

Carbon Assessment Workshop Proceedings

1. Introduction

Following the announcement in the 2007 Scottish Budget Spending Review, the Scottish Government is committed to developing and implementing a framework and set of tools to assess the carbon impact of individual Scottish Government policies, programmes and projects, and the carbon impact of total Government spend. This commitment is being taken forward through the Carbon Assessment Project.

The overarching aim of the project is to put an assessment of carbon impact at the heart of government decision-making to support a reduction in emissions in line with carbon budgets and the longer term aim of an 80% reduction in Scottish Greenhouse Gas emissions by 2050.

There are three components to the work. The first component is a project to develop and refine a methodology to assess carbon emissions related to individual policies, programmes and projects. The second component is a methodology to assess of the carbon impact of total Government spend. Lastly there is the work that will develop a mechanism for using individual and high level carbon impact assessments to drive down emissions attached to government spend.

PricewaterhouseCoopers ('PwC') were commissioned to take forward the work on the high level assessment of the carbon impact of Government spending and to develop a framework for using the high level assessment to reduce emissions.

As part of this work, the Scottish Government held a 2 day workshop on the 24th and 25th November 2008 in Edinburgh. The workshop, which was facilitated by PwC, brought together experts from a range of disciplines to consider carbon assessment methodologies and their application to the high level assessment of the carbon impact of Scottish Government expenditure.

The purpose of this document is to provide a record of the proceedings and to summarise the issues raised and discussed during the event.

2. Key themes and conclusions

The expert workshop proved vital for confirming existing thoughts, highlighting areas of potential concern and developing the requirements for the Carbon Accounting Project for the immediate future. The key themes discussed and conclusions reached are as follows:

1) Should the carbon assessment of spend take a production or a consumption based approach?

There were convincing arguments on both sides. A production based approach would be in line with National Inventories, the EU emissions trading scheme, the Kyoto Treaty, the UK Climate Change Act and the Scottish Climate Change Bill. However, government production based emissions are a small proportion of the total emissions associated with government activities. Evidence presented at the workshop suggested that government indirect or consumption based emissions can be 4-6 times larger than direct or production emissions. Most workshop participants favoured the consumption based approach on the grounds that government has an unparalleled ability to influence carbon emissions beyond its organisational boundaries. It was also noted that these two approaches are not mutually exclusive.

2) Should the carbon assessment also take account of the influence of non-spend policies such as regulation?

An expenditure based assessment will only capture a proportion of emissions associated with government activities. Given that direct emissions from the public sector represent a small percentage of the total,¹ consideration must be given to the impact that the Government can have on the wider economy through regulation and legislation. Participants agreed that there is a need to ensure that information regarding the impact of the whole of government policy (i.e. including non-spend policies and regulation) is included in decision making. A separate project is looking at the bottom-up assessment of individual policies and programmes but it is not yet clear whether this means that all carbon influenced by government will be captured. Workshop participants discussed whether a further high level assessment of policy would be required, but there were no firm conclusions on this point.

3) What is the most appropriate method for conducting the assessment given the timescales for the project?

Environmentally extended Input-Output (EIO) based approaches appear to be the most pragmatic solution available in the short term to estimate consumption based emissions. EIO models can provide a reasonable level of detail at industry level, but EIO has many limitations. In particular the analysis is static and based on sector average emissions factors and will not therefore be sensitive to near term emissions reduction efforts. This limits its usefulness for monitoring and target setting. In addition, EIO does not consistently capture emissions arising from the consumption of government services (downstream emissions). These may more appropriately be estimated as part of individual policy analyses.

4) How could some of the limitations of EIO be overcome?

It would be possible to supplement EIO with more accurate estimates obtained from bottom-up or dynamic macro methods in future years making a staged approach possible. Several existing studies use a hybrid approach using data on direct emissions gathered from bottom-up inventories combined with EIO methods to estimate upstream indirect emissions (arising from for example procurement, capital spend and resource spend on programmes).

5) What would be the ideal solution in the longer term?

The static nature of EIO based methods render them unsuitable for assessing the impact of policy. EIO assumes an entirely passive supply side with demand as the controlling factor. However, many carbon reduction policies are aimed at influencing the supply side e.g. energy policies. Therefore dynamic macro models are required. A number of such models already exist. These are either Computable General Equilibrium models or may also include econometrically specified behavioural equations – in both cases an IO framework is generally the starting point. None of the models presented at the workshop would appear to directly meet the needs of the Carbon Assessment Project. However, it is possible that in the longer term such models could be re-specified and restructured to allow a more detailed, dynamic understanding of the impact of spending within portfolio areas.

6) What are the data requirements for conducting a carbon assessment of spend?

Scotland has good input-output data, but a poor Greenhouse Gas ('GHG') inventory. Most participants felt that there is a strong need to use region specific data in any IO model as the differences in carbon intensity between the same product manufactured in different regions can be great. However, there was also recognition that in the absence of a more disaggregated Scottish GHG inventory, use of UK factors may be a pragmatic way forward. The Scottish Government should seek to improve both the GHG inventory and data on trade with UK and Rest of World over time.

7) How should the carbon assessment be integrated into decision making?

The importance of a governance framework for the carbon assessment was stressed. Carbon assessment needs to be integrated into existing decision making frameworks and represents an opportunity to link spend to outcomes in the National Performance Framework. The spending review itself can be extremely concentrated - key spending decisions are made

¹ Figures from DECC for the UK show 22 MtCO₂e for the public sector out of a total of over 700 MtCO₂e in 2006.

inside 6 weeks – this has important implications for the carbon assessment process. It is not clear at what level of decision making the assessment will be most useful, however there were several participants who felt that it was more likely to be used within portfolio areas rather than at the highest level of decision making.

8) How should the carbon assessment methodology be implemented?

Most participants agreed that the implementation should proceed in a step-wise fashion, with the assessment being piloted on the areas of spend with the greatest environmental impact, not necessarily the largest areas of spend. Areas with a high proportion of spend on wages and salaries should be avoided. The strengths and limitations of any assessment exercise need to be properly and transparently communicated. The initial design and implementation of the assessment tool should focus on providing reliable data at budget line level.

3. Record of proceedings

3.1. Climate change policy context

Speakers: Sir John Elvidge, Rebekah Widdowfield, Philip Wright, Stephen Elderkin

Topics discussed: The political importance of the Carbon Assessment Project, Scottish and UK climate change policy, the role of carbon assessment in the UK and Scotland, its use to deliver climate change policy, the challenges of moving from carbon accounting to carbon informed decision making.

Rebekah Widdowfield gave an overview of the issue and described the evolution of the Carbon Assessment project, including its components and its governance structure. She went on to place the issue in the context of the decision making process. The data presented showed that a small number of statements in the spending review accounted for a large proportion of the overall spend, and demonstrated the scale of reductions required by 2050.

Philip Wright advised that the primary goal of the Scottish Government is creating a more successful country, and sustainability is a key component of this – two of the seven purpose targets in the National Performance Framework are greenhouse gas ('GHG') related. Scotland is expected to commit to an 80% reduction target for 2050 and an interim target of 50% by 2030 in the Scottish Climate Change Bill. Scotland's approach to the bill differs from that of the UK by introducing **annual** carbon reduction targets (compared to the **5 yearly** targets of the UK) and including emissions from the aviation and shipping industries.

Stephen Elderkin's presentation suggested that a production based approach had been followed for the UK carbon budget (and in the EUETS) because this is the basis in which international agreements had been negotiated. He suggested that a production based approach would be simpler to administer and embodied carbon in imports would be captured in the manufacturing countries' production based carbon accounts – except for countries with no carbon cap. He also pointed out that carbon budgets are only budgets for the non-traded sector since the overall cap for the traded sector is set at a European level within the EUETS.

There followed a discussion around the issue of production and consumption carbon accounting. The main points were:

- Production based targets cover around 50% of total EU emissions - rising to 60%.
- The gap between the emissions captured by the production method and the consumption method was estimated to be 21% for the UK as a whole. This gap is thought to be rising as the UK increasingly sources its manufactured products abroad.
- In an ideal world, both production and consumption based approaches would be used to ensure that the full carbon impacts were captured.
- Questions were raised about the ability of production based accounting to drive behaviour change.

3.2. Interaction between carbon accounting and other policy instruments

Speaker: Dr Paul Koutstaal,

Topics discussed: Influence of government on carbon emissions through spending, taxation and energy/ climate policy measures, interaction between policy instruments and behaviours, cost-effectiveness of policy options.

Paul Koutstaal outlined some of the practical challenges facing government carbon reduction policies. He pointed out that the rebound effect from energy efficiency measures (income and substitution effects) can be as much as 20%, while carbon leakage from relocation of businesses to avoid EUETS is thought to be as much as 3.3%. He suggested that the main options for reducing government related emissions were therefore to regulate emissions directly using market based instruments, to compensate government related emissions by targeting emissions reductions in the non-traded sectors or to compensate by buying ETS allowances or CDM credits. An analysis of the costs of these options for the Dutch government had shown that compensation of government emissions by purchasing ETS allowances was a cost-effective option.

Discussions centred on the wider costs and benefits of the suggested policy options. The main points were:

- There may be longer term benefits from policies aimed at non-ETS sector versus purchase of CDM credits – these were accounted for in Dutch study.
- There was a lack of consensus over whether renewable energy policies have wider benefits in terms of income and employment. There is no Dutch evidence to support this argument.

3.3. Carbon informed decision making

Speaker: Professor Jan Bebbington

Topics discussed: Integration of carbon information into decision making processes, governance.

Jan Bebbington advised that a key requirement for carbon informed decision making is getting the governance processes right. There are three prerequisites: carbon 'balance sheets' or position statements for the entity under investigation; a carbon reduction trajectory linking the current position to goal (percentage reductions or budgets) and a decision making process that will incorporate carbon impacts into choices. She outlined three generic options for the decision making process: lists of un-weighted indicators - for example the 45 indicators in the National Performance Framework, lists of indicators plus rules for making trade offs (such as weighting or threshold based); and monetised models. Each approach has strengths and weaknesses, they are not mutually exclusive, governance is the central issue.

There followed a discussion on the implementation of the Scottish Government's high level carbon impact assessment tool. The main points were:

- The assessment tool should take into account and be integrated into existing decision making processes, e.g. department level decision frameworks such as the Scottish Transport Appraisal Guidance (STAG), the 45 indicators for the National Performance Framework and existing monetized models.
- Visibility within the tool was also called for to allow policy makers to clearly see the impacts of spending on carbon emissions.
- The government is working on an integrated impact appraisal process which will incorporate carbon amongst other impacts into the policy appraisal process for new policies.

3.4. Current thinking on the Carbon Assessment Project

Speaker: Melissa Carrington

Topics discussed: The work to date on the Carbon Assessment Project, the methodologies under consideration and the key challenges faced.

Melissa Carrington advised that the project had identified a number of scoping questions including the choice between a production or consumption based approach to estimating carbon emissions and the choice of organisational boundaries to define which parts of the public sector would be included in any analysis. However, nothing had yet been ruled out. The project has involved: identification and evaluation of a number of candidate methodologies for conducting the carbon assessment, work on a method for linking spending to emissions sources and some initial thinking about how the assessment might be integrated into the spending review process. The key challenges that had emerged were:

- Establishing a link between spending data and emissions sources particularly for indirect emissions
- The carbon estimation methods identified offer a trade-off between accuracy of the method and completeness in terms of coverage of emissions sources – a decision will need to be made on whether a broad but less accurate picture (on a consumption basis) is preferable to a narrow but more accurate picture (on a production basis) or whether both methods should be used.
- There is a lack of Scottish specific carbon emissions data
- Establishment of governance and oversight processes for the assessment and ongoing monitoring of progress and performance
- Precise timing and process to be followed for the next spending review still to be determined
- Recognition that the carbon assessment process may not provide all of the information required for decision making
- Ability of the methods identified to assist with identifying opportunities for emissions reduction and their sensitivity to tracking emissions reductions over time
- Identification of methods for determining influence of government on wider economy emissions and allocation rules.

Discussion centred on the scope of the project and practicalities of implementation. The key points were:

- The focus on spending means that emissions influenced by non-spend policies (e.g. regulation) are not covered in the high level assessment tool
- There is a need to ensure that information regarding the impact of the whole of government policy (ie including non-spend policies) is included in decision making.
- A separate project is looking at the bottom-up assessment of individual policies and programmes but it is not yet clear whether this means that all carbon influenced by government will be captured
- Several participants suggested that the project should therefore also include consideration of wider policy measures beyond spending including taxes and subsidies, regulation and market based instruments.
- The desire to look at indirect and induced impacts of government suggests use of broader macro models but these must be able to distinguish between production and consumption based emissions categories.

3.5. Public finance and expenditure

Speakers: Alistair Brown

Topics discussed: The spending review process

Alistair Brown advised that spend reviews occur every 2-3 years and are based upon economic projection of taxation, spend and the likely allocated budget. The objectives of the spending review are to align spending with political priorities, provide an opportunity to push efficiency gains, encourage stability through a longer planning horizon and provide a framework for scrutiny, accountability and transparency. The main drawback of the process has been that the review itself can be extremely concentrated - key spending decisions are made inside 6 weeks and that the focus is on inputs, not outputs or outcomes. To date, government spend has not been linked to the achievement of the goals of Government, as set out in the National Performance Framework. Therefore the Carbon Assessment Project presents an opportunity to link carbon numbers to budget lines.

Alistair advised that implementation should proceed in a step-wise fashion by first describing the linkage between spending and carbon emissions and estimating numbers; second, using parts of Scottish budget as pathfinders, third using the carbon numbers to support spending decisions and last demonstrating impact in terms of greater sustainability. He suggested that the project should proceed cautiously as unreliable data may undermine confidence and therefore it would be important to put effort into data that is reliable at budget line level. He also called for transparency and regular reporting from the project team.

Discussion centred on the practicalities of implementation. The main points were:

- Whichever methodology is chosen, the assessment needs to be transparent and fully explained
- Several participants agreed that the project should pilot the methodology on the areas of greatest environmental impact, not necessarily the largest areas of spend. Areas with a high proportion of spend on wages and salaries should be avoided. Schools would represent a good area of focus.
- Actual spend during the year may differ from planned spend and the carbon assessment may therefore have to be updated during the year
- The level of detail to which the assessment descends should be carefully chosen, too much detail may undermine the objectives of the assessment process
- Ranges of numbers may be more appropriate for the carbon assessment given the inaccuracy of the methods available, but the spending review inevitably focuses on a single point.

3.6. Carbon accounting case studies

Speakers: Dr Roel Delahaye, Dr Max Mundy, George Tarvitt, Rocky Harris

Topics discussed: National Accounts Matrix incorporating Environmental Accounts (NAMEA), Welsh Assembly carbon foot printing project, carbon inventory development within Scottish Local Authorities.

Roel Delahaye presented a case study of the use of NAMEA in the Netherlands. This project estimated that direct emissions from public sector have been relatively constant over time. Indirect emissions including both current and capital expenditure, measured on an embodied emissions basis, have increased over time and are 6 times the level of direct emissions. The emissions intensity of government spending has decreased over time.

The main points of discussion were:

- The importance of including indirect emissions in any assessment of the carbon impact of government spending
- Indirect emissions may occur in other parts of the world and therefore it is important to be able to distinguish Scottish emissions from those arising in the rest of UK and the rest of world.

- Scottish trade and emissions data do not currently enable a split between Scottish and rest of UK emissions.
- While the NAMEA approach has been successfully used for carbon accounting in the Netherlands, it has **not** been used to determine spending priorities.

Max Munday presented the Welsh experience of using input output models to produce environmental satellite accounts (ESA) and ecological footprint analysis. There is a legal duty for sustainable development in Wales that is driving interest in tools to measure sustainable economic development. However, there remain a number of issues surrounding IO based methods in informing policy decisions. Key criteria for assessing the applicability of these methods include: does the method give an unequivocal perspective on sustainable development, for example is employment growth good or bad within the measurement framework? Does the method provide contextual information or point to what can be influenced or controlled? How transparent and clear are the results? The presentation called for a standardisation in methods and consideration of use of confidence intervals rather than point estimates in carbon accounting.

George Tarvitt described the work that has been undertaken by Sustainable Scotland Network (SSN) and others working with Scottish Local Authorities to identify tools and approaches to estimating area wide carbon footprints. Carbon footprints have been developed in all 32 local authorities. An SSN workshop in early 2008, examined a number of tools and initiatives that are informing the development of consistent area wide emissions profiles in Scotland. These include GRIP – the Greenhouse Gas Regional Inventory Project developed by the Tyndall Centre, AEA - National Indicator 186 and the Resources & Energy Analysis Programme (REAP) tool developed by Stockholm Environment Institute.

Rocky Harris presented on two recent DEFRA projects that incorporated some attempt to measure the indirect carbon impacts of Government policies. The first study “Procuring the Future” had considered the use of an EIO based method to identify sustainable procurement priorities. Similarly, Defra had used a number of impact assessment methods (including bottom-up and top-down methods such as EIO) to understand the impact and uptake potential of a number of household pro-environmental behaviours such as recycling, water saving and energy efficiency.

3.7. Carbon Assessment Methodologies

Speakers: John-Mark Zywko, John Stocks, Dr Tommy Wiedmann, Peter McGregor, Anthony Barker

Topics discussed: Criteria for evaluation of methods, Bottom up approach, Environmentally extended input output analysis (EIO), hybrid EIO-LCA and dynamic macro modelling.

John-Mark Zywko introduced the methodologies that are being considered by the project and the criteria that would be used to evaluate them. The methodologies are bottom-up inventory development, Life cycle Assessment, EIO, hybrid EIO-LCA and dynamic macro-modelling. The criteria being used to evaluate them include: completeness in terms of coverage of emissions and spend; sectoral and temporal compatibility of factors with actuals; fit for purpose in terms of ability of method to assist with identification of emission reductions opportunities and track performance through time; and data and resource requirements.

John Stocks provided an overview of the work of the Carbon Trust in Scotland. The Carbon Trust in Scotland has worked with all 32 local authorities, 7 large NHS Trusts, 6 universities, parts of central government and NDPBs such as SEPA. The process involves collecting baseline data using a bottom up accounting process. At present this focuses on direct carbon emissions for example energy use in owned buildings, street lighting, transport fleet, staff

travel, staff commute, contracted and devolved services and municipal waste. The complexity of obtaining this level of detailed information on local authority operations was stressed.

The main points of discussion were:

- The Carbon Trust gathers baseline data for all of its public sector clients but this is on an ad-hoc basis and the data is considered confidential.
- The Carbon Trust is not planning to get involved in assisting Local Authorities with area-wide carbon footprint assessment except through community planning partnerships with police, fire service etc.

Tommy Wiedmann presented his work on EIO and hybrid LCA-EIO approaches to carbon footprinting. The GHG Protocol defines 3 scope of reporting: Scope 1 - direct, production emissions, Scope 2 - electricity use, indirect emissions and Scope 3 - other indirect emissions. Within the scope 3 category the further distinction can be made between upstream emissions (e.g. supply chain, employee commute, business travel) and downstream emissions (e.g. customer or consumer use and disposal/ recycling). EIO methods can provide an insight into the carbon emissions associated with Scopes 1, 2 and upstream scope 3 emissions. Critically, EIO methods can trace the economic linkages (and carbon emissions) back through many layers of the supply chain. Typically the 3rd-4th supplier level should be sought to capture the most material contributors to overall carbon footprint. EIO overcomes the limitations of full-process LCA which may limit investigation of backward linkages to a subset of the supply chains of an industry ('truncation error'). However the use of industry sector average carbon coefficients in EIO is a limiting factor for targeting and benchmarking. One way of overcoming this is to supplement the EIO models with specific bottom-up data as in a hybrid LCA-EIO. Matrix or tiered hybrid LCA/EIO can be used to combine the strengths of LCA and EIO whilst minimising the weaknesses.

The main points of discussion were:

- The ideal boundaries for an EIO based analysis would be the world economy but world IO tables do not exist therefore Multi-Region- IO is the next preferred method.
- In the absence of an MRIO some studies have assumed that imports are produced using the same energy mix as the country of study. Whilst this is not ideal, it is preferable to not including imports within the boundaries of the study. Exceptions to the assumption should be made for dissimilar countries e.g. China.
- Studies undertaken by Stockholm Environment Institute (SEI) on Scottish organisations have so far used UK IO tables.
- It is thought that Highlands and Islands Enterprise are not using the carbon assessment information derived by SEI in their decision making as yet.
- EIO should form the starting point of any consumption based carbon accounting study due to its ability to account for emissions across the entire supply chain. This needs to be focused on and invested in if necessary before any further modelling (i.e. macromodelling) can be undertaken.

Gjalt Huppel presented information on a number of existing models that use the EIO approach, these include: the US GTAP model which uses a hybrid EIO-LCA approach and contains detail on 60 sectors; the EIPRO model which is an EU wide 500 sector and 600 products hybrid EIO-LCA model and the EXIOPOL model which contains 130 sectors, 41 regions and models embodied emissions in trade.

Peter McGregor presented work done at the University of Strathclyde on measuring carbon emissions in Scotland which used a combination of IO and computable general equilibrium approaches. He explained that IO assumes an entirely passive supply side and assumes demand is the controlling factor. However, many carbon reduction policies are aimed at influencing the supply side e.g. energy policies. Therefore macro models are required. A number of such models exist. Computable general equilibrium (CGE) models, such as University of Strathclyde's AMOSENVI includes capital-labour-energy-social interactions. A model which includes labour movements is important given the high level of labour immigration and emigration between Scotland, the UK and Europe. CGE models give the

same results as EIO models in the long run. However CGE can in addition capture the short run supply side responses and rebound effects which could not be captured by EIO.

The main points of discussion were:

- There is a strong need to use region specific data in any IO or CGE model as the differences in carbon intensity between the same product manufactured in different regions can be great.
- CGE models could in principle be restructured to look at particular areas of spend (e.g health)
- There would be a need to distinguish traded and non-traded sectors in any macro-model and imports from carbon constrained versus non-constrained countries.

Anthony Barker explained that dynamic macro-models such as Cambridge Econometrics' REEIO and MDM-E3 were both designed to produce a forward-looking assessment of future carbon (and other) emissions associated with economic development. MDM-E3 has been used to explore policy scenarios at the UK level, while REEIO has been applied to regional carbon inventory assessment. Both models are based on IO tables but these are supplemented with behavioural equations which are affected by previous outcomes – therefore history matters. The models could be used to estimate energy use or carbon emissions trends for different activities and link these to government spend giving a forward-looking view based on current policy. However, it would be difficult to distinguish policy effects from an underlying change in forecast trends. The models can be used to assess the impact of specific policies but this is dependent on level of granularity already specified. CE does not yet have an operational in model for Scotland.

The main points of discussion were:

- The issue of sector aggregation was discussed. IO tables typically contain 93-130 industry sectors but the CE models are aggregated to 25-40 sectors. It is important to avoid a loss in accuracy when aggregating sectors – **material** sectors should remain separated to an adequate level of detail; it is acceptable to merge the **immaterial** sectors.

3.8. Data requirements

Speakers: Daniel Forster, Karen Turner

Topics discussed: Scottish GHG inventory, Scottish IO data, future data requirements.

Daniel Forster explained the processes surrounding the compilation of the UK and Scottish GHG inventories. The UK GHG inventory consists of 450 different sources of emissions compiled into 93 IPCC economic sectors. The Scottish and other devolved administration GHG inventories follow the same processes and are therefore consistent with official statistics, the UK inventory, EU-ETS, and the reporting formats and quality requirements of IPCC. The Scottish inventory is based on bottom-up data where available for Scotland (e.g industrial point sources, road transport and domestic flights) and top-down modelling where this is unavailable. In order to derive a set of Environmental Accounts (EA) mapping between IPCC sectors and IO sectors is necessary. Some IPCC sectors can be mapped directly but others span several economic accounting sectors and therefore need to be allocated appropriately. This mapping has been done judgementally based on UK activity assumptions which may not be appropriate for Scotland.

The inventory is production based and this is a significant issue in the power sector, as Scotland has high level of renewable energy generation and exports electricity to England and Northern Ireland. All Scottish power station emissions are allocated to Scotland. It was also noted that there is an 18 month time lag in the production of the GHG inventory. This delay is not adequate for policy appraisal.

Karen Turner advised that Scotland benefits from the regular production of country specific IO tables, yet is limited to an extent by the position of the UK. No UK analytical IO tables are available since 1995 (produced in 2000) and therefore there is no data on UK-Scotland trade flows in IO format. At present this is not a priority for the ONS. Using an IO approach to accounting for emissions is appropriate, rigorous and transparent and permits international comparisons. The minimum requirement for this type of analysis is an environmentally augmented analytical IO table for Scotland (Scottish NAMEA). This should be an investment priority. This can use proxy UK data where necessary as long as there is ongoing work towards Scottish specific data. Data regarding the rest of the UK and rest of the world imports and exports should also be given immediate priority.

4. Break out groups

Two breakout sessions were held to conduct in depth conversations surrounding the issues that had been highlighted during the presentations. The first addressed the most appropriate methodology for the purpose of this project, considering the timelines that are required. The second focused on the application of this method to particular areas of Government spend: health, transport, local authorities and central government.

4.1 Evaluation of methodologies

Key messages arising from the first breakout discussions were:

- A focus on spend will not capture emissions associated with government policy. Policy assessment and spend assessment are different processes – distinct tools and data sets will be required for each.
- The spend assessment should cover direct, indirect and induced emissions if possible.
- EIO is generally agreed to be a starting point for consumption based analysis of carbon implications of government spend. The EIO analysis should gradually incorporate more sophisticated assessment of emissions embodied in trade over time – moving from single region to multi-region IO. Future iterations of the carbon assessment could supplement the top-down IO approach with bottom up data and macro-modelling where required.
- The development of a consistent set of environmental accounts for Scotland is a prerequisite for both EIO and dynamic modelling
- In the long term, a policy assessment tool using based upon macromodelling should be developed. The specific type of model will depend on the policy in question, as it is unlikely that one tool will be suitable for all policy levers.
- The next steps should focus on a pilot system focussed around the development of the Scottish IO tables. This will include an increase in the number of Government experts in working in IO, and the disaggregation of a few specific IO sectors, namely electricity, waste and sewerage and agriculture. This work could take 1-2 years.
- Concerns were raised that the perception of this work by other Government bodies may hinder the process.
- The lack of connection between the spending review and National Outcomes should be addressed in order to embed this into a national performance framework.
- Scotland should be working in conjunction with other countries to build a robust and transparent tool. In particular, Holland and Australia were cited as countries with good experience of developing such accounting frameworks.

4.2 Application to different areas of spend

Health

The key messages were:

- It was suggested that carbon budgets should be assigned to individual organisations e.g NHS Trusts.
- Key carbon reduction mechanisms within health spending were suggested: the development of CHP infrastructure to supply energy to the hospital and surrounding communities, the development of “green hospitals” and application of green building standards when undergoing major capital schemes, green procurement, green vehicle fleets and the provision of more GPs and local facilities in an attempt to increase early intervention and reduce the number of cases requiring hospital treatment.
- The majority of these initiatives would be adequately captured within an EIO framework. However, the use of green building materials may not be visible though the IO table and the installation of CHP would only lead to accountable emissions reductions if the electricity sector was disaggregated further.
- It was agreed that macromodelling would be required to assess the carbon implications of future health policies.

Local Authorities

The key messages were:

- The primary carbon reduction areas suggested included procurement, food, municipal waste, low carbon planning, transport, social housing, employees and education.
- Most of these options could be tracked by EIO.
- None of the suggested methodologies would appropriately track emissions reductions arising from employees and low carbon planning. The waste sector of the IO table would require further disaggregation if it is to be fully reflected.
- There is an inverse relationship between the level of Government control and the significance of an area’s carbon impacts.
- Local authority spending is only 20 lines within the entire spending review statement- greater disaggregation will be required for visibility..

Transport

The key messages were:

- Transport policy has a large impact on carbon emissions
- EIO will not capture the use phase of transport; instead dynamic modelling is required for induced impacts of transport spending.
- The Scottish Transport Appraisal Guidance (STAG) and carbon balance sheet are already used by the Transport Directorate to incorporate carbon into decision making.
- Embedded emissions from infrastructure spend should also be given due consideration. EIO would account for this, but a bottom up approach would give a higher level of accuracy.

Central Government/ NDPBs

The key messages were:

- EIO is useful for hot-spotting and general awareness raising but would be less useful for tracking specific emissions reduction measures
- Other models can be used to calibrate the outcomes from EIO, for example, bottom up studies can be directly compared to EIO results
- The shadow price of carbon should be included into the model but should be aware of the extent to which carbon is already priced.
- There was concern over the level of inaccuracy introduced by the use of sector averages.
- Carbon budgeting should not be used where carbon trading already occurs.
- In the case of NDPBs and LAs that raise revenue from other sources, the scope of the spending assessment should include all spending by these bodies as the specific activities that are funded by money coming from central government are not identifiable.