



EU Transport GHG: Routes to 2050?

Project methodology

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Partners



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Table of contents

| | | |
|----------|---|----------|
| 1 | Introduction | 1 |
| 2 | The project's objectives and principles | 2 |
| 3 | Methodology | 4 |
| 3.1 | Setting the project framework and data collection (Task 1)..... | 4 |
| 3.2 | Initial assessment of transport's potential contribution to meeting future, long-term EU GHG reduction targets (Task 2)..... | 6 |
| 3.3 | Assessment of transport demand trends and drivers (Task 3)..... | 7 |
| 3.4 | Assessment of options and policy instruments and stakeholder engagement (Tasks 4 and 5)..... | 7 |
| 3.5 | Part II: In-depth assessment and creation of policy framework..... | 8 |
| 3.6 | Ad hoc papers and briefings | 12 |
| 3.7 | Project outputs | 14 |

1 Introduction

This document sets out the methodology used in the project “Technical support for assessing Options for European action to reduce Greenhouse Gas emissions from transport in the period to 2050” which was given the working title of “EU Transport GHG: Routes to 2050?”. It was a 15-month project led by AEA and supported by CE Delft, TNO, ISIS and Milieu.

Many deliverables were produced as part of the project (see Section 3.7). Each of these contains conclusions and an Executive Summary and all of these were subject to stakeholder consultation and were amended in light of the comments received. A summary of the project as a whole, based on these papers and reports, as well as the results of the Excel-based illustrative scenarios tool (IST) called SULTAN (**SU**stainab**Le** **TrAN**sport) that was developed in the course of the project, are presented in the Final Paper of the project. The other reports and papers, including this one, are effectively appendices of the Final Paper.

The purpose of this paper is not to replicate the content of these other papers, or even reproduce the results of the project. Rather, this report focuses on setting out the methodology that was used in the production of the papers and the illustrative scenarios tool that was developed as part of the project. In this respect, this report has been produced largely for contractual purposes in order to demonstrate that the requirements of the project’s terms of reference were met.

The project proposal was divided into three parts, each of which contained a number of tasks, however these were often being carried out concurrently. These were as follows:

- Part I (**‘Review of the available information’**) set up the project by collating the relevant data, providing the context for the project and by undertaking an initial analysis of technical and non-technical options and policy measures for reducing greenhouse gas (GHG) emissions from transport. It involved:
 - **Task 1:** Setting the analytical framework and data collection (see Section 3.1).
 - **Task 2:** An initial assessment of transport’s potential contribution to meeting long-term, EU GHG targets (Section 3.2).
 - **Task 3:** Assessment of transport demand trends and drivers (Section 0).
 - **Task 4:** Overview and initial assessment of technical and non-technical options and policy instruments (Section 3.4).
- Part II (**‘In depth assessment and creation of framework for policy making’**) brought together the work of Part I with the aim of developing a long-term policy framework for reducing transport’s GHG emissions. It involved a number of elements, which were interlinked (Section 3.5):
 - In-depth assessment of selected options and instruments.
 - Exploration of scenarios for reducing transport’ GHG emissions to 2050.
 - Development of alternative policy frameworks for the development of policies to mitigate transport’s development, including the prioritisation of options and instruments.
- Part III (**‘Ongoing tasks’**) covered:
 - **Task 5:** Stakeholder consultation (Section 3.4).
 - *Ad hoc* Support notes / briefings and concise analytical or discussion papers (Section 3.6).
 - Project Management and Reporting.

Section **Error! Reference source not found.** presents the project’s objectives and underlying principles.

2 The project's objectives and principles

In the early stages of the project, the project team and the Commission discussed the relevant underlying objectives and principles of the project at length. Eventually, the following list was agreed and adhered to in the course of the project.

1. The project should **begin to consider long-term policy framework** for transport in the context of the need to reduce greenhouse gas emissions economy-wide.

In spite of the lack of an agreement at the Copenhagen conference in December 2009, the European Union is still committed to the long-term of achieving significant reductions in GHG emissions by 2050. In this context, the project aimed to identify the long-term policy framework that would ensure that transport contributes appropriately to these emissions reductions.

2. The project should deal with the **medium to longer-term** (post 2020; to 2050), i.e. moving beyond short-term policy measures.

The Commission has put in place a range of new policy measures that are aimed at controlling emissions from the transport sector. The principle recent instruments are:

- Passenger car CO₂ Regulation.
- Inclusion of aviation in EU Emissions Trading Scheme.
- Clean and efficient road vehicles Directive.
- Promotion of Renewable Energy Directive.
- Carbon reduction requirement of amended Fuel Quality Directive.
- Tyre rolling resistance and labelling measures
- Proposed Regulation on CO₂ from vans.

However, to date these measures have not been established as part of a broad strategy or aimed at contributing towards an overarching goal. Hence, one of the key aims for this project was to provide guidance and evidence on the potential elements of a broader policy framework for controlling GHG emissions from the transport sector and the required stringency of those measures over the time-frame considered.

3. The project should identify **what is known** about reducing transport's GHG emissions and **what is not**.

In order to achieve this it was important to review existing literature for evidence on the state of play with respect to potential GHG reductions and costs of the various options and policy instruments for reducing transport's GHG emissions. The stakeholder engagement was also an important part of the project in this respect.

4. The project should aim to identify by when the Commission and other stakeholders **need to take action** and **what this action should be**.

In order to achieve the potentially significant reductions in GHGs that might be required in the longer-term, it is important to take action in timely fashion in order to ease the ability of actors to implement the necessary options that deliver longer-term emissions reductions. The following considerations need to be made: More drastic action might be needed in relatively short periods of time that might be sub-optimal from a cost perspective. Having said this, it is important to ensure that actions taken are cost-effective. In addition, some technologies may become available only at a later stage and locking-in suboptimal technologies should be avoided, especially in light of the large and often long-term investments needed. Hence, the

project took a qualitative and quantitative approach to identify when action would have to be taken to achieve the potential GHG emissions reductions required and aimed to prioritise these actions where possible.

5. The project **should engage stakeholders** from the transport and other sectors about what transport might have to deliver in terms of GHG emissions reductions to 2050

The need to engage stakeholders was a fundamentally important element of the project. This engagement had the following aims in particular to:

- Enable stakeholders to hear **a summary presentation** of our **draft** findings at various key stages in the project.
- Give stakeholders the opportunity **to discuss and challenge** the **draft** findings.
- Reach consensus with stakeholders on **what we know** and **what we do not know** regarding (technical and non-technical) options and policy instruments for reducing GHG emissions from all modes of transport.
- Enable stakeholders **to provide input to the project** – either during the meeting or afterwards via the project's website.
- **Stimulate a debate** among EU stakeholders about future policy action that might be needed to reduce transport's GHG emissions.

3 Methodology

An overview of the various elements of the project, along with their respective timings and relationships, is given in Figure 1. Each of these elements is discussed in more detail below.

3.1 Setting the project framework and data collection (Task 1)

Task 1 had three sub-tasks:

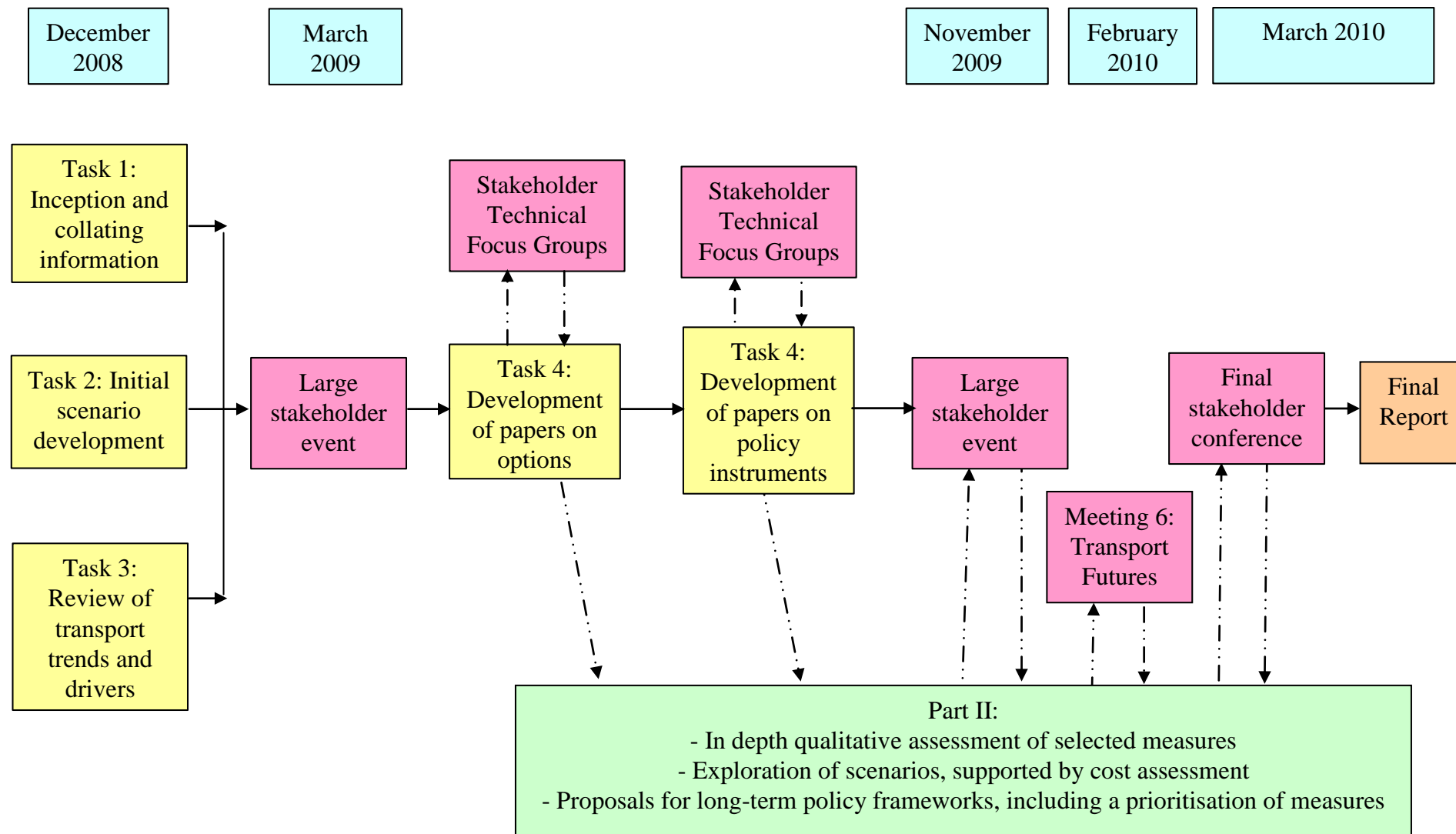
- Setting the data collection framework. The aim of this sub-task was to agree the type and scope of the information being sought and to allocate the responsibilities for collecting these data.
- Development of an internet site for sharing the literature documentation.
- Collecting information on transport policies and measures, including their greenhouse gas reduction impacts and costs (and any underlying assumptions that are relevant).

This provides the framework for the storage of the reports on the website. Additionally, a long list of possible stakeholders was brought together, in preparation for Task 5 (stakeholder engagement) with inputs from all of the project team, as well as DG Environment and DG TREN.

A project **website was established** (see www.eutransportghg2050.eu), which played the following roles in the project:

- A **storage facility for the reports** collated as part of the project. Partners were able to log on to the website and download any of the reports.
- Enabled partners and all stakeholders **to upload reports** onto the website, which were saved in the storage facility. For stakeholders, there was an ongoing **call for evidence** on the site.
- The site was used to **announce stakeholder meetings**. Stakeholders were able to register their interest in attending the meeting via the website.
- Information (presentations, videos etc) relating to **all stakeholder meetings** could be downloaded from the website.

Figure 1: Schematic diagram of methodology used and the structure of the project

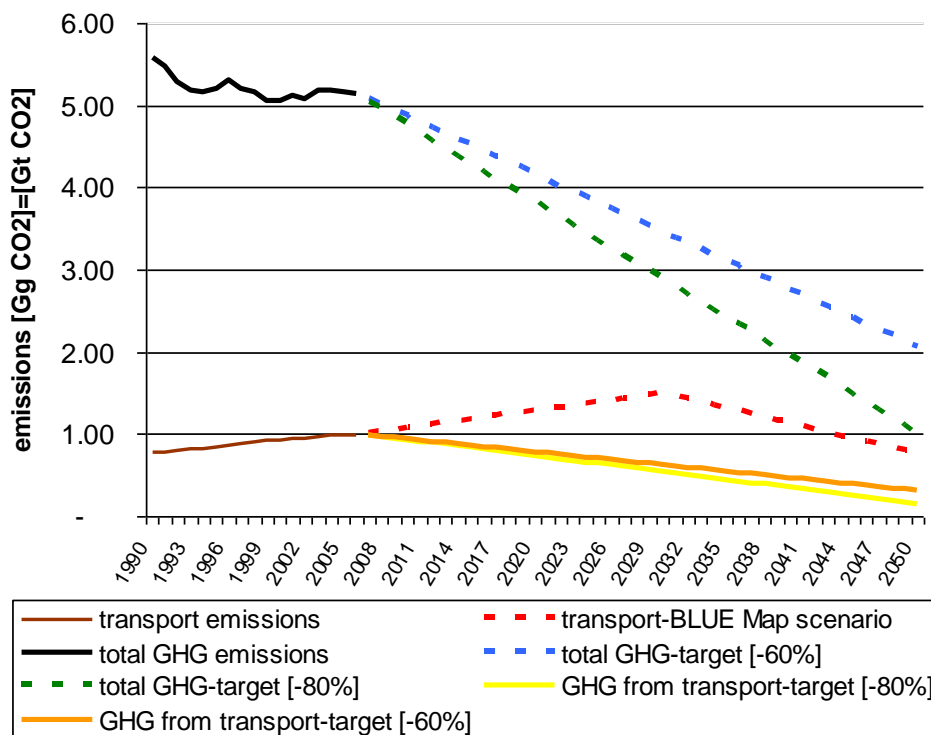


- Draft versions of reports were put on the site for the purpose of sharing these with stakeholders. All reports were available **for consultation** for a fixed period and amended in light of the comments that were received.
- The website will **remain live after the project has ended, i.e. until March 2011**, which will enable stakeholders and others to access all of the reports prepared in the course of the project.

3.2 Initial assessment of transport’s potential contribution to meeting future, long-term EU GHG reduction targets (Task 2)

A draft paper on this Task was presented at the first stakeholder event (see Section 3.4). The paper used existing scenarios (i.e. the IEA’s ETP and the IPCC’s SRES) of potential economy-wide GHG reductions that might be required to identify the potential, economy-wide GHG reductions that might be required by the EU-27 to meet long-term GHG reduction targets. As both of these scenarios were wider than the EU-27, a number of assumptions were made to identify the potential reductions applicable to the EU-27. From these two scenarios, it was not possible to identify the potential GHG reductions that might be required from the EU-27’s transport sector. In order to assess these, it was necessary to use the assumptions under the IEA’s BLUE Map scenario, which assumes that an ambitious approach is taken to reducing GHG emissions in the transport sector. The conclusions of the analysis, i.e. the potential GHG reductions that might be delivered by the EU’s transport sector by 2050, are presented in Figure 2.

Figure 2: EU-27 total GHG and GHG from transport emissions trends against EU targets and results from BLUE Map scenario¹



This shows that even under the ambitious assumptions of the IEA’s BLUE Map scenario, the EU’s transport GHG emissions would still make up a significant proportion of the economy-

¹ IEA (2008), Energy Technology Perspectives - Scenarios & Strategies to 2050; IPCC (2000), IPCC Special Report on Emissions Scenarios (<http://www.ipcc.ch/ipccreports/sres/emission/010.htm>) - national submissions to UNFCCC for the 25 EU Annex I parties (excludes Malta and Cyprus); EUROSTAT (<http://epp.eurostat.ec.europa.eu>)

wide GHG emissions that the EU would be allowed to emit under ambitious, economy-wide GHG reduction targets in 2050. The analysis in the paper was a starting point, upon which Part II of the project built. It was important in communicating to the stakeholders present at the first large stakeholder meeting the challenge that transport faces in terms of reducing its GHG emissions.

3.3 Assessment of transport demand trends and drivers (Task 3)

This paper was prepared and presented to the first stakeholder event (see Section 3.4) and its conclusions were presented used in the Final Paper. The paper:

- Provides an overview of past and future transport **demand patterns by transport mode, distance and destination**.
- **Reviews transport drivers**.
- **Summarises the impacts** on transport demand for each driver (included the related uncertainties) in terms of:
 - the type of transport domain addressed (passenger or freight);
 - the GHG relevance; and
 - the geographical area of interest (urban area, regional, Europe-wide, etc).

3.4 Assessment of options and policy instruments and stakeholder engagement (Tasks 4 and 5)

Tasks 4 (assessment of options and instruments for reducing transport's GHG emissions) and 5 (stakeholder engagement) are discussed together because they were interlinked. Task 4 consisted of drafting a series of papers on potential options and policy instruments to reduce transport's GHG emissions, where:

- **Options** deliver GHG emissions reductions in transport, e.g. technical options and non-technical options, which included operational options and modal shift.
- **Policy instruments** may be implemented to promote the application of these options.

The following papers were drafted under Task 4 (see Section 3.7 for full details):

- **Papers on technical and non-technical GHG reduction options:**
 1. Technical options for fossil fuel based road transport
 2. Alternative energy carriers and powertrains
 3. Technical options for non-road transport modes
 4. Operational options for all modes
 5. Improving vehicle utilisation, co-modality and demand management
- **Papers on policy instruments to stimulate the uptake of these options:**
 6. Regulation of vehicles and energy carriers
 7. Economic instruments and emission trading
 8. Infrastructure and spatial policy, speed and traffic management
 9. Information to raise awareness and instruments to stimulate innovation and development

Draft versions of the papers were then presented to, and discussed with, stakeholders at a series of meetings. Task 5, therefore, consisted of a structured debate based on the papers and included two types of stakeholder consultation meeting:

- **Large stakeholder consultation events**. There were three of these each of which had between 80 and 120 stakeholder participants.

- **Technical focus meetings.** These were smaller meetings of between 20 and 50 participants, of whom the majority were stakeholders.

At the first two large stakeholders meetings, external speakers on related topics complemented the presentations on the project that were given by the project team, while at the third meeting, the Final Stakeholder Conference, all of the presentations came from the project team. In summary, these three meetings focused on:

- **27 March 2009:** Introducing the project to stakeholders and a presentation of the proposed approach, including presenting the findings of Tasks 2 and 3.
- **9 November 2009:** The findings of Task 4, i.e. the findings of the five reports on (technical and non-technical) options and the four reports on policy instruments, as amended in light of the discussions at the respective technical focus meeting and subsequent comments received from stakeholders.
- **15 March 2010:** Draft findings of the overall project.

The following technical focus meetings were held:

- **2 July 2009:** Long term technical options for non-road modes (Meeting 1b).
- **3 July 2009:** Long term technical options for road transport modes (Meeting 1a).
- **7 July 2009:** Operational options, co-modality and demand management (Meeting 2).
- **8 July 2009:** Energy use in, and Energy Security of supply for, Transport (Meeting 3).
- **23 September 2009:** Regulation of vehicles, their components, fuels and energy carriers (Meeting 4).
- **24 September 2009:** Spatial planning, traffic management and soft measures (Meeting 5).
- **2 October 2009:** Economic instruments, including emissions trading (Meeting 7).
- **15 February 2010:** Transport Futures: Scenarios and visions (Meeting 6).
- **16 February 2010:** Meeting with Commission services (Meeting 8).

The way in which the papers were presented to the various meetings is presented in Figure 3.

3.5 Part II: In-depth assessment and creation of policy framework

As noted in Figure 1, Part II of the project consisted of:

- In depth qualitative assessment of selected measures;
- Exploration of scenarios, supported by a cost assessment; and
- Proposals for long-term policy frameworks, including a prioritisation of measures.

The **exploration of scenarios, supported by a cost assessment**, was enabled by the development of the illustrative scenarios tool. This is an Excel-based tool that brings together the reduction potential identified in the Task 4 papers on options and policy instruments (i.e. those listed in Section 3.4) in order to assess how various targets for reducing transport's GHG emissions to 2050 could be achieved. A full description of the tool, its development of the tool and how the tool can be used can be found in Appendix 19.

Proposals for longer-term policy frameworks were developed around the various meetings that were held towards the end of the project. The framework was developed for, and presented to, the Final Stakeholder Conference a month later. As part of this, **the key measures were discussed qualitatively in more depth**, i.e. the regulation of carbon content of fuels, the regulation of the fuel/CO₂ efficiency of vehicles and a measure to increase the cost of travel, either fuel taxation or emissions trading.

Figure 3: Mapping the Task 4 papers and other Reports to the Technical Focus Groups and larger stakeholder meetings

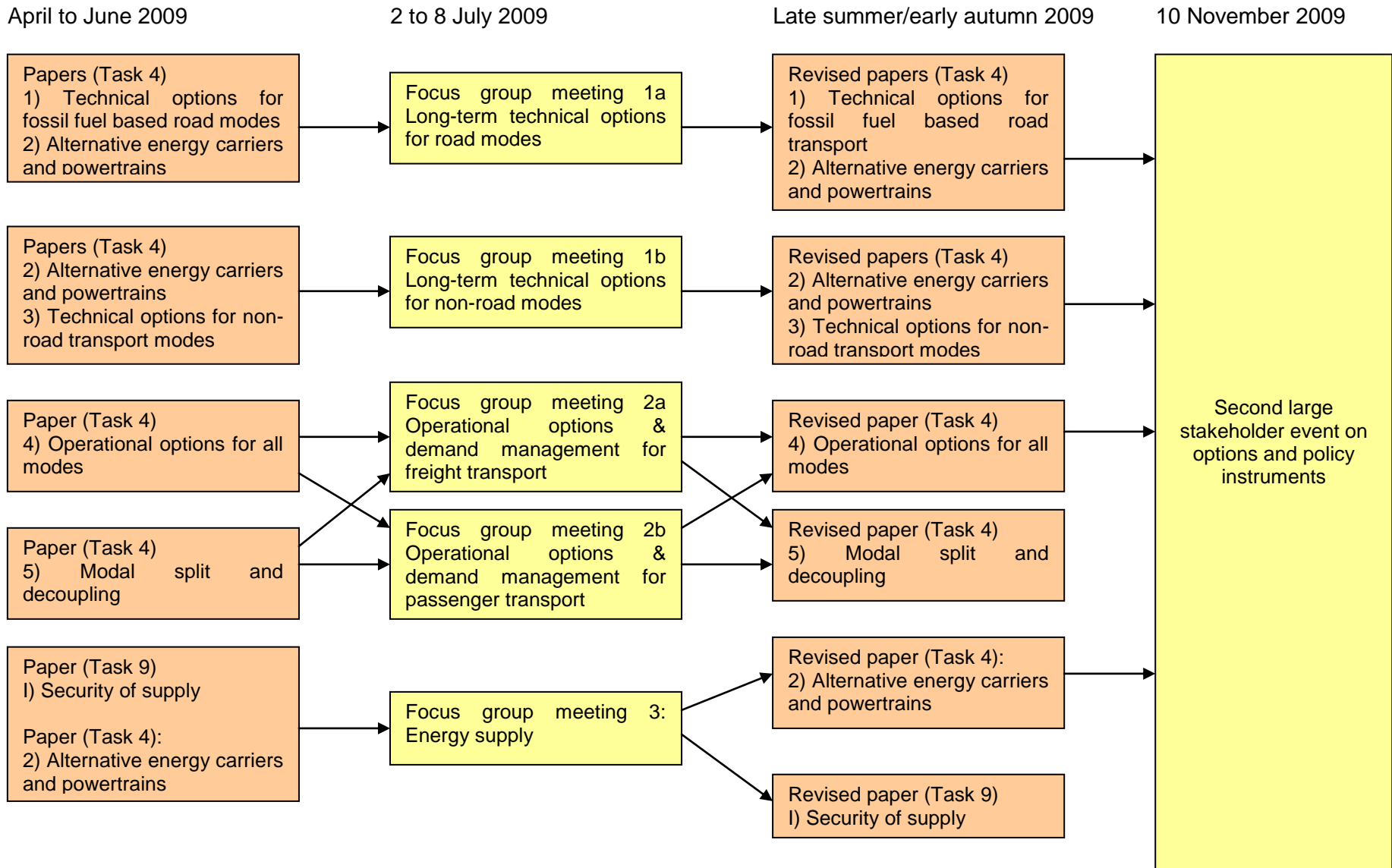


Figure 3: Mapping the Task 4 papers and other Reports to the Technical Focus Groups and larger stakeholder meetings (continued)

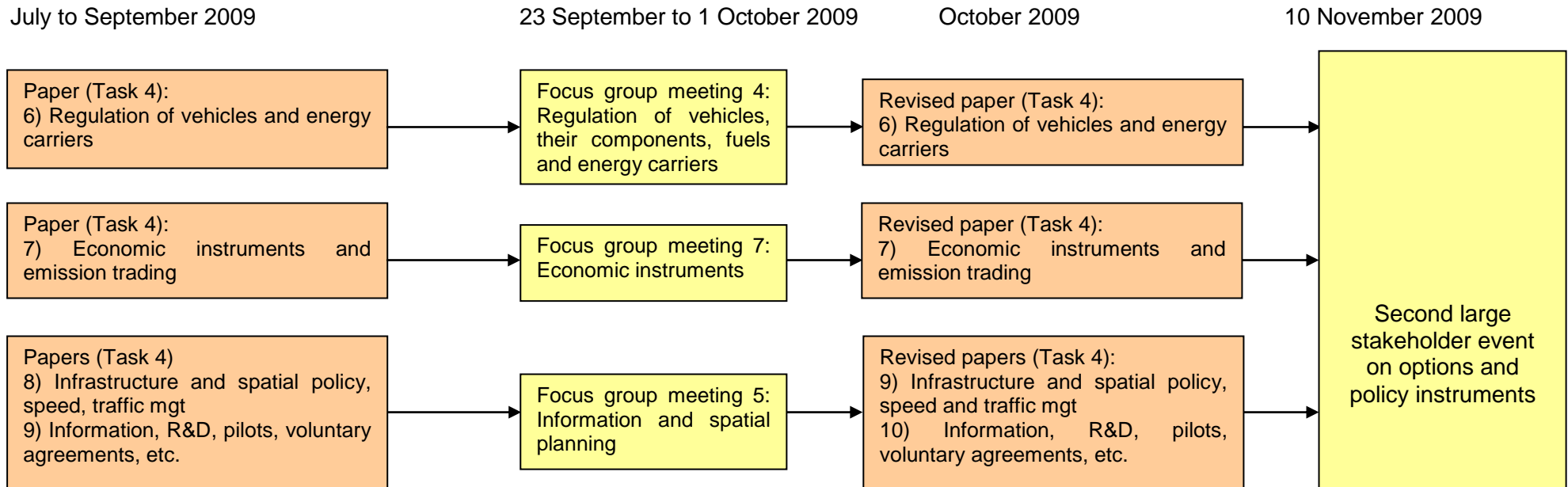
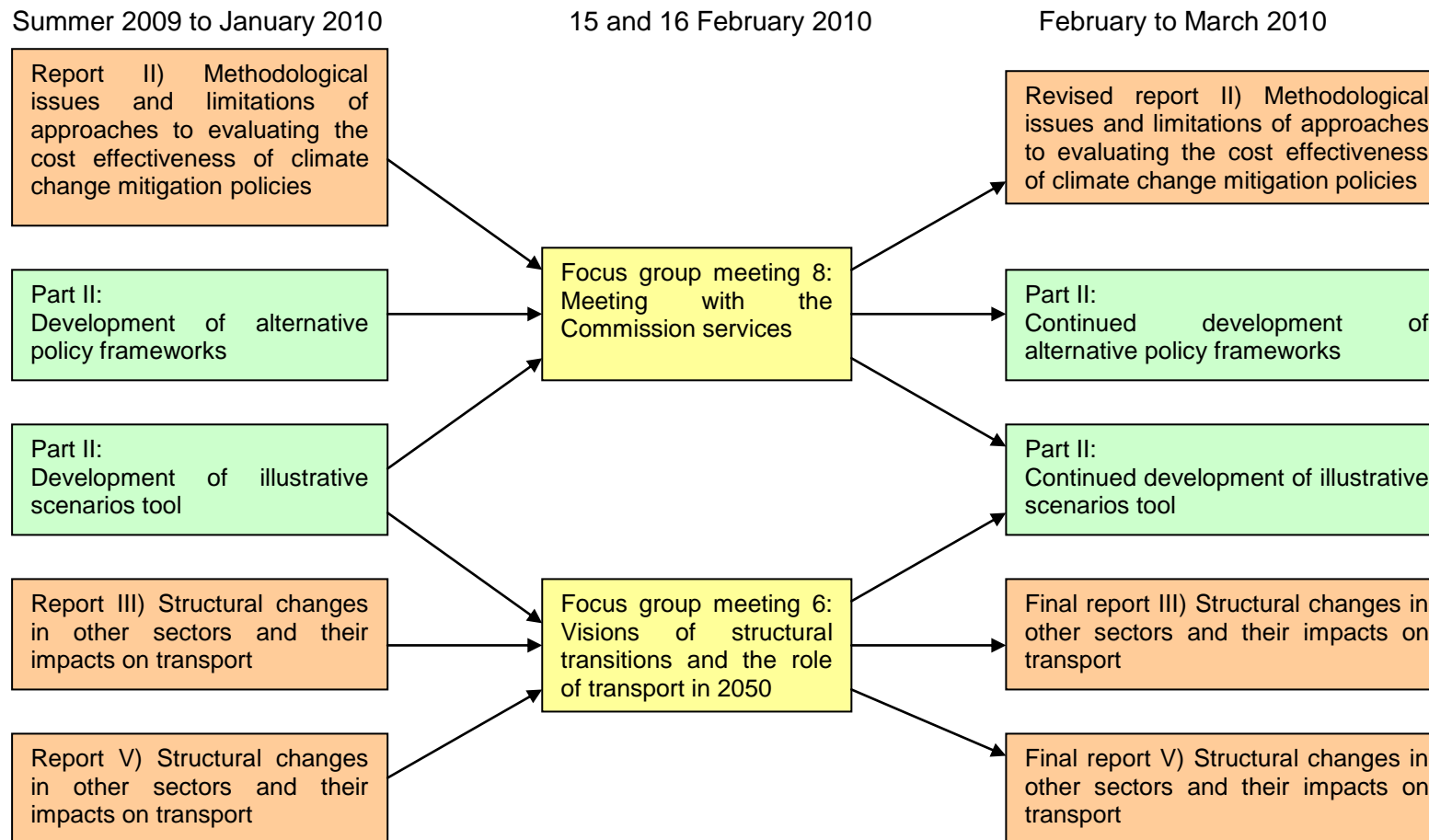


Figure 3: Mapping the Task 4 papers and other Reports to the Technical Focus Groups and larger stakeholder meetings (continued)



All of these elements were developed and presented in a Final Paper, which was developed in the same format as the other papers and reports that had been developed in the project. The aim of this report was to bring together the key messages from the project in one paper that could be put on the website and widely distributed.

3.6 Ad hoc papers and briefings

In the original proposal the project team reserved €70,000 for the production of “between 20 and 25 ad hoc written support/briefings on technical matters” (referred to from now on as “briefings”) and “between 20 and 25 concise analytical or discussion papers” (referred to as “papers”). It was agreed that this element would effectively be operated as a call-off element whereby briefings or papers would be proposed and partners would express an interest in drafting the documents that have been proposed. A diagrammatic representation of the process for approving the briefings/papers was agreed with the Commission (see Figure 4).

In order to identify what this means in practice it was agreed that (given the budget already mentioned):

- A briefing would be a short document of no more than two pages that would cost €500, i.e. half a day's work.
- A paper would be a slightly longer document of around five to six pages and would cost €1,750, i.e. between 1 and 2 days' work.

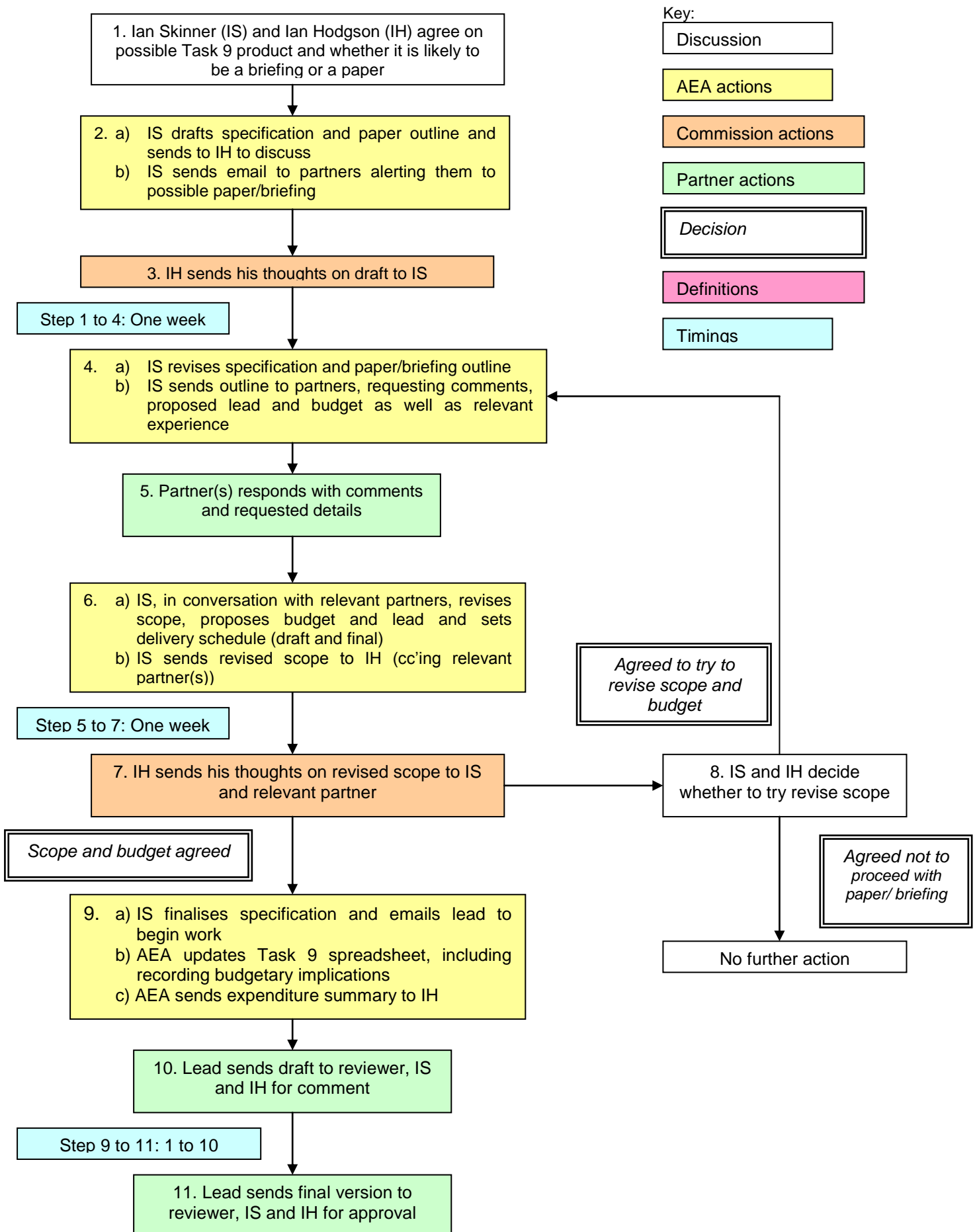
These rates would enable 10 briefings and 37 papers to be delivered within the project or 40 papers if no briefings were requested.

However, in discussion at the Inception Meeting and subsequently, it became clear that there were a number of issues – not originally covered by the core project – that it would be useful to examine in greater detail than would be allowed under the proposed descriptions/rates described above. Specifications for some early reports were developed and circulated to partners to express an interest in developing these. From the responses it was clear that it was not possible to deliver either a briefing or a paper on any of these, as more work was needed. However, the Commission was keen that these issues being addressed as part of the project. Hence, it was agreed that **reports drafted from the call-off budget would be larger than the length of a proposed briefing or paper, but that the same amount of total effort would be applied to the reports developed in this way.** The reports would effectively be interpreted as being the equivalent of so many papers, i.e. a certain number of “paper-equivalents”.

The reports produced within the project that were funded from the call-off budget are as follows (with their paper-equivalents in brackets), which is the equivalent of the 40 papers requested:

- I. Security of Energy Supply (4).
- II. Methodological issues related to cost effectiveness (5).
- III. Structural changes in other sectors and their impacts on transport (7).
- IV. An overview of the factors that limit new technology and concepts in the transport sector (6).
- V. Review of projections and scenarios for transport in 2050 (11)
- VI. Review of potential radical future transport technologies and concepts (3)
- VII. SULTAN: Development of an Illustrative Scenario Tool for Assessing Potential Impacts of Measures on EU Transport GHG (4)

Figure 4: Revised process for commissioning and delivering Task 9 briefings or papers



3.7 Project outputs

As noted above, the work within the project was undertaken and presented in a series of papers and reports. These are all available on the project's website. The Final Report summarises the results of the project drawing on the other papers, which should be considered as appendices to the Final Report. A full list of the references, along with their respective numbers and the part of the project they relate to, is given in Table 1.

Table 1: List of Reports and Paper produced within the project

| Stage of the project where the report was prepared | Paper/ Report number | Full reference* | Final Report Appendix Number |
|--|----------------------|--|------------------------------|
| Final Paper | | Skinner I.; Smokers, R.; van Essen, H. and Hill, N. (2010) <i>Towards the decarbonisation of EU's transport sector by 2050</i> | n/a |
| Task 2 | | Jozwicka, M. and Pulles, T. (2009) <i>Identifying transport's potential contributions to future GHG reduction</i> | 1 |
| Task 3 | | Sessa, C. and Enei, R. (2009) <i>EU transport demand: Trends and drivers</i> | 2 |
| Task 4 | Paper 1 | Sharpe, R. (2009) <i>Technical options for fossil fuel based road transport</i> | 4 |
| | Paper 2 | Hill, N.; Hazeldine, T.; Pridmore, A.; von Einem, J. and Wynn, D. (2009) <i>Alternative Energy Carriers and Powertrains to Reduce GHG from Transport</i> | 5 |
| | Paper 3 | Hazeldine, T.; Pridmore, A.; Nelissen, D. and Hulskotte, J. (2009) <i>Technical Options to reduce GHG for non-Road Transport Modes</i> | 6 |
| | Paper 4 | Kampman, B.; Rijkee, X.; Pridmore, A. and Hulsotte, J. (2009) <i>Operational options for all modes</i> | 7 |
| | Paper 5 | van Essen, H.; Rijkee, X.; Verbraak, G.; Quak, H. and Wilmink, I. (2009) <i>Modal split and decoupling options</i> | 8 |
| | Paper 6 | Smokers, R.; van Essen, H.; Kampman, B.; den Boer, E. and Sharpe, R. <i>Regulation for vehicles and energy carriers</i> | 9 |
| | Paper 7 | van Essen, H.; Blom, M.; Nelissen, D. And Kampman, B. (2010) <i>Economic Instruments</i> | 10 |
| | Paper 8 | Kampman, B.; van Rooijen, T.; Tavasszy, L.; van Essen, H. and Wilmink, I. (2009) <i>Infrastructure and spatial policy, speed and traffic management</i> | 11 |
| | Paper 9 | Brannigan, C.; Hazeldine, T.; Schofield, D.; Halsey, S. and von Einem, J. (2009) <i>Information to raise awareness and instruments to stimulate innovation and development</i> | 12 |
| Ad hoc Reports | Report I | Kollamthodi, S. and Haydock, H. (2010) <i>Energy security and the transport sector</i> | 13 |
| | Report II | Davidson, M. and van Essen, H. (2009) <i>Methodological issues related to assessing cost effectiveness of climate change abatement options</i> | 14 |
| | Report III | Enei, R. and Verbraak, G. (2009) <i>Structural changes in other sectors and their impacts on transport</i> | 15 |
| | Report IV | Pridmore, P.; Wynn, D.; Hazeldine, T. and Milnes, R. (2010) <i>An overview of the factors that limit new technology and concepts in the transport sector</i> | 16 |
| | Report V | Xander, A. and van Essen, H. <i>Review of projections and scenarios for transport in 2050</i> | 17 |
| | Report VI | Wynn, D. and Hill, N. <i>Review of potential radical future transport technologies and concepts</i> | 18 |
| | Report VII | Hill, N. and Morris, M. <i>SULTAN: Development of an Illustrative Scenarios Tool for Assessing Potential Impacts of Measures on EU Transport GHG</i> | 19 |
| Methodology report | | Skinner, I. and Hill, N. <i>Project methodology</i> | 20 |

* All of the papers and reports can be found on the project website: www.eutransportghg2050.eu



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