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The greenhouse gas regional inventory project (GRIP): Designing and employing a regional greenhouse gas measurement tool for stakeholder use

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ABSTRACT

Regional and local policy-making on carbon reduction requires user-friendly greenhouse gas inventory and quantitative scenario tools. We present one such tool – the Greenhouse Gas Regional Inventory Project (GRIP) – and discuss stakeholder reaction to this interactive computer-based approach. We then provide results on a set of 38 stakeholder-led interviews that were undertaken using GRIP to explore prospects for achieving deep cuts (−60%) in CO_2 emissions by 2050 in the North West region of England. Seventeen energy stakeholders, despite being engaged in a professional capacity with the climate change and carbon reduction issues, struggled to find ways to reduce emissions by as much as 60% by 2050. This should worry policy makers in central government who consider that local and regional implementation of energy policy will be straightforward. Our findings, we argue, support a greater role for energy policy making at the sub-national regional scale in England.

1. Introduction

Local and regional (sub-national) policy makers in many nations are increasingly asking what they can, and should, be doing to respond to the challenge of greenhouse gas (GHG) emissions reduction (e.g. Byrne et al., 2007; Rabe, 2007; Walker et al., 2007; Webber and Fleming, 2002). Regional targets for renewable energy are one of the most developed areas of energy policy at the sub-national scale within the UK. Take, for example, the *North West Sustainable Energy Strategy* published in 2006 by the North West Regional Assembly (for England). Whilst it contains a useful and informative summary of the broad expanse of sustainable energy activities in the region, the only quantified targets are for renewable electricity (10% of final regional electricity demand by 2010, 15% by 2015 and 20% by 2020) (NWRA, 2006, p. 6). What is more, these targets are only *aspirational*, not definitive or in any senses binding, continuing the usual pattern of sub-national energy policy making in England. Nevertheless, there appears to be a demand from regional stakeholders for policies which go further in addressing regional greenhouse gas emissions. Furthermore, there is a need to formally link regional and national energy policy formation; otherwise, it is likely that confusion will reign and the necessary policy drivers and incentives will not be in place. The key questions addressed in this paper are consequently:

1. To what extent do regional stakeholders currently engage in an assessment of the prospects for deep cuts in CO_2 emissions in their region?
2. How can we characterise stakeholders' assessments of the prospects for deep cuts in regional CO_2 emissions?

In order to address question 1, a regional greenhouse gas simulator, the Greenhouse Gas Regional Inventory Project tool (GRIP), was employed. This tool, described in Section 2, is designed to allow stakeholders to explore regional greenhouse gas emission reductions across the whole energy system. In order to reflect the proposed national policy target in the Climate Change Bill (at the time of the research) of a 60% reduction in CO_2 emissions by 2050 (compared to a 1990 baseline) and of 26–32% reduction by 2020, the participants were asked to explore the prospects for a 60% reduction by 2050, and then asked to 'back-cast' from their 2050 reduction to 2020. It became apparent between 2005 and 2008 that a 60% reduction target for the UK and other industrialised countries was insufficient as their contribution towards stabilising atmospheric CO_2 concentrations to below dangerous levels (Solomon et al., 2009; Hansen et al., 2008). In November 2008, the Climate Change Act introduced a legally binding target of an 80% reduction in CO_2 emissions in the UK by 2050; subsequently the Committee on Climate Change

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(2008) has proposed carbon budgets for the three time periods up to 2022.

Note that stakeholders were not asked to generate a scenario that they would *like* to see or would in some senses *prefer* to happen; rather they were asked to provide a scenario that they thought was a realistic appraisal of what would be likely to happen to achieve a 60% reduction in regional CO_2 emissions. The results of this exercise will be discussed in Section 3 and analysed further in Section 4. The implications for climate change policy making regionally and nationally will then be explored in Section 5.

2. The GRIP decision-support tool

Many different greenhouse gas emission calculators have emerged over the past decade or so and a summary of the main tools to date is shown in Table 1. Whilst there are many excellent emission calculators and tools, as well as regional scenario studies, none meet the requirements of a user-friendly stakeholder-driven quantitative greenhouse gas emissions tool which can be used at the English regional scale to explore deep cuts in CO_2 emissions to 2050.

The Greenhouse Gas Regional Inventory Project (GRIP) was initiated as a PhD in the early 2000s and was initially focused upon production of a high-quality regional inventory for the North West of England, building upon work published in 2000 (Mander et al., 2000). It was, from the start, designed with the needs of regional stakeholders in mind. The PhD was part-funded by the Environment Agency North West region and there was extensive interaction during the inception and implementation of the research with the North West Climate Group, a stakeholder panel with wide representation from the public and private sectors. GRIP evolved over time to become an interactive, user-driven scenario-tool for exploring regional greenhouse gas emission reductions and targets.

The detailed technical specification of GRIP can be found in Carney (2006). The baseline used in this study is the year 2000, rather that the 'Kyoto' baseline of 1990, this being because of the difficulty of sourcing the necessary data to create a reliable regional-scale baseline for 1990 (though an estimate of emissions in 1990 can be made). The key emission sources from the energy sector are illustrated in Fig. 1. This figure shows that the domestic sector is the most important contributor to CO_2 emissions in the North West, followed by transport (mostly road); next comes heavy industry, the energy industry and service sector. The GRIP programme is comprised of two parts. Part 1 is a methodology for estimating greenhouse gas emissions on the regional scale. It is largely compatible with international standards for national inventory formation. The method has been designed to ensure that the results from within a region can be directly compared to the relevant national figure. Due to the aforementioned problems with data availability on the regional scale, the GRIP methodology incorporates three different methods for estimating emissions associated with each sector.

These different methods are referred to in GRIP as level 1, level 2 and level 3. The three levels are similar to the IPCC's tiered approach to national inventory formation (IPCC, 2004) and are

Table 1
Different greenhouse gas calculators and their appropriability at different scales.

Name of model	Scale/application	Other comments	Refs.
National air emissions inventory	UK	All six 'Kyoto' greenhouse gases	Baggott et al. (2006a, b)
DREAM	City/urban region	High resolution data required	Titheridge et al. (1996)
EEP	City/urban region	High resolution data required	Jones et al. (2000)
Greenhouse gas protocol	Company	Detailed company data needed	www.ghgprotocol.org/
Leicester model	City		Fleming et al. (2001); Fleming and Webber (2004)
REWARD	English regions	'Mass-balance' approach	
Various	Individual	Life style emission calculations	Numerous available on the Web
REEIO	English regions	Economic allocation	Barker (2008)
REAP	Sub-national	End-user including embodied energy	Barrett et al. (2005)

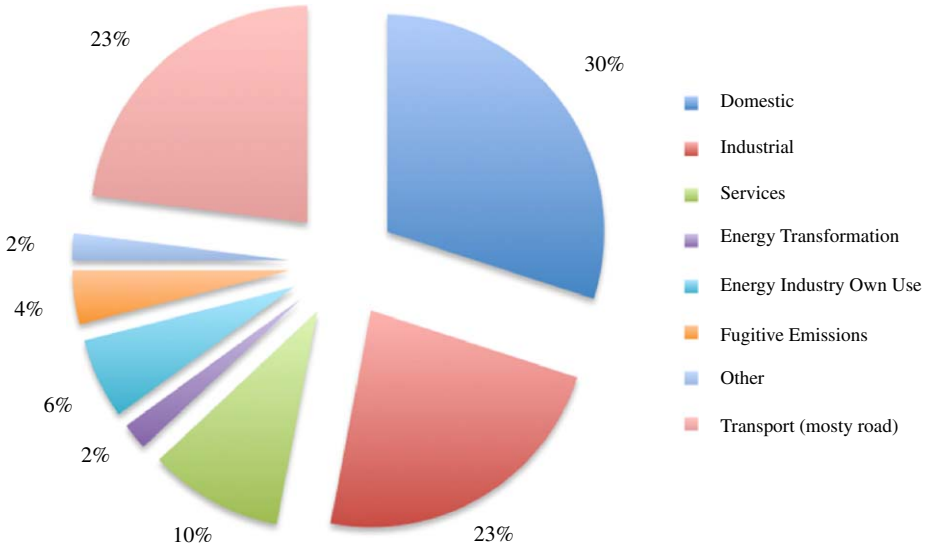

Fig. 1. North West England carbon dioxide equivalent emissions in the year 2000 (total 61,785 thousand tonnes).