SUSTAINABILITY DEVELOPMENTS OF PRODUCT SYSTEMS 1800-2000

Duration of the project: 15/12/2001 – 31/12/2004
Budget: € 359.439
Keywords: Sustainability Indicators, Future Scenarios, Basic Needs, Production and Consumption

CONTEXT

The objective of sustainable development on a macro level (global, national, over the generations) has to be converted into objectives on the micro level (companies, products, consumers and their behaviour). Here, we are still at the beginning. This can be illustrated by the fact that hardly any sustainability indicator exists on a micro level for products.

For this project we do not want to start from today's situation to think of scenarios for future sustainable development, but we wish to gain an insight (positive and negative factors and indicators) into the process of (un)sustainable development during the past centuries. We will research 4 basic needs starting from the pre-industrial period until the year 2000, when production and consumption are clearly separated and when production is highly specialised.

PROJECT DESCRIPTION

Objectives
Gaining insight into the factors that influenced the process of sustainable development on a micro level for four basic needs, using a quantitative and qualitative analysis for the period 1800-2000, in order to better interpret and steer recent and future developments.

Methodology
1 The research objects we have selected are those basic needs we wish all persons on earth would have: food, the ability for mobility and accommodation. Because we will use the modern life cycle analysis (LCA) method to determine the environmental load (ISO 14040), we have to define the functional unit for each basic need as absolute as possible in order to allow comparisons between time and space. Therefore we choose the following: 1 litre of drinking water, 1 bread, a human trip of 40 km over land, and 1 cubic metre of heated accommodation during 1 year.

2 We have selected a number of "key data" in the past: 1800, 1850, 1900, 1950, 1975 and 2000.

3 Based on historical research and actual available data we will make a quantitative and qualitative status description of the fulfilling of the four basic needs, for each selected date. The research will examine the environmental, social and economic aspects on the production side as well as on the consumption side. We will integrate the most important influences that have lead, in the intervening period of 50 or 25 years, to changes in the status description. We focus on Belgian sources for data on production and consumption. If the tracing of these data does not fit in the project planning and we dispose of representative Western European data, we will use these data with a specific acknowledgement of sources.

The following aspects are quantitatively founded:
- Environmental: integral environmental load (production, consumption, disposal) by means of LCA.
- Economical: real costprice, consumption per person.
- Social: distribution of the consumption over the community (degree of equality).

4 On macro level we will give a description of important data on environmental, social and economic level for the "key data". The following elements that come up quantitatively are the total amount of consumers, the average life expectancy, the GNP, the available accommodation and the infant mortality. Qualitatively, aspects like the abolition of child labour, the rise of the unions, rights of employees, technological breakthroughs in the production system, causes of change in consumption patterns, consumer behaviour, marketing, educational level etc. are concerned.

Interaction between the different partners
- Inventory and start

Orientating study of the sources, consultation of the consumer committee, creating a collective working space via the Internet. This will be a common task for the VUB and VITO.

- Study of the sources and inventory of data

Research of relevant data regarding the status description of the production- and consumption side of the 4 basic needs, from 1800 until 2000. For the years until 1975 the main research for needed inventory data for LCA will be performed by the VUB, for the year 2000 this will be performed by VITO. VITO will help VUB focussing the search for relevant data.

■ Execution of additional environmental analyses
If necessary and possible, VITO will perform additional environmental analysis (like emissions).

■ Development and interpretation of results
This will be a common task.

■ Valorisation
Common task (the VUB will focus on education, VITO will focus on the actors: policy makers, producers).

Expected results and/or products
We expect to gain insight in the combinations of factors that influenced the process of sustainable development in the past in a positive and negative way. Among other things, the course of the improvement process will not be identical for each of the selected basic needs and it is of great importance to identify the causes of these differences. On the basis of the eco-efficiency improvement of the functional unit together with the increase of the consumption we can give a quantitative indication of the (un)sustainability, regarding the environmental performance, of certain periods in the past and we can indicate the dominant factors.
We also expect to make suggestions for relevant economic and social indicators for sustainable products (i.e. on micro level).

PARTNERS

Activities

VITO
The Product and Technology Studies project group evaluates energy and raw material consumption and the environmental impact of products and processes by applying life cycle analyses, substance flow analyses, ecodesign and cleaner production. The project group develops and tests these decision-supporting instruments for use in industry and in governmental authorities. The project group also researches the relation technology-society.

VUB
The History Department, contemporary period, is researching all domains of contemporary history. Specific themes that relate to this OSTC project include: standard of living, material culture, prices, wages and buying power, consumption (food, living, comfort), labour, economic development (growth, employment, product cost), working hours.

CONTACT INFORMATION

Co-ordinator

Theo Geerken
Vlaamse Instelling voor Technologisch Onderzoek (VITO)
Projectgroep Product- en Technologiestudies

Gebouw ENE, Boeretang 200
B-2400 Mol

Tel: +32 (0)14 33 59 47
Fax: +32 (0)14 32 11 86

theo.geerken@vito.be
www.vito.be/milieu/milieustudies.htm

Partner

Peter Scholliers
Vrije Universiteit Brussel (VUB)
Vakgroep Geschiedenis

Kamer 5 B 421, Pleinlaan 2
B-1050 Brussels

Tel: +32 (0)2 629 26 70
Fax: +32 (0)2 629 23 74

pscholli@vub.ac.be
www.vub.ac.be/SGES/

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LAW & ECONOMICS AND THE ENFORCEMENT OF ENVIRONMENTAL LAW

Duration of the project: 15/12/2001 – 31/12/2004
Budget: € 231.197
Keywords: Environmental Law, Sustainable Production, Law Enforcement, Sanction-Execution Instruments

CONTEXT

The project helps to develop political instruments for sustainable production. We examine legally formalised environmental policy instruments in the enforcement stage. The impact of the costs associated with the instruments and with the strategies used to implement them is studied for different users (government, firms, citizens).
It is important for regulation to correctly define and implement monitoring and enforcement strategies. An inadequately chosen enforcement policy can corrode the efficacy of the complete regulatory process. Estimating the consequences of environmental policy instruments in the enforcement stage assists political decision-making. The correct estimation of the costs associated with these processes especially helps the regulator and the enforcers to choose adequate instruments for a sustainable policy.

PROJECT DESCRIPTION

Objectives
We examine the instruments and strategies of environmental law enforcement starting from an interdisciplinary approach Law & Economics. The objectives are:
- The in-depth exploration of the SPSD I – model "Law & Economics and the Choice of Environmental Policy Instruments" by including new instruments.
- The refinement of the study of costs and strategies of environmental law enforcement. This refinement will be both empirical and theoretical.
- Writing a synthesis of the accumulated knowledge concerning monitoring and enforcement.

The project is innovative in the following aspects:
- It separately models the social costs of the enforcement stage for the monitoring, sanctioning and sanction-execution instruments.
- It develops an empirical framework for research into the costs associated with the enforcement of environmental policy in Belgium.
- It studies the social costs of instruments (tradable permits), including enforcement, for which there exists no legislative experience in Belgium.

Methodology
We examine the following instruments: rule making (tradable permits), monitoring and sanction-execution instruments. We analyse these instruments using the methodology developed within the framework of the SPSD I – project.

The law team formulates cards that represent the different cost aspects associated with the structure of the instruments. The cards and profiles of the instruments are formulated after analysis of the legislative practice and the relevant juridical framework. Using these cards the economic team, in close collaboration with the juridical team, valorises the different cost aspects. The monetary appraisal of the cost aspects of the instruments is used as input in a numerical model and helps estimating the social cost connected to that instrument.

In the empirical part we want to identify and model the different factors that influence the decision to inspect a particular firm. We consider, among others, firm size, complaints filed, sector, examples of such models in the international literature are Dion, Lanoie and Laplante (DP-World Bank, 1996); Gray and Deily (JEEM, 1996) and Helland (JEEM, 1998). Next, in a second model, we want to analyse which sanctions are imposed when a firm is found in violation. We investigate whether these sanctions depend on the size of the violation, previous violations, sector etc... Two publications in which a sanction function is estimated are Cohen (JLE, 1987) and Oljaca, Keeler and Dorfman (J. of Regulatory Ec., 1998).
To correctly manage this task the collaboration of the administrations charged with environmental enforcement duties is necessary. We need to create a database with data on inspection, on firms and on the consequences of inspections. This work is partly delegated since such a database does not yet exist in Belgium.

In the theoretical part we provide an overview of existing dynamical models. The conclusions drawn from these studies will be compared with the empirical research we conduct. In dynamical models several time periods are incorporated. This allows us to take, for example, the compliance history of agents into account. Moreover agents are able to build a certain reputation over time.

Interaction between the different partners
The law team is mainly responsible for the formulation of the juridical cards of the different instruments and the analysis of the enforcement procedure in Belgium. The economic team will in essence provide the empirical and theoretical analysis of the data collected in the database. The legal and economic teams

will work closely together and consequently provide each other with advice. In the past it has been shown that both approaches provide each other with new insights and an increased sense of reality. Cross fertilisation is necessary to correctly finish the project.

Expected results

We will create a database with data on firm inspections. This database can be used for further empirical research and as a basis for policy advice.
We will promote and distribute the importance of the research conducted and the acquired results by publications in scientific journals.
Moreover we will organise an international workshop on enforcement.

PARTNERS

Activities

KULeuven

The research group Energy, Transport and Environment of the Centre for Economic Studies (CES) co-ordinates this project. The promoter and the research group have developed a varied and well-founded knowledge base. Prof. Dr. S. Proost was co-promoter and S. Rousseau researcher for the project "Law & Economics of the Choice of Environmental Policy Instruments" (SPSD I).

RUG

The second partner in this project is the Centre for Environmental Law (CMR) led by Prof. Dr. Luc Lavrysen. The CMR has some 20 years of experience concerning environmental law and well-developed know-how about juridical formulation of environmental policy instruments within a given supranational and constitutional context. They build further on the experience accumulated during the above-mentioned SPSD I – project. The researcher C.M. Billiet was part of this project.

CONTACT INFORMATION

Co-ordinator

Stef Proost
Katholieke Universiteit Leuven (KULeuven)
Centrum voor Economische Studiën (CES) – Onderzoeksgroep Energie, Transport en Milieu (ETE)

Naamsestraat 69
B-3000 Leuven

Tel: +32 (0)16 32 68 01
Fax: +32 (0)16 32 69 10

Stef.Proost@econ.kuleuven.ac.be
www.kuleuven.ac.be/ete

Partners

Luc Lavrysen and Carole Billiet
Universiteit Gent (RUG)
Faculteit Rechtsgeleerdheid
Centrum voor Milieurecht

Universiteitsstraat 4
B-9000 Gent

Tel: +32 (0)9 264 69 27
Fax: +32 (0)9 264 69 90

Luc.Lavrysen@rug.ac.be
www.rug.ac.be

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FEASIBILITY OF AN ENVIRONMENTALLY-SOUND PRODUCT POLICY IN BELGIUM

Duration of the project: 15/12/2001 – 31/12/2003
Budget: € 265.068
Keywords: Product Standards, Regulation, Free Movement of Goods, Normalisation

CONTEXT

The project aims to examine the scope for policy-making of the Belgian authorities concerning the adoption of product standards in compliance with the international trade regulations (WTO) and the European Community law. The product standards in view are justified in regard to an objective goal of sustainable development. The project connects thus the national decisions with their juridical supranational context.

PROJECT DESCRIPTION

Objectives
The project aims to verify whether the Belgian state disposes of possibilities of action, considering the limitations posed by the supranational law, to put into action a policy of product standards in implementation of the federal law of 21 December 1998 related to product standards. The juridical examination of the limits imposed by the supranational framework, forms indeed a necessary condition for each policy that aims to realise sustainable development.

Methodology
The first year of the project is devoted to a profound analysis of the supranational rules and policies, controlling the product policies adopted in consideration of a sustainable development (national law, community law and the WTO regulation).

The second year relates to the realisation of case studies, examined on the base of priority product groups, this with the intention of having in view the standards that could be applicable to them.

Finally, the ultimate objective of the project is to offer the policy-makers and various interest groups a vademecum of pertinent juridical rules.

Interaction between the different partners
The RUG is mainly responsible for the Belgian juridical aspects, the FUSL is responsible for the aspects of the Community law, while the VUB is responsible for the aspects of the international trade law. Finally, the ULB is responsible for the political analyses. Considering there is an interaction between these four aspects, each month a joint meeting is held between the four different research groups. A number of congresses will also be organised.

Link with international programmes
In the long term, alliances will be made with international research groups, particularly concerning the conflict between environment and WTO.

Expected results and/or products
Within the scope of the project, different juridical publications will be published in specialised journals (Cahiers de droit européen, Revue trimestrielle de droit européen, ...).

A vademecum will be published, containing:
- on the one hand, a test-diagram combining the different restrictions of the adaptation of product standards;
- on the other hand, the more specific steps undertaken concerning specific products.

Finally, an interuniversity colloquium will be organised with reference to the project.

PARTNERS

Activities

VUB
Study of the obligations from the international environmental and commercial law:
First year: general part: study of the international law (WTO-regulations, ...).
Second year: case study.

FUSL
First year: general part: study of the European law and the regulation concerning environmental tax law.
Second year: case study.

RUG
First year: study of product standards, the competition law, the regulation concerning state support and normalisation.
Second year: case study.

ULB
First year: analysis of the priory product groups on the basis of their impact on the environment and the policy related to it.
Second year: contributing to the study of the various restrained product groups, by means of a quantitative part, by research of the data, the indications and the describing factors of the concerning sectors.

CONTACT INFORMATION

Co-ordinator

Nicolas de Sadeleer
Facultés universitaires Saint-Louis (FUSL)
Centre d'étude du droit de l'environnement (CEDRE)

43, bd du Jardin botanique
B-1000 Brussels

Tel: +32 (0)2 211 79 50
Fax: +32 (0)2 211 79 51

desadeleer@fusl.ac.be
www.fusl.ac.be

Partners

Marc Pallemaerts
Vrije Universiteit Brussel (VUB)
Faculteit Rechtsgeleerdheid - Centrum Interactie Recht en Technologie

Pleinlaan 2
B-1050 Brussels

Tel: +32 (0)2 629 26 42
Fax: +32 (0)2 629 26 62

mpallema@vub.ac.be
www.vub.ac.be

Edwin Zaccaï
Université Libre de Bruxelles (ULB)
Institut de Gestion de l'Environnement et d'Aménagement du Territoire (IGEAT) - Centre d'Etudes du Développement Durable (CEDD) - CP130/02

50, avenue F.D. Roosevelt
B-1050 Brussels

Tel: +32 (0)2 650 43 32
Fax: +32 (0)2 650 43 12

ezaccai@ulb.ac.be
www.ulb.ac.be/igeat/cedd

Luc Lavrysen
Universiteit Gent (RUG)
Faculteit Rechtsgeleerdheid – Centrum voor Milieurecht

Universiteitsstraat 4
B-9000 Gent

Tel: +32 (0)9 264 69 27
Fax: +32 (0)9 264 69 90

Luc.Lavrysen@rug.ac.be
www.rug.ac.be

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INTEGRATING CLIMATE, RESOURCES USE AND WASTE POLICIES THROUGH PRODUCT POLICIES

Duration of the project: 15/12/2001 – 31/12/2004
Budget: € 511.935
Keywords: Product Life Cycle, Product Policy, Greenhouse Gas Emissions, Production and Consumption

CONTEXT

In Kyoto (1997) and later in Marrakech (2001), the nations have asserted their will to fight climate change. This fight, as well as the problems of resources and waste, are parts of the fields of action having priority in the 6th European Action Programme for the Environment.

The sector-based environmental policies are insufficient to reach the objectives of sustainable development and an increased attention towards the environmental impacts of products and ways of consumption is necessary. The Integrated Product Policy discussed at European level and the preparation of a Federal Plan of "Product Policy and Environment" aim at taking them better into account, while targeting an integrated approach of the different stages in products life cycle and environmental problems.

This project aims at offering useful elements regarding these developments.

PROJECT DESCRIPTION

Objectives
The project "Reduction of greenhouse gas (GHG) emissions and material flow", carried out by IW, VITO and IDD in the scope of the Scientific Support Plan for a Sustainable Development Policy (SPSD I) from the OSTC, was a first research effort aiming at providing an evaluation of the impacts of ways of consumption through an evaluation of the life cycle emissions of GHG, while taking into account the potential of technical improvement at the level of production modes and at the level of waste management systems after the use of products. It focused on three product categories (single family housing, beverage packaging and livestock products).

The project "Integrating climate, resources and waste policies through a Product Policy" aims at providing more general information on the possibilities of reinforcing and integrating existing climate, resources and waste policies through product-oriented policies. To do so, it will identify the products having priority which must be targeted by product policies and it will evaluate the impact of product-oriented measures which could contribute to simultaneously reduce GHG emissions, resource use and waste generation by taking into account the improvement potential of eco-efficiency along the products' life cycle. The Integrated Product Policy (IPP) being now discussed at the European level, as well as the Federal Guiding Plan on "Product Policy and Environment" also being prepared, will be the general framework for the proposed project.

Methodology
The project is composed of three complementary parts:

1 *A general analysis of the ways of consumption of households and their impacts*
The results of this task will enable us to determine the products having priority for a product policy in the view of integrating climate, resources and waste policies. This work of identification will be based on the assessment of product consumption by households, as well as on an evaluation of material consumption and life cycle GHG emissions and waste associated to this consumption. These evaluations imply a work of data collection and treatment. They will lead at the same time to identifying the statistics improvement, which would allow to a better evaluation of these ways of consumption and the product policies.

2 *A close analysis of four product systems*
The analysis of the two product categories studied beforehand will be widened first to larger consumption categories (all domestic packaging and all housing), and second to material use and waste generation. A similar analysis of two other product categories will also be carried out (information technologies in connection with paper, and cars).
These analyses aim at estimating life cycle GHG emissions, resource use and waste generated by the Belgian demand on affected products as well as identifying reduction options (resulting either from technological changes, material/product substitution, or behavioural changes) for these impacts. Costs and benefits of these options will be estimated and their technical, statutory and sociological limits evaluated. This will provide the theoretical reduction potential for the three studied impacts.

3 *An evaluation of some instruments and measures*
This evaluation aims at identifying the most appropriate sets of product-oriented measures, which could be efficiently combined in order to reach the

theoretical reduction potential of impacts improvement for the product categories studied in detail. The results expected from these sets of measures (reduction of GHG emissions, of waste generation and of resource use) will be quantified.

Interaction between the different partners
IW will study housing and information technologies, whereas VITO will study domestic packaging and cars.

PARTNERS

Activities

VITO and IW are the two partners for this project, the latter also being co-ordinator.

CONTACT INFORMATION

Co-ordinator

Françoise Nemry
Institut Wallon (IW)

4, boulevard Frère Orban
B-5000 Namur

Tel: +32 (0)81 25 04 95
Fax: +32 (0)81 25 04 90

f.nemry@iwallon.be
www.iwallon.be

Partner

Jan Theunis
Vlaamse Instelling voor Technologisch Onderzoek (VITO)

Boeretang 200
B-2400 Mol

Tel: +32 (0)14 33 59 30
Fax: +32 (0)14 32 11 85

jan.theunis@vito.be
www.vito.be

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GREENMOD

DYNAMIC REGIONAL AND GLOBAL MULTI-SECTORAL MODELLING OF THE BELGIAN ECONOMY

Duration of the project: 15/12/2001 – 31/12/2003
Budget: € 400.000
Keywords: Economic Modelling, Policy Instruments, Tradable Emission Permits, Decision-Making Process

CONTEXT

Since the Kyoto Protocol, the number of policy proposals and measures considered in order to reduce greenhouse gas emissions has significantly increased. Despite the importance of the challenges the three Belgian regions should face, and despite the frequent debate on policies to be adopted, there is no regional model in Belgium for helping to evaluate the economic policies. The permanent evolution of the Belgian state towards a federal structure and the prospect of allocating new responsibilities to the regions elucidate the necessity of developing a new powerful instrument for serving public authorities in their decision-making process. The goal of this project is to fill up this gap.

PROJECT DESCRIPTION

Objectives
The goal of this project is to develop a dynamic regional general equilibrium model of the Belgian economy (GREENMOD) capable of evaluating, in an integrated manner, the different economic instruments that are being considered for environmental policies.

Beyond building this model as an instrument for helping in the decision-making process, the project will also explore the main challenges related to energy and climate policies in the socio-economic, energetic and environmental fields and especially the analysis of the impacts of policies and measures relating to the climate field. Special attention will be given to the tradable emission permits and their interaction with other instruments (fiscal, non-fiscal, voluntary agreements, etc.).

The two goals of this project are thus the following:

1 To build up a dynamic regional multi-sectoral general equilibrium model of the Belgian economy. The model will take into consideration all the interactions between the three regions (Brussels, Flanders and Wallonia) in order to assess the impacts of the economic measures related to energy and the environment. The model will include all the important sectors of the three regions. The model will be dynamic and will give the effects on the short but also on the medium and long term of the economic policies and external shocks. Special care will be given on the modelisation of the labour market in order to be able to measure the impacts of the different environmental measures on the labour force and on unemployment.

2 To develop some applications and analysis with the collaboration of the Users Committee and the OSTC. As soon as GREENMOD will be finished, it will be used as an important tool in the decision-making process, on national as well as on regional or sectoral level. The model will give the results of the different considered measures in sectoral terms (activity level, cost of production, competitiveness, etc.), macro-economic terms (national and regional public finance, balance of payments, etc.), socio-economic terms (employment, revenues, distribution) and environmental terms (production and consumption of energy, emissions of greenhouse gases).

Methodology
General equilibrium modelling allows the evaluation of the socio-economic, energetic and environmental impacts of the different economic instruments, should they be fiscal (direct and indirect fiscal policies, subvention, etc.) or non-fiscal (support for replacement technologies, etc.). This evaluation is realised under a coherent framework in terms of macro identities (national accounts and agent accounts), of distribution of the revenues in the economy (social accounting matrix) and under strict respect of the economic theories.

The tradable permits market will be fully integrated in the theoretical framework and will work under a coherent way with the other markets included in the model (such as the labour and the capital markets). The combination of different economic instruments will thus be possible and their effects will be estimated in a coherent way. The model will also allow the analysis of how the different measures can be complimentary to each other.

The project will include the following stages:

1 Construction of the database: GREENMOD will require a very desegregate database. The first year of the project will mainly consist of the collect of the gross data, of their analysis, their harmonisation, and of the creation of regional social accounting matrix and their integration in the international database.

2 Construction of the model: the model will include sectoral models for each of the regions and models for the rest of the European Union and for the other major international economies.

3 Analysis and modelisation of the tradable pollution permits. An analysis of the different existing environmental models will be made in order to compare their results and state their differences. An analysis of the literature on the modelisation of the tradable permits market will also be done. Finally, an analysis of the difference in terms of cost of the reduction of the emissions between the different sectors of the economy will be realised.

4 As soon as the model is operational, applications and analysis will be made in collaboration with the User Committee and the OSTC.

5 At the end of the research, a final report and a user guide will be done.

Expected results and/or products

- A multi-regional and multi-sectoral database integrated in a multi-national database.
- A dynamic, multi-regional general, and multi-sectoral general equilibrium model of the Belgian economy.
- Baseline projections.
- Analysis of scenarios related to instruments defined by the Kyoto Protocol.
- Manual and guide for model users.
- Final report.

PARTNERS

Activities

The team led by Prof. Ali Bayar at the Department of Applied Economics of the Free University of Brussels (ULB-DULBEA) will be in charge of building the regional/global general equilibrium model and its database. The section relating to the tradable permits will be realised by a team of the UCL-CORE under the supervision of the Prof. Thierry Bréchet.

CONTACT INFORMATION

Co-ordinator

Ali Bayar
Université Libre de Bruxelles (ULB)
Département d'Economie Appliquée (DULBEA)

50, avenue F.D. Roosevelt
C.P.140, B-1050 Brussels

Tel: +32 (0))2 650 41 15
Fax: +32 (0)2 650 41 37

Ali.Bayar@ulb.ac.be
www.ecomod.net

Partners

Thierry Bréchet
Université Catholique de Louvain (UCL)
Core for Operations Research and Econometrics (CORE)

34, voie du Roman Pays
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 81 86
Fax: +32 (0)10 47 43 01

brechet@core.ucl.ac.be
www.core.ucl.ac.be

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RENDERING SUSTAINABLE CONSUMPTION BEHAVIOUR MORE SUSTAINABLE: PSYCHOLOGICAL TOOLS FOR MARKETING PROSOCIAL COMMITMENT

Duration of the project: 01/12/2001 – 31/12/2005
Budget: € 281.001
Keywords: Consumer Behaviour, Sustainable Consumption, Priming Technique, Social Labelling

CONTEXT

Sustainable consumption patterns in individual consumers are obviously in society's best interest. Therefore, governments (and some government-supported organisations) serve as social marketers, using marketing tools to promote the consideration of 'brotherhood' in everyday consumer actions.
Government-as-a-marketer can use communication instruments, but often has to refer to regulatory actions and direct influence on prices of different behavioural options to accomplish. After all, initiating and persisting with sustainable behaviour is difficult for any consumer, because the behaviour tends to clashes with self-interest. Some will realise the importance of behaving in ways that are responsible to the environment and the well being of others, even when separated in time or space. Still, sustainable behaviours are often repetitive everyday behaviours, and sometimes self-interest will creep back in. For other consumers, self-interest will always dominate. Our project proposal deals with two major questions of general importance to the social marketing of brotherhood.

PROJECT DESCRIPTION

Objectives
First, we want to investigate which kind of communication is best suited to induce sustainable behaviours in consumers who also have more selfish options. Traditionally, the government's position has been that of an advocate, trying to convince consumers to take the collective interest into account. Social marketing of the traditional kind is the art of presenting convincing arguments, trying to make consumers change their minds about what is the best thing to do. We suspect that this approach is not optimal. Thinking about options activates the pros but also the cons of each behavioural option, including the self-interested one.

We propose an alternative approach that uses the principle of priming, heavily studied in social psychology. Priming is the art of unobtrusively bringing subtle cues in the environment, which activate available prosocial memory content, and subtly guide behaviour in prosocial directions, typically without the recipient of the information being aware. We will investigate experimentally the scope of the applicability of the priming technique. More in particular we want to investigate whether general 'pro-sustainable' priming messages are effective, and how effective they are in comparison with messages designed for a specific behaviour. After all, not all sustainable behaviours are the same, and it may be that someone sensitive to one issue is completely insensitive to another. We also want to investigate the precise role of the social context of the behaviour. Our current results suggest that primes affect inferences about what other people will do, but they do so in an experimental task requiring attention to the behaviour of these others. Not all sustainable behaviours are like that (most are not). Does unobtrusive priming still work if the others are a mere audience of a consumer's behaviour?

Our second objective is to study how the social marketer should combine communication with direct behaviour modification techniques (pricing, regulations) championed by lawyers and economists. Carrots and sticks are required because there are some who are not to be convinced of the collective interest in any other way. But what happens to those for whom the carrots and sticks were not necessary? The available evidence suggests that they will take a step backwards. They will now justify their behaviour on the basis of the rules or price advantages of sustainable behaviour, and lose intrinsic motivation. We introduce the practice of social labelling as a potential solution to this problem. Labelling is a summary for any social marketing intervention suggesting consumers that their behaviour is due to the kind of person they are. Some limited evidence suggests that labelling my foster persistence of behaviour, because it makes consumers see their sustainable behaviour as their own motivated choice, not forced by the environment.

The second part of our proposal is an extensive study of the usefulness and limits of this technique. We want to investigate which type of carrot-and-stick approach can benefit most from labelling effects, and we also look at how specific and how explicit labels should be to have the desired effect.

Interaction between the different partners
It is our intention to conduct every aspect of the research jointly.

Expected results and/or products

Our ambition is to publish our results in the top international journals in both social psychology and marketing/consumer behaviour.

The project will enable us to produce two doctorates, one at KULeuven, one at UCL.

Theoretical results need translation to policy. We therefore plan 'managerial guidelines' reports for submission to publications with a practitioner audience. Obviously, we also want to publish the products of our research as OSTC research reports.

PARTNERS

Activities

For practical purposes, the Leuven team will co-ordinate the data collection and analysis of the section 1 studies. The studies described in section 2 will be initiated in Louvain-la-Neuve, as they will probably be part of the doctoral work of the research, UPSO will hire for this project. Later in the project, studies may be conducted in both places, depending on subject and lab availability.

CONTACT INFORMATION

Co-ordinator

Luk Warlop
Katholieke Universiteit Leuven (KULeuven)
Departement voor Toegepaste Economische Wetenschappen

Naamsestraat 69
B-3000 Leuven

Tel: +32 (0)16 32 69 41
Fax: +32 (0)16 32 67 32

luk.warlop@econ.kuleuven.ac.be
www.econ.kuleuven.ac.be/tew/academic/market/members/LukWarlop.htm

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Partners

Vincent Yzerbyt and Olivier Corneille
Université Catholique de Louvain (UCL)
Département de Psychologie

10, place du Cardinal Mercier
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 43 76
Fax: +32 (0)10 47 37 74

vincent.yzerbyt@psp.ucl.ac.be / olivier.corneille@psp.ucl.ac.be
www.psor.ucl.ac.be

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A FAIR AND SUSTAINABLE TRADE, BETWEEN MARKET AND SOLIDARITY: DIAGNOSIS AND PROSPECTS

Duration of the project: 15/12/2001 – 15/12/2003
Budget: € 372.466
Keywords: International Trade, Fair Trade, Development, Marketing, Consumption

CONTEXT

One of the aspects of sustainable trade deals with the perception of resource distribution processes, notably between North and South, and implies the adaptation of consumption and production modes, so as to reach a well-balanced social and economic development. Although fair trade is becoming more and more important indeed, one is forced to note the deficiency of scientific experience in this field: the research work on the subject is often of an applied or even militant kind and has limited theoretical anchors. Yet, theoretical currents that have been developed in the economic and sociological literature may now be applied to fair trade research.

PROJECT DESCRIPTION

Objectives

- Analyse the fair trade network as a whole, as well as its extension possibilities as a sustainable and responsible production and consumption mode with the prospect of North-South relationships and fairness in the economic process, and as a new ethical consumption mode in the North.
- Provide fair trade with a conceptual and theoretical foundation, in all its economic, sociological and marketing aspects.
- Come to scientifically based recommendations in the field of fair trade supporting policies.

Methodology

The favoured methodology studies fair trade's entire process, through three integrated approaches: an economic approach, an anthropological approach and a marketing approach. This methodology can be divided as follows:

A study of the producers:

- analysis of the producers' socio-economic conditions, their organisations and activity context;
- field studies on the impacts of fair trade, assessment of its efficiency on poverty reduction and comparison of this form of "assistance" with classical development projects. The comparative approach is concerned with two cultural areas: sub-Saharan Africa and Latin America;
- bringing fair trade into a theoretical perspective (sociology of social movements).

A study of the networks:

- in-depth economic analysis of the fair trade networks: dissection of the price and of the added value, in comparison with classical networks (studied products are coffee, honey and bananas);
- marketing analysis of fair trade's distribution strategies;
- bringing fair trade into a theoretical perspective (fair price theory, ...) and modelisation/conceptualisation of fair trade;
- voluntary participation and human resources management in the points of sales.

A study of the consumers:

- analysis of the demand for fair products, of the consumers' profiles and purchasing behaviours;
- bringing fair trade consumption as a social commitment into a sociological perspective.

Interaction between the different partners

A multidisciplinary approach is necessary for the global perception of fair trade's different aspects and is integrated during the research, with the three teams working in a collaborative way. The study of the producers is carried out from a socio-anthropological and economic point of view, both on theoretical and field research level. The study of the distribution networks comes within the three economic, marketing and sociological approaches (voluntary participation and HRM). The study of the consumers combines the sociological and marketing approaches, notably through a joint survey.

Expected results and/or products

At the theoretical level, the expected results are mainly:

- the conceptualisation and modelisation of fair trade;
- the bringing into perspective of fair trade from the angle of sociological and economic theories;
- an assessment of fair trade's potential as a tool for development aid.

At a more pragmatic level, the research will lead to recommendations aiming at:

- improving the relationships between producers and with networks;
- improving distribution strategies;
- determining the factors that could have a positive influence on the consumption of fair products and set up priorities (target groups).

As a conclusion, we will set out fair trade's future prospects, as a sustainable production and consumption mode from the South to the North.

The research's different valuation modes will be:
- the exchange of information with the Users Committee (field players);
- publications in scientific journals (theoretical input);
- recommendations to concerned authorities.

PARTNERS

Activities

ULg - Department for Social Change and Development
- socio-anthropological aspects of the field studies (the producers' socio-economic conditions and organisation, assessment of the development's impact);
- application of sociological theories to the thought on fair trade;
- analysis of the consumers' sociological profile and social commitment;
- co-ordination of the research teams.

ULg - Centre for Social Economy
- economic aspects of the field studies and the analysis of the networks;
- application of economic theories to the thought on fair trade, and modelisation.

UAMS - Department of Marketing
- in-depth marketing analysis of fair trade consumption;
- analysis of distribution strategies.

CONTACT INFORMATION

Co-ordinator

Marc Poncelet
Université de Liège (ULg)
Service de Changement social et Développement (PôLE-SuD)

7, boulevard du Rectorat,
Bât. B31, bte 8
B-4000 Liège

Tel: +32 (0)4 366 30 74
Fax: +32 (0)4 366 47 51

Marc.Poncelet@ulg.ac.be
www.egss.ulg.ac.be/csd

Partners

Jacques Defourny
Université de Liège (ULg)
Centre d'Économie Sociale (CES)

7, boulevard du Rectorat,
Bât. B33, bte 4
B-4000 Liège

Tel: +32 (0)4 366 31 36
Fax: +32 (0)4 366 28 51

J.Defourny@ulg.ac.be
www.egss.ulg.ac.be/ces/

Patrick De Pelsmacker
Universiteit Antwerpen
Management School (UAMS)
Department of Marketing

Sint-Jacobsmarkt, 9-13
B-2000 Antwerpen

Tel: +32 (0)3 220 47 49
Fax: +32 (0)3 220 47 69

patrick.depelsmacker@ua.ac.be
www.uams.be

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CRITERIA AND IMPULSES FOR CHANGES TOWARDS A SUSTAINABLE CONSUMPTION: APPROACH PER SECTOR

Duration of the project: 01/12/2001 - 31/12/2003
Budget: € 344.644
Keywords: Sustainable Consumption, Sectors, Products, Producers, Consumers' Behaviour

CONTEXT

General context of a partial switch from environmental policies towards products policies. Study of the consequences and of the feasibility of these orientations:
- European level: Integrated Product Policy, in particular the "products study groups" aspect;
- Belgian federal level: Federal director plan "Product policy and environment", in particular the "products panel" aspect.

PROJECT DESCRIPTION

Objectives

- Understanding of the logic of different actor groups relative to change and resistance considering the objectives of a "sustainable" product policy (environment and ethical criterions).
- Determination of five "favourable" sectors regarding change of the consumption and production patterns.
- To foster concrete propositions of change for two sectors.

Methodology

Phase A : identification of the actors' change and resistance factors and choice of the pertinent sectors

1 definitions of "sustainable consumption":
- within political projects (international → regional);
- from the different actor groups' point of view;
- in its relationships with the environment and the social factors;
- in its relationships with the great phases of the product life cycle (production, supply, consumption, elimination).

2 elaboration of an analytical grid: utility:
- characterisation of different sectors of production;
- choice of the sectors to be studied;
- assessment of the existing/current situation;
- assessment of the feasibility for change;

... regarding some criterions related to sustainable development.

3 qualitative approach:
- interviews with persons working in the field of sustainable development:
  - differences regarding how they conceive "sustainable consumption";
  - making an assessment of the sectors "having priority" regarding change of production and consumption patterns.
- focus groups: 2x2 consumer groups (French/Dutch):
  - do the consumers take into account "sustainable development" criterions in their consumption choices?;
  - sectors for which changes are wished/envisaged.

Based on bibliographical and qualitative data, phase A is closing with the proposition of five sectors which appear to be more "favourable" to changes

Phase B : sector-based analysis

- product assessment approach:

within each of the five sectors, analysis of particular consumption products through a comparative study based on environmental and ethical criterions related to producers
- qualitative approach:
  - for the five sectors as a whole: two focus groups;
  - for the two sectors where a deepening is needed: tests of change:
    - 2x2 focus groups;
    - in depth face-to-face interviews.
- "corporations" approach:

Identification of the considered sectors' potential factors for a change through analysis of:
- the actions that can be developed by corporations;
- the corporations' room for manoeuvre;
- the determinant factors which are susceptible to provoke a change in the way products are produced (including political instruments).

Tool: Business environmental barometer (1996, 1997, 2001) which will permit us to establish general sector-based profiles which will be used as a basis for in depth interviews.
- other actors:
  - enrichment of the sector-based analysis (NGOs, public sector, advertising) by:
    - bibliographical studies;
    - organisations' own documents studies;
    - interviews.
  - qualitative assessment (kind of messages) of advertisement for the considered sectors.

Phase C: test of changes

Two workshops with actors coming from the two sectors where the propositions for change will be presented and discussed.

Interaction between the different partners

From a general point of view, each partner intervenes in each of the steps of the research project and an active co-ordination is assumed all along the project duration, but more specifically:

- the researchers of the Centre d'études du développement durable (CEDD) of the ULB co-ordinate the research project, they take part in this research from a theoretical point of view, and study different kinds of actors, excluding consumers and corporations;
- the researchers of the Centre de recherche et d'information des organisations de consommateurs (CRIOC) will focus their work on the aspects related to consumers and they will also conduct the qualitative approach;
- the researchers of the Centre entreprise-environnement (CEE) of the UCL will focus their work on the aspects related to corporations.

Expected results and/or products

- identification of opportunities for concrete change and possible obstacles regarding change;
- possibly, sectors' engagement to put these changes on tracks;
- usable precise data concerning different sectors' situation regarding expected policies;
- list of political instruments;
- recommendations to different political, economical and social actors;
- two workshops (phase C);
- awareness campaigns;
- supplying input for experts' and consumers' representatives within the consultative commissions;
- possibly, inclusion of some results within the next European surveys of the Business environmental barometer.

PARTNERS

Activities

ULB
The CEDD realises multidisciplinary studies related to environmental policies within the frame of sustainable development. It works on the elaboration and the implementation of policies and also on the socio-economical, technical or philosophical context of sustainable development.

UCL
The CEE, inside the Marketing Unit, seeks to promote a scientifically approach of the analysis of consumption phenomena. Its goal is both the enhancement of knowledge in this field and the development of usable instruments in help-decision.

CRIOC
CRIOC supplies technical advice to consumers' organisations, to value the consumption function and to promote consumer's protection. The CRIOC leads a pluridisciplinarily activity.

CONTACT INFORMATION

Co-ordinator

Edwin Zaccaï
Université Libre de Bruxelles (ULB)
Institut de Gestion de l'Environnement et d'Aménagement du Territoire (IGEAT) - Centre d'Etudes du Développement Durable (CEDD) - CP130/02

50, avenue F.D. Roosevelt
B-1050 Brussels

Tel: +32 (0)2 650 43 32
Fax: +32 (0)2 650 43 12

ezaccai@ulb.ac.be
www.ulb.ac.be/igeat/cedd

Partners

Marie-Paule Kestemont
Université Catholique de Louvain (UCL)
Institut d'Administration et de Gestion - Centre Entreprise-Environnement (CEE)

1, place des Doyens
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 84 77
Fax: +32 (0)10 47 83 24

kestemont@mark.ucl.ac.be
www.mark.ucl.ac.be

Catherine Rousseau and Ann De Roeck-Isebaert
Centre de Recherche et d'Information des Organisations de Consommateurs (CRIOC-OIVO)

18, rue des Chevaliers
B-1050 Brussels

Tel: +32 (0)2 547 06 11
Fax: +32 (0)2 547 06 01

catherine.rousseau@oivo-crioc.org
www.oivo-crioc.org

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DEVELOPMENT STRATEGIES FOR A MULTIFUNCTIONAL AGRICULTURE IN PERI-URBAN AREAS

Duration of the project: 15/12/2001 – 30/06/2005
Budget: € 373.214
Keywords: Peri-Urban Zone, Agricultural Development, Urban Environment, Socio-Economic Viability

CONTEXT

The rural area in Flanders (as other densely populated areas in Europe) have a peri-urban character. The agricultural sector in these regions is increasingly confronted with pressure coming from the population, environmental measures and a more severe spatial planning framework. But also in these peri-urban areas, agriculture still has an important role in the preservation of the landscape, the socio-economic viability of the rural regions, the ecological functioning of these areas and so on. To fulfil these functions the agricultural sector must be economic viable and be able to develop. The question therefore is which individual and sector strategies can be developed in these peri-urban zones to keep an economic viable agricultural sector able to play his multifunctional role.

PROJECT DESCRIPTION

Objectives
In the project a number of aspects are investigated with regard to the functions agriculture is providing in the peri-urban zone. More precisely the following subjects are studied: what kind of functions are expected from agriculture in peri-urban areas, how this agriculture can actually fulfil these functions, what can be done to improve function development and how can policies support multifunctional forms of agriculture in the peri-urban zones (see also scheme).

Function expectations

After an analysis of the historical role and evolution of the agrarian sector in Belgium with emphasis on the differences between peri-urban and rural areas, the first objective of the research will focus on the influence of the urban environment on agriculture and on the functions expected by society from agriculture. Through interviews with all relevant actors in peri-urban areas these expectations and their evolution will be described and the importance of the demand evaluated.

Function fulfilment

Next, the jointness between the production of agricultural commodities and the expected non-commodities will be analysed. Through different research methods it will be investigated how agriculture is responding to the expectations from society and how individual farms try to adapt to the expectations of the non-rural population in peri-urban zones. It is also studied in how far this leads to new income sources and with what kind of constraints farmers in peri-urban zones are confronted with when developing new forms of agriculture.

Function development

The new income sources are analysed and their strengths and weaknesses studied. Their relation with the peri-urban situation is analysed as well as their future potential. This potential is linked to different socio-economic and spatial factors such as purchase power in the nearby urban zone, the accessibility of the area, the historical evolution, the recreational value of the zone and so on.

Function support

The final objective of the project is to analyse policies to support the development of agriculture in peri-urban zones. Efficiency and effectiveness of policies promoting the multifunctional role of agriculture will be evaluated. The shift from a production oriented income support towards a more area specific rural development policy will be critically analysed. Further implementation of environmental policies may reduce the viability of farming in peri-urban areas (license policy e.g.) while spatial restrictions have a negative influence on land prices. But on the other hand the proximity of the city may also be a source of innovative power which can result in new forms of agriculture nearby the city if correct incentives are given.

Methodology and interaction between the different partners
The research methodology is mainly based on case studies. On the basis of a number of regional parameters, a number of case study areas will be selected within the Belgian urban diamond (between Antwerp, Gent, Brussels and Nivelles). In the study areas the developed theoretical relations will be empirically analysed through data collected by interviews with citizens, consumers, lobbyist, farmers and policy makers. Hereby the Department of Agricultural Economics of the University of Gent will mainly focus on the economic potential of development strategies, while the Institute for Social and Economic Geography of the KULeuven will mainly study the social and spatial context in which these strategies are developed.

Expected results

The expected results are situated at three levels:

- an increased knowledge of the role and specific problems of agriculture in peri-urban areas;
- analysis of possible individual and sector development and survival strategies for peri-urban agriculture;
- recommendations for specific policies toward peri-urban areas: activities to be developed, policy instruments, relevant scale and indicators for analysis and monitoring, necessary knowledge and institutions, and so on.

PARTNERS

Activities

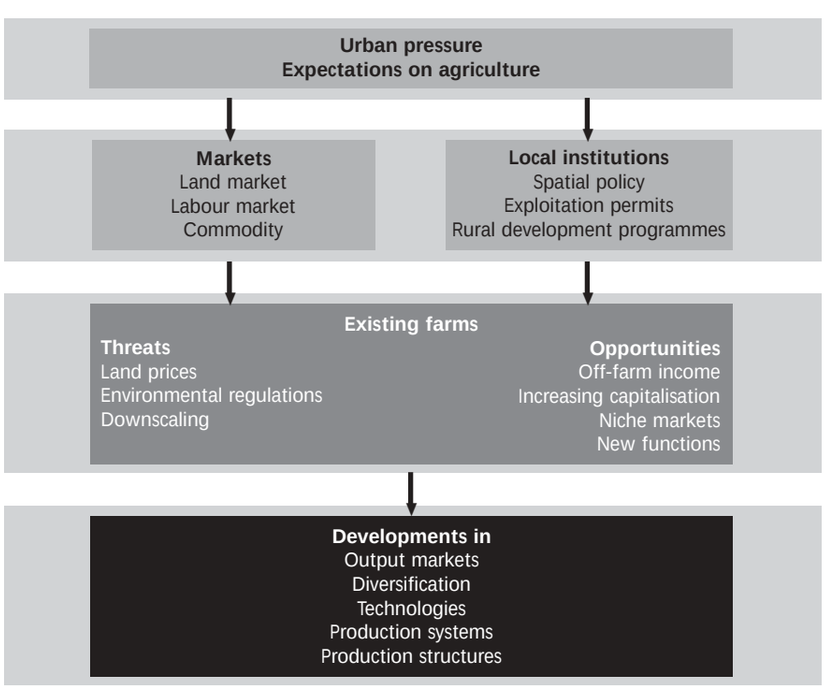
RUG

The Department of Agricultural Economics is focusing on how agriculture is adapting to changed external conditions. Hereby attention is paid to the development of strategies to respond to environmental requirements as well as potential of broadening or deepening agricultural activities (diversification, quality products, organic farming, ...). Not only the economic impact of such strategies is studied, but also the consequences at social and structural level are analysed.

KULeuven

The Institute for Social and Economic Geography belongs to the Faculty of Science. The research involves the spatial dimensions of social and economic processes. They are analysed from a historical, current and future perspective. In the course of the last years, the institute has gained a lot of experience in processing statistical data and in methodologies regarding surveys and in-depth-interviews. The composition of different databases, their analysis and conversion into maps are central to the expertise of the Institute. The research of the institute focuses on settlement structures, on interrelationships between urban and rural and on agriculture and underlying social processes (especially concerning poverty, social exclusion and survival strategies).

THREATS AND OPPORTUNITIES FOR PERI-URBAN AGRICULTURE: CONCEPTUAL FRAMEWORK



CONTACT INFORMATION

Co-ordinator

Guido Van Huylenbroeck
Universiteit Gent (RUG)
Vakgroep
Landbouweconomie

Coupure Links 653
B-9000 Gent

Tel: +32 (0)9 264 59 26
Fax: +32 (0)9 264 62 46

Guido.VanHuylenbroeck@rug.ac.be
www.rug.ac.be

Partners

Etienne Van Hecke and Henk Meert
Katholieke Universiteit Leuven (KULeuven)
Instituut voor Sociale en Economische Geografie

Willem de Croylaan 42
B-3001 Heverlee

Tel: +32 (0)16 32 24 41
Fax: +32 (0)16 32 29 80

Etienne.vanhecke@geo.kuleuven.ac.be / Henk.meert@geo.kuleuven.ac.be
www.kuleuven.ac.be

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HOW CAN ORGANIC FARMING CONTRIBUTE TO SUSTAINABLE PRODUCTION AND CONSUMPTION PATTERNS?

Duration of the project: 15/12/2001 – 30/09/2005
Budget: € 700.000
Keywords: Organic Agriculture, Consumer, Intervention Research, Food Chain Supply Patterns, Collective Action

CONTEXT

Following the various crises that 'conventional' livestock farming systems have gone through, consumers, who are increasingly distrustful and worried, are turning to alternative systems, especially organic farming. The public authorities have set in their federal sustainable development plan a target of converting 10% of the country's usable agricultural area to organic farming by 2010. However, the sustainability of this production system remains to be validated, for while in some areas it seems to offer truly novel responses, its strong growth is a true challenge for the stability of various elements. The trust in organic farming is not safe from crises, its regulation and the organisation of the marketing of its products are subject to the pressure of a demand that exceeds the Belgian supply; and finally, the current scheme of technical supervision appears to be poorly suited to its needs.

PROJECT DESCRIPTION

Objectives
The project's overall objective is to define the sustainability of organic agriculture based on three two-part dimensions that must be confronted with each other and balanced, namely:
- economic sustainability: competitive position and potential for development;
- environmental sustainability: reproduction of resources and balance of specific externalities;
- social sustainability: innovative abilities and social/territorial externalities.

These dimensions must be evaluated, matched up with effective sets of references, and backed up by policy instruments.

This makes it possible to define the research's specific aims:
1 To establish technical references for the two major stakes linked to the organic ranching and fattening of cattle, namely, rations and health. That entails making use of/improving the positive externalities of organic cattle ranching schemes (nitrogen balance, biodiversity) and analysing their environmental and social costs.
2 To study and test the organisational forms that permit negotiations between marketing requirements and the dimensions of sustainability and to reinforce the guarantees that the various production and processing networks appear to give consumers.
3 To analyse consumer demand and the most suitable communication tools and to initiate a participatory and experimental approach to negotiation.

Methodology
The originality of this project lies in the fact that it allows for the interdependence of these three specific aims whilst trying to develop at the same time and in a co-ordinated fashion various types of sets of references and tools through intervention-research (Sébillotte, 2000; Hatchuel, 1999). The main hypothesis is the validity of a knowledge co-generation model through the interactions of all the stakeholders and that can be represented in the research process in different ways.

This research also aspires to explore and validate an intervention-research model that might be transposed to other areas. The idea is to validate the usefulness of establishing connections amongst consumption, production, and communication in the research itself. This is thus a multidisciplinary approach that strives to co-ordinate the work of engineers, sociologists, and economists on the one hand, but also that of the farmers, processors, and distributors on the other hand, by the reciprocal influences of the research concepts, priorities and tools, rather than by their simple juxtaposition. The approach belongs to an original epistemology (Hatchuel, 1999) that is centred on transformation rather than mere observation so as to give priority to reflexivity, and that is based less on established values than on the restatement (or regeneration) of values.

Interaction between the different partners
Given the number and heterogeneousness of the requirements placed on agriculture, we can no longer treat the economic and environmental aspects, nor the constraints of supply and demand, separately. A consistent system of sets of references for each network's (internal and external) co-ordination is vital if we want to ensure the networks' long-term viability just as much as their environmental conformity. The project will take care to connect the various sets of references, i.e., technical and organisational feasibility and consumer demand. For those reasons, the different research teams will work in strong interaction along the all phases of the project. The economic input will be modulated in function of the hierarchy of research questions.

Link with international programmes

- INRA UREQUA, Le Mans (B. Sylvander) Research and organic farming
- INRA SAD, Avignon (B. Hubert) Intervention research.
- INRA Colmar (Girardin), Frame of technical references.

Expected results and/or products

The project will produce sets of references in terms of production systems, organisational models, and the construction of the demand. The sets of references' feasibility will be validated in the networks (sector subsystems) that we test. Sustainability will be validated from the economic, social, and environmental standpoints. In addition, the research will determine to what extent the general organisation and negotiating schemes that exist in the organic farming networks can be transformed into new forms of collectives that can allow better organisation regarding the various dimensions of sustainable development.

PARTNERS

Activities

FUL

This research team will focus on studying the organisational schemes that permit negotiation between distribution requirements, and aspects of sustainability as farm income, the ranchers' socio-economic control over the situation, territorial dynamics, etc. Concerning the consumer references, the FUL team will study the communication tools and the consumer representation. Regardless of the type of distribution circuit, reciprocal learning is required if supply has to match demand. In this respect, the FUL team will initiate and evaluate such a learning trajectory. This calls for consultation and leading discussion groups in order to get the consumer more actively involved in the process and to check the validity of such a negotiating model.

CRAGx

The agronomist of the CRAGx will establish a set of technical references around two major stakes in breeding and fattening cattle organically, namely, diet and health. Defining the sets of references for cattle rations connects two types of relationship, the breeding-cropping relationships and the breeding-fattening relationship. The second aim is to make use of and/or improve the positive externalities of organic cattle breeding, i.e., nitrogen balance, biodiversity, and landscapes. What impacts do organic farming practices have on nitrogen balance? What impacts do the choice of production system, especially the fodder production choices, on the biodiversity?

RUG

The economists of the RUG will analyse organic livestock farming's economic sustainability by studying the apportionment of the prices that consumers pay amongst the various members of each network and trying to understand the organisational justifications for this distribution of the profit margins. The analysis of the margins will be accompanied by an estimation of the transaction costs for each of the players

CONTACT INFORMATION

Co-ordinator

Marc Mormont
Fondation Universitaire Luxembourgeoise (FUL)
Unité socio-économie, environnement et développement

185, avenue Longwy
B-6700 Arlon

Tel: +32 (0)63 23 08 68
Fax: +32 (0)63 23 08 18

mormont@ful.ac.be
www.ful.ac.be

Partners

Didier Stilmant
Centre de Recherches agronomiques de Gembloux (CRAGx)
Section systèmes agricoles

100, rue de Serpont
B-6800 Libramont

Tel: +32 (0)61 23 10 10
Fax: +32 (0)61 23 10 28

stilmant@cragx.fgov.be
www.cragx.fgov.be

Guido Van Huylenbroeck
Universiteit Gent (RUG)
Vakgroep Landbouweconomie

Coupure Links 653
B-9000 Gent

Tel: +32 (0)9 264 59 26
Fax: +32 (0)9 264 62 46

guido.vanhuylenbroeck@rug.ac.be
www.rug.ac.be

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April 2003

INTEGRATED PRODUCT POLICY CONSIDERING ECOLOGICAL, SOCIAL AND ECONOMICAL ASPECTS: DEVELOPMENT OF TWO INSTRUMENTS

Duration of the project: 15/12/2001 – 31/12/2003
Budget: € 377.760
Keywords: Sustainable Consumption and Production, Product Life Cycle, Sustainability Indicator, Sustainable Development Labelling

CONTEXT

Integrated product policy is one of the ways of setting about achieving sustainable consumption and production patterns. Genuine integrated product policy means that account is taken of ecological, social and economic considerations throughout the product's entire life cycle. After all, sustainable development is the framework for genuine integrated product policy. At present, an integrated product policy oriented towards sustainable consumption and product patterns is too often approached from an environmental viewpoint. Attention to the social conditions in which a product is manufactured is occasionally required. Other approaches again focus on a justified price breakdown for products brought on the market, etc. However, the full story is seldom told.

PROJECT DESCRIPTION

Objectives

This research is thus also aimed at developing two instruments for an integrated product policy based on ecological, social and economic considerations:

- The development of a set of key indicators for 1) sustainable consumption and production patterns, 2) integrated product policy and 3) integrated product policy, partim the environmental aspects.
- Development of a voluntary policy instrument, i.e. the 'sustainable development' label: a proposed (written up) legal basis for 'the allocation of a 'sustainable development' label to products' (with attention paid to content and procedure), plus implementation and testing in one case (coffee).

The project aims to integrate the ecological, social and economic dimensions in concepts, methodologies and voluntary instruments. Attention will be paid to the section of the life cycle, which occurs in developing countries during the working out of the case study.

Methodology

Sustainable development label

- Development of criteria, evaluation systems and integration methods.
- Development of procedures for investigation, testing, evaluation and monitoring.
- Testing of the developed criteria, methods and procedures on 2 cases.
- Development of a legal basis for the allocation of the 'sustainable development' label for products.
- Value enhancement.

Meetings of a brainstorming committee will accompany each phase of this part of the project, where the members of the Users Committee will be invited in the first place.

The development of a set of key indicators

- Investigation of proposed international and European key indicators.
- Investigation of usability within the DPSIR framework and for the suitability analysis.
- Examination of the employability for effectiveness analysis.
- Proposal of a model list of key indicators with feedback.
- Value enhancement.

Interactions between the different partners

Sustainable development label

- The development of the contents and the procedure, valorisation.

Centre for Sustainable Development - University of Gent and Ethibel vzw.
The Centre for Environmental Law will read and correct the proposal of law.

- The application to case: coffee.

Centre for Sustainable Development - University of Gent and Ethibel vzw.
ESPOL (Guayaquil - Ecuador) will be engaged to work out the coffee case.

Key indicators

The Centre for Sustainable Development - University of Gent will entirely accomplish this task. The brainstorming committee (incl. ESPOL, Ecuador) and Ethibel vzw. will function as the reading committee of the reports before publishing.

Expected results and/or products

Sustainable development label

- An English-language publication to make the results known at international level.
- A workshop where the instrument would be presented to corporate representatives and stakeholders.
- A special workshop concerning the policy and legal aspects for policy makers (political representatives and the appropriate civil servants).
- A legally-based (written-up) proposal for "the allocation of the 'sustainable development' label to products" with account taken of content and procedure on behalf of the Federal Government's sustainable development programme department and the European Commission.

Key indicators

- A set of key indicators for:

a Sustainable consumption and production patterns.
b Integrated product policy.
c Integrated product policy, partim the environmental aspects.

The three sets of key indicators with a methodological file per indicator will be published in a brochure.

- The calculation of a set of key indicators which can be offered for the Federal Report concerning Sustainable Development.
- Preparation of a suitability analysis for the Federal Services for the Environment and for the European Commission Environment DG dealing with the environmental aspects of integrated product policy.
- Preparation of a suitability analysis for integrated product policy for the Federal Government's 'sustainable development' programme department and for the European Commission.
- Workshop (optional).

PARTNERS

Activities

RUG-CDO
The aim of the Centre for Sustainable Development (CDO) is to use an interdisciplinary methodology for the elaboration on the sustainable development as a social framework. It concentrates on research concerning rational decision-making and the efficiency of policy instruments, in function of long-term policies, in an integrated perspective with a focus on participation and communication.

ETHIBEL
This is an independent research organisation. Its main purpose is the screening of companies on social, environmental and economical criteria for socially responsible investment funds. ETHIBEL has its own European quality label. The criteria for the ETHIBEL label cover all aspects of social corporate responsibility. ETHIBEL also takes part in various scientific researches concerning corporate social responsibility.

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April 2003

CONTACT INFORMATION

Co-ordinator

Bernard Mazijn and Ruddy Doom

Universiteit Gent (RUG)
Centrum voor Duurzame Ontwikkeling (CDO)

Poel 16
B-9000 Gent

Tel: +32 (0)9 264 82 07
Fax: +32 (0)9 264 83 90

bernard.mazijn@skynet.be
Ruddy.Doom@rug.ac.be
http://cdonet.rug.ac.be

Partner

Herwig Peeters
ETHIBEL vzw.

Vooruitgangstraat 333, b7
B-1030 Brussels

Tel: +32 (0)2 206 11 11
Fax: +32 (0)2 206 11 10

info@ethibel.org
www.ethibel.org

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GENERAL ISSUES
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OPTIMAL OFFSHORE WIND DEVELOPMENT IN BELGIUM

Duration of the project: 01/12/2001 – 31/11/2003
Budget: € 302.665
Keywords: Offshore Wind Energy, Renewable Energy

CONTEXT

The European Commission (EC) has published its White Paper on Renewable Sources of Energy in 1997, in which the target was set to achieve 12% of the domestic consumption of the European Union (EU) by 2010. In 2001, the European directive on green electricity was published, in which indicative targets for each EU member state. Belgium is expected to strive towards a contribution of 6% of renewable sources (RES) to its gross inland consumption by 2010.
Wind energy represents a major form of sustainable electricity generation. With an installed capacity of the order of 13GW, wind energy is currently the 3rd highest source of RE electricity in the EU, and constituted almost 1% of total electricity generating capacity in 1999. Undoubtedly, the resource potential, particularly in offshore areas, is enormous, and with several initiatives underway to increase the share of wind energy consumption in the EU, it is clear that the development of offshore wind energy will play a crucial role.
In the framework of the EC's Renewable Energy Strategy, wind energy, with a target of 40GW by 2010, is expected to provide the second most important contribution to the growth in energy from RES. The European Wind Energy Association (EWEA) has gone a step further in anticipating a feasible target of 60GW for all wind energy by 2010, 5GW coming from offshore resources.

PROJECT DESCRIPTION

Belgium is at the forefront of implementation of offshore wind in its territorial seas, and – depending on the outcome of running administrative procedures - among the first EU member states with large first generation offshore wind farms in its territorial seas.

Objectives
1 Determine the resources for offshore wind energy production in the Belgian territorial sea by:
- scanning the geological and geotechnical restrictions;
- studying the wind climate for the envisaged region;
- analysis of the options for grid-connection.

2 Study on the technological evolutions and the economic viability of long-term options by studying:
- the offshore wind turbine technology evolution scenarios;
- the evolution in the electrotechnical schemes for interconnection and the grid connection based on the expected technological evolutions and the likely evolutions of the grid architecture.

The long term options for support structures, installation procedures and O&M procedures.
3 Determining the physical, technical and economical potential for offshore wind application in the Belgian territorial sea based on the indicated specific resources and expected technological evolutions.

Interaction between the different partners

Co-ordination: 3E

1 *Survey of resources*
1.1. Geological and geotechnical study of the Belgian territorial seas: RUG
1.2. Wind resources: 3E
1.3. Availability of a high-voltage grid connection: KULeuven
1.4. Investigation of all static and dynamic factors limiting the potential in practice: 3E
2 *Calculation of technological options*
2.1. Wind park technology: 3E
2.2. Electric interconnection and grid-connection schemes: KULeuven
3 *Definition of the potential*
3.1.Calculation of the local potential: 3E and in discussion with RUG, KULeuven and the user group
3.2. Calculation of the global potential: 3E, RUG, KULeuven and the user group
4 *Recommendations on policy measures and dissemination of the results: 3E, RUG, KULeuven and the user group*

Expected results and/or products
1 Hierarchical classification and integrated mapping of sites based on geological, geotechnical, morpho- and sedimentdynamical criteria.
2 Calculation and classification of the Belgian North Sea wind resources.
3 Detailed parameterisation of the relevant available grid-infrastructure options.
4 Inventory and spatial definition of non-technical exclusive criteria.
5 Technology figures of offshore wind turbines anno 2005 and anno 2015.
6 Software tool for static and dynamic calculations of grid-interaction of offshore wind energy.
7 Report on the simulation results of the grid interaction of different electro-technical options for interconnection and grid connection of offshore wind turbines.

8 Listing of the local physical, technical and economical potential for offshore wind energy in the Belgian territorial sea anno 2005 and anno 2015.
9 Report on the global physical, technical and economical potential for offshore wind energy in the Belgian territorial sea anno 2005 and anno 2015.
10 Report on the recommended policy measures for the optimal exploitation of the Belgian offshore wind resources.
11 Workshop presenting the results of the project.

The involvement of at least 6 public administration stresses the multi-sectorial approach, which is required, and the need to dispose of an objective analysis, which can integrate all the policy objectives of the different services involved.
The exploitation of results aims at using the research results as a reference guide for the regional and federal administration, allowing them to make well-considered assessments when deciding/advising upon permits and concessions.
- Taking into account expected technological evolutions.
- To put the authority of each service in perspective of the – sometimes conflicting - objectives of other public services.
- Stimulating the discussion en negotiations between the involved public services based on facts and analysis.

PARTNERS

Activities

3E nv
- photovoltaic solar energy;
- active solar thermal energy;
- wind power;
- hydro power;
- energy in buildings;
- energy and environmental policy.

KULeuven
- analysis, design and optimisation of the steady state and dynamic behaviour of electromagnetic energy transducers and electro-heat applications;
- development of high performance two and three dimensional field computation software (finite element method approach;
- measurement and computation of the performance, efficiency, heating vibrations and acoustic noise of electrical machines;
- DSP control, automation and simulation of variable speed drives, active filters and powerline communication applications;
- power quality: modelling of the impact of harmonics and voltage dips, studying PQ parameters and mitigation measures;
- analysis, design, safety issues and power quality aspects of renewable energy conversion, with special emphasis towards photovoltaic applications;
- techno-economical studies of the liberalised electricity market.

RUG-RCMG
- design and application of original very high-resolution seismic techniques in the offshore and limnic environment;
- multibeam mapping and acoustical seafloor characterisation often in combination with sediment sampling and/or coring and sediment transport measurements.

CONTACT INFORMATION

Co-ordinator

Geert Palmers
3E nv

Verenigingsstraat 39
B-1000 Brussels

Tel: +32 (0)2 217 58 68
Fax: +32 (0)2 219 79 89

info@3E.be
www.3E.be

GENERAL ISSUES
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Partners

Ronnie Belmans and Johan Driesen
Katholieke Universiteit Leuven (KULeuven)
Onderzoeksgroep Elektrische Energie (ESAT/ELEN)

Kasteelpark Arenberg 10
B-3001 Heverlee

Tel: +32 (0)16 32 10 20
Fax: +32 (0)16 32 19 85

Ronnie.belmans@esat.kuleuven.ac.be
www.esat.kuleuven.ac.be

Jean-Pierre Henriet
Universiteit Gent (RUG)
Renard Centre of Marine Geology (RCMG)
Vakgroep Geologie en Bodemkunde

Krijgslaan 281, S8
B-9000 Gent

Tel: +32 (0)9 264 45 85
Fax: +32 (0)9 264 49 97

Jeanpierre.henriet@rug.ac.be
www.rug.ac.be

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MARKAL/TIMES

A MODEL TO SUPPORT GREENHOUSE GAS REDUCTION POLICIES

Duration of the project: 15/12/2001 – 31/12/2005
Budget: € 332.007
Keywords: Greenhouse Gas, Global Warming, Policy-Making, Modelling, Emission Reduction

CONTEXT

Despite the disappointing result of COP 6 in The Hague in November 2000 and the withdrawal of the USA from the Kyoto Protocol, climate change is and remains a high priority research theme because an efficient and effective international and national climate policy is a necessary condition for sustainable development. When current greenhouse gas (GHG) emission patterns are continued, and when no measures are taken to curb these GHG emissions, projected climate change will cause considerable damages to both natural and human systems, as stressed by the new IPCC Working Group II Third Assessment Report which was approved in Geneva in February 2001. The commitments regarding GHG emission reductions will need important efforts from different sectors and actors and there is therefore a need for an instrument to evaluate the role of sectors and technologies in a verifiable and consistent manner.

PROJECT DESCRIPTION

Objectives
The main objective of this project is to support the Belgian climate change policy with the MARKAL model and its successor TIMES. While the primary focus of this project is on climate change policy, it can also contribute to the evaluation of other policies. This can be energy policy, e.g. investment/rational use of energy, both on the demand and the supply side or conventional air pollution policies within the energy system. The project lies in the prolongation of a previous project with MARKAL, financed by the OSTC and builds on the experience and model development done during that project.

Methodology
MARKAL/TIMES is a technico-economic model, which assembles in a simple but economic consistent way technological information (conversion-efficiency, investment- and variable costs, emissions, etc.) for the entire energy system. It can represent all the energy demand and supply activities and technologies for a country over a horizon of 40/80 years, with their associated emissions (CO, CO_2, SO_2, NOx, VOC and PM) and the damages generated by these emissions. TIMES follows the same paradigm as MARKAL but the model formulation is completely revised such as to allow more transparency and greater flexibility in view of the continuous development of the model. The development of TIMES is done jointly with different partners within ETSAP.

The further development of the modelling framework concerns two aspects, the integration of the international dimension in the Belgian model and the integration of a refinery module. For the international dimension, the project will concentrate on two domains where it is most important: electricity production and GHG emission reductions.
Furthermore, as the reliability of MARKAL/TIMES depends to a large extent on the quality of the database, the database maintenance remains an important activity. Database maintenance activities include the follow-up of energy demands and analysing shifts in energy demand, including new (emerging) technologies, analysing market penetration of existing technologies, gathering information on existing installations (existing capacities - residual lifetime), reviewing energy prices, follow up of industrial developments and activities.

The activities regarding policy analysis will mainly be related to the Belgian climate policy. Besides the contribution to the national communications (as has been done in the previous project with MARKAL), the project aims at contributing to more specific case studies. Possible topics are sectoral or intersectoral cost-efficiency studies, evaluation of the cost of GHG emission reduction targets to which Belgium can commit itself for the post Kyoto period, comparative analysis of the efficiency of policy instruments: taxes, permits or equipment or fuel standards. The precise specification of the case studies will have to be done in close collaboration with the policy makers during the project.

Interaction between the different partners
Two partners are involved in this project:
- KULeuven - Center for Economic Studies (CES) - Prof. Stef Proost
- VITO (Flemish Institute for Technological Research) - Hendrik Van Rompaey

VITO is responsible for the extension and maintenance of the databank and the integration of the refinery module, while KULeuven-CES will concentrate on the development of the international dimension in the Belgian model. Both partners will contribute to the case studies.

Link with international programmes
ETSAP (Energy Technology Systems Analysis Programme) is a collaboration agreement within the International Energy Agency, which concentrates its work on "Energy Options for sustainable Development". The ETSAP-network is in charge of the maintenance of most of MARKAL model software (databasemanagement system and model specification) and organises two workshops per year where the experience with case studies of some 20 countries are compared. Results from common case studies are presented in international fora, organised ea. by IEA and can contribute to the negotiations within the United Nations Framework Convention on Climate Change (UNFCCC).

Expected results and products
There are five outputs expected:
1 an update and extension of the technological databank of MARKAL;
2 the conversion to the TIMES model;
3 the integration of the international dimension in MARKAL/TIMES Belgium for the electricity market and for emission permit markets;
4 integration of a refinery module;
5 a series of case studies, which can contribute to the design of the climate change policy for Belgium.

CONTACT INFORMATION

Promoter

Stef Proost
Katholieke Universiteit Leuven (KULeuven)
Centrum voor Economische Studiën (CES) – Onderzoeksgroep Energie, Transport en Milieu (ETE)

Naamsestraat 69
B-3000 Leuven

Tel: +32 (0)16 32 68 01
Fax: +32 (0)16 32 67 96

stef.proost@econ.kuleuven.ac.be
www.econ.kuleuven.ac.be

Partner

Jan Duerinck
Vlaamse Instelling voor Technologisch Onderzoek (VITO)
Expertisecentrum Integrale Milieustudies

Boeretang 200
B-2400 Mol

Tel: +32 (0)14 33 59 19
Fax: +32 (0)14 32 11 58

Jan.duerinck@vito.be
www.vito.be

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OPTIMAL OFFSHORE WIND DEVELOPMENT IN BELGIUM

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Budget: € 302.665
Keywords: Offshore Wind Energy, Renewable Energy

CONTEXT

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PROJECT DESCRIPTION

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Objectives
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2 Study on the technological evolutions and the economic viability of long-term options by studying:
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- the evolution in the electrotechnical schemes for interconnection and the grid connection based on the expected technological evolutions and the likely evolutions of the grid architecture.

The long term options for support structures, installation procedures and O&M procedures.
3 Determining the physical, technical and economical potential for offshore wind application in the Belgian territorial sea based on the indicated specific resources and expected technological evolutions.

Interaction between the different partners
Co-ordination: 3E

1 *Survey of resources*
1.1. Geological and geotechnical study of the Belgian territorial seas: RUG
1.2. Wind resources: 3E
1.3. Availability of a high-voltage grid connection: KULeuven
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3.1.Calculation of the local potential: 3E and in discussion with RUG, KULeuven and the user group
3.2. Calculation of the global potential: 3E, RUG, KULeuven and the user group
4 *Recommendations on policy measures and dissemination of the results: 3E, RUG, KULeuven and the user group*

Expected results and/or products
1 Hierarchical classification and integrated mapping of sites based on geological, geotechnical, morpho- and sedimentdynamical criteria.
2 Calculation and classification of the Belgian North Sea wind resources.
3 Detailed parameterisation of the relevant available grid-infrastructure options.
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mical potential for offshore wind energy in the Belgian territorial sea anno 2005 and anno 2015.
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10 Report on the recommended policy measures for the optimal exploitation of the Belgian offshore wind resources.
11 Workshop presenting the results of the project.

The involvement of at least 6 public administration stresses the multi-sectorial approach, which is required, and the need to dispose of an objective analysis, which can integrate all the policy objectives of the different services involved.
The exploitation of results aims at using the research results as a reference guide for the regional and federal administration, allowing them to make well-considered assessments when deciding/advising upon permits and concessions.
- Taking into account expected technological evolutions.
- To put the authority of each service in perspective of the – sometimes conflicting - objectives of other public services.
- Stimulating the discussion en negotiations between the involved public services based on facts and analysis.

PARTNERS

Activities

3E nv
- photovoltaic solar energy;
- active solar thermal energy;
- wind power;
- hydro power;
- energy in buildings;
- energy and environmental policy.

KULeuven
- analysis, design and optimisation of the steady state and dynamic behaviour of electromagnetic energy transducers and electro-heat applications;
- development of high performance two and three dimensional field computation software (finite element method approach;
- measurement and computation of the performance, efficiency, heating vibrations and acoustic noise of electrical machines;
- DSP control, automation and simulation of variable speed drives, active filters and powerline communication applications;
- power quality: modelling of the impact of harmonics and voltage dips, studying PQ parameters and mitigation measures;
- analysis, design, safety issues and power quality aspects of renewable energy conversion, with special emphasis towards photovoltaic applications;
- techno-economical studies of the liberalised electricity market.

RUG-RCMG
- design and application of original very high-resolution seismic techniques in the offshore and limnic environment;
- multibeam mapping and acoustical seafloor characterisation often in combination with sediment sampling and/or coring and sediment transport measurements.

CONTACT INFORMATION

Co-ordinator

Geert Palmers
3E nv

Verenigingsstraat 39
B-1000 Brussels

Tel: +32 (0)2 217 58 68
Fax: +32 (0)2 219 79 89

info@3E.be
www.3E.be

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Partners

Ronnie Belmans and Johan Driesen
Katholieke Universiteit Leuven (KULeuven)
Onderzoeksgroep Elektrische Energie (ESAT/ELEN)

Kasteelpark Arenberg 10
B-3001 Heverlee

Tel: +32 (0)16 32 10 20
Fax: +32 (0)16 32 19 85

Ronnie.belmans@esat.kuleuven.ac.be
www.esat.kuleuven.ac.be

Jean-Pierre Henriet
Universiteit Gent (RUG)
Renard Centre of Marine Geology (RCMG)
Vakgroep Geologie en Bodemkunde

Krijgslaan 281, S8
B-9000 Gent

Tel: +32 (0)9 264 45 85
Fax: +32 (0)9 264 49 97

Jeanpierre.henriet@rug.ac.be
www.rug.ac.be

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CLIMNEG II

CLIMATE CHANGE, INTERNATIONAL NEGOTIATIONS

Duration of the project: 15/12/2001 – 31/12/2005
Budget: € 862.631
Keywords: Greenhouse Gas, Climatic Change, International Co-operation, Emission Reduction

CONTEXT

Climate change is and remains a high priority research theme because an efficient and effective international and national climate policy is a necessary condition for sustainable development. When current greenhouse gas (GHG) emission patterns continue unchecked, projected climate change will cause considerable damages to both natural and human systems, as stressed by the new IPCC Third Assessment Reports. According to these reports, there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities and that human influence will continue to change atmospheric composition throughout the 21st century. During the last couple of years also the Belgian policy maker has increasingly recognised the importance of the climate change problem in relation to sustainable development.

PROJECT DESCRIPTION

Objectives
The aim of the CLIMNEG II project is to characterise theoretically and to simulate numerically the economic and climate change consequences of different greenhouse gas (GHG) emission reduction policies on the global, European and Belgian level. This exercise requires a coupling of a long-term economic model with a simplified but reliable representation of the climate system. The results and conclusions of this multidisciplinary research can serve as input and background information for the Belgian team participating in international climate negotiations.

Methodology
The research project is an exercise in integrated assessment analysis, i.e. it looks at the problem of climate change from a broad perspective in order to fully appreciate the numerous and complex interactions between the many economic actors (consumers, producers, national governments, supranational organisations) and the complex physical environment they are operating in. This broad perspective is reflected in the extensive geographical coverage, the extensive time horizons considered, and the variety of policy questions it considers. The core of the project consists of a set of numerical simulation models, each with a specific scope and level of detail.

Interaction between the different partners
In order to enhance communication between the different scientific disciplines and to cover the broad menu of research and policy questions, the network will use mathematical modelling as a common research language.

Expected results and products
The CLIMNEG II project is organised around three major research themes. In the first major research theme of the proposal, criteria for sustainable development, we want to operationalise the concept of sustainable development in the context of climate change. The project will not provide a definite answer to the difficult question of defining sustainable development. Instead, the analysis will identify minimal requirements (necessary but probably not sufficient conditions) a sustainable economic development should satisfy. These conditions will be derived from a theoretical welfare economic analysis of the trade off between the fundamental concepts of (1) economic efficiency, (2) environmental sustainability, (3) intragenerational and intergenerational equity, and (4) implementation and strategic stability of post-Kyoto climate agreements.

The second major research theme will focus on climate policy instruments and in particular on the combination of tax instruments and emission trading, the microstructure, initial allocation and trading rules of GHG emission permit markets. For the purpose of this research theme, a portable simulation tool will be developed for analysis of GHG emission trading under different institutional regimes (number of participants, trading ceilings, banking, market power etc.).

Thirdly, the CLIMNEG II project contains an important integrated assessment modelling effort. The project will refine and update several models that are currently available in the network (the integrated assessment model CLIMNEG World Simulation CWS model, the general equilibrium model GEM-E3). In particular, the emissions of non-CO_2 greenhouse gases and their emission reduction costs will be incorporated in the models. In addition, the project will create "soft links" between the different models in order to achieve consistency between the different levels of analysis. For the integrated assessment aspect of the project, interdisciplinary contributions from climatology are called upon. Concerning climatology, the CLIMNEG II proposal will refine the carbon cycle and regional temperature change module of the existing CWS model by allowing for a multi-gas approach and by adding a sea-level module. The climate team will also contribute to the identification of criteria for sustainable development by providing a family of GHG emission trajectories leading to a stabilisation of GHG concentrations at levels that prevent irreversible damage to the Earth's ecosystems. Finally, the project will consider the possibility of linking a medium sized physical model (MoBidiC) to a general equilibrium model of the world economy (GEM-E3-WORLD).

One of the innovative aspects of the CLIMNEG II project is the development of a new simulation model based on the concept of overlapping generations. A model with overlapping generations explicitly takes into account the fact that members of future generations are not present when decisions are taken, that can have a large impact on those future generations. We will incorporate a climate module in a model with overlapping generations in order to examine the possible co-operation between countries with respect to climate policy. Finally, the overlapping generations framework allows to refine the micro-economic relations, taking into account private intergenerational altruism. Intergenerational altruism will have important consequences for the intergenerational transfers organised by the government. It also allows to study questions of political economy in general and of the role of climate policy instruments in the context of public finances.

PARTNERS

Activities
The CLIMNEG II network brings together four different university teams, each with a specific expertise: (1) UCL-ASTR (Prof. J.-P. van Ypersele, climatology), (2) KULeuven-CES-ETE (Prof. S. Proost, coordinator, economic simulation models, economic theory and economic philosophy), (3) UCL-CORE (Prof. C. d'Aspremont, economic theory, game theory) and (4) UCL-CORE (Prof. Bréchet, environmental economics and modelling). The four teams will contribute to three different research themes: (1) Criteria for Sustainable Development, (2) Climate Policy Instruments and (3) Integrated Assessment Modelling as to enhance interdisciplinary exchange and team interactions. The results of the three research themes will be integrated into the simulation models (see flow chart below).

CONTACT INFORMATION

Website of the network:
www.climneg.be

Co-ordinator

Stef Proost
Katholieke Universiteit Leuven (KULeuven)
Centrum voor Economische Studiën (CES) – Onderzoeksgroep Energie, Transport en Milieu (ETE)

Naamsestraat 69
B-3000 Leuven

Tel: +32 (0)16 32 68 01
Fax: +32 (0)16 32 67 96

stef.proost@econ.kuleuven.ac.be
www.econ.kuleuven.ac.be

Partners

Jean-Pascal van Ypersele
Université Catholique de Louvain
Institut d'Astronomie et de Geophysique Georges Lemaître (UcL-ASTR)

Bâtiment Marc de Hemptine
2, chemin du Cyclotrone
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 32 97
Fax: +32 (0)10 47 32 97

vanypersele@astr.ucl.ac.be
www.astr.ucl.ac.be

Claude d'Aspremont
Université Catholique de Louvain
Center for Operations Research and Econometrics (UcL-CORE)

34, voie du Roman Pays
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 43 21
Fax: +32 (0)10 47 43 01

daspremont@core.ucl.ac.be
www.core.ucl.ac.be

Thierry Bréchet
Université Catholique de Louvain
Center for Operations Research and Econometrics (UcL-CORE)

34, voie du Roman Pays
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 81 86
Fax: +32 (0)10 47 43 01

brechet@core.ucl.ac.be
www.core.ucl.ac.be/chlhoist

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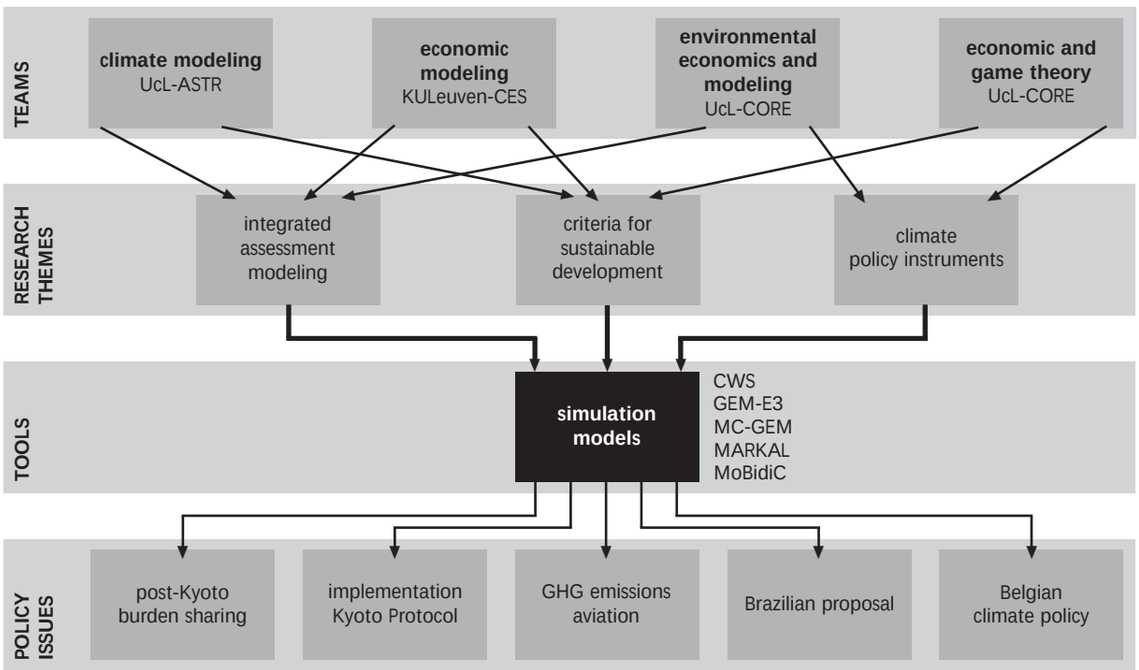
FLOW CHART OF CLIMNEG II PROJECT



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MULTI-POLLUTANT EMISSION REDUCTION POLICY

Duration of the project: 15/12/2001 – 31/12/2005
Budget: € 446.437
Keywords: Tropospheric Ozone, Greenhouse Gas, Emission Reduction, Climate Change

CONTEXT

For many years air pollution policy was based on fixing location independent emission standards. However, problems of acidification and tropospheric ozone are not as critical in all areas of Europe. For instance, the desert in Spain is not so vulnerable for acidification as wildlife area in Norway or densely populated areas. In the RAINS model, environmental objectives are formulated in terms of location dependent depositions. From these objectives, the RAINS model calculates cost-effective national emission limitations for all European countries. This model has been used by the EU in the preparation of the National Emission Ceilings directive. This directive states that Belgium by 2010 will have to reduce SO_2 emissions by 73%, compared with 1990 levels. For NOx the reduction is -48%, for VOC -58% en for NH_3 -31%. The challenge for Belgium will be to realise these reductions. On top of that, Belgium will have to reduce greenhouse gas (GHG) emission by 7,5% compared with the level of 1990.

PROJECT DESCRIPTION

Objectives
The cost-efficiency aspect in the RAINS model is based on national emission reduction cost curves. Cost curves express the minimum expenses to be made to reduce emissions by a certain amount. RAINS cost curves only consider single pollutant emission reduction technologies. Therefore, this analysis is not complete and does not guarantee the highest welfare. In this project, both single-pollutant reduction technologies and multi-pollutant reduction technologies will be considered. The objectives of the project can be summarised as follows:

- To demonstrate the relevance of this issue. The first task is to identify the potential for multi-pollutant reduction technologies, process changes and fuel substitution.
- To formulate a theoretical framework for the allocation of emission reduction costs to single pollutants. To design a practical tool for marginal reduction costs calculation. To quantify the benefits of a simultaneous approach.
- To design theoretical and practical systems for the distribution of emission reduction costs to different polluters.
- Making tools (database, optimisation routine, simulation routine) available for the analysis of policy options, the quantification of reduction programs and the burden sharing in the regional context.

Methodology
The first issue is the creation of a national emissions database from the figures of the three regions. For large industrial point sources, this database will contain very detailed information on applied production technologies and energy consumption.
This database will contain technical and economical information on reduction technologies (both primary measures and end-of pipe measures). For evaluating early replacement of existing equipment, replacement best available technologies (BAT) should also be included.
The database will be used in a simulation and optimisation module. The aim of the simulation module is to design emission projections for the next 15/20 years, taking into account the planned policy and technological evolution. The optimisation module will be used to calculate least cost scenarios, for the derivation of cost curves and to evaluate the benefits of a multi-pollutant approach.
In a second stage of the project, the model will be used to design policy scenarios as well as for the evaluation of policy options.
Finally, we would like to investigate the impacts on the burden sharing whether a policy is based on minimising total costs or on any other welfare objective. For this purpose we do not have the intention to make an additional general equilibrium or econometric simulation model. Rather we would like to use existing tools that have been designed in other SPSD I or SPSD II projects.

The project team is a typical “Belgian” one. Four research teams from three regions participate in the project. VITO has designed the project scope and acts as project co-ordinator as well. VMM is a Flemish partner in the research team, responsible for the collection of emission data for Flanders. IW is the Walloon partner in the project and will supply the Walloon emission figures and make the design of the database. Finally the Brussels institute for environmental policy (IBGE-BIM) will supply the Brussels emission figures.

Expected results
The tools (database, simulation and optimalisation modules) that will be developed will support emission reduction environmental policy. It will be possible to demonstrate the advantages of a simultaneous approach. As the model will include the regional

dimension, the model can also be used to support the regional burden sharing discussions. Furthermore, the model will support long term strategical decision-making and improve consistency in short term and long-term environmental policy. Research results will be published in order to draw the public attention to the results.

PARTNERS

Activities

VITO
It has designed the project scope and acts as project co-ordinator. VITO supports emission reduction policy by different actions, including the development of the Flemish energy balances and by the realisation of sectoral emission reduction potential studies. VITO will design and perform the modelling work, scenario building, calculating marginal reduction cost curves.

IW
The IW's different domains of activity are integrated in the most global concept of sustainable development. Here, IW will design the national emissions database and work on the emission figures for the Walloon region. IW will also participate in the scenario development and in the policy research.

VMM
VMM is responsible for the registration and reporting of all emission figures in the Flanders. Here, VMM will supply emission figures on a very detailed level for all-important industrial installations and on a more aggregated level for other sources.

IBGE-BIM
The Brussels Institute for Environmental Policy will supply the emission figures for Brussels.

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CONTACT INFORMATION

Co-ordinator

Jan Duerinck
Vlaamse Instelling voor Technologisch Onderzoek (VITO)
Expertisecentrum Integrale Milieustudies

Boeretang 200
B-2400 Mol

Tel: +32 (0)14 33 59 19
Fax: +32 (0)14 32 11 58

Jan.duerinck@vito.be
www.vito.be

Partners

Françoise Nemry
Institut Wallon (IW)

4, boulevard Frére Orban
B-5000 Namur

Tel: +32 (0)81 25 04 95
Fax: +32 (0)81 25 04 90

f.nemry@iwallon.be
www.iwallon.be

Marie-Rose Van den Hende
Vlaamse Milieumaatschappij (VMM)

Alfons Van de Maelestraat 96
B-9320 Erembodegem

Tel: +32 (0)53 72 62 11
Fax: +32 (0)53 77 71 68

m.vandenhende@vmm.be
www.vmm.be

Marianne Squibin
Institut Bruxellois pour la Gestion de l'Environnement (IBGE-BIM)

Gulledelle 100
B-1200 Brussels

Tel: +32 (0)2 775 75 11
Fax: +32 (0)2 775 76 21

msq@ibgebim.be
www.ibgebim.be

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THE CLEAN DEVELOPMENT MECHANISM: DESIGNING THE TOOLS AND IMPLEMENTATION

Duration of the project: 01/11/2001 – 31/12/2003
Budget: € 281.434
Keywords: Kyoto Protocol, Clean Development Mechanism, Developing Countries, Emission Credits, Capacity Building

CONTEXT

Belgium, as most industrialised countries, made the commitment in the Kyoto Protocol to reduce its emissions of greenhouse gases. In its article 12, this Protocol gives the possibility to industrialised countries to adopt a Clean Development Mechanism (CDM) in order to respect their commitments. This instrument is based on the following principle: a country which has an objective for reduction of emission is authorised to finance emission reduction projects in developing countries and to receive a benefit in the form of emission credits. Moreover, it has the advantage to offer industrialised countries the opportunity to contribute to development aid thanks to technology transfers. A double dividend is thus at stake, on condition that rules governing CDM projects are established in a fair way and that deviation risks are fully under control.

PROJECT DESCRIPTION

Objectives
The objective of this project is to provide Belgium with tools, which enable it to use the Clean Development Mechanism, would it be legal, institutional, technological or economic tools. To be more precise, the project pursues the following objectives:

- To specify the institutional framework of CDM projects implementation (at the different Belgian scales of competency) and against defined rules (or yet to be defined) by international organisations (under the aegis of the United Nations Framework Convention on Climate Change-UNFCCC)); to specify the role that the various actors, institutional or private, can play.
- To define the practical conditions of CDM projects implementation for the whole stages involved in a project and to elaborate necessary tools to this implementation.
- To assess the potential of greenhouse gases reduction which can be achieved in the sub-Saharan area, to select a pilot project, to prepare all the necessary procedures for its implementation and to draw conclusions for a possible generalisation of the CDM in this area.
- To spread the findings of this research towards beneficiary countries (countries of the sub-Saharan area) and also towards actors interested by the CDM in Belgium, especially institutional actors.

Methodology
One part of these objectives (objective 1 and 2) relies on the analysis and the monitoring of the international negotiations undertaken under the aegis of the UNFCCC. Other objectives can be achieved by using the experience gained with the Joint Implementation projects, by taking account of the Belgian institutional context (objectives 2 and 3). Finally, the project accentuates the necessity to control the methodologies adapted to the design, monitoring and assessment of the CDM projects, replicable methodologies if necessary (objectives 2, 3 and 4). These methodologies can be guided in part by tools used in industrialised countries, but sometimes they also need to adopt particular assessment tools, especially concerning socio-economic impacts of projects (semi-qualitative models). It must be noted that the notion of technologies transfer is omnipresent within the dimension "decision helping". The project aims at promoting not only the technologies transfer which reduces greenhouse gases emissions, but also the setting up of a capacity building which benefits both Belgium and beneficiary countries of the CDM projects.

The project assesses the contribution of one of the flexibility mechanisms recommended by the Kyoto Protocol to the Belgian policy of greenhouse gases emissions reduction and takes up the division of responsibilities problem between Northern and Southern countries, the production and consumption patterns transfer, the inequalities reduction, the analysis of basic concepts, of decision-making process and of international negotiations and the preparation of decision-making aid tools.

Expected results and products
The following results are expected:

- To elaborate a summary document which specifies the institutional framework of the CDM projects implementation.
- To elaborate a summary document which specifies the role of various actors, at the offer level (Belgian providers) and at the demand level (sub-Saharan Africa partners).
- To elaborate a handbook with examples of procedures for CDM projects between Belgium and sub-Saharan Africa countries (description of different stages in the design of a CDM project).
- Creation of a database of all eligible technologies which are transferable to sub-Saharan Africa.

- Analysis of baseline projection establishment methodologies.
- To elaborate semi-qualitative models for the socio-economic assessment of CDM projects, which also take into, account investments in human resources and increases in institutional capacities of the host country.
- To elaborate and monitor a pilot project of CDM in Senegal which could be financed by the GEF (Global Environment Facility).
- Data and scientific knowledge transfer to sub-Saharan Africa countries.
- Organisation of a workshop to present the first results and developed tools after the first 18 months of research.

PARTNERS

Activities

IDD
The Institute for a Sustainable Development is a centre of multidisciplinary research, which aims at improving and making know better the problems of sustainable development in Belgium. Its mission is to promote, undertake and spread researches and studies that can help public authorities and citizens to develop a sustainable development project.

AQUADEV
AQUADEV is an international NGO specialised in feasibility studies and realisation of projects and programmes, which aim at reinforcing the "capacity building" of partner organisations in Southern countries.
It is particularly active in the fields of microfinance, food security and urban environment.

UCL
The Center for Operations Research and Econometrics (CORE), subcontractor, is an interdisciplinary and interuniversity research centre, which focuses its activities on economic theory, modelisation and econometry.

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CONTACT INFORMATION

Co-ordinator

Paul-Marie Boulanger
Institut pour un Développement Durable (IDD)

7, rue des Fusillés
B-1340 Ottignies

Tel: +32 (0)10 41 73 01
Fax: +32 (0)10 41 73 49

idd.org@skynet.be
http://club.euronet.be/idd/

Partner

Christophe Brismé
AQUADEV

151, rue des Carmélites
B-1180 Brussels

Tel: +32 (0)2 347 70 00
Fax: +32 (0)2 347 00 36

Aquadev@skynet.be
www.aquadev.org

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AN INTEGRATED MODEL FOR IMPACT ANALYSIS OF CONTAMINANTS DURING THE PRODUCTION OF BASIC FOOD PRODUCTS

Duration of the project: 15/12/2001 – 31/12/2005
Budget: € 286.017
Keywords: Contaminants, Food, Model, Transfer, Impact Analysis

CONTEXT

Food safety is one of the major issues these days on the Agenda of the European Commission and the Belgian government. Incidents like the dioxin- and BSE-crisis lead to important economic losses and to concern about the protection of public health through the food chain. At the European level, the White Paper on Food Safety was published, including the organisation of a European Food Authority, which sets out priorities for research and regulation. At the national level the Federal Agency of Food Safety was established in Belgium. Quality control and risk evaluation of the food chain starting from the farm to the basic food products is important because of the possible direct link with consumers on one hand and because products from the farm are the basic products of the producing industries.

PROJECT DESCRIPTION

Objectives
The objective of the proposal is to develop an integrated model that calculates the transfer of contaminants through the food chain, i.e. from the input to the farm to basic food products (e.g., crops, grains, dairy products, meat and eggs). The transfer model is coupled to a module calculating the impact of contaminated food products on general public health and evaluating the economical effects.

Methodology
The transfer model incorporates various mechanisms:
- input and output of contaminants in the soil root zone (i.e. where crops grow and on which cattle grazes);
- indirect (i.e. via the soil) or direct (i.e. through atmospheric deposition) crop uptake of contaminants;
- intake of contaminants by cattle and redistribution to meat, dairy and egg products.

The input of contaminants to the agro-ecosystem includes atmospheric deposition due to industrial emissions, direct application of fertiliser, soil improving products and pesticides. Output from the soil root zone consists of leaching to groundwater, degradation, volatilisation and crop uptake. The transfer to basic food products takes the supply from the agro-ecosystem as well as from external sources such as animal feed products.
The impact analysis compares predicted and measured contaminant concentrations in animal and human diets to existing quality standards. Secondly, the impact analysis calculates human dietary exposure and exposure to other sources, and compares the exposure to an Acceptable Daily Intake or a dose-response curve to assess the effects on public health on one hand and for a monetary valuation on the other. The chemicals concerned are heavy metals, persistent organic pollutants and pesticides. The model will be evaluated for three representative contaminants, which are well-documented in literature and of which sufficient data exist.

Interaction between the different partners
During the first two years, existing transfer models (i.e. air-soil transfer, soil transfer, soil/air-plant transfer, soil/air-cattle transfer) are reviewed by all partners. The co-ordinator integrates and programs the transfer models into an integrated model for the calculation of transfers in the agro-ecosystem and for the quantification of health impacts. During the fourth year all partners are involved in demonstrating the model for the typical food contaminants.

Expected results
The result of the research is a quantitative model for the calculation of:
- the transfer of contaminants in an agro-ecosystem;
- the impact of contamination on the quality of primary food products (milk, meat, vegetables, eggs);
- the impact on human health due to contamination of primary food products.

The model will allow evaluating the effect of changing boundary conditions (e.g. the reduction of emissions, changing agricultural practices, changing food standards) on the quality of primary food products.

PARTNERS

The partners in the project are the Flemish Institute for Technological Research (VITO), the University of Limburg (LUC) and the University of Gent (RUG).

Activities

VITO
- co-ordinator;
- development of the transfer model for the agro-ecosystem for persistent organic pollutants;
- development of the model for impact analysis;
- coupling of the transfer and the impact analysis model;
- demonstration of the integrated model for three typical contaminants.

LUC
- compilation of data and models for the transfer to plants;
- support for the demonstration of the integrated model for heavy metals.

RUG
- the development of the transfer model for pesticides;
- support for the demonstration of the integrated model for pesticides.

CONTACT INFORMATION

Co-ordinator

Christa Cornelis
Vlaamse Instelling voor Technologisch Onderzoek (VITO)
Expertisecentrum Integrale Milieustudies

Boeretang 200
B-2400 Mol

Tel: +32 (0)14 33 59 24
Fax: +32 (0)14 32 11 85

christa.cornelis@vito.be
www.vito.be

Partners

Jaak Vangronsveld
Limburgs Universitair Centrum (LUC)
Onderzoeksgroep Milieubiologie – Centrum voor Milieukunde

Universitaire Campus
Gebouw D
B-3590 Diepenbeek

Tel: +32 (0)11 26 83 31
Fax: +32 (0)11 26 83 01

jaco.vangronsveld@luc.ac.be
www.luc.ac.be

Walter Steurbaut
Universiteit Gent (RUG)
Faculteit landbouwkundige en toegepaste biologische wetenschappen - Vakgroep Gewasbescherming

Coupure Links 653
B-9000 Gent

Tel: +32 (0)9 264 60 11
Fax: +32 (0)9 264 62 49

walter.steurbaut@rug.ac.be
www.rug.ac.be

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SAFE

FRAMEWORK FOR ASSESSING SUSTAINABILITY LEVELS IN BELGIAN AGRICULTURAL SYSTEMS

Duration of the project: 15/12/2001 – 31/12/2004
Budget: € 668.989
Keywords: Sustainable Agriculture, Biodiversity, Multifunctionality, Externality, Indicator

CONTEXT

Sustainability is the main principle of the Rio Declaration and Agenda 21 established in 1992 at the Earth Summit. Sustainable development was defined as an objective for the EU at the Amsterdam Treaty of 1997. In 1999 the Agenda 2000 was adopted, ensuring a continuation of the agricultural reform with a view to stimulating European competitiveness, taking great account into environmental considerations, ensuring fair income for farmers, simplifying legislation and decentralising the application of legislation.

At EU level, it is considered that appropriately developed agri-environmental indicators can be of particular importance to achieve sustainability since they can improve transparency and they can also ensure the success of monitoring, control and evaluation of new policies.

PROJECT DESCRIPTION

Objectives
The objective of the project is to develop an analytical framework (SAFE) to evaluate sustainability in agriculture. This framework aims to integrate the multifunctional character of agriculture thereby considering the production, environmental and socio-economical functions of an agricultural system. This tool will enable to measure the increase of environmental quality in the long term, ensuring at the same time the continuity of agriculture not only as a productive activity but also as a provider of environmental goods and services.

Methodology
The SAFE framework, composed of principles of sustainability, criteria, indicators and norms, will integrate ecological and socio-economic factors influencing and influenced by agriculture.

Indicators of sustainability will be selected, defined, measured, calculated and/or extrapolated in four test sites (2 in Wallonia and 2 in Flanders) representative of contrasting production systems at three scales:
- Field: this scale gives the opportunity to compare different management techniques.
- Farm: this is the socio-economic unit level for practical implementation of different management decisions.
- Ecosystem/Landscape: this is the dimension that best reflects both agricultural and ecological multifunctionality. Considerations on biodiversity and landscape conservation will be of special importance at this level.

The sustainability evaluation will be of comparative character, either spatial (simultaneous analysis of several parcels within a test site) or temporal (analysis of the same system over time).

Three different approaches will be explored to combine measured indicators in order to obtain a global performance of the studied test sites. Those approaches are:
- qualitative;
- quantitative;
- graphic.

Interaction between the different partners
The tasks to be developed within this project are summarised in the following table. Although most tasks are carried out by all partners, a leading team has been selected for each of them. The leading team is responsible for the proper and timely realisation of the specific task.

TASK	LEADING TEAM	WORKING PARTNER
General Management	ECOP	
A. Experimental sites Selection and monitoring	ECOP	LBNL; GERU; ALME
B. Agricultural production systems Description	ECOP	
C. Indicators Selection and evaluation	LBNL	Agriculture: ECOP Biodiversity: LBNL Water and Soil: GERU Economic and Socio-economic: ALME
D. Monitor ecosystems	LBNL	Agriculture: ECOP Biodiversity: LBNL Water and Soil: GERU
E. Monitor energy	ALME/ LBNL	

F. Monitor economy	ALME	
G. Data management	GERU	Agriculture: ECOP Biodiversity: LBNL Water and Soil: GERU Economic and Socio-economic: ALME
H. Indicators' response evaluation	ECOP	Agriculture: ECOP Biodiversity: LBNL Water and Soil: GERU Economic and Socio-economic: ALME
I. General Synthesis	ALME/ ECOP	LBNL; GERU
J. Dissemination of results	ECOP	LBNL; GERU; ALME

Link with international programmes
At international level several initiatives are being developed in the field of sustainability indicators or agri-environmental indicators for the agricultural sector, like the OECD's initiative.

Expected results and/or products
A website is already functional at:
http://www.geru.ucl.ac.be/NEW/Recherche/projets/Safe/

The final expected result of the project is an analytical framework, which will include a list of indicators for sustainability assessment in Belgian agricultural systems. Also a general synthesis document (Task I) will be produced, summarising all the information concerning indicators that was gathered during the project.
It is also expected to produce scientific and technical publications.

PARTNERS

Activities

UCL-ECOP
The research activities of this laboratory (of Grassland Ecology) cover diverse themes relating to agriculture, grassland production, agriculture-environment relationship such as: optimisation of the nitrogen cycle in grass and arable land, agri-environmental measures, biodiversity restauration, ...

KULeuven-LBNL
The research carried out in this laboratory (of Forest, Nature and Landscape Research) focuses on the spatial and quantitative assessment of biological and man-induced patterns and processes at the landscape and habitat level both in rural, urban and natural settings.

KULeuven-ALME
The mission of ALME (Agricultural and Environmental Economics Unit) is the identification and economic analysis of operational and strategic management practices that improve the sustainability of agricultural land use, and of policy measures aimed at stimulating these practices.

UCL-GERU
The main research activities of the Department of Environmental Sciences and Land Use Planning focus on soil and water resources systems such as: water-soil-plant relationships, erosion, surface and subsurface hydrology, irrigation, and monitoring.

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CONTACT INFORMATION

Website of the network: www.geru.ucl.ac.be/NEW/Recherche/projets/Safe/

Co-ordinator

Alain Peeters
Université Catholique de Louvain (UCL)
Unité d'écologie des prairies et des grandes cultures - Laboratoire d'Ecologie des Prairies (ECOP)

5, croix du Sud, bte. 2
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 37 71
Fax: +32 (0)10 47 24 28

peeters@ecop.ucl.ac.be
www.ecop.ucl.ac.be/prairies

Partners

Martin Hermy and Bart Muys
Katholieke Universiteit Leuven (KULeuven)
Laboratorium voor bos, natuur en landschap (LBNL)

Vital Decosterstraat 102
B-3000 Leuven

Tel: +32 (0)16 32 97 57
Fax: +32 (0)16 32 67 60

martin.hermy@agr.kuleuven.ac.be / bart.muys@agr.kuleuven.ac.be
www.agr.kuleuven.ac.be/lbh/lbnl/lbnl_home_en.htm

Erik Mathijs
Katholieke Universiteit Leuven (KULeuven)
Departement Agrotechniek en -economie - Centrum voor landbouw- en milieueconomie

Willem de Croylaan 42
B-3001 Leuven

Tel: +32 (0)16 32 14 50
Fax: +32 (0)16 32 19 96

erik.mathijs@agr.kuleuven.ac.be
www.agr.kuleuven.ac.be/aee/clo/clohomen.htm

Marnik Vanclooster and Charles Bielders
Université Catholique de Louvain (UCL)
Department of Environmental Sciences and Land Use Planning (GERU)

2, croix du Sud, bte. 2
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 37 10
Fax: +32 (0)10 47 38 33

vanclooster@geru.ucl.ac.be / bielders@ geru.ucl.ac.be
www.geru.ucl.ac.be

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INTEGRATED APPROACH FOR THE CONTROL ON RESIDUES OF COCCIDIOSTATS IN EGGS

Duration of the project: 15/11/2001 – 14/05/2005
Budget: € 353.789
Keywords: Food Safety, Control, Residues, Eggs, Coccidiostats

CONTEXT

Since a few decades our society is concerned about the microbiological and chemical safety of food. Several crises, mainly of animal origin, (hormones, PCB's, BSE,...) broke out with a decline in consumption of certain foodstuffs as a consequence. To prevent such crises in the future and to be able to guarantee safe food for the consumers, an effective control is necessary. To perform efficient controls (Directive 96/23/EC) on the correct use of veterinary drugs and on the absence of forbidden substances an economic liable approach, based on a combination of immunological and mass spectrometric methods, is necessary.

PROJECT DESCRIPTION

Objectives
The concrete aim of the project is to set up an integrated approach for the control on the presence of residues of coccidiostats in eggs. Coccidiostats are compounds that are widely used to prevent and treat coccidiosis, a contagious amoebic disease. These compounds are licensed in broilers and in young chickens but not in laying hens. Accidental cross contamination during the manufacturing of the feed can lead to residues in eggs. The applicability of the methods on incurred samples will be tested and in the last stage of the project, a monitoring program will be executed. Out of the several compounds that were introduced since 1948 as coccidiostat, five compounds were chosen to be studied: diclazuril, dimetridazole, nicarbazin, halofuginone and robenidine.

Methodology
To perform the control on residues in an efficient and economical liable way, the pyramid structure is used. This means that initially the samples are screened by mostly immunological methods. These latter have the advantage that a big number of samples can be analysed at the same time at a reasonable price. The disadvantage of these methods is the occurrence of cross-reactivity, so it is always necessary to confirm a positive result with a physicochemical technique. These techniques are more expensive but are able to identify the molecule and can quantify in a reliable way. At this moment mass spectrometry is the method of choice for this task.

The development of the immunological methods consist in the synthesis of antigen and conjugate, the production of the polyclonal antibodies, the development of ELISA-tests and the optimisation of the clean-up of the egg matrix for the ELISA-tests. The development of the liquid chromatographic – mass spectrometric methods (LC/MS) is done by successively the optimisation of the mass spectrometric conditions, of the chromatographic conditions and of the clean up of the egg matrix.

As well the immunological as the mass spectrometric methods will be validated according to the criteria set by revision of Decision 93/256/EC. The applicability of the developed methods will be tested on contaminated samples. Therefore laying hens will be fed with medicated feed at two concentration levels for each compound. The contaminated eggs will be gathered and the influence on the zootechnical parameters (egg weight, feed conversion,...) will be checked. The eggs will be analysed by both immunological and mass spectrometric methods. Excretion curves and withdrawal times will be established. In the last stage of the project 300 eggs from different sources on the Belgian market will be collected, screened with the immunological methods and positive samples will be confirmed with the mass spectrometric methods.

Interaction between the different partners
The Laboratoire d'Hormonologie is responsible for the development and validation of the immunological screening methods (task 1: scheme). The DVK is responsible for the development and validation of the LC/MS confirmation methods (task 2). For the optimisation of the clean up of the egg matrix for mass spectrometric detection (task 2.5), the immunoaffinity columns which are made with the antibodies of the immunological methods (task 1.7) will be used. The DVV is responsible for the treatment of the animals and the research on the zootechnical parameters (task 4.1). The analysis of the eggs coming from the treated animals and of the commercial available eggs will be executed by the Laboratoire d'Hormonologie and by the DVK.
Literature and standard material will be exchanged between the partners during the entire project.

Link with international programmes
The results will be complement to those from the European project "Poultry Check".

Expected results and/or products
Belgium will have the ability to perform monitoring on eggs for the presence of the 5 coccidiostats in a reliable and economical liable way. By using the fully validated methods in monitoring programmes, the faith of the consumer in the quality of his food can be renewed and/or strengthened.
By monitoring the Belgian eggs, a picture will be acquired of the contamination level of eggs with coccidiostats and corrective measures can be taken in case of problems.
The results obtained will be published in international scientific journals with referee system. The results will also be presented at symposia concerning the safety of food to the sectors involved.

PARTNERS

Activities

CLO-DVK
The DVK is carrying out research to improve the market position, quality, hygiene and transformation of animal products. The chemical division is doing research on the development and validation of methods for the detection of veterinary drugs and contaminants in foodstuffs.

CER
The Laboratoire d'Hormonologie is doing research on the development of immunological and physicochemical methods in the field of residues and micropollutants to determine these substances. Tranquillisers and antibiotics are the main current focus.

CLO-DVV
The experimental trials, carried out in DVV, are focused on the improvement of the animal efficacy, thereby reducing the production costs, on the reduction of the environmental pollution, thereby increasing the sustainability of the poultry industry and on the improvement of the quality of eggs and poultry meat, thereby improving the animal welfare.

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CONTACT INFORMATION

Co-ordinator

Els Daeseleire
Ministerie van de Vlaamse Gemeenschap
Centrum voor Landbouwkundig Onderzoek – Gent (CLO) – Departement voor de Kwaliteit van Dierlijke Producten en Transformatietechnologie

Brusselsesteenweg 370
B-9090 Melle

Tel: +32 (0)9 272 30 32
Fax: +32 (0)9 272 30 01

e.daeseleire@clo.fgov.be
www.clo.fgov.be/dvk/

Partners

Philippe Delahaut
Centre d'Economie Rurale (CER)
Laboratoire d'Hormonologie Animale

1, rue du Carmel
B-6900 Marloie

Tel: +32 (0)84 31 00 90
Fax: +32 (0)84 31 61 08

delahaut.cerdha@skynet.be
www.province.luxembourg.be/agriculture/cer_hormonologie.html

Gerard Huyghebaert
Ministerie van de Vlaamse Gemeenschap
Centrum voor Landbouwkundig Onderzoek – Gent (CLO) - Departement voor Dierenvoeding en Veehouderij – Afdeling Kleinveehouderij

Burg. Van Gansberghelaan 92
B-9820 Merelbeke

Tel: +32 (0)9 272 25 05
Fax: +32 (0)9 272 25 01

G.Huyghebaert@clo.fgov.be
www.clo.fgov.be/dvv/

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MYCOTOXIN CONTAMINATION OF REGULAR AND "ORGANIC" FOODSTUFFS

Duration of the project: 15/12/2001 – 31/12/2004
Budget: € 554.256
Keywords: Food Safety, Mycotoxins, Reference Centre, Biological Method

CONTEXT

More than 200 different mycotoxins have been identified but the list is not exhaustive. Currently, only a few of them are sporadically or systematically investigated in a limited number of foodstuffs; the methods of detection are actually complex. The laws concerning the maximal tolerated amounts in foodstuffs differ in the European Union, in spite of the wish to harmonise these laws. The project is concerned with the mycotoxin problem in regular and organic foodstuffs. Its aim is to provide the public authorities with contamination data and analytical tools for the evaluation and management of the food safety risks generated by the mycotoxins.

PROJECT DESCRIPTION

Objectives
The project aims to:
- generate a database allowing the evaluation of the mycotoxin contamination of regular and organic foodstuffs in Belgium;
- develop reliable and powerful tools for the regular and effective control of mycotoxin in food products.

At the end, the project must lead to the creation of a permanent Reference Centre to ensure the maintenance of newly developed analytical methods, as well as the management of the database and the collection of reference samples.

Methodology
The project will focus on three mycotoxins (Ochratoxin A, Deoxynivalenol, Fumonisin B1) in four kinds of food matrices derived from cereals (beer, wholemeal bread, pasta, breakfast cereals). Various detection and quantification methods will be developed and compared for each selected foodstuff: validated analytical methods; rapid immunoenzymatic methods; multi-mycotoxin chromatographic methods; biological detection methods.
The multi-mycotoxin methods are analytical tools allowing simultaneous quantification of several mycotoxins. Currently, the VAR develops a multi-mycotoxin method for cereals as follows: non-specific extraction, non-specific purification and liquid chromatographic analyses (HPLC and Capillary Electrophoresis) using different kinds of detection (fluorescence and U.V.).

It seems increasingly necessary to develop faster and more practical immunological assays than conventional Enzyme-Linked ImmunoSorbent Assays (ELISA). The Laboratory of Food Analysis of the University of Gent has developed 3 immunoassay field-tests (Dipstick Enzyme Immunoassay, Flow-Through Enzyme Immunoassay, Solid Phase Column-Based Immunoassay).

The objective is also to set up a biological method allowing to evaluate the cytotoxicity related to the presence of mycotoxins in food extracts. The direct cytotoxicity of mycotoxins will be established on several animal cell types representative for the major target organs in humans. Indirect cytotoxicity will be assayed on the intestinal function, as primary site of absorption. Further assays could be done on the hepatic function with other human cells.

Interaction between the different partners
The Unit of Biochemistry of Nutrition, the co-ordinater of the project, is in charge of the field prospecting and settlement of a preliminary sample collection, and the optimisation of sampling and analysis strategies.
It is in charge of the validation of the reference methods for the three mycotoxins in the different food matrices.
The three other partners are in charge of the one of the alternative methods.

Expected results and/or products
Several goals are expected in this project: methodological improvements of rapid and reliable alternative methods of mycotoxin detection in the selected food matrices; creation and management of a database and of the collection of reference samples, comparison between the regular and the organic food chains. Furthermore, the project must lead to the creation of a permanent Reference Centre, that will ensure the maintenance of newly developed analytical methods, as well as the management of the database and of the collection of reference samples. The sampling and developed analytical strategies can be used for the elaboration of an effective policy for the permanent monitoring of food in Belgium.

PARTNERS

Activities

UCL-BNUT
The Unit of Biochemistry of Nutrition has acquired the methods for the measurement of several important mycotoxins in a large number of foodstuffs, and is also performing physiological studies on the transport, metabolism and toxicological effects of some mycotoxins.

VAR
Its know-how about both gas and liquid chromatography will be used and the department has a lot of experience in the field of chemical contaminants.

RUG
The Laboratory of Food Analysis has experience in rapid immunoassay development in the field of mycotoxin detection and screening of mainstream cereals grains and other foodstuffs.

UCL-BIOC
Previous work allowed to set up and validate a cell culture system as in vitro model of the human intestinal barrier. With such a model, several distinct phenomena are investigated: absorption, interaction of several substances...

CONTACT INFORMATION

Co-ordinator

Yvan Larondelle
Université Catholique de Louvain (UCL)
Unité de biochimie de la nutrition (BNUT)

2, place Croix du Sud, bte. 8
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 37 35
Fax: +32 (0)10 47 37 28

larondelle@bnut.ucl.ac.be
www.bnut.ucl.ac.be

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Partners

Jean-Claude Motte
Centre d'étude et de recherche vétérinaires et agrochimiques (CERVA-CODA-VAR)

Leuvensesteenweg 17
B-3080 Tervuren

Tel: +32 (0)2 379 04 00
Fax: +32 (0)2 379 04 01

info@var.fgov.be
www.var.fgov.be

Carlos Van Peteghem
Universiteit Gent (RUG)
Vakgroep Bioanalyse

Harelbekestraat 72
B-9000 Gent

Tel: +32 (0)9 264 81 15
Fax: +32 (0)9 264 81 99

carlos.vanpeteghem@rug.ac.be
www.rug.ac.be

Yves-Jacques Schneider
Université Catholique de Louvain (UCL)
Laboratoire de biochimie cellulaire (BIOC)

1, place Louis Pasteur
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 27 91
Fax: +32 (0)10 47 48 95

yjs@bioc.ucl.ac.be
www.chim.ucl.ac.be

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MICROBIAL FOOD SAFETY ASSESSMENT: DEVELOPMENT AND INTEGRATION OF GENERIC PREDICTIVE MODELLING TOOLS

Duration of the project: 15/12/2001- 31/12/2005
Budget: € 653.779
Keywords: Public Health, Microbial Food Safety, Risk-Analysis, Exposure Assessment, Predictive Microbiology

CONTEXT

The safety of food products supplied to consumers and its public health aspects are of utmost importance worldwide. Recent crises in industrialised countries have damaged the public confidence in the regulatory process, the food industry and the authority of science. The European Commission's White Paper on Food Safety elaborates upon the development of a comprehensive integrated approach to regulating the food supply chain, within the FAO/WHO Risk Analysis framework. The (Belgian) Federal Agency for Safety of the Food Chain has two principal tasks: analysis of the risks related to food products and control of the complete food chain, e.g., through the advanced exploitation of auto-control systems. This contributes to the principles of sustainable development as it enables to deal carefully with energy and time consumption, food ingredients and production of waste.

PROJECT DESCRIPTION

This project is to be framed within the context of the above mentioned Risk Analysis, more precisely in the area exposure assessment. The (relatively young) discipline of predictive microbiology deals with the design and analysis of quantitative relations (mathematical models) aiming at the prediction of the evolution (growth, inactivation, survival) of pathogenic or spoilage micro-organisms (the so-called target-organisms) during subsequent stages of production, distribution and storage of food products.

Objectives

The project focuses on the development and integration of a collection of generic predictive modelling tools for predictive microbiology, hereby aiming at standardising and consolidating the promising use of mathematical modelling techniques in the framework of risk analysis of foods. As a vehicle to demonstrate their intrinsic generic nature and applicability, two case studies (that are challenging from both the scientific and technological/economical point of view) will be used for development and validation purposes: (i) exploring the boundaries of microbial evolution, and (ii) quantifying interactions between micro-organisms.

Methodology

The project objectives are to be reached by carrying out four major Work Packages (WPs):
Work Package 1: Exploring the boundaries of microbial evolution.
Work Package 2: Quantifying inhibition and inactivation phenomena due to microbial interaction.
Work Package 3: Developing and integrating predictive modelling methodologies.
Work Package 4: Towards a Belgian centre for predictive microbiology/risk assessment.

The different steps in the model building cycle (namely, data generation, model development, and model validation) are to be performed in an iterative scheme. Optimally designed experiments (calculated based on methods developed in WP3) are needed to generate informative data sets of microbial lag phenomena in WP1 and of antagonistic microbial interaction phenomena in WP2. These data, in combination with available a priori mechanistic knowledge, will allow for proper model structure selection (based on building blocks developed in WP3) and model parameter estimation (including uncertainty assessment using techniques developed in WP3). Validation of the model is a crucial step within this cycle: less successful modelling attempts are the driving force for designing and performing more informative experiments that will yield models with a higher predictive value.
Finally, all knowledge generated in WP1 to 3 is integrated in WP4 to contribute to the establishment of a national centre for predictive microbiology/quantitative microbial risk assessment.

Interaction between the different partners

Successful realisation of the project objectives requires a multidisciplinary and complementary research team, combining the expertise of food microbiologists/biochemists and scientists involved in mathematical modelling, system identification, and statistics. The former aspect is realised by the Laboratory for Food Microbiology and Food Preservation (RUG-LFMFP), while the latter expertise is to be found at the research group Bioprocess Technology and Control (KULeuven-BioTeC).

Expected results

The modelling framework, realised in this project, generates an application driven optimal modelling procedure (modelling recipe), ranging from experimental design and data collection, over data processing and model identification, up to protocols for model validation and validation in real food products.

A portal site presenting interesting links related with predictive microbiology and microbiological risk assessment is a deliverable that will be updated throughout the project's lifetime. Research findings will be disseminated via (inter)national peer reviewed scientific journals, presentations at (inter-)national conferences and sector-specific journals. Next to the technical meetings on a 6 months basis, this research consortium will organise (hands-on) courses for the Users Committee members aiming at the introduction and exploitation of predictive modelling methodologies/risk assessment in the Belgian food industry. Moreover, the (Belgian) Federal Agency for Safety of the Food Chain will deliver further regulatory impetus to the food industry in this respect.

PARTNERS

Activities

KULeuven

The research group BioTeC concentrates on mathematical modelling and model based design, monitoring, optimisation and control of microbial/biochemical conversion processes. Application domains include bioreactors, biological wastewater treatment systems, and food production processes. In the latter context the focus lies on the development of a standard unifying and transferable methodology in the frame of predictive microbiology.

RUG

The main objective of the Laboratory of Food Microbiology and Preservation (LFMFP) is to study the microbial behaviour and ecology of microbiologically perishable food products during their production and further storage. The research involves spoilage phenomena as well as microbial safety. Next to mild and novel, more focused preservation techniques, food packaging and rapid (molecular) detection techniques are key research topics.

CONTACT INFORMATION

Co-ordinator

Jan Van Impe and Annemie Geeraerd
Katholieke Universiteit Leuven (KULeuven)
Faculteit Toegepaste Wetenschappen – Departement Chemische Ingenieurstechnieken - Bioprocess Technology and Control (BioTeC)

Kasteelpark Arenberg 22
B-3001 Leuven

Tel: +32 (0)16 32 19 47
Fax: +32 (0)16 32 19 60

jan.vanimpe@agr.kuleuven.ac.be
www.agr.kuleuven.ac.be/lmt/biotec/biotec.htm

Partner

Johan Debevere and Frank Devlieghere
Universiteit Gent (RUG)
Faculteit landbouwkundige en toegepaste biologische wetenschappen - Vakgroep Levensmiddelentechnologie en voeding - Laboratorium voor Levensmiddelenmicrobiologie en –conservering (LFMFP)

Coupure Links 653
B-9000 Gent

Tel: +32 (0)9 264 61 64
Fax: +32 (0)9 225 55 10

johan.debevere@rug.ac.be
http://allserv.rug.ac.be/~pprovijn/Microbiology/aan.htm

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TRACING AND AUTHENTICATION OF GMOs AND DERIVED PRODUCTS IN THE AGRO-FOOD SECTORS

Duration of the project: 15/12/2001- 31/12/2003
Budget: € 581.537
Keywords: Traceability, Agro-Food Sector, GMO (Genetically Modified Organism)

CONTEXT

The present project aims at providing Belgium with the most up to date technologies for the genetically modified organism's (GMO) tracing, authentication and quantification.
Dietary GMOs as seeds or food/feedstuffs have to be labelled. The food/feedstuffs conventionally or biologically cultivated have also to be controlled for potential GMOs contamination.
Labelling, quantification and authentication of GMOs in food/feedstuff should allow European authorities to encourage more civil responsibility and to insure, if necessary, enough feedback to the consumers.

PROJECT DESCRIPTION

Objectives
The project aims to clarify the different scientific and technical problems in the domain of GMOs genetically traceability. One main goal of this project is to develop in a two years challenge an accurate analytical method able to face the problem of the increasing GMOs diversity on the international market, the cost of analysis and the delay for results production.
Another purpose consists in an evaluation of the sampling methods and the measure of the threshold for GMOs traces in seeds lots.
A third goal more related to fundamental research and thus, more universal, is to rationalised the notion of DNA "quality" in physically/chemically terms and not more in functionally terms. The relation between "quality" and precision of quantification will be studied to improve the actual methods of quantification.
Finally, in prevision of the European regulation on foodstuff and moreover with the difficulty to get at good time the reference material of authorised and non authorised GMOs, a fourth objective consists to evaluate the use of genetic markers of GMOs cloned in plasmid as positive reference material.

Methodology
The basic method relies on identification of GMOs genetic markers and their parental lines. These markers should then be isolated, cloned in plasmids, amplified with a standard PCR method or detected by molecular hybridisation.
By the way, we will evaluate the screening methods based on Biochips and the "INVADER" technologies. We also would use the "Real time" PCR method to quantify GMOs and to study the DNA quality.

Interaction between the different partners
The characterisation of GMOs genetic markers and their validation before subsequent exploitation in the different screening, identification or quantification methods need the collaboration between ISP and CLO. ISP and the FUNDP collaborate to develop the qualitative or semi-qualitative screening methods. The study of the relation between DNA «quality» and quantification associates the CRA and the CERVA/CODA. The production of cloned genetic markers associates the ISP, the CLO and a lot of European partners non-financed, like for instance the Institute of Reference Material of the European Commission.

Expected results
The project associates in a «ad hoc» comity a number of industrial or regulatory operators who are the prospective customers of the studied technologies. Beyond the publications of the different results in international journals, a collection of cloned genetic markers should offer a widespread application area, especially for the law regulation field.

PARTNERS

Activities

FUNDP
The FUNDP works on the understanding of the cellular responses and on new molecular analysis technologies as the development of biochips.

CRA
The CRA activities, as a part of a department dedicated to the quality of agriculture products, consist in the application of molecular biology to authentication of agro-food products.

VAR
The activities of VAR consist in the protein identification and protein modifications as well as the monitoring of transgenes in the environment using analytical chemistry techniques.

ISP
The activities of the ISP consist to elaborate accredited standards that could be used as a reference system of genetic traceability. Use of these standards could find an application in the federal public health domain, particularly in the detection of GMO in the food chain. ISP also starts research on alternative reference material.

CLO
The activities of CLO consist to develop molecular techniques which on one hand allow qualitative and quantitative control of GMOs traces in seed lots and on the other hand allow a characterisation of cultivars and a measuring of genetic diversity.

CONTACT INFORMATION

Co-ordinator

Godfried Thiers and William Moens
Institute of Public Health-Louis Pasteur (ISP)
Section de Biosécurité et Biotechnologie

14, rue Juliette Wytsman
B-1050 Brussels

Tel: +32 (0)2 642 52 93
Fax: +32 (0)2 642 52 92

directeur@iph.fgov.be
www.iph.fgov.be

Partners

Pierre Dardenne
Ministère des Classes Moyennes et de l'Agriculture
Centre de Recherche Agronomiques de Gembloux (CRA) - Département Qualité des Productions Agricoles

24, chaussée de Namur
B-5030 Gembloux

Tel: +32 (0)81 62 03 50
Fax: +32 (0)81 62 03 88

dardenne@cragx.fgov.be
www.cragx.fgov.be

Herwig Keymeulen
Ministerie van de Vlaamse Gemeenschap
Centrum voor Landbouwkundig Onderzoek - Gent (CLO) - Departement Plantenveredeling en –genetica

Caritasstraat 21
B-9090 Melle

Tel: +32 (0)9 272 29 00
Fax: +32 (0)9 272 29 01

m.deloose@clo.fgov.be
www.clo.fgov.be/dvp/

Johan Peeters
Centrum voor Onderzoek in Diergeneeskunde en Agrochemie (CODA-CERVA-VAR)

Leuvensesteenweg 17
B-3080 Tervuren

Tel: +32 (0)2 379 04 00
Fax: +32 (0)2 379 04 01

info@var.fgov.be
www.var.fgov.be

Michel Scheuer
Facultés Universitaires Notre-Dame de la Paix (FUNDP)

61, rue de Bruxelles
B-5000 Namur

Tel: +32 (0)81 72 40 01
Fax: +32 (0)81 72 40 03

rectorat@fundp.ac.be
www.fundp.ac.be

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DEVELOPMENT OF AWARENESS TOOLS FOR A SUSTAINABLE USE OF PESTICIDES

Duration of the project: 15/12/2001- 29/02/2004
Budget: € 372.143
Keywords: Environment, Food Safety, Good Agricultural Practices, Pesticide, Indicator

CONTEXT

About 10.000 tons of active ingredients of pesticides are marketed annually in Belgium in agricultural and not agricultural sectors. These pesticides allow a sufficient high quality food. Profitability of a majority of agricultural productions is linked to the use of pesticides in the current farming system.
However, side effects of their use are sometimes observed: toxicity for the applicator (farmer), presence of residues above the threshold level in food, development of resistance and damage on natural resources.
That is why, it is important to have a Pesticide Impact Assessment System (PIAS) to monitor and to manage a safer use of pesticides in the framework of good agricultural practices.

PROJECT DESCRIPTION

Objectives
To select or develop a PIAS in order to estimate the impact of the use of pesticides on the food chain, on the environment, on the farm and societal economy.
- To realise inquiries on the way farmers have to face, integrate and manage the socio-economic, agronomic and environmental constraints.
- To test the selected or developed PIAS by controlling the sensitivity and robustness of the indicators with various agricultural situations and various pest management strategies.
- To use the PIAS to estimate the advantages and the disadvantages of various measures, as for example, the application of grass strips along rivers or restriction in the use of particle or an environmental policy.
- To propose scenarios to support farmers, extension services and also politicians in their decision for a more sustainable use of pesticides.

Methodology
The first stage is to identify, among the presently developed indicators, those that are relevant for the objectives. Besides, toxicological and ecotoxicological data are to be selected in the literature (scientific paper or registration documentation) and in the existing database (ecotox, agritox, etc.). An inquiry will be realised with the farmers to identify the major parameters that influence the pest control strategies. Results of the inquiry will determine the presentation of the indicators in order to optimise their efficacy. The indicators will then be aggregated in a PIAS. In a second stage, the PIAS will be validated as much as possible with monitoring of the surface water quality and with monitoring of the pesticide food residues. Besides, the validation of the PIAS will be submitted to an expert evaluation. Finally this tool will allow the evaluation of the impact of some measures (current or proposed in the future) on human health and different compartments of the environment.

Interaction between the different partners
The succession of tasks and the co-ordination of the scientific teams are resumed in the grid below.

Expected results and products
1. The project aims to provide a PIAS for the assessment, at farm scale, of the impact of present and new crop protection methods on the environment and on the economy.
2. According to human health and environmental risk, a ranking of the pesticides will also be feasible with the PIAS.
3. The tool would also be used as a decision aid system for the farmer, grower and other land manager in order to minimise the side effect of pesticides applications.
4. Extension services will use the PIAS to provide more accurate advises for a sustainable crop protection.
5. If possible, the PIAS will be regionally adapted in order to provide the public authorities with a system that helps taking decisions.
6. An inquiry on the farmer attitude, knowledge's and practices concerning the pesticide use and its impact on human and environment.

PARTNERS

UCL
The expertise of the 'Unité de Phytopathologie' is based on the development of crop protection strategies in order to increase the quality and the yield of plants while respecting the environment.

RUG
The Crop Protection and Phytopharmacy Department is experienced in the pesticide residues in food and in the environment. An indicator (POCER) was also developed in the department to assess the impact of pesticides on nature and human.

VAR
The Department of Quality and Safety has an expertise in the transfer, degradation and adsorption of pesticides in soils. A regional indicator of the pesticide exposure and risk in surface water (SEPTWA) and a pesticide risk assessment indicator (SyPEP) were developed in the department.

CO-ORDINATION OF THE RESEARCH

TASKS	VAR	RUG	UCL
Task A: Selection of the field of investigation ■ A.1. GIS approach: regions-crop in order to represent ~ 70 % of the UAA on the base of the active ingredient quantity.	•	•	
■ A.2. Screening of the inquired farms on basis of the farm structure (size, crops, etc.) and the farmer characteristics (age, full-time farmers, etc.).			•
Task B: Development /selection of a Pesticide Impact Assessment System (PIAS) ■ B.1. Review of the major current indicators.	•	•	
■ B.2. Evaluation of the major ecotoxicological and toxicological databases.	•	•	
■ B.3. Selection and/or development of indicators of the: - impact of pesticide on nature, applicators and food consumers; - technical, sociological and economical impact of the pesticide use.	•	•	•
■ B.4. Aggregation of the indicators in a PIAS.	•	•	•
Task C: Validation: evaluation and modification of the PIAS ■ C.1. Validation of the PIAS for the toxicological and ecotoxicological aspects with results of monitoring (water quality, pesticide residues in food).	•	•	
■ C.2. Validation of the PIAS for the technical, economical and sociological aspects with the inquiry.		•	•
Task D: Evaluation of diverse crop management strategies with the PIAS ■ D.1. Analyze of the crop protection strategies with the developed PIAS.	•	•	
■ D.2. Analyze and discussion of the results of D.1. with several extension services.			•
Task E: Finalization ■ E.1. Development of a finalized, friendly and transparent global indicator.	•	•	•
■ E.2. Reporting of the results of task D.	•	•	•

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CONTACT INFORMATION

Co-ordinator

Henri Maraite
Université Catholique de Louvain (UCL)
Faculté d'ingénierie biologique, agronomique et environnementale - Unité de Phytopathologie

2, place Croix du Sud, bte. 3
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 37 49
Fax: +32 (0)10 47 86 97

maraite@fymy.ucl.ac.be
www.fymy.ucl.ac.be

Partners

Walter Steurbaut
Universiteit Gent (RUG)
Faculteit landbouwkundige en toegepaste biologische wetenschappen - Vakgroep Gewasbescherming

Coupure links 653
B-9000 Gent

Tel: +32 (0)9 264 60 1;
Fax: +32 (0)9 264 62 49

Walter.Steurbaut@rug.ac.be
www.rug.ac.be

Herwig Keymeulen
Ministerie van de Vlaamse Gemeenschap
Centrum voor Landbouwkundig Onderzoek - Gent (CLO) - Departement Plantenveredeling en –genetica

Caritasstraat 21
B-9090 Melle

Tel: +32 (0)9 272 29 00
Fax: +32 (0)9 272 29 01

m.deloose@clo.fgov.be
www.clo.fgov.be/dvp/

Philippe Debongnie
Centre d'Etude et de Recherche Vétérinaires et Agrochimiques (CERVA-CODA-VAR)

Leuvensesteenweg 17
B-3080 Tervuren

Tel: +32 (0)2 769 22 4;
Fax: +32 (0)2 769 23 05

Ph.Debongnie@var.fgov.be
www.var.fgov.be

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GENERAL ISSUES
AGRO-FOOD
ENERGY
TRANSPORT

INNOVATIVE SPATIAL TECHNIQUES FOR THE ANALYSIS OF TRAFFIC SAFETY

Duration of the project: 15/12/2001- 31/12/2004
Budget: € 357.506
Keywords: Transport, Traffic Safety, Spatial Accident Analysis, Remote Sensing, Statistical Analysis of Spatial Data

CONTEXT

During the last decades mobility of goods and persons – notably the share of road transport – has increased significantly. One of the most dramatic and direct effects of the increased mobility on the human environment is the annual occurrence of more than 51,000 accidents with injuries (NIS, 1998). Under these circumstances, each Belgian citizen has a very high risk of being confronted with several accidents, of which at least one is with physical injury.
The competencies on the matter are also very dispersed: vehicle safety is a European competence closely related to technological changes in the industry; fiscal measures and traffic regulations are a federal competence, public works is divided between the regional, provincial and local authorities.

PROJECT DESCRIPTION

Objectives
In the previous research programme (Impact of Spatial Planning on Traffic Safety, 1998-2000) new methods were developed to locate accidents on the entire network and to define black zones based on statistically sound methods. The explanatory model for traffic safety was based on environment, road and traffic characteristics.
The main objective of this research is to improve that explanatory model for traffic safety, in order to clarify the interactions between safety factors. This requires an examination of utility of new data sources and of innovative analysis techniques. This model will be built on three sub-research projects:

- High Resolution Satellite Imagery: development of new causal factors (SADL KULeuven R&D);
- Spatial Data Mining: determination of significant combinations of causal factors (LUC);
- Multi Level Analysis: analysis of interactions at different scales (UCL).

Methodology
One part of the project consists of determining environment and traffic characteristics from high-resolution satellite images. The new generation of satellite imagery has spatial resolutions up to 61x61 cm (Quickbird), which makes it possible to discern individual vehicles. By means of specific software and image processing techniques we will try to extract characteristics of vehicles, roads and environment in a semi-automatic way. Subsequently it will be investigated if those indicators take on different values within and outside black zones.

The Spatial Data Mining research part will focus on the accident database. This database contains thousands of localised accidents in Belgium, each accident record having about 65 attributes. Data Mining techniques search for significant combinations of those factors. Once the black zones are located, correlations between the attributes will be explored. Aren't there any specific correlations for specific accidents or black zones? Is it possible to classify those accidents and zones?

The Multi Level Analysis will explore the effect of different aggregation scales on traffic safety. It can be statistically demonstrated that results obtained at one scale of analysis can not be extrapolated to another scale. Multi level analysis is a statistical method which specifically addresses the problem of the spatial scale of the analysis and the surrounding scales ("nested scales"), by analysing the accident characteristics on a local scale and at the same time being aware of the differences in the context or environment. Concerning traffic accidents, data are available about individual accidents and individual actors.

Interaction between the different partners
Every research team will elaborate an own analysis technique. Conformity will be brought by two successive iterations. These provisional results of each team will be used as input for following steps in the research of all other teams. During the first iteration the accident database as well as an exploratory statistical analysis of accident causes will be completed. These results are used as input in the second iteration, which will refine those results.

Expected results and/or products
One of the results will be a database of localised environmental elements, road infrastructure and accidents between 1991 and 2000. This database will be used by the researchers themselves and via the users (especially the BITS) put at the disposal of road managers and other researchers. The results will be published in specialised journals and presented at international colloquia concerned with road safety.

PARTNERS

Activities

KULeuven
The Spatial Applications Division Leuven (SADL) is a multidisciplinary research group specialised in processing spatial data. SADL applies specialised technical knowledge in the fields GIS and Remote Sensing on subject matters ranging from hydrology studies to traffic safety.

LUC
The Research group "Data Analyse en Modellering" from the University of Limburg already has experience with Data Mining techniques on economical matters, which they will apply on traffic safety matters. Recently they accommodated the "Steunpunt Verkeersveiligheid" (Centre for Traffic Safety).

UCL
The experience of the "Centre d'Analyse Spatiale et Urbaine" of the "Département de Géographie" mainly concentrates on spatial statistics and a thorough knowledge of traffic accident statistics. In the previous research project they developed a new method for defining black zones by means of spatial autocorrelation techniques.

CONTACT INFORMATION

Co-ordinator

Thérèse Steenberghen
Katholieke Universiteit
Leuven (KULeuven)
R&D – Divisie Ruimtelijke
Informatieverwerking
Leuven (SADL)

Vital Decosterstraat 102
B-3000 Leuven

Tel: +32 (0)16 32 13 37
Fax: +32 (0)16 32 97 60

Therese.steenberghen@
sadl.kuleuven.ac.be
www.sadl.kuleuven.ac.be

Partners

Geert Wets
Limburgs Universitair
Centrum (LUC)
Departement Bedrijfskunde

Universitaire Campus
Gebouw D
B-3590 Diepenbeek

Tel: +32 (0)11 26 86 49
Fax: +32 (0)11 26 87 00

Geert.Wets@luc.ac.be
www.luc.ac.be

Isabelle Thomas
Université Catholique de
Louvain (UCL)
Département de
Géographie

3, place Louis Pasteur
B-1348 Louvain-La-Neuve

Tel: +32 (0)10 47 21 36
Fax: +32 (0)10 47 28 77

Isabelle@ucl.ac.be
www.geo.ucl.ac.be/unites/geog/index.html

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TRANSFERABLE MOBILITY RIGHTS: AN ANALYSIS OF FEASIBILITY, SOCIO-ECONOMIC EFFECTIVENESS AND LEGITIMACY

Duration of the project: 01/12/2001 – 30/06/2004
Budget: € 288.951
Keywords: Mobility Rights, Mobility Demand, Modal Shift, Feasibility, Social and Political Basis

CONTEXT

The European Union (EU) had put sustainable development as the central goal in all government policies. One of the critical issues for sustainable development is the congestion of traffic that continues to increase.

The goal of the common traffic policy in the EU is to deal with the increasing congestion and pollution and also to stimulate the use of more environmentally friendly ways of transportation. Primary goal of the EU for improving the transport system and the town and country planning is to master the mobility demand in relation with road traffic. One wants to establish this by creating a shift from the road traffic to the traffic by rail, water and public transport, in order to achieve that the share of road traffic in 2010 will not exceed that of 1998.

PROJECT DESCRIPTION

Objectives
In this project we want to explore the possibilities of mastering the mobility demand by the use of tradable mobility rights (TMR). The goal is fourfold:
1. The development of an economic-legal analysis of tradable permits by creating a link to a similar system in the fight against environmental pollution, namely the emission permits.
2. Research into the technological feasibility of tradable permits by means of a thorough screening and prioritising of comparable systems.
3. To get a better insight in the long-term socio-economic effects by drawing up a system dynamic model.
4. Research of the legitimacy of the system, particularly the political and social basis.

Methodology
The first section of the research is an analysis of available literature concerning emission rights. The goal is to learn from both practice and theory how a system of tradable rights operates in concrete. This will be pursued by the LUC. Iris Consulting (subcontractor of the LUC) will explore comparable systems, by means of a literature study, complementary with a research in best practises and interviews with privileged experts.

The VUB will create a system dynamic model, which makes it possible to study the effects of a tradable mobility rights system in the long run. The goal of this model is to help decision-makers to envision a mental image of the system, to construct it and to integrate it in a cause-consequence diagram. One can simulate different management scenarios on the basis of the model developed.

The first step in this model is the creation of a mental image of the demand for mobility in Belgium. In the first place, this analysis consists of a problem definition constraining the investigated system. Then, the conceptualisation of the system will start: this is the mental picture of the system.
In the second step, there will be values attached to the different variables. The goal of the modelling is to investigate how the system will evolve in time.
Once the causal diagram is made and the relation between the variables is quantified, the researchers will start in a third step the simulation of the behaviour of the system in time by means of software programmes. Also the consequences of different management options will be investigated.
The last step is an evaluation of different management options by discussing the possible undesired and unwarranted effects of the introduction of tradable mobility permits.

Langzaam Verkeer will conduct the research on legitimacy, political and social support. They will carry out a management oriented Delphi-research for the study of the political basis. This is a systematic investigation that is used to show conflicting opinions, to analyse pros and cons and to show the differences between different groups of respondents.

Focus groups will be organised to investigate the existence of a social basis for mobility rights and the possible creation of it. An individual written inquiry of the participants will anticipate these focus groups. This inquiry enables the researcher to make a better selection of the focus groups and to present some findings of the inquiry in the group discussions.

Interaction between the different partners
In this project, LUC and Iris consulting work closely together in the feasibility analysis and the development of the different alternatives (year 1). These alternatives will be used by VUB and Langzaam Verkeer for their research (year 1+2). In the third

year, the three subprojects (feasibility, effectiveness and legitimacy) will be summarised in one consistent and integrated report. On the basis of this report, the management conclusions will be drawn. This integrated and concluding final reporting will be written by the LUC.

Expected results and/or products
This project will result in:
- a consistent theory of TMR;
- a classification and evaluation of concrete, alternative TMR systems;
- an analysis of the effectiveness of TMR for the mobility;
- concrete implementation scenarios;
- public information, debate and an increase of the public support for TMR.

PARTNERS

Activities

LUC
The group policy management conducts policy-supporting research concerning environmental policy, town and country planning, employment market policy and judicial organisation. Studies are done for the federal government, regional governments and public institutions.

VUB
The research unit 'Statistics and Operational Research' studies the Adaptive Control Methodology in which system dynamics, MCDA and Control Theory are combined. They apply this theory on different socio-economic problems. During more than 15 years this unit developed expertise concerning policy-making and more specifically in Multi Criteria Analysis.

Langzaam Verkeer
Langzaam Verkeer researches and accompanies new traffic programmes and –projects by means of a coherent societal approach. The multidisciplinary staff is divided in 3 units: research & policy-making preparation, planning & design and training & communication.

CONTACT INFORMATION

Co-ordinator

Lode Vereeck
Limburgs Universitair Centrum (LUC)

Universitaire Campus
Gebouw D
B–3590 Diepenbeek

Tel: +32 (0)11 26 87 32
Fax: +32 (0)11 26 87 60

lode.vereeck@luc.ac.be
www.luc.ac.be

Partners

Joel P. Brans and Cathy Macharis
Vrije Universiteit Brussel (VUB)
Vakgroep Statistiek en Operationeel Onderzoek

Pleinlaan 2
B–1050 Brussels

Tel: +32 (0)2 629 22 86
Fax: +32 (0)2 629 20 60

jpbrans@vub.ac.be /
Cathy.Macharis@vub.ac.be
ww.vub.ac.be

Tim Asperges
Langzaam Verkeer vzw

J.P. Minckerlerstraat 43 A
B–3000 Leuven

Tel: +32 (0)16 23 94 65
Fax: +32 (0)16 29 02 10

LV@langzaamverkeer.be
www.langzaamverkeer.be

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ASSESSMENT OF QUALITY DIFFERENCES BETWEEN FREIGHT TRANSPORT MODES

Duration of the project: 15/12/2001 – 31/12/2003
Budget: € 484.669
Keywords: Freight Transport, Modal Shift, Stated Preferences, Qualitative Attributes

CONTEXT

The strong development of freight transports, particularly by trucking, is the source of important negative externalities: congestion, pollution, accidents, etc. In order to solve that problem, a partial solution could be found in a policy of modal shift towards rail and inland waterways transport. However, information on the instruments that could affect that modal shift is rather incomplete. Furthermore, transport management and organisation have been progressively integrated into the management of the complete logistic chain from the production of goods to their commercialisation. In this context, it is not sufficient anymore to analyse the monetary costs and/or price of transports. Qualitative attributes like reliability, information, flexibility, etc. must also be taken into account for developing an appropriate modal shift strategy.

PROJECT DESCRIPTION

Objectives
This research endeavours to integrate qualitative factors like reliability, safety, information, flexibility of response, damages, etc. into a global analysis of the factors that affect the choices of freight transport modes. Until now, most of the available researches have been focused on costs and/or prices and time of transports, and what is known on other decision factors is mostly circumstantial.

Methodology
The usual statistical approach on published data (when they exist) is not feasible for studying qualitative factors, as they may be specific to well-defined categories of goods and enterprises. Hence, this research must rely on a survey of shippers, forwarders and consignees. The survey, which will cover all the relevant factors, will allow to observe the actual choices made in different industrial circumstances (revealed preference approach), but also to question the decision makers about the choices they would make if some of the decision parameters were changed (stated preference approach). Such a survey will then provide a relevant data basis for an appropriate econometric analysis of the various factors that affect the modal choices.

Given the time framework of the research programme and the complexity of the problem, this survey must be seen as a pilot survey among Belgian enterprises. Nevertheless, the international character of Belgian economic transport activities will provide a relevant domain of research. At this stage, the modes that will be the main objects of the survey are the road, the rail and the waterway transports. We hope this pilot survey will provide a good basis for a more extensive research at a full international scale, and including air transport and short-sea shipping.

Interaction between the different partners
The pilot survey will be realised by the university teams themselves, so that a maximum of information will be gathered in the process of interviewing. The composition of the research network made of researchers from different parts of the country should facilitate that fieldwork. The specialisation of the different teams is also a positive factor as the consortium gathers experts in statistical estimation, network modelling, decision analysis, and transport economists working at the theoretical and applied levels. Each partner will contribute in his field of specialisation, allowing thus a comprehensive approach of all the methodological facets.

Link with international programmes
The consortium has contacted the main international experts in this field of research and will benefit from their advises.

Expected results and/or products
A better assessment of the role played by qualitative factors in modal choices, and, therefore, a better approach to the definition of a modal shift strategy. The results will be disseminated through the Users Committee and through publications in international scientific journals.

PARTNERS

Activities

FUCAM
The Group Transport & Mobility (Prof. Michel Beuthe and Bart Jourquin) are responsible for the co-ordination of the consortium. This research team is specialised in transport network analysis and multi criteria analysis.

UFSIA
The Faculteit Toegepaste Economische Wetenschappen, where Prof. Eddy Van de Voorde and Hilde Meersman are specialists in harbour economics and analysis of inland transport modal choice.

RUG
The Department of Geography, where Prof. Frank Witlox is a specialist in transport case studies and spatial transport economics.

UCL
The Institute of Statistics, where Prof. Michel Mouchart has done a number of researches on the statistical models of discrete choices.

CONTACT INFORMATION

Co-ordinator

Michel Beuthe and Bart Jourquin
Facultés Universitaires Catholiques de Mons (FUCAM)

151, chaussée de Binche
B-7000 Mons

Tel: +32 (0)65 32 32 96
Fax: +32 (0)65 31 56 91

gt&m@fucam.ac.be
www.fucam.ac.be

Partners

Hilde Meersman and Eddy Van de Voorde
Universiteit Antwerpen (UFSIA)
Faculteit Toegepaste Economische Wetenschappen

Prinsstraat 13
B-2000 Antwerpen

Tel: +32 (0)3 220 41 11
Fax: +32 (0)3 220 40 26

hilde.meersman@ufsia.ac.be
eddy.vandevoorde@ufsia.ac.be
www.ufsia.ac.be

Frank Witlox
Universiteit Gent (RUG)
Departement Geografie

Krijgslaan 281 - Gebouw S8
B-9000 Gent

Tel: +32 (0)9 264 45 53
Fax: +32 (0)9 264 49 85

frank.witlox@rug.ac.be
www.rug.ac.be

Michel Mouchart
Université Catholique de Louvain (UCL)
Institut de Statistique (STAT)

20, voie du Roman Pays
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 43 18
Fax: +32 (0)10 47 30 32

mouchart@stat.ucl.ac.be
www.stat.ucl.ac.be

Users Commitee

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AN INTEGRATED INSTRUMENT FOR THE ENVIRONMENTAL EVALUATION OF LOCAL TRAFFIC PLANS

Duration of the project: 15/12/2001 – 30/06/2005
Budget: € 547.569
Keywords: Liveability, Urban Transport, Noise, Air, Pollution

CONTEXT

Sustainable mobility at the local level, in cities, towns or districts, requires a balance between accessibility, liveability and environmental quality. Despite technological progress and strict standards for new vehicles, a balanced local traffic plan is still needed to improve the quality of life and environment in our cities and communities. Local administrations are therefore in need of an integrated instrument to check the impacts of their plans with criteria for district accessibility, liveability (including road safety, pedestrian cross-over possibilities,...) and environmental quality (noise and air). We plan to create a methodology that takes the spatial characteristics, traffic situations and social functions of districts and streets into account.

PROJECT DESCRIPTION

Sustainable development, sustainable mobility and the balanced quality of life in mobile societies are the central themes of this project. The quality of life is determined by the possibility to travel (safely and reliably) with different modes of transport on the one hand and by the control of the detrimental influences of transport on (other) people (safety, public health, noise nuisance) and their environment (e.g. accessibility, pedestrian cross-over possibilities) on the other. The project deals with economic, environmental and social aspects of sustainable mobility.
An integrated methodology for the evaluation of local traffic plans of cities and municipalities will be developed and demonstrated. Starting with the (modelled) traffic flow information, we assess several indicators for the quality of life (in relation to traffic: accessibility, pedestrian cross-over, accident risks) and environmental quality (air and noise). A special technique will be devised to integrate these different indicators so that different plans or options can be compared, tested against sustainability criteria and the optimal scenario chosen, taking into account the objectives of the local administration.

Objectives

- Develop an integrated methodology for the evaluation of impacts of local traffic plans on accessibility, traffic liveability, noise nuisance and air quality.
- Develop and use new methods and models to evaluate all these impact categories at the district or street level and in more detail than before.
- New recommendations for local policies related to mobility, environment, road safety and urban planning.

Methodology

The research is structured according to the DPSIR model, (Driving forces, Pressures, State, Impacts, Response). For the selected case study (town or city) we will calculate traffic flows (for different traffic plans) and analyse the vehicle fleet composition and speed profiles. This is the basis for the calculation of the environmental indicators.

- Accessibility: we estimate the accessibility of different functions and districts, with all transport modes (car, bus, bike, walking,...).
- Air quality: we calculate emissions, dispersion, concentrations in the streets, exposure of people to pollutants and impacts on public health.
- Noise: we calculate emissions and propagation of noise, sound levels in the city and its streets, and quantify and interpret exposure and noise nuisance.
- Quality of life is evaluated with indicators describing the accident risks for different road users and the cross over facilities for pedestrians.

In the last step these indicators are integrated. An expert system works out bottlenecks and sticking points in terms of one indicator (e.g. noise nuisance) or for the whole aggregate of indicators.

Interaction between the different partners

see Scheme

Link with international programmes

1 European project DECADE;
2 ExternE network. NewExt;
3 WHO working group on the quantification of health impacts of exposure from air pollution;
4 SETAC, Life cycle impacts assessment working group;
5 European project on ISA: Prosper;
6 COST Action 715: Meteorology applied to Urban Air Pollution Problems;
7 EUROTRAC II subproject SATURN: Studying Atmospheric Pollution in Urban Areas;
8 EU-project Transplus.

Expected results and/or products

The major results of this project are:

- emission factors and vehicle fleet data for local and slow traffic in the present and future situation (2010);
- a dispersion model that predicts hourly values for air quality parameters at the city and street levels with even more detail in the streets;
- a model that converts data on emission factors and traffic flows into noise levels at the street and city levels;
- an impact module that links population distributions to variations in noise and air quality levels. A detailed (in space and time) analysis of exposure for different population groups;
- a methodology to quantify accident rates, cross-over possibilities and spatial quality of major roads;
- development of an instrument to estimate impacts on liveability at the local level;
- a database of liveability indicators linked to liveability levels that depend on the type and function of a district;
- recommendations to policy makers that take our new perspective of traffic impacts on cities' liveability into account. The integrated approach favours policy measures that score well for all aspects studied.

PARTNERS

Activities

VITO
Calculation of emissions, concentrations in the streets, exposure of people to pollutants and impacts on public health. Integration of different indicators for liveability.

RUG
Calculation of noise emissions and sound levels in the city and streets, quantify and interpret exposure to noise and noise nuisance.

KULeuven
Modelling of the traffic flows in the city and selected streets. Estimate the accessibility of different functions and districts with all transportation modes

Langzaam Verkeer
Evaluate the quality of life with indicators describing the accident risks for different road users and the cross over facilities for pedestrians.

CONTACT INFORMATION

Co-ordinator

Leo De Nocker and Luc Int Panis
Vlaamse Instelling voor Technologisch Onderzoek (VITO)
Expertisecentrum Integrale Milieustudies in collaboration with Teledetectie en Atmosferische Processen

Boeretang 200
B-2400 Mol

Tel: +32 (0)14 33 58 87
Fax: +32 (0)14 32 11 85

luc.intpanis@vito.be
www.vito.be

Partners

Dick Botteldooren
Universiteit Gent (RUG)
Faculteit Toegepaste Wetenschappen - Vakgroep Informatietechnologie (INTEC)

Kuiperskaai 55
B-9000 Gent

Tel: +32 (0)9 267 35 78
Fax: +32 (0)9 264 35 93

Dick.Botteldooren@rug.ac.be
www.intec.rug.ac.be

Ben Immers and Steven Logghe
Katholieke Unviersiteit Leuven (KULeuven)
Departement Burgerlijke Bouwkunde

Kasteelpark 40
B-3001 Heverlee

Tel: +32 (0)16 32 16 69
Fax: +32 (0)16 32 19 76

ben.immers@bwk.kuleuven.ac.be
www.bwk.kuleuven.ac.be/bwk/

Jos Zuallaert and Veerle Beyst
Langzaam Verkeer vzw.

J.P. Minckelersstraat 43A
B-3000 Leuven

Tel: +32 (0)16 23 94 65
Fax: +32 (0)16 29 02 10

Jos.zuallaert@langzaamverkeer.be
www.langzaamverkeer.be

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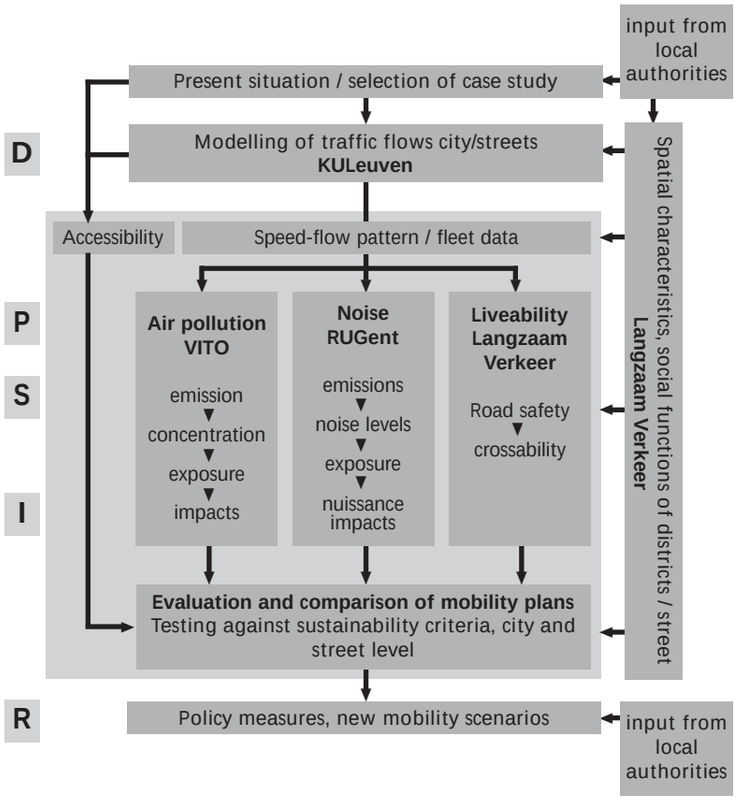

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AN ECONOMIC ANALYSIS OF TRANSPORT SAFETY: THEORY AND APPLICATIONS

Duration of the project: 15/12/2001 – 31/12/2005
Budget: € 231.196
Keywords: Transport Safety, Regulation, Liability Rules, Economic Instruments, Law and Economics

CONTEXT

The project is a logical continuation of the project 'External Costs of Transport', that was conducted as part of the programme sustainable mobility (MB/DD/008). Although there are points of agreement between the two projects, their focus is different. In the first project, marginal external accident costs were calculated taking government policy as given. In this project we look for the policy that minimises the accident costs.

PROJECT DESCRIPTION

Objectives
Traffic accidents are an important source of social costs. In Belgium more and more people are convinced that actions should be taken to reduce traffic accidents and their costs. Policy makers can do this by using different instruments: traffic regulation and its enforcement, liability rules, economic instruments, infrastructure measures, public and safety education… All these instruments are aimed at influencing the driver's behaviour.
The project analyses the potential and the restrictions of the first three types of instruments and aims at characterising the conditions for an optimal combination of such instruments. The analysis uses an innovative interdisciplinary approach, it aims to integrate law and economics.
The aim of the project is to propose concrete policy measures for promoting traffic safety in Belgium on the basis of sound theoretical and empirical research.

Methodology
The project proceeds in three steps:
The first step consists of making an overview of existing and potential measures that policy makers can use and of selecting some specific measures, which will be studied further.

The second step approaches the problem from a theoretical angle. This step of the analysis finds its theoretical underpinning both in transport economic models and in law and economic models. We aim at an integration and further development of these two approaches in a partial equilibrium framework. This means that we only look at the effects on the transport market. We consider the following issues:
- How should we judge the traffic safety policy?
- Which elements play an important role in the evaluation?
- What is the social optimum?
- What are the social costs and benefits of specific instruments?
- What are the implications if instruments cannot be optimally applied?
- Which information is needed to make a good evaluation?

The third step applies the theoretical insights to Belgium. The welfare impacts of a number of specific policy packages are calculated. These packages consist of different combinations of regulation, liability rules and economic instruments. A cost-benefit analysis of the measures is conducted. To this end we can use different approaches.
A first approach consists of building examples based on the theoretical models using real world data.
A second approach consists of the integration of the theoretical insights of the second step into an existing transport model, such as the TRENEN-model. This is a partial equilibrium model for multiple transport markets, which also allows the incorporation of a number of general equilibrium aspects. This model can be adjusted and extended to give a better idea of accident cost and their determinants and to simulate the welfare effects of different safety measures. The use of this transport model also allows the analysis of the interactions between traffic safety and other external costs of transport, such as congestion.

The selection of the best approach will depend on the cost and the benefit of each approach and the measures. Examples of questions, which will be answered in this step, are:
- What are the social costs and benefits of specific measures and of combinations of measures?
- Which groups in society benefit of these measures and who is worse off?
- Which measures or combinations of measures are to be preferred from a social point of view? What is the cost for the society of implementing other measures?
- Is it social beneficial to raise the budget for traffic safety?
- What are the limits and uncertainties of the evaluation methods?

Interaction between the different partners
Both teams in the project contribute to all tasks.

Expected results and/or products

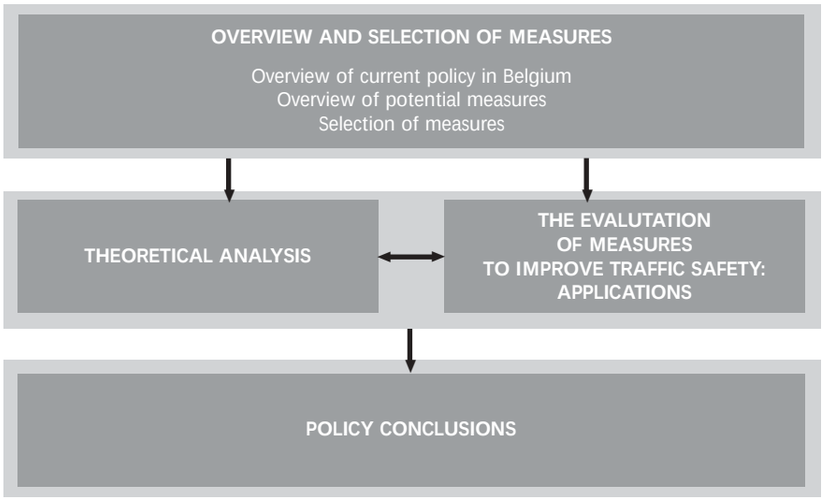
- Research reports, discussion papers, publications in scientific journals.
- Presentation of the results on seminars and conferences.
- Participation in valorisation initiatives of the OSTC.
- Website of the project.
- Interaction with members of the Users Committee.
- Short discussion notes.

PARTNERS

Activities

KULeuven
The Centre for Economic Studies (CES) is the research division of the Department of Economics. One division focuses on Transport, Energy and Environmental problems. This division is specialised in the use of modelling tools (general equilibrium, partial equilibrium) to address pricing and investment problems in the transport, energy and environmental fields.

RUG
The Centre for Advanced Studies in Law and Economics (CASLE) is a research division of the Faculty of Law that combines the research of law and economics within the department of Legal Theory and Legal History. CASLE is specialised in applying the insights of the literature on law and economics to Belgian law and Belgian policy.



CONTACT INFORMATION

Co-ordinator

Stef Proost
Katholieke Universiteit Leuven (KULeuven)
Centrum voor Economische Studiën (CES) – Onderzoeksgroep Energie, Transport en Milieu (ETE)

Naamsestraat 69
B-3000 Leuven

Tel: +32 (0)16 32 68 01
Fax: +32 (0)16 32 69 10

Stef.Proost@econ.kuleuven.ac.be
www.kuleuven.ac.be/ete

Partners

Gerrit De Geest
Universiteit Gent (RUG)
Faculteit Rechtsgeleerdheid – Vakgroep Grondslagen en Geschiedenis van het Recht - Centre for Advanced Studies in Law and Economics (CASLE)

Universiteitsstraat 4
B-9000 Gent

Tel:+32 (0)9 264 68 09
Fax: +32 (0)9 264 69 83

gerrit.degeest@rug.ac.be
www.law.rug.ac.be/grond/CASLE.html

Users Commitee

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OPTIMA

OPTIMISATION OF ROAD ACCIDENTS STATISTICS

Duration of the project: 01/11/2001 – 31/10/2003
Budget: € 198.682
Keywords: Road Safety, Traffic Accidents, Statistical Information, Traffic Policy

CONTEXT

An efficient road safety policy requires having a reliable and representative picture of road unsafety and its evolution. Accident statistics are therefore essential. However, the accident statistics, currently available in Belgium have many shortcomings, quantitative as well as qualitative. Indeed many road accidents and victims are not registered and this problem concerns more particularly certain categories of road users involved in an accident, such as cyclists or pedestrians for example. These are thus under-represented in statistics. Little information is also available on the injuries of road users caused by accidents. The evaluation of their consequences is therefore incomplete.

PROJECT DESCRIPTION

In order to fill these gaps and to improve the current recording system of accidents data, which are gathered by police forces, the project OPTIMA proposes to complete them with information collected by hospitals where road accidents victims are taken.

Objectives and Methodology
OPTIMA aims at studying the setting up of a simple and accurate recording system of accident victims in hospitals and its connection with the accident statistics gathered by police forces.

The project OPTIMA will first analyse how other countries (The Netherlands, Sweden, Great Britain) register victims of accidents in their hospitals and how these data are linked to the ones collected by the police.

The current registering system of patients in Belgian hospitals will also be described and compared to the foreign systems studied.

OPTIMA will then realise a pilot project in the casualty department of the University hospital of Gent. This pilot project allows the testing of a new registering system of victims and the examination of the procedure in order to link the by gathered data hospitals with the police data as well as the problems that this transmission to the police will cause. Indeed, the principle of the medical confidentiality has to be taken into account. The pilot project also allows the evaluation of the workload generated by a possible general implementation of such a system in Belgium as well as the necessary budget. The legislative, technical and organisational measures to be taken for an optimal functioning of the system will also be identified and described. Finally, this project will allow a more precise identification of the type and seriousness of the injuries caused by road accidents and so, an evaluation of the implications of these accidents on health care costs.

Expected results and products
At the end of the project, a final report will present the conclusions of the study and the results of the experience carried out in the pilot project. On this basis, recommendations will be formulated to the attention of the Ministries of Mobility and Transports, Public Health and Social Affairs. The results of the study and of the tested registering system will also be communicated to a larger interested public through publications and colloquium.

PARTNERS

Activities

BIVV
Among its various activities, the Belgian Road and Safety Institute (BRSI) regularly analyses the accidents statistics and their evolution. One of its priorities is to improve the quality, exhaustiveness and recording method of these data.
The BRSI has been assigned by the Minister of Mobility and Transports to co-ordinate the federal workgroup 'Road Safety Statistics' set up in the framework of the Belgian road safety plan. This in order to automatise the registered accidents and to advise the local and provincial authorities on their enforcement plans and activities.

RUG-CDO
The Centre for Sustainable Development (CDO) is an interdisciplinary research group drawing on the knowledge and expertise of nine departments at the University of Gent. The aim of the centre is to use an interdisciplinary methodology for the elaboration on sustainable development as a social framework. This approach includes, but is not limited to, research in the following five key fields: social, economic, ecological, institutional and ethical.

CONTACT INFORMATION

Co-ordinator

Patric Derweduwen and Ward Vanlaar
Belgisch Instituut voor de Verkeersveiligheid (BIVV)
Departement Statistieken

1405, chaussée de Haecht
B-1130 Brussels

Tel: +32 (0)2 244 15 11
Fax: +32 (0)2 216 43 42

patric.derweduwen@bivv.be
Ward.vanlaar@bivv.be
www.bivv.be

Partner

Ruddy Doom
Universiteit Gent (RUG)
Centrum voor Duurzame Ontwikkeling (CDO)

Poel 16
B-9000 Gent

Tel: +32 (0)9 264 82 09
Fax: +32 (0)9 264 83 90

johan.demol@rug.ac.be
http://cdonet.rug.ac.be

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SUSTAINABILITY EFFECTS OF TRAFFIC MANAGEMENT SYSTEMS

Duration of the project: 01/12/2001 – 30/11/2004
Budget: € 461.743
Keywords: Sustainable Traffic Management, Sustainability Aspects, Modelling/Simulation, ATMS, Cost Function

CONTEXT

We wish to study the use of Advanced Traffic Management Systems (ATMS) in order to expand the capacity of the Belgian road network. ATMS consist of actuators that interact with the traffic stream or the road and of control strategies. These control strategies are specifically developed in order to maximise the sustainability. By using the correct optimisation techniques and simulation models, which find the balance between accuracy and computation time, the result, which will take the form of a control strategy, will be seriously improved. At a national scope, the developed traffic models can be implemented for the Belgian traffic situation, which will give rise to more optimal flowing of traffic, in view of certain characterisations of sustainability.

PROJECT DESCRIPTION

Objectives
This project is situated around the concept of 'sustainable traffic control'. A more detailed consideration teaches us that traffic is dynamic in nature. It is based on demand and supply, of which the demand is formed by the travellers who wish to move themselves (the transport) and of which the supply is characterised by the available road infrastructure. The dynamic behaviour is described through the use of mathematical models. Using these, we can develop adaptive control strategies for the Belgian road network that take into account the dynamic effects. The main goal is to establish a sustainable traffic pattern, in which sustainability is accomplished through the implementation of different technologies (such as mathematical models, control theory…).

Methodology
A major component in the context of this traffic research consists of the characterisation of the concept 'sustainability'. To this end, several objectives concerning sustainability are elaborated (such as accessibility, safety, environmental effects…) and bundled in a mathematical cost function. Besides this, we will also determine which traffic network infrastructure to use (the highway road network, which is at certain locations complemented by the secondary regional road network). The characterisation of the demand pattern (which is dynamic in time) is also an important part. The starting point is formed by gathering several traffic measurements (collected by loop detectors in the road, cameras, GSMC…). Finally, the traffic situation is optimised (using the cost function) with the help of computer simulation models, resulting in optimal flowing of traffic, keeping an eye on the different sustainability aspects.

Interaction between the different partners
In this research, an initial planning was developed, based on the presented proposal. During the course of the project, the different partners convene on a regular basis, possibly leading to the modification and rectification of the project's planning. Each partner is assigned several tasks, based on his individual appraisement in various research areas. Some of these tasks may overlap with other partners, resulting in an extra stimulation of internal co-operation.

Expected results and/or products
An important result will be formed by gaining a deeper insight into the processing of traffic measurements. Besides this, the research will result in the development of a working dynamic traffic model, which allows for the tuning of the used mathematical models, the estimation of the dynamic traffic pattern and the evaluation of the cost function. The most relevant results will consist of the optimal flowing of traffic, this by means of certain measures such as ramp metering, speed harmonisation, eventually route guidance… An intended valorisation will be formed by the practical application of the traffic model to the Belgian road network, which will result in the improvement of the already existing road transport system.

PARTNERS

Activities

KULeuven
Department of Electrical Engineering (ESAT) - Research Group SCD (SISTA)
Project co-ordination, take an inventory of the measurement data, estimation of the demand patterns, developing the models, optimisation and control.

KULeuven
Department Civil Engineering, Research Group Traffic Engineering and Infrastructure Planning Section
Take an inventory of the measurement data, estimation of the demand patterns, developing the models.

KULeuven
Centre for Economic Studies, Research Group Energy, Environment and Transport
Developing the cost function.

UCL
Département d'ingénierie mathématique - Centre for Systems Engineering and Applied Mathematics (CESAME)
Integration of the different models.

RUG
Department of Electrical Energy, Systems and Automation, Research Group SYSTeMS
Take an inventory of the measurement data.

CONTACT INFORMATION

Co-ordinator

Bart De Moor
Katholieke Universiteit Leuven (KULeuven)
Departement Elektrotechniek (ESAT) - Onderzoeksgroep SISTA

Kasteelpark Arenberg 10
B-3001 Heverlee

Tel: +32 (0)16 32 17 09
Fax: +32 (0)16 32 19 70

bart.demoor@esat.kuleuven.ac.be
www.kuleuven.ac.be/ete

Partners

Ben Immers
Katholieke Universiteit Leuven (KULeuven)
Departement Burgerlijke Bouwkunde - Onderzoeksgroep Verkeer en Infrastructuur

Kasteelpark Arenberg 40
B-3001 Heverlee

Tel: +32 (0)16 32 16 69
Fax: +32 (0)16 32 16 89

ben.immers@bwk.kuleuven.ac.be
www.esat.kuleuven.ac.be/traffic/indexnl.htm

Stef Proost
Katholieke Universiteit Leuven (KULeuven)
Centrum voor Economische Studiën (CES) - Onderzoeksgroep Energie, Transport en Milieu (ETE)

Naamsestraat 69
B-3000 Leuven

Tel: +32 (0)16 32 68 01
Fax: +32 (0)16 32 67 96

stef.proost@econ.kuleuven.ac.be
www.econ.kuleuven.ac.be/ew/academic/energmil

Georges Bastin and Guy Campion
Université Catholique de Louvain (UCL)
Département d'ingénierie mathématique (INMA) - Center for Systems Engineering and Applied Mathematics - Onderzoeksgroep CESAME

Bâtiment Euler, 4,
avenue Georges Lemaître
B-1348 Louvain-La-Neuve

Tel: +32 (0)10 47 80 38
Fax: +32 (0)10 47 21 80

bastin@auto.ucl.ac.be / campion@auto.ucl.ac.be
www.csam.ucl.ac.be

René Boel
Universiteit Gent (RUG)
Departement Elektrische Energietechniek - Onderzoeksgroep SYSTeMS

Technologiepark-Zwijnaarde 9
B-9052 Zwijnaarde

Tel: +32 (0)9 264 56 58
Fax: +32 (0)9 264 58 40

rene.boel@rug.ac.be
http://systems.rug.ac.be

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SAMBA

SPATIAL ANALYSIS AND MODELLING BASED ON ACTIVITIES

Duration of the project: 01/11/2001 – 31/05/2004
Budget: € 477.504
Keywords: Spatial Analysis, Mobility, Activity Chains, Synthetic Population

CONTEXT

This project relies on data collected during the first national survey on mobility behaviour of Belgian households (MOBEL), co-ordinated by the GRT and funded by the OSTC (SPSD I) but also, at regional or local level, on the data collected in Flanders and, locally, in Antwerp, Gent and Hasselt. Links will also be established with another SPSD II project "Determinants of Modal Choice in Trip Chains" studying the same set of data.

PROJECT DESCRIPTION

Objectives
This project aims to study the mobility demand for Belgium using the activity chains concepts and especially their spatial dimensions. The purpose of SAMBA is to build a synthetic population that can be used later for creating origin/destination matrices. In view of achieving this goal, we also have to add a spatial dimension to the activity chains, up to now, only studied through their temporal component.

Briefly, the main goals of this project are:
- the spatialisation of data from the national survey and also from other (regional and local) surveys;
- the spatial-temporal modelling of activity chains;
- the analysis of barriers effects on activity chains;
- the study of the advantages of fuzzy logic for the description of decision schemes of the households setting up their activity chains;
- the building of synthetic population(s).

Methodology
After a necessary geocoding of the travel data collected during the national survey and other regional and local ones, these data would be used to describe the household activity chains focusing especially on their spatial dimension. From this description a synthetic model for the population mobility will then be drawn up. During this phase, an analysis of barrier effects will also be undertaken as well as a study of what the fuzzy logic could bring up for describing the decision schemes of the households when setting up their activity chains. Finally, based on these models, a synthetic population will be built.

Interactions between the different partners

Initial phase: study of the state of the art and of the literature

All the partners (GRT, UCL, UFSIA and RUG) will participate in this phase.

Data spatialisation

The geocoding of data from the surveys will be the core of this task. After a standardisation work, achieved by all the partners, GRT and UCL will be more especially responsible for data from the national survey while UFSIA and RUG will undertake the geocoding for data from regional (Flanders) and local (Antwerp, Gent and Hasselt) surveys.

Modelling activity chains

In this phase, GRT will be in charge of extending activity chains models taking into account their spatial-temporal dimensions.
Based on journeys and, more particularly on their spatial dimension, a description of the spatial-temporal chaining of activities by households has to be drawn up.
At the end of this step, we will have a descriptive analysis of activity chains based on spatial-temporal dimensions and highlighting the most significant variables for their organisation.

Study of the barrier effects

UCL will focus on the study of barrier effects on the mobility behaviours. More especially, the research team from UCL will study how the barrier phenomena (as the linguistic barrier) could affect how the activity chains are set up in their spatial component.

Possible contribution from fuzzy logic

RUG will study which could be the contribution of fuzzy logic in the description of decision schemes that the households set up when building their activity chains

Building a synthetic population

GRT will co-ordinate this task. Teams from UFSIA and RUG will be rather involved in the aspects related to regional and local data.

In this phase, the purpose is to go from the sample to the population. Based on the descriptive analysis of activity chains for surveyed households, we will have to build a synthetic population, statistically representative of the mobility behaviours of the actual population.

Expected results and/or products
Besides the results (among others on barrier effects or spatial-temporal models for activity chains), which could bring an academic added value through papers or conference presentations, the main contribution of this project will be the building of a synthetic population which could, in the future, be used for evaluating origin/destination matrices for all travel purposes at Belgian level.

PARTNERS

Activities

FUNDP-GRT
The 'Research Group of Transportation' of the University of Namur shares its activities between different research streams:
- modelling;
- data surveys and analysis;
- software and technologies;
- learning, training.

UCL
The 'Centre for Spatial and Urban Analysis' works in areas like:
- sustainable mobility;
- location-allocation models;
- human and economic geography.

UFSIA
The 'Department of Transport and Regional Economics' deals with several aspects of transport economy and is particularly interested in maritime transport as well in freight transport.

RUG
In the research unit 'Social and Economic Geography', five fields of research are pursued:
- population geography;
- location theoretic research;
- urban geography and urban policy;
- transport geography;
- spatial data collection and modelling.

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CONTACT INFORMATION

Co-ordinator

Philippe Toint and Eric Cornelis
Facultés Universitaires Notre-Dame de la Paix de Namur (FUNDP)
Groupe de Recherche sur les Transports (GRT)

8, rempart de la Vierge
B-5000 Namur

Tel: +32 (0)81 72 49 22
Fax: +32 (0)81 72 49 14

eric.cornelis@math.fundp.ac.be
www.grt.be

Partners

Isabelle Thomas
Université Catholique de Louvain (UCL)
Département de géologie et de géographie

3, place Louis Pasteur
B-1348 Louvain-la-Neuve

Tel: +32 (0)10 47 21 36
Fax: +32 (0)10 4728 77

Isabelle@geog.ucl.ac.be
www.geo.ucl.ac.be

Ann Verhetsel
Universitaire Faculteiten St.-Ignatius Antwerpen (UFSIA)
Vakgroep Transport en Ruimtelijke Economie

Prinsstraat 13
B-2000 Antwerpen

Tel: +32 (0)3 220 42 21
Fax: +32 (0)3 220 47 99

ann.verhetsel@ufsia.ac.be
www.tew.ua.ac.be

Frank Witlox
Universiteit Gent (RUG)
Departement Geografie

Krijgslaan 281 (S8)
B-9000 Gent

Tel: +32 (0)9 264 45 53
Fax +32 (0)9 264 49 85

frank.witlox@rug.ac.be
aivwww.rug.ac.be/Onderzoeksbeleid/techno2002/EN/WE/I-WE12V10.htm

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DETERMINANTS OF MODAL CHOICE IN TRIP CHAINS

Duration of the project: 01/12/2001 – 31/12/2004
Budget: € 419.253
Keywords: Modal Choice, Trip Chains, Travel Behaviour, Sustainable Mobility Policy

CONTEXT

Society is becoming increasingly complex. People have to combine different activities during one day. When these activities are spatially separated, people have to make chain trips to combine them. This results in complex transport chains (Toint et al, 2000, final report SPSD I). The car is a suitable means of transportation to combine trips such as travel to work, drop children, shopping etc. A policy of sustainable mobility might be interested in how to replace these complex car trips by more sustainable trips by public transport, bicycle, walking…
During the previous SPSD programme, a National Survey on Travel Behaviour was held and the data have been analysed. In this project the same data will be used to examine determinants of modal choice in trip chains. A first attempt to calculate and characterise a potential for a more sustainable modal split will be made.

PROJECT DESCRIPTION

Objectives

The first objective is the further exploitation and evaluation of the data collected during the National Survey on Travel Behaviour (SPSD I).
The second objective is the development of a scientific base for sustainable mobility policy, through the development of policy indicators on sustainability characteristics of trips.
The focus is on trip chains of individuals and households and the potential of changing less sustainable trips (in terms of modal choice, trip distance…) into more sustainable trips.
Especially three types of determinants will be focused on: socio-economic characteristics of households, location of activities and availability of alternatives.

Methodology

Problem definition

An overview is made of existing literature, research and data about modal split and modal choice (analysis of documents).
Next the possibilities to put them into operation by means of variables in the data set will be evaluated.

Technical preparation

For each trip in the national data set (15000 in total) not performed by public transport, the optimal alternative route by public transport has to be looked up and essential characteristics such as duration, number of transfers, distance to the stops… of this route have to be added to the database. For this, the full cooperation of all public transport providers is crucial.

Analysing the data

Description of trip chains
This has already been done in the previous SPSD programme. The intention is to use this approach, but a more detailed analysis of the modal choice variable within the patterns is necessary.

Household constraints
The "intra-household" constraints are the constraints put on an individual's modal choice given the availability of transportation means (car, cycle or public transport tickets) within the household. The intention is to determine combinations of these variables that entail specific modal choices and the degree with which a household can alter its choices.
(Responsible: Research Group of Transportation of the University of Namur (GRT))

Location
In this part of the research, the impact of location on the travel behaviour will be examined. More particularly, the real travel resistance in terms of travel time and travel distance, as it appears from the survey, will be compared to the theoretical travel time and travel distance computed from the public transport time tables and the shortest path computations. Through correlation computations and regression analyses, significance of (objective and subjective) factors affecting the travel time and distance, will be computed. Further classifications will be based on discriminant analysis and logistic regression. This will allow a more thorough classification of modal choices based on time and space variables.
(Responsible: Spatial Applications Division Leuven (SADL))

Modus
For each trip some key characteristics concerning possible alternatives have been added to the data set. These characteristics have to be synthesised for the whole trip chain. Starting from these chain characteristics and the information gathered in a previous phase about 'critical values' the potential for a modal shift will be calculated.

In a next phase a link will be made with some characteristics of individuals (and optionally of households). (Responsible: Langzaam Verkeer).

Interaction between the different partners
The three mentioned partners are working together intensively on the collection and structuring of the data. GRT delivers the survey data and a methodology to analyse chain trips. SADL co-ordinates the collection and input of travel information that has to be retrieved from the transportation companies. Langzaam Verkeer is the general co-ordinator.

Link with international programmes
This project uses the data of the Belgian National Survey on Travel Behaviour, held in 1999-2000. The design and methodology of this National Survey was based on the findings of the European projects 'TEST' and 'MEST'. These European projects took place in the Fourth Framework Programme of the European Commission. MEST dealt with the methodological aspects of surveys on long distance trips. It was followed by TEST, which studied the use of modern technologies in this kind of surveys.

Expected results and/or products
- A complete overview of actual modal choice: description and explanation.
- An (empirically verified) overview of determinants of modal choice in trip chains, especially household constraints, location and offer.
- A better insight in and description of possible target group(s) for mobility management.
- Scientific final report.
- Report for policy makers focusing on practical results.
- Articles in professional journals.
- A seminar.
- Exchange of results with another SPSD II project "SAMBA".

PARTNERS

Activities

Langzaam Verkeer
The co-ordinator has been studying and supervising traffic programmes and projects since 1982. The multidisciplinary staff is divided into three departments: Research and Policy Preparation, Planning and Design, and Training and Communication. The Research and Policy Preparation Department, in charge of this project, conducts research and consultancy on themes such as traffic safety and viability, public and collective transport, and mobility management, but also looks for the interfaces between mobility and other social sectors such as, for example, environmental planning, social inequality, work, leisure time, telematics and economic activities. Both qualitative and quantitative research methods are used.

KULeuven
The 'Spatial Application Division Leuven' (SADL) combines scientific services, applied research and professional education in the domain of GIS and Remote Sensing. Due to its academic relations, the division disposes of important technical and managerial GIS-, database and Earth Observation expertise and important thematic expertise in the fields of amongst others urban and regional planning, traffic transport management and spatial statistics. The activities are mainly situated in:
- Training and education concerning GIS.
- GIS in mobility and transport.
- GIS in spatial planning.
- GIS in agriculture and environmental studies.
- Construction and management of GIS-databases and applications.

FUNDP-GRT
The Research Group of Transportation (GRT, Mathematics Department) has worked on various mathematical methods to study transportation related problems. The GRT does methodological and theoretical research but is also concerned with their application to specific cases.
The GRT achieved researches including mathematical modelling, dynamic assignment models, demand analysis, the study of activity chains, discrete choice models and behavioural aspects of mobility. Its modelling activities lead the GRT to be aware of the problems caused by the lack of data needed for providing models. Therefore, the GRT also takes interest in survey studies. It analysed the methodologies to undertake travel surveys, co-ordinated the first Belgian mobility survey and achieved many statistical analyses about survey data.

CONTACT INFORMATION

Co-ordinator

Tim Asperges
Langzaam Verkeer vzw.
J.P. Minckelersstraat 43A
B-3000 Leuven
Tel: +32 (0)16 23 94 65
Fax: +32 (0)16 29 02 10
tim.asperges@langzaamverkeer.be
www.langzaamverkeer.be

Partners

Thérèse Steenberghen
Katholieke Universiteit Leuven (KULeuven)
R&D - Spatial Application Division Leuven (SADL)
Vital Decosterstraat 102
B-3000 Leuven
Tel: +32 (0)16 32 97 32
Fax: +32 (0)16 32 19 84
Therese.Steenberghen@sadl.kuleuven.ac.be
www.sadl.kuleuven.ac.be

Philippe Toint and Arnaud Luyckx
Facultés Universitaires Notre-Dame de la Paix de Namur (FUNDP)
Groupe de Recherche sur les Transports (GRT)
8, rempart de la Vierge
B-5000 Namur
Tel: +32 (0)81 72 49 09
Fax: +32 (0)81 72 49 14
aluyckx@math.fundp.ac.be
www.grt.be

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SUSTAINABILITY ASSESSMENT OF TECHNOLOGIES AND MODES FOR TRANSPORT IN BELGIUM

Duration of the project: 15/12/2001 – 31/12/2004
Budget: € 335.573
Keywords: Transport policy, Technology, Emissions, External costs, Technology Assessment

CONTEXT

In 2000 the amount of vehicle kilometres driven on Belgian roads increased by 30% compared to 1990 and has tripled compared to 1970. This increase in traffic demand has raised concerns in Belgium, as in many other countries, about air pollution, climate change, noise and congestion.
Policy makers are hence challenged to work out strategies and action plans leading to a more sustainable mobility. As transport technologies and systems became continuously more complex, policy makers need good, technical-scientific assistance. This project aims at supporting the most sustainable technologies for transport over land, by railway and on waterways.

PROJECT DESCRIPTION

The aim of this project is to carry out an integrated assessment of policy measures, in view of a successful introduction of new technologies in the transport sector on the one hand and of a shift between modes on the other, all this in order to promote sustainable mobility. Besides the road traffic, powered two-wheelers included, also technological developments regarding railway traffic and inland navigation will be studied extensively.

Objectives

- To obtain a greater understanding of consumer behaviour with regard to new technologies.
- To draw up a reliable methodology for emission calculations for railway traffic and inland navigation.
- To deliver recommendations towards regulators at various levels to stimulate more sustainable technologies and modal shift.

Methodology

For each transport mode the different technologies are first subjected to a sustainability screening to select the most sustainable ones. Therefore sustainability index cards are drawn up in which criteria related to technological, social, economic and environmental aspects are included. The weighting of the criteria is subjected to a peer review with external experts. This method of working results in a sustainability score per transport mode and technology. On the basis of this score, for each transport mode some technologies are selected and later evaluated on their marketing possibilities in a 2020 time horizon. For each mode the reference technology is the diesel technology, available and generally used in 2000.

The second phase of the project aims at the assessment of the penetration of the selected technologies. A survey is carried to gather new material on hypothetical consumer choices of new vehicle technologies. The results make it possible to define new policy assumptions. For each mode, transport volumes for the different technologies are assessed for Belgium by means of a transport model.

Then emission and impact models (1990-2020) are used to evaluate the environmental impact for Belgium of policy measures. The emission results are checked with international agreements, such as the Kyoto Protocol. Furthermore, the cost for the different parties concerned (consumers, technology-developers, regulatory authorities) is estimated.

This study also involves three Technology Assessment (TA) case studies. For the most pressing problem areas, it is examined how the technology can be adapted and which social services must be provided in order to deal with the problem. A lot of attention is paid at the view of the users.
Furthermore, the assumptions for the transport model get twice feedback from the TA exercises and impact analyses.

On the basis of the results of this multidisciplinary study, recommendations for a more sustainable mobility policy will be made.

Models that are extended and used within this project are:

- TREMOVE, transport model for transport volumes;
- TEMAT, emission model for road traffic;
- ExTC, model for external environmental costs of transport;
- ARGUS, model for multiple criteria analyses and group decision-making.

Interaction between the different partners

See Activities partners and Scheme.
Throughout the project it is aimed at a general quality assurance that consists of three core activities: coordination, knowledge management & expert panel, and valorisation.

Link with international programmes

- European project ARTEMIS (Assessment and reliability of transport emission models and inventory systems);
- European project DECADE;
- ExternE network: NewExt;
- WHO working group on the quantification of health impacts of exposure from air pollution;
- COST Action 346 (Emissions and fuel consumption from heavy duty vehicles);
- European project Cleaner drive.

Expected results and/or products

- Sustainability Index Card per transport mode and technology.
- Updated and extended models for mobility, emissions and external costs.
- Indication of uncertainties on the assessments of emissions, impacts and costs.
- Policy recommendations concerning the stimulation of new technologies and modal shift, taking into account new insights in consumer choices and TA-aspects.
- Reports and publication, in which the models and results are discussed.

PARTNERS

Activities

VITO
Co-ordinator of the project. Carry out the sustainability screening of technologies. Develop an emission model for railway and inland shipping. Calculation of emissions and impact on public health. Perform the Technology Assessment studies. In collaboration with KULeuven-CES formulation of recommendations.

KULeuven-CES
Assessment of transport volumes for each transport mode and technology on the basis of a survey on consumer choices and modelling of mobility demand. Calculation of internal costs of mobility. Together with VITO formulation of recommendations.

CONTACT INFORMATION

Co-ordinator

Ina De Vlieger
Vlaamse Instelling voor Technologisch Onderzoek (VITO)
Expertisecentrum Integrale Milieustudies in collaboration with Expertisecentrum Energietechnologie

Boeretang 200
B-2400 Mol

Tel:+32 (0)14 33 59 33
Fax:+32 (0)14 32 11 85

ina.devlieger@vito.be
www.vito.be

Partner

Stef Proost
Katholieke Universiteit Leuven (KULeuven)
Centrum voor Economische Studiën (CES) – Onderzoeksgroep Energie, Transport en Milieu (ETE)

Naamsestraat 69
B-3000 Leuven

Tel: +32 (0)16 32 68 01
Fax:+32 (0)16 32 67 96

stef.proost@econ.kuleuven.ac.be
www.econ.kuleuven.ac.be

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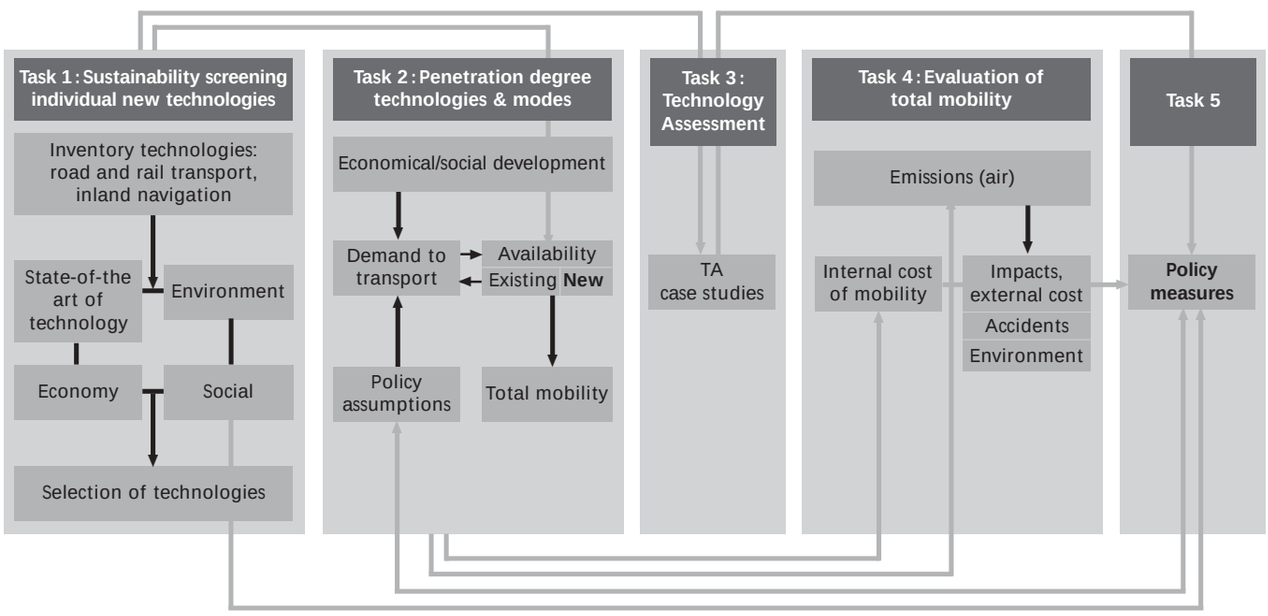

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FOUNDATIONS OF INTERMODAL TRANSPORT GROWTH IN BELGIUM: AN INVESTIGATION OF "MISSING LINKS"

Duration of the project: 15/12/2001 – 31/12/2003
Budget: € 239.654
Keywords: Missing Links, Intermodal Transport, Transport Policy, Sustainable Mobility, Transport Growth

CONTEXT

The Brussels (VUB) – Liège (ULg) research team is at present the main Belgian research group on intermodal transport issues. The present project aims to pursue an intermodal transport development research agenda that will focus on critical "missing links" in public policy and will include extensive strategy implications for the various actors involved, more specifically the national and regional governments, the transport companies and the transport users.

PROJECT DESCRIPTION

The prior researches led to the conclusion that both practitioners and public policy makers should focus on different aspects still largely "missing links". The present research project proposes an in-depth investigation of these elements.

The research process suggested by the research team does imply a bottom-up approach, and is complementary to the more conventional top-down approaches usually resulting from academic research. The research areas proposed here should therefore be viewed as the foundations of a new intermodal transport policy approach in order to foster a more attractive, transparent and co-operative environment for the various players in the transport market.

The main bottlenecks that hinder the growth of intermodal transport include the lack of a coherent location policy for intermodal terminals, the lack of transparency of the intermodal market which makes it difficult to engage in a modal shift, and the quality problems prevailing in intermodal transport as compared to road transport.

Objectives
The present project aims to integrate the knowledge bases acquired by the two research groups and to pursue an intermodal transport development research agenda that will focus on critical "missing links" in public policy and will include extensive strategy implications for the various actors involved, more specifically the national and regional governments, the transport companies and the transport users.

The joint research teams have identified several elements requiring urgent and in-depth study, namely:
1 Intermodal transparency concerning pricing.
2 The required added-value services to be provided.
3 The bundling possibilities to grow the use of intermodal transport.
4 Modal scan exercises.

Methodology
Each of the defined elements will be examined on the basis of the following components:
- the international academic researches on the topic;
- the previous results obtained by the team;
- the actual efforts (or lack of efforts) from different professional organisations and public agencies on the topic concerned in Belgium and also in other European countries;
- the coherence with the goals of transport policies of the Belgian and regional governments.

1 Analysis of prices
The present project aims to increase transparency of intermodal transport pricing through developing and administering, with the key suppliers of intermodal transport services in Belgium, a survey instrument.

2 Added-value services
Which additional value added services may increase the users' willingness to pay a higher price for intermodal transport as compared with unimodal road transport (for example: fulfilment of the role of proximate external stock warehouse) ?

3 Bundling possibilities
An evaluation model allows gaining insights into the actual bundling processes especially in function of the possibilities provided by so-called new generation terminals.

4 Modal scan analysis
The research team will conduct a number of high profile case studies in "high potential" companies with substantial traffic volumes that could be shifted to intermodal transport.

Interaction between the different partners
Each partner will be involved in each part of the study sometimes as responsible and sometimes as partner.

ANAST will be responsible for the following points:
- Analysis of prices.
- Insight of necessary added-value services.

VUB will be responsible for the following points:
- The bundling possibilities.
- Modal scan analysis.

Expected results and /or products
The stimulation of intermodal transport is at present an important priority for public policy makers. Given the expectation of increased road congestion and other road externalities in the future, public agencies face powerful incentives to stimulate the growth of intermodal transport.

A great number of high-quality papers on the topic can be expected. The research team intends to present the results at the 2004 World Conference on Transport Research (WCTR) and various European Transport conferences.

The transport sector will greatly benefit from the project in direct and indirect ways.

PARTNERS

Activities

ULg
The department 'Naval Architecture and Transport Systems Analysis (ANAST) of the University of Liège has research, teaching, training and consultant activities in Transportation Systems Analysis fields. Founded and headed by Prof. Jean Marchal (Full Professor at the University of Liege and a leading Belgian scholar in the areas of transport modelling, technical and economical analysis of transport systems).
ANAST main research methodology is based on global and integrated approaches taking into account technical and economical and/or social-economical aspects, realised in a multidisciplinary way and supported by evaluation instruments and decision-support tools.

VUB
The department 'Business Economics and Strategic Management' is specialised in the areas of transport policy evaluation and business-government interactions in various economic sectors (including R&D policy, trade and investment policy, industrial policy). Within this department, Prof. Alain Verbeke and Prof. Cathy Macharis are supporting the research in the domain of passenger and freight transport. Prof. Alain Verbeke is also associated with the University of Oxford, the University of Antwerp, and the KULeuven. He has published 14 books and over 160 referred papers. Prof. Cathy Macharis is giving the courses Transport economics and logistics management and Sustainable Mobility and Supply Chain Management at the Managementsschool Solvay of the Vrije Universiteit Brussel.

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CONTACT INFORMATION

Co-ordinator

Jean Marchal
Université de Liège (ULg)
Architecture navale et analyse des systèmes de transport (ANAST)

1, chemin des Chevreuils
Bât B52/3, B-4000 Liège

Tel: +32 (0)4 366 92 27
Fax: +32 (0)4 366 91 33

J.Marchal@ulg.ac.be
www.ulg.ac.be/anast

Partners

Cathy Macharis and Alain Verbeke
Vrije Universiteit Brussel (VUB)
Vakgroep voor Bedrijfseconomie en Strategisch Beleid

Pleinlaan 2
B-1050 Brussels

Tel: +32 (0)2 629 22 86
Fax : +32 (0)2 629 20 60

cathy.macharis@vub.ac.be
www.vub.ac.be/bedr/

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