Productivity and environmental tax reform in Europe (petrE)

Minutes of Steering Group meeting[1]

22 September 2006

Present:

PSI: Paul Ekins (PE), Roger Salmons (RS), Andrew Venn (AV), Alexandra Miltner (AM)

CE: Sudhir Junankar (SJ), Phillip Summerton (PSu), Hector Pollitt (HP)

GWS: Christian Lutz (CL)

SERI: Stefan Giljum (SG), Stefan Speck (SS)

UEP: Petr Sauer (PS),

FU: Martin Janicke (MJ)

AGF: Ray Cunningham (RC)

Apologies

PSI: Paolo Agnolucci (PA)
GWS: Bernd Meyer (BM)
CE: Terry Barker (TB)
UEP: Jaroslav Klusak (JK)

1. Welcome and introduction

PE chaired the meeting and welcomed all partners. A copy of the agenda is provided in Annex 1. Due to some partners having been delayed, the running order was amended.

2. Administrative issues

The notes of the teleconference on the 28 July 2006 were accepted. It was agreed that any matters arising would be covered under the relevant agenda headings.

[1] *Please note a separate 'Actions Points' list generated from this meeting was circulated by AV to the steering group on 26 September 2006.*

It was agreed that for all future meetings, the host institution would be responsible for taking and circulating the minutes.

RS presented a number of alternative designs for the project logo (which had been created by Jenny Yip of PSI). The group unanimously adopted one of the designs. RS will finalise this design (including a black and white version) and will circulate.

RS presented the prototype project website. It was agreed that there would be a "private" section of the website for project partners only. This would allow project documents (minutes, working papers, etc,) to be posted and downloaded, but would not include a FTP facility. RS will keep partners informed on the development of the website.

3. AGF / CSGE

RC gave a brief history of the Anglo German Foundation (AGF) and the rationale for the "Creating Sustainable Growth in Europe" (CSGE) research programme. The CSGE programme – which comprises four projects - will open up the comparative base from the traditional UK/German focus of the Foundation. The titles of the four projects are:

- Explaining productivity growth in Europe, America and Asia
- Sustainable welfare and sustainable growth – towards a new social settlement in the UK and Germany.
- The economics and politics of employment, migration and social justice.
- Resource productivity and environmental tax reform in Europe (petrE)

Joint meetings are planned so as to allow dialogue between the four projects, and to help increase policy relevance. Mid point events are to be held in 2007 in Berlin – and will act as a forum for policy debate (with policy makers), a full conference and a programme meeting. Mirror events will take place in London. Further events are planned for Autumn 2009.

4. Work-package (WP) presentations

Concept notes for the work-packages are provides in Annexes 2-6. AV will circulate copies of the accompanying Powerpoint presentations.

WP1

PE explained that WP1 has been divided into three sub-WPs:

1. WP1A – Energy, competitiveness, economic growth and environmental quality
2. WP1B – Quality of life
3. WP1C – Environmental industries

a) WP1A

AV presented a summary of the data that has been collected so far. CL explained that PSI and GWS are working together on data collection to prevent duplication of work and to build common datasets. PA will be undertaking the micro econometrics. It was agreed that sourcing reliable energy price data will be key.

SJ suggested, and it was agreed, that it would be useful to define competitiveness and the indicators to be used from the outset. PE noted that the Competitiveness of Environmental Tax Reforms (COMETR) project PSI are currently finishing work on will have some useful insights. It was agreed that GWS would produce a note on competitiveness, and that PSI will

comment on it. RS will check the confidentiality of the COMETR concept paper (written by Mikael Skou Andersen) and that – subject to it being allowed – he will forward it to GWS.

b) WP1B

PE presented on WP1B. It was noted that there appears to be a very limited literature on the wellbeing/happiness agenda in Germany. Even though the underlying data is available, such a debate has not developed. Furthermore, Green GDP methods have been dropped in Germany. PE noted that if the UK experience is indeed unique, there is a possibility for petrE to contribute towards broadening the base of analysis. RC noted that Richard Layard's book was published (to a sceptical response) in Germany in 2005. MJ agreed to look further into the literature in Germany on this. It was noted that SERI are involved in organising a forthcoming conference hosted by DG Environment 'Beyond GDP', which is scheduled to be held in May 2007.

c) WP1C

PE presented on the plan for developing WP1C. Testing the Porter Hypothesis for the environmental industry sector is one of the main aims of this WP. PE agreed with MJ that there is scope for the analysis to go beyond the traditional 'end of pipe' technologies that are resource intensive, towards investigating technological change and innovative technologies. However, the three components of WP1C (listed in Annex 2) must not be ignored as core aims.

RS mentioned that the resource budget for WP1c is not large and that therefore there is a constraint on the scope for widening of analysis. PE agreed the need to cover the basis of the original investigation while trying to include or accommodate, where possible, these new ideas. CL noted that he may be able to use some days from WP1a for this endeavour as it would be mutually beneficial.

FFU / GWS / PSI will agree on the division of responsibilities (and the allocation of resources) regarding the collection of resource productivity data at the sectoral level. SJ noted that "Envirowise" may be a good source of information/data since they audit firms for their value added (hidden under surface) costs.

WP2

RS presented the work plan for WP2, with the objective, approach, milestones and method being outlined. It is not planned to start the work until January 2007. It was noted that although the WP is straightforward conceptually, the construction of the necessary datasets will be quite challenging.

WP3

SJ presented the work plan for WP3, including the objectives, division of tasks, milestones and issues present. PE noted, and SJ agreed, that the timescale of the scenarios is a key issue. It was agreed that the range of scenarios must be sufficiently large to properly analyse ETRs, and also reflect the relevant policy/political debates for the results to be most useful. CL noted that the material flow element of the GINFORS model will be used by GWS in this WP, and that the creation of a common set of scenarios and baselines will be needed. CL noted that if two different models generate the same result using the same data set,
this will increase the credibility of the results. PE stated that there is a need to create defensible parameters for the models.

WP4

SS presented the work plan for WP4. There was general agreement regarding the proposed approach for the work-package, and that the analysis would focus on the Visegrád Countries,

It was recognised that WP3 and WP4 will need to feed data into one another, and that CE and SERI (as respective work-package leaders) need to agree on the content and timings of these 'data bi-laterals'.

Data bi-laterals may also be needed between other work-packages (e.g. see WP5). Work-packages leaders are to identify these, and send details of timings to Roger Salmons (RS) at PSI by the end of October 2006. He will then incorporate these (and any other inputs /outputs of WP data) into the project GANTT chart and circulate.

WP5

SG presented the work plan for WP5. Data links between WP3 and WP5 were highlighted as being important. The concepts of embodied energy, carbon leakage and hidden flows will also be of interest to WP5.

5. Book outline

PE presented a proposed book outline (see Annex 7). It was agreed to remove the E3MG reference in chapter 5 and to add an executive summary. MJ suggested that the title of the book should more closely reflect the work being carried out. RC noted that the title for the book is fully flexible from the AGF point of view. It was agreed that it would be useful if each WP notes its own recommendations that would be useful for insights into policy design.

RC noted that the separate report for AGF will need to be designed for the policy community: i.e. around 10-15,000 words in a glossy format, similar to that of the Joseph Rowndtree Foundation reports. There may also be scope for the production of a shorter briefing document.

6. Future meetings

a) Advisory Council meeting, November 2006

PE outlined that it is intended to combine the Advisory Council (AC) meeting with the Partner meeting in November 2006 (see below for the proposed structure of the meeting). PE is organising the invites for AC members. It was noted that there are limited funds for travel, and that this may affect the number of meetings scheduled. RC mentioned that for mid-point events (scheduled for November 2007) AGF will fund all travel costs. RC further highlighted the point that AGF are open to approaches for AC travel costs generally if the petrE budget gets too tight.

b) Partner meeting, November 2006

The first Partner meeting will be held on the 15-16 November in Berlin, and will be hosted by FU. It has been scheduled to coincide with a major conference on resource efficiency that is being held on the 17-18 November. The planned agenda is:

15 November 2006	14.00 to 17.00	Partner meeting (part 1)
	18.30 onwards	Dinner with Advisory Council
16 November 2006	09.00 to 13.00	Advisory Council meeting
	14.30 to 17.30	Partner meeting (part 2)
	evening	Meal for petrE partners

c) Partner meeting, May 2007

It was agreed that the second Partner meeting will be held on the 22-23 May 2007, in London. The structure will be the same as for the November meeting. RC offered the AGF meeting room in Belgrave Square as a venue. RS will check with Ann Pfeiffer at AGF regarding the availability of the room.

7. Any other business

PS invited partners to an environmental economics conference in Prague on 13 October 2006.

Roger Salmons / Andy Venn
1 November 2006

Annexes

Annex 1 Agenda
Annex 2 WP1 concept note
Annex 3 WP2 concept note
Annex 4 WP3 concept note
Annex 5 WP4 concept note
Annex 6 WP5 concept note
Annex 7 Book outline

petrE

Productivity and environmental tax reform in Europe

Steering Group Meeting No. 1
Friday 22 September 2006
Policy Studies Institute

Agenda

10.30 – 10.45 Welcome and introduction (PSI – PE)

10.45 – 13.15 Work-package presentations (30 minutes each)

- WP1 (PSI – PA)
- WP2 (PSI – RS)
- WP3 (CE – SJ)
- WP4 (SERI – SS)
- WP5 (SERI – SG)

13.15 – 14.00 Lunch

14.00 – 14.30 CSGE Research Programme (AGF – RC)

- Programme overview / background
- UK Government briefing, 24 November 2006
- AGF mid-term events, November 2007

14.30 – 15.00 Book outline (PSI – PE)

15.00 – 15.30 Administrative issues (PSI – RS)

- Project logo
- Project website

15.30 – 16.00 Future meetings / events (PSI – RS)

- Partner Meeting/Advisory Council, 15-16 November 2006
- Dates of future SG/Partner meetings

16.00 – 16.30 Any other business

16.30 Close

WORK PLAN
(For Partner Meeting, September 22nd 2006)

Work Package (WP) 1:
The Link Between Resource Use, Economic Performance and Environmental Quality
Key Research Question (RQ):

- *Is there any relationship between trends in resource productivity, resource (especially energy) prices, environmental quality, economic growth and competitiveness?*

Lead Partners: PSI, GWS, FU

WP1 has been subsequently divided into three subWP;

WP1A: energy, competitiveness, economic growth and environmental quality
WP1B: quality of life
WP1C: environmental industries

Re. WP1C, FFU has proposed that this part of the project should be re-framed as outlined at the end of this paper. Whether we want to do this will be a major item for discussion at the Steering Group meeting.

WORKPLAN WP1A

From Proposal:
This question seeks to go to the heart of the issue of the relationship (positive or negative) between resource productivity, end-user resource (especially energy) prices (broken down into various components, e.g. wholesale prices, taxes etc.), economic growth and competitiveness, environmental quality, and quality of life. The question is relevant not only to relative price changes due to ETR, but also to the whole question of resource prices, in a context of high fossil fuel prices which may be maintained into the future.

The work will be carried out by PSI (Paolo Agnolucci and Andy Venn) and GWS (Ariane Jungnitz and Christian Lutz). Considering that the same piece of analysis will be undertaken for the UK and Germany, a division of the work on the basis of the subject was judged more effective than one based on the geographic location of the assessed industrial sector. In particular, GWS will focus on Competitiveness and Material flows while PSI on Energy use and Air pollutants.

In the case of Energy use, data for about 10 industrial sectors[2] on Energy Consumption, Energy Price, GVA was identified. Data collection is already in progress. The timespan goes from 1978 to 2004; data are in annual terms. Considering the relatively long sample and the availability of information on price, the great deal of the effort from PSI will focus on the analysis of this dataset. The analysis will start by running regression for the individuals sector

[2] More specifically, Data were collected for the following Industrial sector (ISIC number in brackets): Iron and Steel (27.1 + 27.31); Chemical and petrochemical industry (24); Non-ferrous metals (27.2 + 27.32); Non-metallic minerals (26); Transport equipment (34 + 35); Machinery (28, 29, 30, 31 and 32); Mining (excluding fuels) and quarrying (13 + 14); Food and tobacco (15 and 16); Paper, pulp, and printing (21 and 22); Wood and wood products (20); Construction (45); Textile and leather (17, 18 and 19); Non specified (any manufacturing industry not included above) (25, 33, 36 and 37.

and then assessing the opportunity to employ panel data econometrics. In particular, we would like to assess whether the dataset can be usefully discussed by using panel cointegration (Baltagi and Kao 1999) and dynamic time series estimators (Smith and Fuertes 2006). The aim of this work will be to analyse the long-run relationship between GVA, energy price and energy consumption.

Data on emissions of air pollutants have also been identified for a number of industrial sectors in the UK and Germany. The major issues with the dataset are the limited timespan (normally starting in 1992) and lack of any information on price at this level of detail. For this reason we plan to assess the relationship between Pollution intensity, GVA, employment and capital. The question we ask is: does an increase in GVA lead to reduction in air pollution intensity when taking into account the difference across industrial sectors and the change in the use of production factors? We plan to employ recently developed microeconomic models (Bond 2002) (small T & big N where T is the length of the timespan and N the number of observation per year). It is worth mentioning that the N of our sample is however very small compared to the dataset normally employed. The extent of the analysis will depend on the results we obtain.

Competitiveness will be analysed on the basis of international trade data of the OECD I a cross-country analysis. The Bilateral Trade Database consists of data from 1988 to 2004 for 25 product groups. International material flow data will stem from the SERI work in the MOSUS project. Energy data is supplied by the International Energy Agency. We will look for relations between international competitiveness and resource and especially energy productivity on country level and if possible also on sector level.

Material flow time series data (from 1991 to 2002) only seem to be available on a sector level for Germany from the Federal Statistical Office. We will use these material flows for cross-sector comparison of economic (GVA, production) and material flow development. Analysis might be extended to the UK, if sector information on material flows will be available.

The timeframe envisaged for the project is:

- **October** 2006: end of data collection
- **February** 2007: literature review (on methodology and similar studies)
- **June** 2007 Working Paper (WP) of the first study (one for each institution)
- **September** 2007 WP of the second study (one for each institution)
- **December** 2007 End of the WP: draft of academic articles + submission

WORKPLAN WP1B

From Proposal:
The WP will then discuss on the basis of these relationships whether the trends in resource flows have had any impact on quality of life in the two countries. For monitoring and measuring the quality of life as well as the quality of the environment, indicators to be used will include subjective indicators of well-being, and ecological indicators (for example of 'critical loads', see Zieschank 2002, Swiss Federal Statistical Office 2003, OECD 2003a, Achtziger et.al. 2004), as well as eco-efficiency indicators, which identify not only the economic use of resources (input orientation) but also the relation to ecological pressures (output orientation: emissions, waste or physical impacts on the environment).

In this context, a difference should be noted between 'sustainable growth' as defined above in the Introduction, and 'sustainable development', which is sometimes defined in economic terms as non-declining welfare (see, for example, Pezzey 1992, pp.14ff.). Sustainable growth will not necessarily be welfare maintaining, and is therefore not a sufficient condition for sustainable development. One reason for this is that sustainable growth is compatible with negative environmental effects, provided that such effects do not breach sustainability limits. Unless these negative effects on welfare are less that the positive effect on welfare of the increased incomes associated with the economic growth, the growth may result in a negative overall effect on welfare. These environmental effects consequent on growth (potentially including sustainable growth) will be investigated for their potential effect on welfare, in particular for a number of sectors that have environmental impacts apart from carbon emissions, including the energy sector, transport, basic industry, especially chemicals, construction, agriculture and waste management.

Workplan WP1B
Literature review: there has been substantial recent interest (in the UK at least) in 'quality of life' (also termed 'happiness') as a political objective and the consequent production of a new literature in this area, not least by Richard (Lord) Layard, the UK Government's 'Happiness Czar'. This and other literature (also that produced in Germany) needs to be reviewed, focusing especially on the links between environment/resource flows and quality of life, both direct (e.g. most obviously from pollution) and indirect (from the economic and social results of environment/resource use).

It will be necessary to construct in detail a model such as that shown schematically in Figure WPIB.1. Clearly major issues arise in making such a model operational, such as the establishment of quantities and causality in the various relations. WP1B will proceed by seeing (from the literature):

- To what extent *qualitative* interactions between the various variables and indicators have been hypothesised, and seem to be supported by evidence;
- To what extent these links can be given a causal direction;
- To what extent a *quantitative* causal relationship between the indicators either has been, or in principle could be, established;
- To what extent this project could establish such quantitative relationships where this has not yet been done.

One issue which will be covered is the relationship between economic growth and quality of life. There has been much loose talk recently about economic growth 'not making people happier'. The evidence on this issue will be rigorously examined.

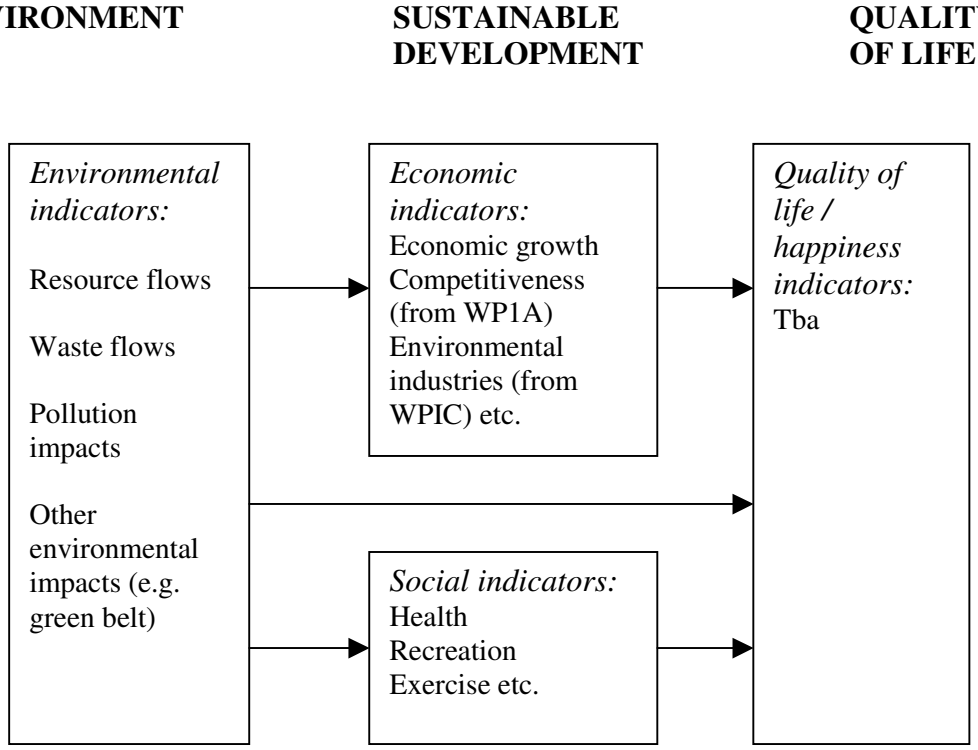


Figure WP1B.1: Schematic Relationship Between Environmental Issues and Quality of Life

Timescale

Early progress will be made on WPIB, but clearly it will also need to be able to use the results from WP1A (on competitiveness especially) and environmental industries (and the extent to which they benefit the economy as well as the environment), and there will need to be a comprehensive synthesising of results in relation to the issue (and any necessary updating of data) towards the end of the project. It is therefore envisaged that the days for WP1B will be expended roughly as follows:

Year 1: 60%	(PSI 26 days)	to carry out basic analysis
Year 2: 20%	(PSI 9 days)	to incorporate any insights from WP1B, WP1C
Year 3: 20%	(PSI 9 days)	to synthesise results of project and bring results up to date

PSI Staff: Paul Ekins, Andy Venn

WORKPLAN WP1C

From Proposal:
Finally, there will be analysis under this question of the environmental industries in the UK and Germany, to see whether there are any patterns between the size and nature of these industries (e.g. their export earnings) and the flows of resources or emissions of pollutants, or resource prices in those countries. The proposers are not aware of any previous studies of this kind. It will not be possible under the Revised Budget to carry out the analysis under this part of the WP as thoroughly or extensively as had been originally envisaged, but it was felt important not to cut this part of the WP altogether, as the budget cut really warranted. As much of the original plan will be carried out as possible.

The purpose of this part of the work is to shed some empirical light on one aspect of what has come to be called the 'Porter hypothesis'. Porter suggested (Porter 1990, pp.647-648, Porter & van der Linde 1995) that, for a number of reasons, including cost reduction (from more efficient use of environmental inputs), first-mover advantages and stimulation to innovation, environmental regulations and policies such as environmental taxes may be good for economic competitiveness. This 'win-win' hypothesis of the economic, as well as environmental, benefits of environmental regulation runs clearly counter to economists' normal assumptions of efficient, competitive markets and remains controversial in economic discourse (see, for example, Palmer et al. 1995 for a rebuttal). However, the hypothesis is attracting policy attention, especially in a European context seeking to combine the competitiveness and sustainable development agendas. Thus, 29 European Environmental Agencies summarizing several empirical studies have recently strongly underlined the importance of the Porter hypothesis (NHEEPA 2005). Also the 'High Level Group' of the Commission led by Wim Kok stressed the need to "increase competitiveness through greater resource efficiency" (Kok 2004, p.35). The EU spring summit 2005 integrated the objective of resource efficiency into the Lisbon Strategy underlining the "the development of eco-innovation and eco-technology as well as the sustainable management of natural resources" (CEU 2005, p.6). This part of the project will seek to generate some much needed empirical evidence on the validity and strength of the Porter hypothesis, on which policy makers seem to be placing increasing attention in their desire to achieve both economic and environmental objectives.

One of the ways in which innovation stimulated by environmental policy might manifest itself is through the development of environmental industries to reduce pollution, or the use of resources, that policy had made more expensive, or otherwise to respond to environmental regulations. It may be that relatively high resource prices or pollution charges will lead to the development of environmental industries to generate the new technologies to reduce resource flows and pollution. If such a relationship can be observed, then this may provide evidence of the Porter hypothesis.

The flows of a number of major resources or pollution will be investigated, along with the methods and technologies (including management systems and consultancies) that have been used to reduce their quantity or environmental impacts. The hypothesis will be explored that a lower than average flow of resources or pollution is related to a higher than average business activity or success rate in terms of environmental technology and services. Clearly, many factors may lead to such activity or success, and no simplistic conclusions will be drawn, but it will be interesting systematically to investigate whether there is any significant correlation in the UK and Germany (and other European countries if time and data permit extra analysis) between resource productivity and successful environmental industries. In this context, environmental industries will be taken to include both the environmental industries as statistically defined and

the additional, more complex group of eco-efficient producers, which constitute an increasing part of modern industrial economies, and which tends to be underestimated in the debate on innovation, competitiveness and employment.

Workplan WP1C

It was agreed at the July tele-conference that WP1C would be led by FU. These preliminary ideas are intended to feed into their thoughts as to how WP1C might be taken forward. SEE END FOR THOUGHTS FROM FFU

From the description above, WP1C has the following components:

1. Investigation of the relationship between resource flows and pollution, resource prices, and the size of relevant parts of environmental industries
2. Contribution of environmental industries to the economy, in terms of employment, exports etc.
3. Effects of environmental regulation on the growth and success of environmental industries, and on other innovation processes in other economic sectors

Tasks here are:

1. Establish the definition of 'environmental industries' for the project, such that maximum data are available (probably will need to use EUROSTAT definitions) and the maximum number of resource flows/pollution impacts are covered.
2. Establish the size of the environmental industries in Europe (for input into WP3) and, in much more detail, for Germany and UK, and their contribution to the economies of Germany and UK (link to WP1B).
3. Establish the environmental improvements that these industries have achieved (link to WP1B).
4. Establish the growth dynamic of these industries, especially how their growth has been related to regulation in both their home and foreign countries.
5. Establish how regulation may have led to innovation in other sectors, and both environmental and economic benefits of this innovation (link to WP1B)

The methods to be used in WP1C will be dependent to some extent on data availability. It would desirable to establish at least some of the relationships through econometric estimation, and PSI has the expertise for this (Miltner). However, this will depend on data, and a decision of the feasibility of quantitative analysis of this kind will be taken once the data and definitional aspects of 'environmental industries' is clearer.

Timescale
The work on WP1C will be carried out in Year 1 of the project, but will probably not begin until January 2007. It will then last about six months, so that by July 2007 it is envisaged that the basic analysis of WP1C will be complete.

PSI staff: Paul Ekins, Alexandra Miltner

PROPOSAL FROM FFU

Productivity and environmental tax reform in Europe (petrE)

FFU: Lead partner 'Environmental Industries' – Concept Notes

10-04-2006 / Agreed by GWS

The main goal of the project is to provide policy recommendations for the design of environmental tax reforms, aiming to increase resource productivity and stimulate sustainable economic growth in Europe.

WP1 – The Link Between Resource Use, Economic Performance and Environmental Quality

Main question: Is there any relationship between trends in resource productivity, resource (especially energy) prices, environmental quality, economic growth and competitiveness?

Additional: Analysis of the development of low carbon technologies. In order for this to feed into WP3, it would need to cover all European countries. However it was recognised that – given budgetary constraints – the work would necessarily focus on the UK and Germany.

As so far, the project will focus on three relationships:

1. Environmental industries - resource flows / emissions

Analysis of the environmental industries in the UK and Germany, to see whether there are any patterns between the size and nature of these industries (e.g. their export earnings) and the flows of resources or emissions of pollutants.

2. Environmental industries - resource productivity

It will be interesting systematically to investigate whether there is any significant correlation in the UK and Germany (and other European countries if time and data permit extra analysis) between resource productivity and successful environmental industries, including eco-efficient producers.

3. Environmental industries - Resource prices / taxes

Testing the ‚Porter hypothesis': Environmental regulations and policies, e.g. environmental taxes may be good for economic competitiveness.

One of the ways in which innovation stimulated by environmental policy might manifest itself is through the development of environmental industries to reduce pollution, or the use of resources, that policy had made more expensive, or otherwise to respond to environmental regulations. It may be that relatively high resource prices or pollution charges will lead to the development of environmental industries to generate the new technologies to reduce resource flows and pollution. If such a relationship can be observed, then this may provide evidence of the Porter hypothesis.

4. Development of low carbon technologies

The description could be a special part of the analyses belonging to the mentioned relations above.

Our proposition is a modification of the existing concept:

We would like to analyse

a) environmental industries, in a short manner, including employment effects,

b) producers of renewable energies (effects of regulation by the German Law for Renewable Energy and the German Ecotax). It will be the only realistic possibility to test the Porter-hypothesis, we think,

c) Industries charakterized by a strong/weak amendment of energy productivity / resource productivity and specific amendment of emissions and waste disposal. Time series should be investigated. It is interesting to compare resource productivity on the one hand and emissions / waste on the other.

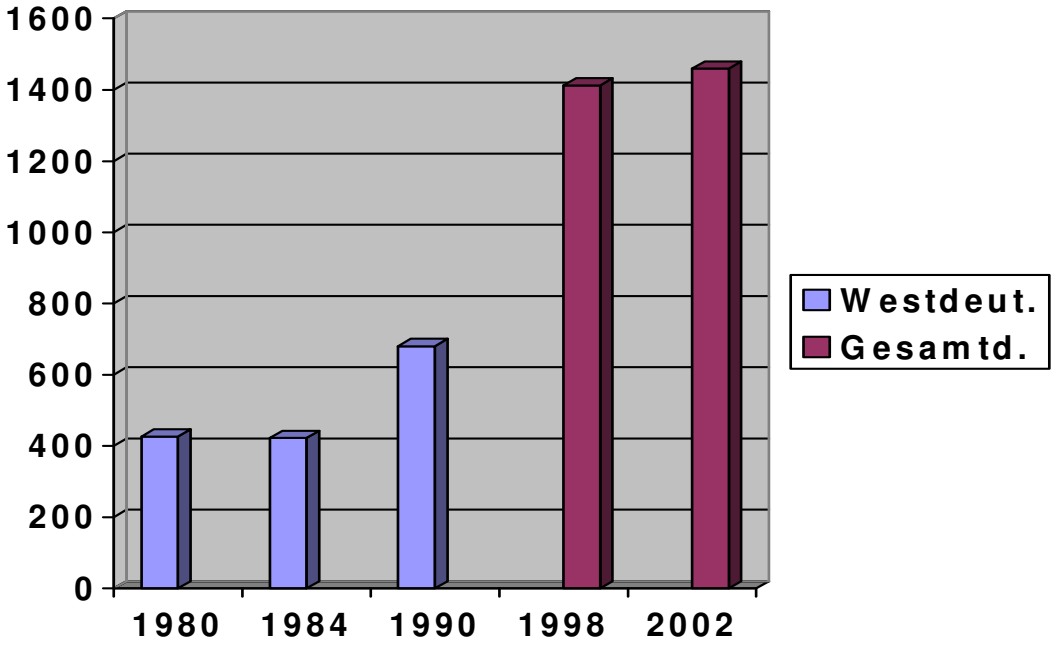
There are some reasons why we would like to shift the focus from environmental industries to an analysis of the renewable energy industry and branches with high / low *environmental performance* (emissions and waste disposal compared with resource productivity) of the *whole industry* in Germany, resp. U.K.:

- The main question is compatible and more important, if the whole industry is included.
- The impact of environmental policy, especially ecological taxes, leads to measures and solutions in many branches at first. Often, the input of environmental companies is not necessary or limited to some additional technologies.
- "Environmental industry" is not easy to describe. The term is moving over time. [3] We assume, there is also a lack of statistical data in Germany.
- Instead of relation 2, we would like to make a differentiation to some industrial sectors of the whole industry: Are there any patterns in the relation between resource productivity and economic growth?
- Concerning relation 3, it would be very interesting to analyze whether environmental taxes loose their function, as resource and energy prices are climbing during the last

[3] It is difficult to make a clear differentiation between environmental industry and other industries. For example, in Germany we can find many studies dealing with employment and environmental industry, arising from research of institutions like DIW, ISI, B.U.N.D. or just now GWS. But there is no clear and common comprehension of 'environmental industry'.

years. Does it mean a substitution of policy by the market? On the other side: are there additional effects governing environmental performance of industries (lowering resource and energy flows as well as emissions)?

Employment in the Environmental Industry in Germany



Source: BMU 2005 (figures in thousands)

References

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WP2 Resource and labour impacts of European ETRs to date

1. Background and objectives

In this work-package, the impact of the energy-related ETRs that have been implemented in Germany and the United Kingdom over recent years will be investigated. In particular, the impacts of the resultant changes to the prices of energy and labour will be assessed.

The ETR in Germany commenced in 1999, with the introduction of an electricity tax, and increases in the existing tax rates for natural gas and light heating oils. Since then the tax rates on these fuels have been increased on a number of occasions; as has the rate for heavy fuel oils (although the tax rate on heavy fuel oil used for electricity generation has been reduced). While these tax increases have been relatively substantial in theory, they have not been applied uniformly in practice. Businesses in the manufacturing, agricultural, fishery and forestry sectors with energy consumption above a certain threshold only had to pay 20% of the increase in the respective rates (versus the pre-ETR rates in 1998) – increased to 60% in 2004. Furthermore, businesses in the manufacturing sector could apply for a "tax cap" if the their additional energy tax payments are more than 1.2 times greater than the reduction in their pension contribution costs (see below) – receiving a full refund of the excess.[4]

The total revenues raised by the ETR were around EUR 18.6 billion in 2003; of which around EUR 10.5 billion related to non-transport fuel use (split approximately 60/40 between households and industry). Of this, around EUR 9.2 billion has been used to fund a uniform reduction in pension contributions paid by employers and employees – with the reduction spilt equally between the two groups.[5] It is estimated that the effective impact of the ETR (taking account of counterfactual trends) has been to reduce the pension contribution costs for each group by around 8% - equivalent to a reduction in average labour costs of around 1.1%. However, the reduction only applied to workers with income above a threshold level. Indeed, part-time employees with an income below €322 per week, that had been exempt from the contributions prior to 1999, became subject to a reduced rate of contribution. Thus, the ETR has resulted in an increase in the average labour cost for low-paid part-time workers, both in absolute terms and relative to other workers.

In the United Kingdom, the climate change levy was introduced in April 2001. At the full rate, the levy represented an increase in average industrial energy prices of around 15%-27% (depending on the size of user). However, as in Germany the rates have not been applied uniformly. Reduced rates (20% of the full levy rate) apply to companies in specified energy intensive sectors that entered into legally binding agreements with the government (Climate Change Agreements) specifying targets for improvements in energy efficiency.

At the time of its introduction, the full-year revenue from the levy was expected to be around £1000 million and this was used to fund a 0.3% point reduction in the employers' national

[4] This was changed in 2004, so that they now receive a refund equal to 95% of the net increase in their tax burden as a result of the ETR.

[5] Around EUR 1 billion was used – as a temporary measure – to reduce the federal budget deficit, with a further small amount being used to fund the promotion of renewable energy.

insurance contribution rate (from 12.2% to 11.9%).[6] This represented a reduction in the average cost of labour (excluding pension costs) of around 0.03%. However, because national insurance contributions are not payable for employees with earnings below the Earnings Threshold, the actual reduction in the average cost of labour has varied between sectors, reflecting differences in the composition of the labour force.

The objective of this work-package is to assess the impacts of the resultant changes in the average prices of energy and labour on the use of these two factor inputs in Germany and in the United Kingdom. The analysis will be undertaken for a number of selected industrial sectors – spanning a range of energy and labour intensities. This will allow a comparison of the impacts both between sectors, and between the two countries.

2. Approach and methodology

In order to assess the impact of the tax reforms, it is necessary to estimate what energy consumption and employment levels would have been in the absence of the reforms (i.e. the counterfactual). To this end, a neoclassical cost function approach will be used to estimate the relationships between factor demands, output levels and factor prices in a partial equilibrium framework. Based on these relationships, the impacts of the resultant price changes on the quantities of the various input factors can be estimated. It is proposed to use the translog cost function for the analysis, which can be written as:

$$\ln C = \ln \alpha + F(Y; \boldsymbol{\gamma}) + G(\mathbf{P}, Y; \boldsymbol{\beta}, \boldsymbol{\chi}, \boldsymbol{\delta}) \quad \ldots (1)$$

$$F(Y; \boldsymbol{\gamma}) = \gamma_1 \ln Y + \tfrac{1}{2} \gamma_2 (\ln Y)^2$$

$$G(\mathbf{P}, Y; \boldsymbol{\beta}, \boldsymbol{\chi}, \boldsymbol{\delta}) = \sum_{i=1}^{N} \beta_i \ln P_i + \tfrac{1}{2} \sum_{i=1}^{N} \sum_{j=1}^{N} \chi_{ij} \ln P_i \ln P_j + \sum_{i=1}^{N} \delta_i \ln P_i \ln Y$$

where C is the total cost of production, Y is the level of output, $\mathbf{P} = (P_1, \ldots, P_N)$ is a vector prices for factor inputs $i = 1, \ldots, N$, and $\chi_{ij} = \chi_{ji}$ (due to the required symmetry of cost functions).

The main advantage of the translog functional form is that is very flexible as it can be interpreted as a second-order approximation of an arbitrary twice-differentiable cost function. In particular, it places no *a priori* restrictions on the substitution possibilities among the factors of production, and allows economies of scale to vary with the level of output. Another advantage is that it yields a system of equations for the cost shares of the various factors that are all linear in prices (relative to an arbitrary "numeraire" factor) and output, i.e.[7]

[6] Actual revenues have been lower than expected, at around £800 million per annum.

[7] The cost share equations are derived by logarithmically differentiating (1), invoking Shepherd's Lemma, and noting that the requirement for linear homogeneity in prices implies that $\Sigma_j \chi_{ij} = 0$.

$$S_i \equiv \frac{P_i W_i}{C} = \beta_i + \sum_{j=1}^{N-1} \chi_{ij} \ln\left(\frac{P_j}{P_N}\right) + \delta_i \ln Y \qquad i = 1, \ldots N \qquad \ldots (2)$$

where W_i is the cost-minimizing quantity of the i^{th} factor input.

Price elasticities and Allen partial elasticities of substitution can be calculated directly from the cost shares and the values of the parameters χ_{ij}.[8] While these will provide a useful output from the analysis, they do not provide any information on the absolute changes in the quantities of the factor inputs as a result of the price changes. However, combining the cost function equation (1) with the cost share equation (2) yields the following expression for the ratio of the quantities of a given factor – with and without the tax reform:

$$\frac{W_i^T}{W_i^N} = \left(\frac{P_i^N}{P_i^T}\right) \times \left(\frac{S_i^T}{S_i^N}\right) \times \left(\frac{\exp\left[G(\mathbf{P}^T, Y^T; \boldsymbol{\beta}, \boldsymbol{\chi}, \boldsymbol{\delta})\right]}{\exp\left[G(\mathbf{P}^N, Y^N; \boldsymbol{\beta}, \boldsymbol{\chi}, \boldsymbol{\delta})\right]}\right) \times \left(\frac{\exp\left[F(Y^T; \boldsymbol{\gamma})\right]}{\exp\left[F(Y^N; \boldsymbol{\gamma})\right]}\right) \qquad \ldots (3)$$

where the values under the tax reform are denoted by the superscript T, and the values under the counterfactual (i.e. no tax reform) are denoted by the superscript N.

The calculation of the ratio requires information about the values of the parameters $\boldsymbol{\gamma}$, which do not appear in the cost share equations. However, given the scale of price changes resulting from the particular tax reforms under evaluation it is reasonable to assume that these had minimal impact on output levels.[9] Consequently, the final term in equation (3) is approximately equal to one, and can be ignored. It follows directly that:

$$W_i^T - W_i^N = (\rho_i - 1) \times W_i^N = \left(\frac{\rho_i - 1}{\rho_i}\right) \times W_i^T \qquad \ldots (4)$$

where $\rho_i = \left(\frac{P_i^N}{P_i^T}\right) \times \left(\frac{S_i^T}{S_i^N}\right) \times \left(\frac{\exp\left[G(\mathbf{P}^T, Y^T; \boldsymbol{\beta}, \boldsymbol{\chi}, \boldsymbol{\delta})\right]}{\exp\left[G(\mathbf{P}^N, Y^N; \boldsymbol{\beta}, \boldsymbol{\chi}, \boldsymbol{\delta})\right]}\right)$

Thus, the absolute changes in the quantities of factor inputs can be calculated from the quantities actually used under the tax reform and the information provided by the system of cost share equations (2).

The cost share equations must be estimated as a multivariate regression system. Since the shares must sum to one, only N-1 of the equations are linearly independent, and hence the disturbance covariance matrix is singular and non-diagonal. Consequently, it is necessary to drop one of the share equations from the system.[10] The parameters values for this equation can be recovered from the symmetry and homogeneity restrictions on the parameter values.

Denoting the estimated value for ρ_i by r_i, the difference in the estimated values of the input quantities is given by

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[8] The Allen partial elasticites are calculated as $\sigma_{ij} = (\chi_{ij} + S_i S_j) / S_i S_j \ \ (i \neq j)$, $\sigma_{ij} = (\chi_{ij} + S_i(S_i - 1)) / S_i S_i$. The price elasticities are calculated as $\varepsilon_{ij} = \sigma_{ij} S_j$.

[9] This would not generally be the case. More significant tax reforms may well have impacts on output levels. Consequently, care should be taken in using equation (4) to make ex ante assessments of potential tax reforms.

[10] If the parameters are estimated by maximum likelihood, the results are invariant to the choice of factor for which the share equation is dropped.

$$\hat{W}_i^T - \hat{W}_i^N = \left(\frac{r_i - 1}{r_i}\right) \times \hat{W}_i^T$$

$$= \left(\frac{r_i - 1}{r_i}\right) \times W_i^T + \left(\frac{r_i - 1}{r_i}\right) \times e_i \qquad \ldots (5)$$

where $e_i = \hat{W}_i^T - W_i^T$ is the (unknown) difference between the (unknown) fitted and (known) actual values of the input quantity. If the % impact of the tax reform is relatively small (e.g. < 10%), the value of r_i will be close to one, and hence the "error term" in (5) is likely to be small.

3. Resources

PSI is the only project partner involved in this work package. The researchers undertaking the data collation and analysis will be Roger Salmons and Alexandra Miltner.

The total number of person-days budgeted for the work-package is 99 days.

4. Milestones and deliverables

The work-package is scheduled to run for a total of eighteen months; from 1st January 2007 to 30th June 2008.

There are three milestones for the work-package. These are:

M1	Completion of data collection	August 2007	(i.e. month 8)
M2	Completion of analysis	February 2008	(i.e. month 14)
M3	Completion of report	July 2008	(i.e. month 18+1)

There is a single deliverable – the work-package report. The proposed schedule for the submission of this deliverable is:

DP	Preliminary version	August 2007
DD	Draft version	March 2008
DF	Final version	August 2008

The preliminary version will comprise a description of the data collation exercise and an outline of the analytical methodology. Any revisions arising from the review at the Partner Meeting in November 2007 will be incorporated in the draft version, along with a description of the analysis and a review of the results. This will be reviewed at the Partner Meeting in May 2008, with any revisions being incorporated in the final version.

5. Potential issues

The methodological approach that is being used is relatively straightforward. The main issues for the analysis are the availability of data and the determination of the price-impacts resulting from the ETRs for the different sectors.

It is proposed to use four aggregate inputs – capital, labour, energy and materials – for the analysis (i.e. a "KLEM" model). The estimation of the cost share equations will require data on the prices and quantities for these four factors, and data on output levels. The collection / collation of this data will be a major task, which will be far from straightforward. While data for energy and labour is available at the sectoral level from original sources in both countries, data for capital services and materials will have to be constructed using information from a range of sources. For labour and capital (in particular) account must be taken of changes in the "quality" of the factor over time – for example the rapid growth of ICT. Fortunately, the same issues apply to the calculation of total factor productivity (where energy and materials are amalgamated), and the literature on this topic should be able to provide some guidance.

Ideally one would like to undertake the analysis for sectors defined at the NACE 3 level (e.g. meat and meat products, pharmaceuticals, etc.). However, this will depend on the availability of data at this level. While there is reasonably good data for energy consumption and employment at this level for more recent years, the need for a reasonably long time series means that the analysis will probably have to be undertaken at the NACE 2 level (e.g. food and food products, chemicals and chemical products, etc.).

The other major issue is the determination of the impacts on the average prices of energy and labour arising from the ETRs. As noted above, neither the energy tax increases nor the labour tax reductions have been applied uniformly. Furthermore, the average (ex-tax) prices may vary between sectors. Consequently, there are likely to have been significant differences in the percentage changes of factor prices between sectors. It should not be too problematic to estimate the sector-specific impacts on the average energy price. However, estimation of the impacts on the average price of labour will require detailed analysis of the labour market structures for the different sectors. While the information needed to do this should be available for both countries, it will involve a considerable amount of work.

Roger Salmons
14 September 2006

PETRE Concept Note

A draft concept note for WP3 of the PETRE project

11 September 2006

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Version	Date	Authorised for release by	Description
1.0	18/08/06	[Sudhir Junankar]	First Draft
2.0	11/09/06	[Sudhir Junankar	Final Version

1. Concept Note

Background

It was agreed at the Teleconference Meeting 24th July, that the lead partner for each work package would produce a "concept note" to be discussed at the next steering group meeting. The structure and content of these notes is flexible – reflecting the differences between the work packages. However, it was noted that they should not be long (i.e. 3-4 pages maximum), and that they should provide an overview of:

- what will be done in the work package, and how it will be done – in slightly more technical detail than was included in the project proposal;
- the division of tasks between the work package Partners and the resources (person months) that will be devoted by each Partner to the work;
- the identification of appropriate milestones, and the timing of work package deliverables;
- any significant issues that need to be resolved, such as the availability of data, etc.

This note has been prepared by Cambridge Econometrics (CE). Staff from CE involved are; Terry Barker, Director (TSB), Sudhir Junakar, Project Manager, (SJ), Hector Pollitt, Senior Economic Modeller, (HP) and Philip Summerton, Energy Economist, (PS).

This note has been amended by GWS. Staff from GWS involved are; Bernd Meyer, Director (BM), Christian Lutz, GINFORS modeller (CL) and Ariane Jungnitz, Energy Economist (AJ).

Specific Objectives of WP3

To identify, using the two EU-wide European macro-econometric models (E3ME and GINFORS) projecting to 2020, what might be the impacts on labour and resource productivity, resource use and employment, and environmental impacts, of major ETRs in the UK, Germany and the EU. As outlined in the final draft of the proposal analysis will not be limited to ETR, but will also include future European trading systems (ETS). In the following ETR stands for price instruments in general.

To identify reasons for any differences in the models' projections.

Work Package 3

Task 3.1: Description of E3ME model (CE (PS/HP))

In order to identify the impacts on labour and resource productivity, resource use and employment, and environmental impacts, of major Environmental Tax Reforms (ETR) in the UK, Germany and the EU, it is necessary to first outline the models that will be used to conduct the analysis. CE (PS/HP) will draw up an outline for the E3ME model, detailing; how the model works, coverage of the model and data requirements. Furthermore with additional assistance from TSB, CE will outline whether any adaptations to the E3ME sub-models will be required in order to fully capture the effects of European Tax Reforms in the UK, Germany and the EU as a whole. When this is complete CE (PS) will need to summarise the relative strengths and weaknesses of the E3ME model with regard to this analysis, and specifically outline the treatment of ETR in Germany and the UK. As part of this process it is

necessary that CE (HP) will have to implement and comment on the ETM (Energy Technology Sub-model) as devised for E3MG, an Energy-Environment-Economy Model at the Global Level, (http://www.camecon.com/e3mg/E3MG_Model.htm). TSB will act as a guide for this implementation.

Task 3.2: Description of GINFORS model (GWS (BM/CL))

Similarly, it will be necessary for GWS to provide the same information (and write up) regarding the GINFORS model. GWS (BM) will outline how the model GINFORS works and stress strengths and weaknesses of the model. CL will be responsible for data requirements. BM and CL will define possible model changes to adapt the model to the task. As a final step BM will summarize strengths and weaknesses of GINFORS.

GWS will discuss with CE the implementation of the bottom up technology model and decide whether they will also develop a comparable system or put a focus on other subjects (e.g. material flows).

Task 3.3: Technical comparison of models (CE (PS/HP)) (GWS (BM/CL))

CE (PS/HP) will then draw up a draft comparison on the models, with the aim of identifying strengths and weaknesses of the two models with specific regard to ETR. The comparison will focus on both the differences and similarities in data coverage and requirements, assumptions, equation specification and applied modelling, with a view to being able to say a priori what we would expect the outcomes of the two models to be. For instance are there any explicit modelling reasons why we might expect the ETRs in Germany to have a bigger effect on employment in Germany in the GINFORS model as compared with the E3ME model (given the same baseline assumptions)? GWS will then provide a second draft based on their interpretation of the two models, with the aim of providing a more comprehensive and robust comparison and assessment. CE (PS) will then write up a finalised version of the comparisons for approval at a steering group / partners meeting.

Task 3.4: Literature Review (CE (SJ,PS,TSB)) (GWS (BM,CL, AJ))

A full literature review will be required to identify previous analysis of ETRs in Europe. The literature review will focus on studies in the UK and Germany, with scope to look at papers investigating the effects of ETRs in other European countries, eg "*Decoupling of CO2 Emissions for Energy Intensive Industries"*, published by NERI, focuses on ETR in the Nordic countries. Primarily the focus of the literature review will be to discuss the results of the papers with regard to the methodology undertaken. This will enable us to identify the type of results we may expect to see when we conduct our own analysis, and by looking at the methodology of other papers we will be able to explain any differences in results.

The literature review will also be used to provide an outline of the ETRs in Europe, and specifically the detail of the ETRs in Germany and the UK. At this stage it will also be worth considering how the research from other work packages can be integrated into WP3, additionally both CE and GWS should consider how recent other work/papers can be used to supplement the review, for example CE's recent work on the COMETR project. CE would research the papers on UK ETR and GWS would research the papers on German ETR, the aim would then be to present the review to each team, with a write up, and then CE would produce a consolidated paper drawing out the main conclusions of the two reviews. EU-wide studies would be shared between the two contributors so that there is minimal overlap.

Given that one of the purposes of the work package (WP3) is also to discuss the impacts on resource productivity, both GWS and CE will need to consider exactly how they treat resource productivity, ie through Material Flow Analysis (MFA). Part of the scope of the review will then be given to assessing

how this has been done before, and more importantly how this can be applied to the GINFORS and E3ME models.

Task 3.5: Modelling design: Baseline specification (CE(TSB,HP))(GWS(BM,CL,AJ))

In order to obtain a comparative set of results between the two models (GINFORS and E3ME) it will be necessary to set up a baseline scenario that is as similar as possible in the time available. TSB suggested that we use the assumptions being developed for the baseline for the EU FP6 ADAM project. At this stage it would be necessary to check that values of key assumptions are exactly the same between the two models. We will also need to consider from the information about the models, as to whether the models use the same exogenous assumptions, US GDP, for example, is taken as an exogenous variable for E3ME. In GINFORS US GDP is an endogenous variable, that will react (a little bit) via international trade to European ETR. The assumptions for the baseline scenario will have to be designed to forecast on an annual basis to 2020, as required by the project. At this point it would be worth drawing up a set up forecast projections to 2020 to identify any differences between the two models.

Task 3.6: Modelling design: Scenario specification (CE(TSB, SJ, PS, HP)) (GWS)

Once the baseline is in place, it will be necessary to create a set of scenarios from the various components of the ETRs. CE and GWS will have to define and design in outline the principal scenarios that are to be analysed by both models. Again, there will need to be consideration of the way in which taxes, quota and allocations are fed into the model, and how they are designed to change over time. One key scenario would be a counter-factual reference case in order to draw percentage comparisons with the base to try to analyse what would have happened if Germany or the UK had not introduced ETRs at all. TSB also suggested the following scenarios as guidelines/examples;

- ETS with 10% auctions
- ETS with 50% auctions
- ETS with 10% revenues from auctions spent on low-carbon investment/innovation
- ETS extended to aviation
- Domestic Tradeable Quotas (DTQs) as EU scheme piloted in Germany and UK
- Landfill and aggregates tax (needs material flow analysis)
- Fertiliser/pesticide tax with revenues used to improve waterways

Task 3.7 Modelling: Solving the model for all the scenarios and presenting the results (CE(HP,PS,TSB))(GWS(BM,CL,AJ))

Following the design of the baseline scenario and the scenarios we will then have to get the models to solve over the forecast period to 2020. At this stage there are a few considerations we should consider as the iterative modelling process takes place. Should we consider other scenarios? How do we want to present the results and do they answer the key research questions in WP3? What data do we want to present and why? Furthermore, with regard to E3ME, it will be necessary to implement the Energy Technology Model (ETM) in order to get a better treatment of environmental tax reform, particularly considering how extra government revenue and industrial incentives from ETR might drive investment in environmental technologies.

- *Task 3.7a* Round 1 of Modelling (with report end of year 1): Use of existing E3ME and GINFORS for baseline, basic ETS scenarios, selected other ETRs, for all EU, with focus on Germany and UK
- *Task 3.7b* Round 2 of Modelling (with report end of year 2): Revised versions of the models (after comparisons and discussions) and application to all ETS scenarios, all other ETRs
- *Task 3.7c* Round 3 of Modelling (with report end of year 3): Revisions to baseline and scenarios for new developments and consolidation of models and results

Task 3.8 Individual interpretation of results of modelling (CE), (GWS)

Each partner will then need to present the outcomes of their modelling. CE will provide commentary and analysis on the outputs of E3ME with the focus on labour and resource productivity, resource use and employment, and environmental impacts in Germany and the UK. GWS will provide a similar commentary and analysis using the outputs from the GINFORS model. The results will also take into account the differences between the various scenarios. For ease of comparison, it is recommended that the results and analysis followed a similar structure and presentation.

Task 3.9 Comparative interpretation of results of modelling and checking for robustness (CE), (GWS)

In addition to analysing the analysis in task 3.8, we will draw together comparisons between the results, particularly discussing any major disparities should they arise. An important aspect of the project is an assessment of their robustness to changes in underlying economic conditions and a comparison of approaches and results, to provide a broader view of potential outcomes for employment and resource productivity. The results will therefore be subject to sensitivity and uncertainty analysis to check that they hold under a variety of conditions. They will also be compared in detail with each other and with results from other studies, in the context of a review of recent academic literature on the double dividend and the effects of technological change. The objective will be to understand in greater depth why the two models deliver their results and how plausible these results are in terms of current theoretical understanding. The outcomes of this part of the project will be quantified and robust recommendations for the best design of ETRs in the UK and Germany, and in the EU as a whole.

Task 3.10 Final write up (CE(PS, TSB, SJ)) (GWS)BM, CL, AJ))

Finally the project will have to be drawn together; preferably each section of the report will have been put into sections, where it was almost ready to go into the report, to form part of the final book. The purpose here is to bring together the assumptions and predictions we made at the beginning of the report and compare them with the main findings. We may also want to draw on the main findings to put forward recommendations for ETR design over the next 15 years in Germany, the UK and more generally Europe as a whole.

N.B. Person days have not been allocated within the concept note. Person days will be finalised when the overall concept note has been agreed at the steering group/partner meeting. Time is likely to be evenly split between CE and GWS, although CE will take on the overall management of the work undertaken in WP3 during the project.

Milestones

In order to meet the deliverables a number of milestones will need to be met;

Completion of comparison of models and literature review and round 1 of model runs Month 13 (July 07)

Finalised baseline and scenario design Month 19 (January 08)

Completion of round 2 of the results Month 24 (June 08)

Completion of modelling Month 30 (December 08)

Completion of second draft, including final figures for all results Month 32 (February 09)

Final paper completed Month 36 (June 09)

Deliverables

R1: Progress report 1 Month 7 (January 07)

R2: Progress report 2 Month 14 (August 07)

R3: Progress report 3 Month 20 (February 08)

D1: First draft Month 26 (August 08)

D2: Second draft Month 32 (February 09)

F1: Final report Month 36 (June 09)

Concept note – work package 4: *Implications for Central and Eastern European Countries*

The following issues should be dealt with – mentioned by Roger Salmons during the telephone conference.

What will be done in the work package?

The work package will discuss the current state of environmental taxes and charges in the new EU Member States focusing on the situation in the four Visegrad states (Czech Republic, Hungary, Poland and Slovakia). This assessment will include discussions / proposals on the possible implementation of ETRs in these countries; i.e. including proposals made by governmental and political institutions, academics and NGOs.
One of the aspects of the overall project is to obtain insights whether some of the experiences gained by the ETRS implemented in Germany and the UK during the last years can be transferred to the new EU Member States. This means that we have to assess also the overall economic situation and also whether the concept of an ETR is of any relevance for them, for example, one of the political objective of the German ETR was to recycle the revenues generated from energy taxes back to the economy aiming to reduce the total labour costs and thereby to reduce unemployment. Therefore it is necessary to look into the whole field of labour policy including unemployment issues, labour taxes and social security charges levied on the labour. It is important to analyse whether these economies are facing the same problems as Germany and the UK as these topics must be seen as somehow the underlying problems which are aimed to be solved by using an ETR. Probably the aspect of subsidisation of energy prices may be of some relevance as the concept of an environmental fiscal reform directly addresses the reduction and / or elimination of environmentally damaging subsidies. The most detailed analysis is to be worked out in the case of the Czech Republic as the colleagues from the University of Economics in Prague are one of the leading proponents of ETR in the Czech Republic.

What are the main issues to be dealt with?

We highlight the main issues which we want to assess in this project:

- Discussion of the current state of energy taxation scheme in the new EU Member States;
- Effects of the 2003 EU Energy Products Taxation Directive – which energy taxes have to be introduced and increased;
- Development of energy productivity in the new EU Member States as compared to the old ones *(a suggestion)*
- Link between energy taxation and ETS *(a suggestion)*
- The role of an ETR could potentially play in the new EU Member States: are the countries facing the same environmental and economic problem as in Germany and the UK so that the principle of the German/UK ETR approach may be copied or are there any other urging problems which could be attempted to be addressed with an ETR; what is important for such an analysis:
    - Labour market in the new EU Member States (focus will be directed to the situation to the four Visegrad states) – unemployment, labour taxation, social security system

- Based on the above analysis we want to study whether the experiences gained in Germany and the UK with the two rather country-specific ETRs may be of any relevance for the new EU Member States, i.e. how can the countries benefit from the 'forerunner'.
    - Discussions on the country-specific ETRs implemented in Germany and the UK are compiled as part of the COMETR project.

How will it be done?

The work will be based on desk studies but we will also consider of interviewing relevant experts in the fields of energy taxation and ETR in the four Visegrad countries.

Information and data on the system of energy taxation have been compiled by different institutions (European Commission, Eurostat, OECD/IEA, REC, etc.) and articles about ETR proposals have been published in journals.

We shouldn't face any problems in compiling relevant data and information concerning the overall economic situation and taxes and charges levied on labour for the Czech Republic. We have to collect the information for the other Visegrad countries by assessing national statistics and probably data published by the European Commission and Eurostat.

It is rather difficult to state at this stage of the project implementation all the data and information we want to collect. As mentioned above, data on energy taxes and prices will be compiled but also information on the system of labour taxation schemes have to be collected and which sources will be used. We are hoping that some of the data request can be satisfied by the colleagues of work package 3. However, we need more detailed information which data are available. Results of work package 3 could be also utilised by other CEE countries starting ETR process. Upgrading models are able to provide detailed information about ETR benefits and costs.

Results of work package 2 seem to be more fruitful for our case. It is crucial to utilise results of ex post studies evaluating ETR process in Germany and UK. Results of comparisons between modelled and real impacts of ETR can provide records for sensitive analysis of factors, which are crucial for modelling of potential ETR effects in CEE countries.

In addition, we would also like to know whether our colleagues (CE and GWS) have any data request from us.

Who will be doing what?

The tasks between SERI/SSP and UEP are planned to be distribute as follows:

- Analysis of energy taxes implemented in CEECs (plus consequences of the 2003 EU Energy Products Taxation Directive also in the light of the EU Emission Trading Scheme): UEP
- ETR proposals in CEE: UEP
    - State of art - ETR proposals or process of ETR implementation - qualitative, quantitative and methodology comparison: UEP

    - Overlook of proposal for new energy taxes - Directive 2003/96/EC in selected CEE countries – comparison of tax rates, taxed commodities: UEP
    - Main problems and treats with new energy taxes - concerned with implementation of new energy taxes in CEE countries: UEP
    - Revenue recycling discussions - labour taxes/charges reductions and other revenue recycling options as a part of ETR concepts in selected CEE countries: UEP
- Discussion on the main problems and threats: UEP
- Can any lessons from Germany and the UK be transferred to CEECs: SERI/SSP
    - Study of the labour market (unemployment, labour taxation) - as the focus on the German and UK approach is directed to labour market issues: SERI/SSP
    - Detailed assessing whether the German and/or the UK ETR approaches can be transferred to the new EU Member States: SERI/SSP

The list above presents who will have the responsibility for each sub-task. However, we are planning to co-operate during the whole project implementation on all topics as we are thinking that such a close co-operation will be rather fruitful considering the different background knowledge and experiences.

PETRE, WP 5: Global Dimensions of Sustainable Growth in Europe

SERI & GWS

Draft work plan, September 2006

Background

Europe's economy is to a significant and growing degree dependent on imports of natural resources from other world regions. Today, around one third of material and energy resources used by Europe are imported from abroad. While the overall level of resource use in Europe has stabilised in the past 20 years, a shift of environmental burden through international trade could be observed, with growing physical imports and associated indirect material flows and increasing substitution of domestic material extraction, in particular with regard to fossil fuels and metal ores. This implies that an externalisation of environmental pressures through international trade is to some extent taking place, helping Europe to achieve relative decoupling in terms of natural resource use, while shifting negative environmental consequences related to resource extraction and processing (such as high energy, emissions and land intensity) to other parts of the world.

In its proposal for the EU Sustainable Development Strategy (EU SDS), the European Commission states that production and consumption activities within the EU borders have impacts on other parts of the world and increase the pressure on the environment (particularly in developing countries). Thus the links between trade and environment and problems related to emissions with global environmental impacts (such as CO2) have to be taken into account in order to guarantee that the goal of achieving sustainability within Europe fosters sustainability on a world-wide scale at the same time. This claim was also reiterated in the document dealing with the external aspects of the EU SDS. Therein, the Commission highlights that intensive energy use, unsustainable exploitation of natural resources and missing internalisation of environmental costs relating to production and transport would threaten the resource base on which economic and social development depend. Therefore, a more sustainable management of natural resources along with a de-coupling of resource consumption and pollution from economic growth in Europe are regarded as a key instrument to also diminish the environmental impact the EU has on the rest of the world and thus to contribute to global sustainable development.

In addition to helping to address environmental problems stemming from unsustainable patterns of resource and energy use, resource productivity plays an increasingly important role for future European economic development. The EU is facing threats of losing competitiveness on world markets, with productivity growth lacking behind other world regions, in particular North America and Asia. Europe's economic underperformance coupled with increasing competitive pressures by emerging economies (such as China, India and Brazil) could lead to shifts in national production structures, which have implications for sustainable development at a global level. In the light of these international developments, it has been proposed that the Lisbon Strategy – with its main goal to make Europe the most competitive market in the world by 2010 – is under urgent need for revision and should focus more strongly on delivering (on the European and national levels) those macroeconomic

policies that will have greatest positive impacts on economic growth and creation of more and better jobs. Against this background of pressing reform needs, eco-efficient innovation and increased resource efficiency could play a key role to increase European competitiveness on world markets (EC 2005d). Innovation leading to resource and energy productivity growth could make a significant contribution to accelerated economic growth and creation of jobs, while ensuring that this development is increasingly environmentally sustainable.

Objectives and research questions

The goal of WP 5 is to investigate world-wide consequences of a European transformation towards sustainable growth based on an environmental tax reform and significantly increased resource productivity.
Main research questions in WP 5 are:

- What are the potentials of higher resource productivity to increase global competitiveness of European industries in line with the Lisbon Strategy?
- The international competitiveness of which European countries and industries will increase their international competitiveness (measured by the development of exports) through the implementation of resource productivity measures?
- On the other hand, which European countries and industries would be most negatively affected by the implementation of an ETR in Europe?
- What are the global consequences of resource productivity increases in Europe in terms of world-wide patterns of natural resource extraction and of production, trade and consumption?
- What are the economic and environmental consequences of resource productivity increases in Europe for other OECD countries, emerging economies (such as China and India) and developing countries?

This analysis will complement work undertaken in WPs 1 to 4, in order to ensure that identified policy strategies for sustainable growth in Europe do not jeopardise sustainable development efforts in other world regions. Furthermore, the analysis of Europe's world-wide relations aims to explore possibilities of European resource productivity strategies for maintaining the competitiveness of its industries in ever more globalised markets and increasing competition from emerging world regions.

Work plan and methodological approach

This work package will apply two modelling approaches:

(a) results of modelling with the extended GINFORS model coming from WP 3
(b) construction of a trade-environment model to assess the indirect resource requirements of European imports and exports

Both approaches will heavily draw on experiences gained in previous research and will use and extend data sets, which have been generated in other projects (in particular the MOSUS project[11]).

[11] "Modelling opportunities and limits for restructuring Europe towards sustainability", funded by the 5th Framework Programme of DG Research (see www.mosus.net). Both GWS and SERI were core partners in this project.

(a) the European/global model GINFORS and its extension by material inputs models will form the basis for the evaluation of the consequences of scenarios on the implementation of an ETR in Europe and increased resource productivity for economic development (trade, investment, growth, etc.) as well as environmental indicators (in particular, resource extraction and use).
The economic-energy part of the GINFORS model will be extended and updated (see details in description of WP 3).
Also the material input models will be improved and updated. This work includes in particular the harmonisation of the existing data set with recent material flow data published by EUROSTAT and other national sources and a refinement of the economic driver variables, which explain the extraction of different categories of materials.

(b) the newly constructed trade-environment model will be a static multi-regional environmental input-output model. It will be based on existing data sets already used in the extended GINFORS model (input-output tables, bilateral trade data, data on material extraction). This model will allow to assess the resource base of the European economy, taking into account all indirect (embodied) resource requirements (also called ecological rucksacks) of traded products. This model can be used for environmental accounting purposes, in order to analyse in detail European trade structures with the rest of the world and to calculate comprehensive indicators on European resource use and resource productivity.
Linking models (a) and (b) will allow assessing the implications of the implementation of an ETR in Europe for European trade patterns and the environmental burden generated in other world regions to support European imports of natural resources.

Models (a) and (b) will be used for a number of analyses, assessing European and world-wide economic as well as environmental consequences of the implementation of different environmental policy measures within the framework of an environmental tax reform:

Economic dimension:
- Quantitative analysis of the development of European trade relations with other world regions in order to investigate changes of competitiveness of different European industries on global markets. Identification of product groups with highest changes in trade volumes (both imports and exports). Identification of policy measures to reduce possible negative effects.
- Quantification of economic consequences (in terms of economic growth, investment, international trade, etc.) of the implementation of an ETR in Europe for other world regions, separated in three country groups (other OECD countries; emerging/"anchor" countries; rest of the world).

Environmental dimension:
- Quantitative assessment of the resource basis of the European economy, including all indirect (embodied) material requirements (ecological rucksacks) related to international trade.
- Quantitative analysis of changing global patterns in natural resource extraction, energy use and CO_2 emissions in all world regions due to the implementation of an ETR in Europe (separating the three country groups as mentioned above).
- Quantitative analysis of the consequences for European imports (in particular of material-intensive products with high ecological rucksacks) based on forecasts of bilateral international trade. Assessment of indirect reductions of global environmental

pressures induced by changing European trade patterns.

Time table and division of work

WP 5 will run from month 1 to month 36 of PETRE.

Year 1 will mainly be devoted to the refinement and construction of the applied modelling tools. In year 1 the following activities will be undertaken:

With regard to the extended GINFORS model:
- Update and improvement of the GINFORS model (GWS)
- Update and improvement of the material input models (SERI)
- Refinement of the economic variables explaining / driving material extraction in the extended GINFORS model (SERI/GWS)
- Running first draft scenarios (GWS/SERI)

With regard to the trade-environment model:
- Development of the conceptual framework for the trade-environment model (SERI/GWS)
- Preparation of data sets for the construction of the model (SERI/GWS)
- Solving problems of missing data (GWS/SERI)
- Linking data sets in a static multi-country input-output framework (GWS/SERI)
- Running first calculations with the trade-environment model (GWS)

Year 2 will mainly be devoted to the simulation of the different scenarios with the extended GINFORS model and the calculations of indirect resource requirements with the trade-environment model.

In Year 3 the results of the different scenarios and model calculations will be evaluated with a set of indicators covering the economic and the environmental dimension.

Expected results

Research undertaken in this WP will significantly expand the insights from past projects through a detailed evaluation of the consequences of an implementation of an ETR for European competitiveness on the international level as well as world-wide economic and environmental consequences induced by a European ETR.

These analyses and evaluations of the modelling results will be the empirical basis for the formulation of policy recommendations addressing such issues as
- how to design a European ETR in order to foster competitiveness of European industries on international markets.
- how to reduce global environmental pressures related to European production and consumption patterns.

These policy recommendations will provide an important input for further revisions of the Lisbon Strategy and its harmonisation with the objectives formulated in the EU SDS.

THE BOOK FROM THE ANGLO-GERMAN FOUNDATION PROJECT PRODUCTIVITY AND ENVIRONMENTAL TAX REFORM IN EUROPE (petrE)

DRAFT TITLE:

WEALTH, ENVIRONMENT AND QUALITY OF LIFE IN EUROPE IN THE 21st CENTURY

SUGGESTED CHAPTER STRUCTURE
(with Work Package numbers, based on WP concepts, and contributing partners in brackets)

EXECUTIVE SUMMARY

Chapter 1: INTRODUCTION TO THE ISSUES

1.1	Economic growth, environment, quality of life	WP1B (PSI, FFU)
1.2	Environmental tax reform (ETR)	PE
1.3	The hypothesis: ETR can raise resource productivity, employment, output ETR can improve the environment ETR can increase quality of life	PE
1.4	Structure of the book	PE

PART I: THE EVIDENCE; ECONOMIC PERFORMANCE, THE ENVIRONMENT AND ETR

Chapter 2: RESOURCE PRODUCTIVITY AND THE ECONOMY

2.1	Economic growth, resource prices and resource use, pollution	WP1A (PSI)
2.2	Resource productivity and competitiveness	WP1A (GWS), WP5A (GWS, SERI)
2.3	Environmental industries in Europe	WP1C (FFU, PSI)

Chapter 3: EXPERIENCES IN ENVIRONMENTAL TAX REFORM

3.1	Environmental taxes and ETR in Western Europe	WP3.4 (CE, GWS)
3.2	Environmental taxes and ETR proposals in new Member States	WP4.1 (UEP)

Chapter 4: IMPACTS OF ETR ON THE LABOUR MARKET WP2 (PSI)

PART II: AN ETR FOR EUROPE

Chapter 5: MODELS FOR PROJECTING THE IMPACTS OF ETR

5.1	Model description: E3ME, GINFORS	WP3.1 (CE), WP3.2 (GWS)
5.2	Hypothesis about modelled ETR outcomes	WP3.3 (CE, GWS)

Chapter 6: MODELLING AN ETR FOR EUROPE

6.1	Baseline specification	WP3.5 (CE, GWS)
6.2	Scenario specification	WP3.6 (CE, GWS)
6.3	Solving the models	WP3.7 (CE, GWS)

Chapter 7: RESULTS OF AN ETR FOR EUROPE WP3.8, WP3.9 (CE, GWS)

Chapter 8: GLOBAL IMPACTS OF AN ETR FOR EUROPE WP5B (GWS, SERI)

PART II: ETR IN EUROPE: SYNTHESIS, CONCLUSIONS, RECOMMENDATIONS

Chapter 9: IMPLICATIONS OF ETR IN EUROPE

9.1	For New Member States (Central and Eastern Europe)	WP4 (UEP, SSP)
9.2	For the Rest of the World	WP5C (SERI)
9.3	For Europe as a Whole	WP3.10 (CE, GWS)
9.4	Overall conclusion (relate back to WP1	PSI (PE)

Chapter 10: RECOMMENDATIONS FOR ETR DESIGN IN EUROPE
All (PSI lead, PE first draft)

PAUL EKINS
For Partner Meeting, September 22nd 2006