Posts or our national partner to make sure that the costs we incur in terms of personnel are reasonable for the country in question – taking a benchmark from previous HMG projects where possible.
73. The organogram below provides an example of the team structure, shape and skills set needed to take this project forward, requiring between 4-7 members of staff over the course of its lifetime. Each country budget only includes the funding to support the secondment in of 2-3 members of staff to deal with resource shortages, meaning that there is the implicit need for each developing country to contribute staff resource to the project. This will be one of the criteria for the selection process taken forward by the project steering group.

Draft project team example



3.5 What is the intended Procurement Process to support contract award

74. In the case of funds transferred over to FCO Posts these will be administered according to FCO procurement rules and are auditable by the NAO. Regional development banks will also have to abide by their own procurement rules.

75. Where we engage in bilateral relationships with a particular research institution Strategy Directorate will be bound by DECC's procurement rules.

3.6 How will contract & supplier performance be managed through the life of the intervention?

76. The majority of the work in this project will be directly carried out by DECC Strategy staff (see organogram in section 5). Therefore performance will be managed via the standard DECC appraisal process.

77. The main instances where this will not be the case will be in the specific instance where DECC and the national government in question agree to bring in additional technical capability (e.g. workstream leader on the power sector or lead modeller) to help in the development of their Calculator. In these cases we will establish a payment/performance system based on results – in conjunction with the national/regional partner that we are working with (e.g. FCO Post or regional body). For example in the case of a lead modeller responsible for delivering a country Calculator this would be structured as follows:

- 1st payment – After 3 months and completion of draft excel spreadsheets
- 2nd payment – After 6 months and development of webtool
- 3rd payment – After 10 months and the national launch of the tool

78. We will work with our national partners to ensure that these performance milestones are met – and will be clear before entering into an agreement with a secondee that payment will be contingent on results agreed at the start of the project. Similar agreements will be drawn up with secondees undertaking other responsibilities. Where possible these arrangements will be written into the MoU signed at the beginning of the project. As already stated we will clear all MoU's with DECC finance and legal before sharing them with national government partners.

4 Financial case

4.1 What are the costs, how are they profiled and how will you ensure accurate forecasting?

79. The total costs on an activity basis over the three years of the project are:

Activity – National Calculators. ¹⁹	Cost (£)
DECC staff kick-off visit (2 staff for a week) ²⁰	9300
Visit to London of lead programmer (1 week)	2000
Stakeholder workshops * 8	10000
Director level visit to London (4 people - 1 week)	10000
Launch event in country (2 DECC staff + event)	6000
Personnel costs for in-country staff (3 times Chinese costs)	59400
Communications workshops	10000
My 2050	30000
Total	136700
Number of countries	10
Activity	Cost (£)
Personnel costs - for support from Chinese and Belgian teams	20000 ²¹
2050 Beijing meeting hosted with China	50000
External evaluation	50000
International conference to present findings	70000
Total	190000
Activity – Global Calculator	Cost (£)
Secondments	300000
Travel	50000
Web-design	100000
Communication	100000
Total	550000
GRAND TOTAL	2107000

80. This represents a small increase of £110k from the Concept Note which received approval in April 2012. During the additional scoping work that we have undertaken when putting together this Business Case we have made the following changes:

- **Communications workshops:** To increase the ongoing use of the Calculator as an engagement tool, this will provide each national team with £10k for targeted events aimed at influential constituencies e.g. journalists, parliamentarians, business groups and NGOs.
- **BRICS conference:** We have already received an initial quote for the costs for the conference from the Chinese government, which puts costs at £60k. We had originally budgeted £40k, and are working hard with the FCO in Beijing to negotiate this figure down, but have revised the cost of the conference to £50k.
- **International conference:** Given the revised cost of the BRICS event, and that this final conference will potentially include both the 10 country teams, and organisations involved in the Global Calculator we have increased the budget here from £40k to £70k.

¹⁹ All travel undertaken as part of this project will be in economy class and best value for money.

²⁰ Travel by DECC members of staff will only be supported by this project where there is a clear benefit from them being in the country (e.g. increasing the amount of government staff who are trained in understanding how the model is structured).

²¹ The project will not involve any payments to support work in non-ODA recipient countries, and will not support the Chinese 2050 Calculator, which has already been built. A small amount of the budget has been earmarked to fund small amount of technical support from the teams in Belgium and China who have already built a Calculator, to support developing countries in taking forward their own project.

81. The costings for the Global Calculator will be revised upon the completion of the scoping exercise.

And this is profiled on the following basis:

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
2012	0	0	0	141133.3333	141133
2013	296583.33	387716.7	225450	342150	1251900
2014	205450	205450	114316.7	188750	713967
				Total	2107000

82. For a full outline of the how the budget has been profiled please refer to budget spreadsheets that have been sent with the Business Case. Broadly speaking the bulk of expenditure (over 50%) is expected to take place in Year 2 of the project, when the majority of the country cooperations will be delivered. There is uncertainty at this stage of what the profiling for the Global Calculator will be, and the scoping work here will confirm this in autumn.

83. We will ensure accurate profiling through the sequencing of the country interventions, and through the monthly reports that we will receive from FCO/DfID or regional bodies that we will work with on a country basis. Travel of DECC staff will be paid for by the FCO/DfID or regional bodies on an up-front basis, only where they deem it necessary for the success of the project. All travel will be economy class and best value for money.

84. We acknowledge there is some uncertainty about the exact timings of the spend in relation to different country calculators, as each case will require support for different aspects of the work and timings may be slightly different for each calculator. A high level project plan shows phases of the work, and has timed checkpoints included, so that we will be able to advise the ICF team in a timely manner of any likely underspend from each workstream.

4.2 How will it be funded: capital/programme/admin?

85. The whole of the project will be classed as programme spend, requiring an R-DEL swap with DfID who have already been notified of this need.

4.3 How will funds be paid out?

86. The method of the payment of funds will depend on the project management structure adopted in each country. We anticipate the following:

- **Devolve to Post:** Transfer of funds to FCO or DfID in-country office upon an invoice basis, following the realisation of activities (e.g. workshops) or milestones as agreed in the MoU.
- **Regional body:** Transfer funds to the regional body on an invoice basis, following the realisation of activities (e.g. workshops) or milestones as agreed in the MoU.
- **Research institution:** Transfer funds to the research body on an invoice basis, following the realisation of activities (e.g. workshops) or milestones as agreed in the MoU.

4.4 What is the assessment of financial risk and fraud?

87. For the first two options the risk of fraud is deemed to be very low given that Posts are part of HMG and abide by strict accounting procedures, and regional bodies such as development banks have strong track records managing projects in their respective regions.

88. The risk of fraud is higher where a direct relationship with a research institution is entered into, but this will be mitigated by DECC managing the dispersal of the national level budget according to DECC procurement rules, and by staggering the payments of staff costs on a performance related basis which will be outlined upfront in the MoU. Ultimately we will need to treat any national interventions that follow this model on a case by case basis, making sure that the MoU and

procurement arrangements are scrutinised and viewed as appropriate by DECC legal and procurement.

4.5 How will expenditure be monitored, reported, and accounted for?

89. Expenditure will be monitored in two ways. First, we will supply monthly updates via the ICF's tracking tool for actual and projected spend of the entire project. We will also ensure that the ICF funds are incorporated into Strategy Directorate's overall submission of financial reports and forecasts.
90. To provide the underlying information to inform our overall project reports to the ICF, we will require each national level partner (be it FCO/DfID, a regional organisation or a research organisation) to provide a monthly update on actual spend undertaken, milestones completed and projected spend for the remainder of the project. This will be used to feed into a tracking tool developed by the DECC Strategy team which will keep an overall record of actual/projected spend for the project.

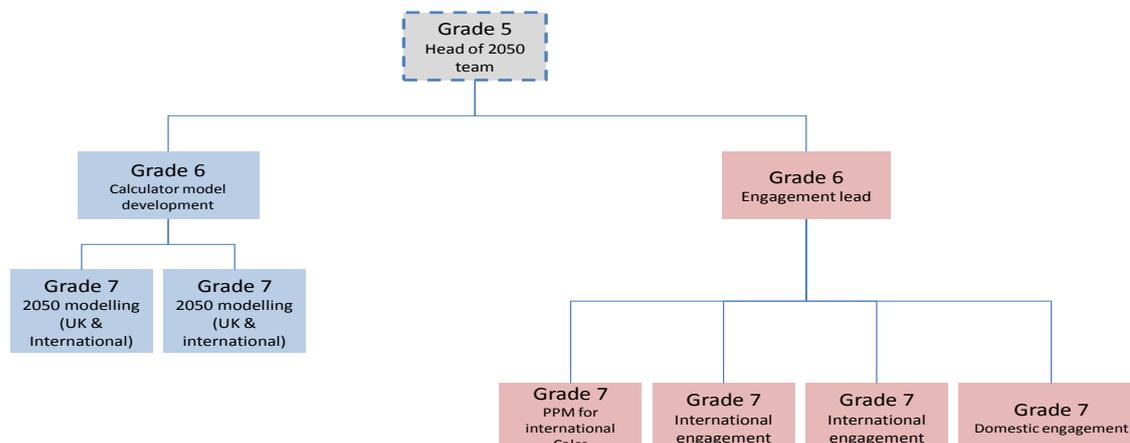
5 Management Case

5.1 What are the Management Arrangements for implementing the intervention? What are the risks and how these will be managed?

Programme management

91. The 2050 Calculator team in DECC Strategy is structured according to the organogram below. Overall leadership will come from the Grade 5 2050 team leader in DECC Strategy who starts with the team in September (he has already played a key role in the development of the China project). He will be supported by project leads for the county Calculators and for the Global Calculator, should we decide to go ahead with this..
92. The 10 Country Calculators will be led by three Grade 7 workstream leaders –who will divide the workload between them – each leading on around three countries each. They will also be responsible for project management tasks such as communications, financial MRV and updating progress against the project plan.
93. The workstream leaders will be supported in the delivery of the 10 Country Calculators by two Grade 7 modellers who will provide technical support across the 10 country interventions both in terms of developing the excel model and converting this into the webtool.
94. The scoping exercise for determining the Unique Selling Point of the Global Calculator, will conclude in autumn 2012. This will not use any of the budget outlined in this ICF proposal and will return with a more detailed outline of what the Global Calculator will showcase, how it would be delivered and what the budget will require.

The 2050 Calculator team is structured as follows



95. The project plan outlines how the work on the 10 Country Calculators will be staggered over the course of the project. Broadly each country intervention will move through three stages (again based on our experience with China). These broadly consist of:

- i. **Stage 1 - Engagement:** Create demand for the Calculator. Work with FCO/DfID to build up project team. Sign MoU.
- ii. **Stage 2 - Technical Support:** Technical training on modelling technique. Development of model and webtool. Set-up stakeholder consultation phase.
- iii. **Stage 3 – Communication:** Promote the Call for Evidence process. Launch the model and drive interest in it with key stakeholders, learning from UK experience. Launch event. Development of My2050 style version.

96. There will be two rounds of country level partnerships, starting with the countries that have already been identified as priorities. A second round will then follow in 2013 to ensure that the DECC team is not trying to spread itself too thinly across 10 countries at the same time, and to allow the second round countries to benefit from work already undertaken. All country calculators should be completed by mid-2014 well before the key round of negotiations in 2015.

Governance

Country Calculators

97. The country calculator section of the project already has a steering group that has met to discuss country prioritisation. It is made up of the following officials:

- Director, Strategy Directorate - DECC
- Head of 2050 team - DECC
- Deputy head ICF team – DECC
- Senior policy advisor, ICF team – DECC
- Head of international engagement– DECC
- Energy Advisor – DfID
- Economic Advisor - DfID
- Senior Strategy Advisor, Strategy 2050 – DECC
- Senior policy advisor, Strategy 2050 – DECC
- Senior policy advisor, Strategy 2050 – DECC
- Senior policy advisor Strategy 2050 – DECC
- Policy Officer, Climate and Energy - FCO

98. All major decisions regarding the country calculators e.g. selecting additional countries, will be cleared through this group, as well as providing a forum for updates on progress and management of the risks outlined below. We aim for this group to meet quarterly to assess progress/select new countries. It may be convened to take key decisions outside of this quarterly timetable.

99. Day to day programme and financial management will be undertaken by the 2050 team, and reports will be presented to the steering group. There will also be a written agreement between the DECC Director General for International Climate Change and the DECC Director for Strategy to transfer the budget to DECC Strategy Directorate – outlining that Director for Strategy will act at the SRO for the project. A smaller executive committee will be convened on an ad-hoc basis to respond to major risks to the project identified by the steering group. These would include an increase in any of the risks outlined in the risk section, or if one of the national Calculators falls significantly behind on the three phases outlined in Annex 1.

100. Options for escalating and treating risk include:

- i. **Political:** Escalating the concern at a higher official level – via FCO/DfID in-country teams, who we will be working closely anyway. This could include intervention up to Ambassador level.

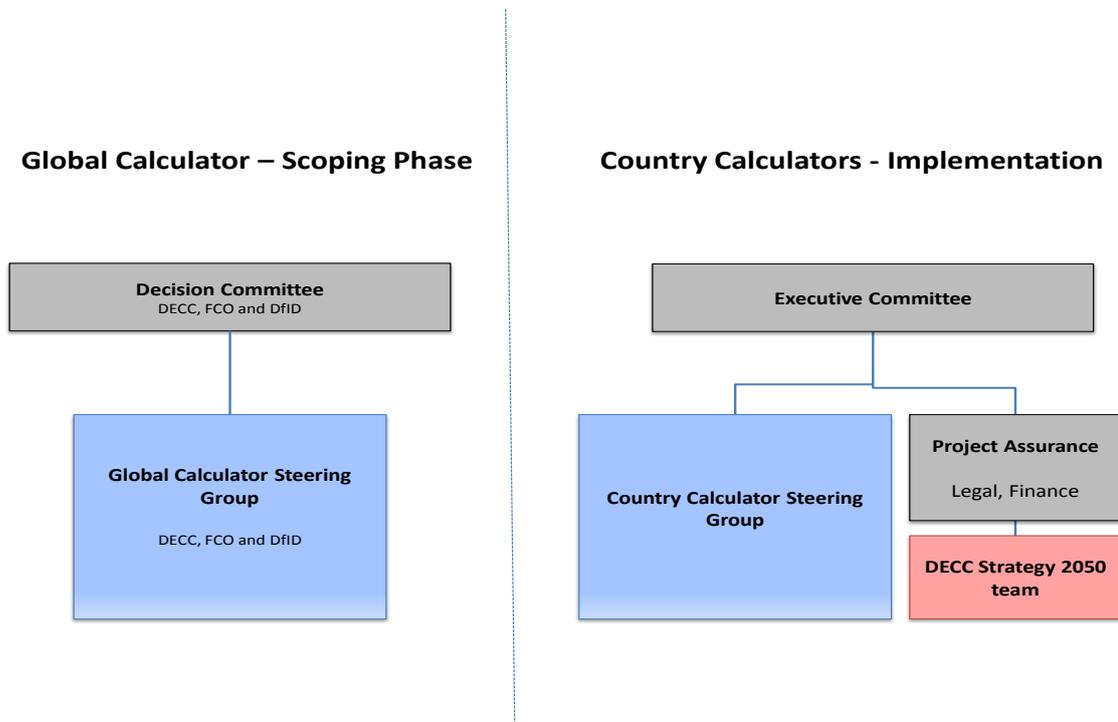
- ii. **Technical:** Bringing in additional technical advice, either to peer-review findings or to advise on where to source data from. This could potentially draw on expertise from within DECC, other UK research institutions (we have already worked with Grantham on the Chinese Calculator) or individuals or organisations within the country (chosen by FCO/DfID).
- iii. **Financial:** Withholding payment where project milestones are not reached, or where the outputs are not of sufficient quality.
- iv. **Withdraw:** Where all other avenues have been explored it could be decided that there is no way of completing a national Calculator to a satisfactory standard. At this point DECC could decide to terminate the cooperation.

Global Calculator

101. Over the course of the scoping phase of the Global Calculator a working group made up of staff from DECC Strategy Directorate will be responsible for providing a more detailed case for the global model.

102. One of the recommendations of the group will be the best governance structure (which will in part depend on the nature of the project). But we envisage a similar structure to the Country Calculators, (possibly involving external organisations in its steering group), particularly if they are providing secondees for the project. The steering group will present the results of their scoping to a Decision Committee comprised of the DECC’s Director of Strategy, Chief Scientist, Chief Economist, Director for Energy Markets and Infrastructure, Director for International Climate Change and Grade 5 representatives from the FCO and DfID’s climate change teams who will then take a view on whether the Global Calculator work should be taken forward.

103. The following graphic outlines the governance structures for both elements of this project:



Risks

104. At a high level the risks associated with this project are:

- **Lack of national capacity:** Countries cannot finish their 2050 Calculator because of a lack of data, skills or resources, meaning it cannot influence their low-carbon development plan.

Mitigation strategy: Critically appraise national capability, with help from FCO/DfID, as part of the country selection process. Utilise the skills of countries that have already built a Calculator (e.g. China, Belgium and South Korea), to provide short cuts and adaptations to the model. Flexibly use each country budget, substituting spend on personnel costs to buy-in data where proven benefit. Encourage countries to make call for evidence phase as open as possible to benefit from existing work outside of government.

- **Transparency**: Countries initially embrace the open-sourced nature of the 2050 Calculator but then refuse to publish their data, meaning that whilst it may influence government policy, its use as a stakeholder engagement tool is lost.

Mitigation strategy: Highlight transparency as a key project goal in initial discussions with countries, and include specific language in MoU. Work with FCO/DfID to ensure that project continues to have political support throughout its lifetime, and this high-level buy-in extends to making the work transparent.

- **Poor communication**: Countries deliver technically sophisticated 2050 Calculators but these are poorly communicated and are not used to influence policy.

Mitigation strategy: DECC Strategy will provide advice on how to conduct the stakeholder engagement process, and give ideas for engagement based on the UK experience. FCO/DfID posts will use their communication networks to provide further leverage. We have also increased the budget for each national Calculator to provide financial support for communications activities in addition to support for the Flash player version of the model which is an effective communication tool.

- **Political risk**: Political interference causes biased use of data within a country's Calculator to advance a particular agenda.

Mitigation strategy: FCO/DfID engagement helps to spot risk early making sure that this is part of the due diligence process that goes into selecting the teams in developing country governments that are supported by this project. Where a team has a track record of not providing analytically credible work in the past, this should be carefully considered by the project steering group and FCO/DfID advice should be sought on whether to proceed. Once a project is nearing its completion we will use external organisations to provide additional peer review of results ahead of their national launch, as part of a quality assurance process, and encourage transparency to make manipulation of data harder to justify. The MoU will contain a disclaimer that DECC reserves the right not to endorse the final product as being analytically credible. In cases where there is significant concern of a biased use of data, a decision could be taken to pay for the view of independent experts to provide an alternate view of what data should be used. Where concerns still remain on the underlying data being used in a country's Calculator we will work with our steering group on a communication strategy, and will keep colleagues in DECC International and Press Office updated.

5.2 How will progress and results be monitored, measured and evaluated?

105. Project success should be measured against the extent to which it delivers against the following ICF key performance indicators (KPIs) and the logframe is shown in 5.3:

- i. Level of integration of climate change in national planning as a result of ICF support
- ii. Level of institutional knowledge of climate change issues as a result of ICF support
- iii. Extent to which ICF intervention is likely to have a transformational impact.

Process

106. Using the methodologies worked up by the ICF team we will conduct a baseline review of the status quo for each of these three indicators for each of the 10 countries building their version of

the Calculator. This will be done with the in-country partner (FCO/DfID, a regional organisation or a third party research organisations) to ensure an impartial and knowledgeable assessment. We will include wording in the MoU to highlight that their support will be required in carrying this out. We will also look to supplement this with an external evaluation of the project, given advice we have received from the ICF approvals panel. The structure of this external evaluation will be determined following advice from the successful company in DfID's current search for a supplier of external monitoring and evaluation services, which is due to culminate in September 2012.

107. We will revisit the baseline score one year after the public launch of each national Calculator, in order for it to be given some time to bed into to both low-carbon development planning, but also to be used widely as an engagement tool. And we will look to complete a final evaluation two years after the public launch. By conducting this across everyone of the 10 countries included in this project, we will be able to provide an average score for the overall success of the intervention as rated against these three KPIs.

108. Given that the methodologies for the qualitative KPIs have only just been completed, we will work with DfID, and particularly the supplier of monitoring and evaluation services that will be identified by the end of September, to ensure that our baseline review is compatible with the overall approach that ICF is looking to take to evaluating in these areas. We will look to rely on the local knowledge of our in-country partner, but will also expect them to provide testimony from stakeholders not directly involved with the development of the Calculator, to ensure that where judgements are subjective they are done from as an impartial position as possible.

109. Our experience using the UK Calculator also suggests that there may be some examples of quantitative data that can also be useful for measuring the degree to which the Calculator has been used as a successful engagement tool. The following statistics will also be compiled with the help of our in-country partners as part of the one and two year on evaluations:

- How many hits has the webtool received?
- How many submitted pathways on the Flash player version?
- How many articles, both in the media and academic, cite the Calculator?

For each of these metrics we have the example of what was achieved in the UK, which whilst not necessarily a benchmark for success, can be used as a indication as to the degree to which the Calculator has had an impact.

110. Key milestones are:

- September 2012: Meet with DfID contracted monitoring and evaluation consultant to scope out method for evaluating this project against the ICF KPIs.
- October 2012: Have a worked up plan for how monitoring and evaluation will be carried out for Phase 1 countries, and identify process for contracting external evaluation for this project.
- December 2012: Select external evaluator.
- At the end of each country calculator project a short evaluation piece should be carried out according to the methodology agreed in October 2012.

5.3 Logical Framework for International 2050 Pathways Partnerships

Impact Indicator 1		Baseline	Milestone 1	Milestone 2	Target (date)		
Countries not included in this intervention look to adopt the Calculator methodology	Planned	Belgium and South Korea have copied the UK methodology with minimal support from DECC	Another funder offers support to other developing countries to produce a Calculator	3 other developing countries adopt the methodology.	Milestone 1 - 2014 Milestone 2 - 2016		
	Achieved		2014	2016			
		Source					
Impact Indicator 2		Baseline	Milestone 1	Milestone 2	Target (date)		
Countries involved in the intervention use their Calculator as a tool for communicating their Low Carbon Development plans in international fora.	Planned	Only the UK does this at the moment	4 Countries participating have achieved Indicator 2	6 countries participating in this project have achieved Indicator 2.	Milestone 1 - 2015 Milestone 2 - 2016		
	Achieved		2015	2016			
		Source					
Outcome Indicator 1		Baseline	Milestone 1	Milestone 2	Target (date)		Assumptions
National Calculators are widely cited in the press and academic literature as bringing a new perspective to the way the country thinks about its energy and emissions challenges over the next 40 years.	Planned	Low levels of public debate and consensus on future energy and emissions pathways	4 countries participating in the project have achieved Indicator 1.	6 countries participating in this project have achieved Indicator 1.	Milestone 1 - 2014 Milestone 2 - 2015		
	Achieved		2014	2015			
		Source					
Outcome Indicator 2		Baseline	Milestone 1	Milestone 2	Target (date)		

National Calculators are also actively used within government both for internal analysis and decision making, but also in public policy statements and to engage with important stakeholder groups	Planned	Some developing countries lack robust public facing tools that can be used to communicate energy and emissions pathways	4 countries participating in the project have achieved Indicator 2.	6 countries participating in this project have achieved Indicator 2.	Milestone 1 - 2014 Milestone 2 - 2015
	Achieved		2014	2015	
	Source				

Output Indicator 1.1		Baseline	Milestone 1	Milestone 2	Target (date)	Assumption
10 countries have developed an open-sourced version of the 2050 Calculator - complete with well documented excel spreadsheets and webtool. This is published on government websites and open to all.	Planned	Chinese government has developed a 2050 Calculator	4 countries participating in the project have achieved Indicator 1.1	10 Countries have achieved Indicator 1.1	Milestone 1 - 2013 Milestone 2 - 2014	
	Achieved		2013	2014		
	Source					
DECC Research						
Output Indicator 2.1		Baseline	Milestone 1	Milestone 2	Target (date)	Assumptions
High level visit to London from senior officials in each country to learn how to use the tool for policy making and engagement.	Planned	Only China has done this.	4 countries participating in the project have achieved Indicator 1.	10 Countries have achieved Indicator 1.	Milestone 1 - 2013 Milestone 2 - 2014	
	Achieved		2013	2014		

Annex 1: Work Package Template for 2050 Calculator Country Engagement

	Task List (52 weeks)	Duration (Weeks)	Engagement	Technical	Legal /Finance
	Phase 1 – Engage (16 weeks)				
1	Contact DFID/FCO in country	1	Y		
2	Work with DFID/FCO to identify possible partners at a political level	2	Y		
3	Work with DFID/FCO to find partners at a technical level	2	Y		
4	Hold initial Conference call with potential partners to explain 2050 Calculator concept	1	Y		
5	Allow country to consider proposal and research status of potential partners	2	Y	Y	
6	Conference call to discuss potential requirements of country partner	1	Y	Y	
7	Agree financial arrangements with FCO, negotiate MoU with Country	4	Y		Y
8	Review proposal ahead of agreement	2	Y		
9	Sign MoU	1	Y		
	Phase 2 – Technical Support (26 weeks)				
7	Prepare for modelling trip	1	Y	Y	
	Outward Modelling visit to country	1		Y	
8	Support development of model structure	4		Y	
9	Support development of model ambition levels	4		Y	
10	Review first excel version	2		Y	
11	Stakeholder workshops	8	Y	y	
12	Inward visit to develop webtool	1	y	Y	
13	Debug webtool	4		Y	
14	Working Webtool for review	1	Y	y	
	Phase 3 – Communicate (10 weeks)				
15	Stocktake on communication plan – Conference call	1	Y		
16	Inward mission to UK	1	Y		
17	Prepare for Launch event	5	Y		
18	Launch event	1	Y		
19	Decide on level of ongoing support	2	Y		
20	Formal Project Close				