

Environmentally friendly transport projects and the Fifth Framework Programme

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Introduction

This presentation aims to give an overview of the activities of the Fifth Framework Programme, focusing on the opportunities for environmentally friendly vehicles. Source material for the paper are excerpts of the official 5FP documents as made available by the Commission, edited and commented by the presenters.

The Fifth Framework Programme

Generalities

The Fifth Framework Programme (FP5) sets out the priorities for the European Union's research, technological development and demonstration (RTD) activities for the period 1998-2002. These priorities have been selected on the basis of a set of common criteria reflecting the major concerns of increasing industrial competitiveness and the quality of life for European citizens.

The Fifth Framework Programme has two distinct parts: the European Community (EC) framework programme covering research, technological development and demonstration activities; and the Euratom framework programme covering research and training activities in the nuclear sector. The total budget of the EC framework programme amounts to 13700 M€.

The Fifth Framework Programme differs considerably from its predecessors. It has been conceived to help solve problems and to respond to the major socio-economic challenges facing Europe. To maximise its impact, it focuses on a limited number of research areas combining technological, industrial, economic, social and cultural aspects. Management procedures have also been streamlined with an emphasis on simplifying procedures and systematically involving key players in research.

Priorities have been chosen according to three basic principles which will apply for all levels: the Framework Programme as a whole, the Specific Programmes implementing it and the RTD activities covered by those programmes.

- European "value added" and the subsidiarity principle, for example, to reach a critical mass or contribute to solving problems of a European dimension,
- Social objectives, such as quality of life, employment or protection of the environment in order to meet the expectations and concerns of the Union's citizens,
- Economic development and scientific and technological prospects in order to contribute to the harmonious and sustainable development of the European Union as a whole.

Structure and contents

The Fifth Framework Programme consists of seven Specific Programmes, of which four are Thematic Programmes and three are Horizontal Programmes.

The Thematic Programmes are:

- *Quality of life and management of living resources*
- *User-friendly information society*
- *Competitive and sustainable growth*
- *Energy, environment and sustainable development.*

In line with the provisions set out in the EC Treaty, the widely ranging Horizontal Programmes underpin and complement these Thematic Programmes. The Horizontal Programmes are:

- *Confirming the international role of Community research*
- *Promotion of innovation and encouragement of participation of small and medium-sized enterprises (SMEs)*
- *Improving human research potential and the socio-economic knowledge base.*

One essential new characteristic of the Fifth Framework Programme is the integrated, problem-solving approach. Integration is strengthened at three levels:

- By the *key action* concept in the Thematic Programmes. Key actions are major innovations of the Fifth Framework Programme. Implemented within the specific programmes, these flexible instruments are targeted at achieving solutions to topics of great concern in Europe. "Key actions" aim to mobilise the wide range of scientific and technological disciplines - both fundamental and applied - required to address a specific problem so as to overcome the barriers that exist, not only between disciplines but also between the programmes and the organisations concerned.
- By integration between Horizontal and Thematic Programmes objectives.
 - International co-operation
Participation by entities of third countries and international organisations will be possible in all Programmes in addition to opportunities for participating in the Horizontal Programme "Confirming the international role of Community research".
 - Innovation and participation of SMEs
Measures encouraging SME participation in RTD activities will be carried out in all Thematic Programmes, interfacing with the Horizontal Programme "Promotion of innovation and encouragement of SME participation".
 - Socio-economic and training aspects
Socio-economic research is present in the Thematic Programmes as an integral part of the technological research activities.
- By integration between Thematic Programmes. Complementary and synergistic interactions will be ensured in implementing the Programmes.

Implementation

Work Programme

A *Work Programme* has been drawn up for each Specific Programme, describing the specific activities and the various research areas. The Work Programme is revised

regularly with the assistance of Advisory Groups of independent experts to ensure its continued relevance in the light of evolving needs and developments. Potential proposers should therefore ensure they are consulting the current version of the work programme when planning a proposal. The Work Programme appearing at the Specific Programme Website is always the current version.

The Work Programme includes an indicative timetable or “roadmap”, which indicates which parts of the Work Programme will be opened, by calls for proposals, and deadline(s) involved. This provides a means of focusing attention on areas or sub-areas, thereby optimising opportunities for launching collaborative projects and establishing thematic networks.

The Commission will manage the Specific Programmes to ensure that links in thematic content between the programmes are exploited in a synergistic way. This may occasionally require joint or synchronised calls for proposals. Where necessary, co-ordination measures such as these will be indicated in the announcement of the calls for proposals, and in the Work Programme.

Types of actions supported

The Community will contribute financially to the RTD activities, carried out under the Specific Programmes implemented within the Fifth Framework Programme. The general rules are as follows:

(a) Shared-cost actions

- Research and technological development (R&D) projects – projects obtaining new knowledge intended to develop or improve products, processes or services and/or to meet the needs of Community policies (financial participation: 50 % of total eligible costs, or 100 % of total eligible cost for universities using the additional cost model)
- Demonstration projects – projects designed to prove the viability of new technologies offering potential economic advantage but which cannot be commercialised directly (financial participation: 35 % of total eligible costs)
- Combined R&D and demonstration projects– projects combining the above elements (financial participation: 35 to 50 % of total eligible costs)
- Support for access to research infrastructures (maximum of 100 % of the eligible costs necessary for the action)
- “SME Co-operative” research projects – projects enabling at least three mutually independent SMEs from at least two Member States or one Member State and one Associated State to jointly commission research carried out by a third party (financial participation: 50 % of total eligible project costs)
- “SME Exploratory” awards – support of 75 % of total eligible costs for an exploratory phase of a project of up to 12 months (e.g. feasibility studies, validation, partner search).

(b) Training fellowships

Marie Curie fellowships are either fellowships, where individual researchers apply directly to the Commission, or host fellowships, where institutions apply to host a number of researchers (financial participation: maximum of 100 % of the additional eligible costs necessary for the action).

(c) Research training networks and thematic networks

Training networks for promoting training-through-research especially of researchers at pre-doctoral and at post-doctoral level - and thematic networks for bringing together e.g. manufacturers, users, universities, research centres around a given S&T objective. Support will cover maximum 100 % of the eligible costs necessary for setting up and maintaining such networks.

(d) Concerted actions

Actions co-ordinating RTD projects already in receipt of funding, for example to exchange experiences, to reach a critical mass, to disseminate results etc. (financial participation: maximum of 100 % of the eligible costs necessary for the action). These include co-ordination networks between Community funded projects.

(e) Accompanying measures

Actions contributing to the implementation of a Specific Programme or the preparation of future activities of the programme. They will also seek to prepare for or to support other indirect RTD actions (financial participation: maximum of 100 % of total eligible costs).

Clusters

The cluster is a defined group of RTD projects. Its aim is to guarantee complementarity among projects, to maximise European added value within a given field and to establish a critical mass of resources at the European level.

An integrated approach towards research fields and projects financed is needed to solve complex multidisciplinary problems effectively. The clusters reflect this problem-solving approach. Indeed, in a cluster projects are joined together because they complement each other in addressing major objectives in the context of a key action or a generic activity (sometimes even across different key actions or specific programmes). Clusters are expected to optimise scientific networking, management, co-ordination, monitoring, the exchange of information and, on voluntary basis, the exploitation and dissemination activities. The cluster may thus become a natural process to generate European added value, wherever it makes sense, beyond the limited resources of an isolated project.

All types of projects can be assembled and integrated within a cluster, including those funded by different EU RTD activities (key action, generic activity, infrastructure). By the same token, and as part of an overall European approach, relevant activities under other research frameworks (notably EUREKA, COST) could also be taken into account whenever this can reinforce synergy.

Programme implementation

The implementation of RTD activities is carried out through Calls for proposals, which can be of the following types:

- Calls for proposals with fixed deadline dates (periodic calls): these are open for submission of proposals within a defined scope and with fixed deadlines. The scope is defined, for each call, in the work programme and specified in the call published in the Official Journal. The deadlines are outlined in the indicative timetable for program
- Open calls: these are launched at the start of the programme for SME specific measures, Marie Curie Fellowships, Accompanying Measures, Expressions of

Interest inviting interested parties to suggest ideas for topics (RTD and infrastructure related needs) in some of the areas to be covered by these calls and International initiatives, such as Intelligent Manufacturing Systems (IMS), and remain open until the last year of the Framework Programme, with periodic evaluations (2/3 per year).

- Dedicated calls: these will be published once or twice a year and will be restricted to a number of specific topics and/or activities. Supporting documents will be made available to specify in depth the objectives of required activities. This modality enables the programme to focus on well identified research or infrastructure needs in Europe,

Environmentally friendly vehicles in the 5FP

Several key actions of the Fifth Framework Programme clearly address issues which are related to environmentally friendly transport. The Thematic Programmes “Competitive and Sustainable Growth” and “Energy, Environment and Sustainable Development” will address these issues in particular. The following paragraphs will summarise the main action domains where relevant action areas and clusters can be identified.

The Competitive and Sustainable Growth Programme

Objectives

The main targets of the Competitive and Sustainable Growth Programme are:

- “growth”: assuring long term future for the EU economy: creation of wealth, employment opportunities, enhancement of quality of life and better working conditions
- “sustainability”: achievement of growth within a responsible economic system, not endangering the next generation’s needs (preservation of the environment and of natural resources)
- “competitiveness”: capacity to create wealth by providing high quality, customer oriented goods and services in efficient organisations.

This goes hand in hand with the development of related services, including transport, which are economic, safe and protective of the environment and quality of life as well as with the development of quality materials, reliable measurement and testing methods and the optimal use of specific research infrastructures.

Competitiveness and sustainability require a “systems approach” in which research activities support the development of coherent, interconnected and eco-efficient industrial and social systems, responding to both market and social needs.

Strategy

The programme supports research activities contributing to competitiveness and sustainability, particularly where these two objectives interact.

- Answering to socio-economic needs: by stimulating holistic approaches, by strengthening the innovative capacity of the European industrial system and by fostering the creation of businesses and services built on emerging technologies and new market opportunities, the programme will help to face the major challenges of society, in particular employment. In parallel, research into sustainable mobility and environmentally and customer friendly processes, products and services will contribute to improving the quality of life and working conditions.

- Stimulating European added value: Activities to solve the cross-border problems arising in connection with the various key actions have a clear European dimension, as does the development of norms and standards in support of Community policies. Achieving the critical mass needed to attain concrete and tangible results in cost-intensive technologies will also necessitate mobilising national and other RTD Community resources.
- Supporting European competitiveness: Europe suffers from a recognised gap compared with its major competitors, inasmuch as it is less able to translate its scientific knowledge into innovation. Not only research but also innovation in respect of new concepts (e.g. eco-industries) should be fostered to boost competitiveness and productivity.

Programme structure and content

The Programme is structured in three main interconnected elements:

- A set of four Key Actions, helping to develop critical technologies, concepts and policies to solve clearly identified problems. Two of these Key Actions are particularly significant for transport issues.
- Research and technological development activities of a generic nature, with potential multi-sectoral applications, helping to develop the scientific and technological base in a limited number of critical areas.
- Support for research infrastructures. This action will stimulate infrastructure operators to co-operate and pool resources among themselves, as well as with users of the infrastructure. In addition it will help to provide a relevant networked environment in the fields covered by the Programme.

Key Action 2: Sustainable Mobility and Intermodality (371 M€ budget)

The three RTD priorities of this Key Action, which contribute to achieving the policy goal of sustainable mobility, reflect the three main components of a modern integrated transport system:

- (a) a regulatory and accountable framework reflecting socio-economic objectives;
- (b) an interoperable infrastructure which allows the operation of attractive, environmentally friendly and efficient transport means;
- (c) modal and intermodal systems for managing operations and providing services.

Traffic in Europe is expected to double by 2025. Its turnover amounts to 7.5% of GDP, but 2% of GDP are costs linked with transport congestion

The objective of this Key Action is to support sustainable, safe, intelligent and interoperable transport systems, without damage to the environment, whilst reducing external costs (-20%); intermodal transport systems

This is achieved through RTD on development of systems for management and safety of transport, navigation and positioning, as well as on infrastructures; socio-economic research.

The main characteristics of this Key Action are illustrated in Figure 1.

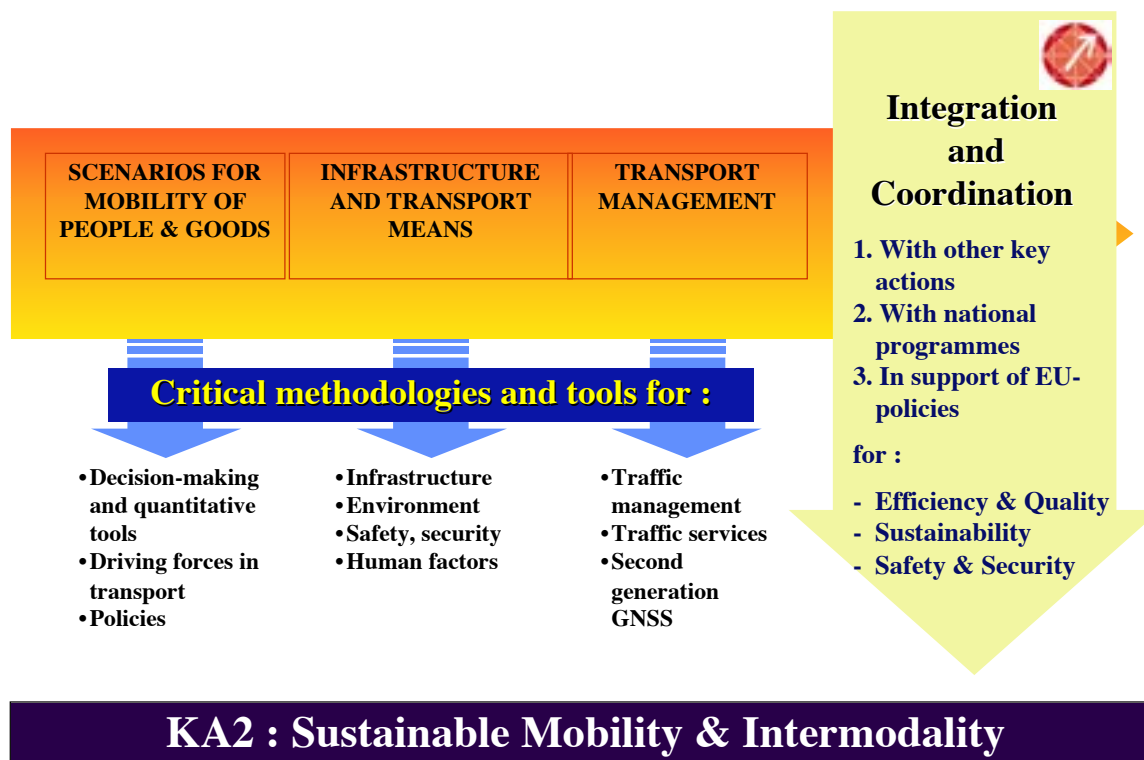


Figure 1: Sustainable Mobility & Intermodality

Key Action 3 - Land transport and marine technologies (320 M€ budget)

Over 90% of passengers and goods transport in Europe is performed over land or water. The composite turnover of the industry is 600 billion € and the direct and indirect employment in the sector exceeds 12 million.

The objective of this Key Action is the development and integration of knowledge and technologies specific to land transport and sea-based activities for consolidation of competitive position of European industry and full exploitation of its potential

This is obtained through developing and integrating critical technologies, as well as systems into concepts for sustainable and efficient vehicles, vessels and related infrastructures;

The research efforts will be considered and organised around

- (a) the development of critical technologies and
- (b) their integration and validation around advanced industrial concepts in order to attain the following main deliverables:
 - (i) improved fuel efficiency and reduction of emissions;
 - (ii) improved performance and
 - (iii) improved system competitiveness.

Figure 2 gives an overview of the structure of this Key Action.

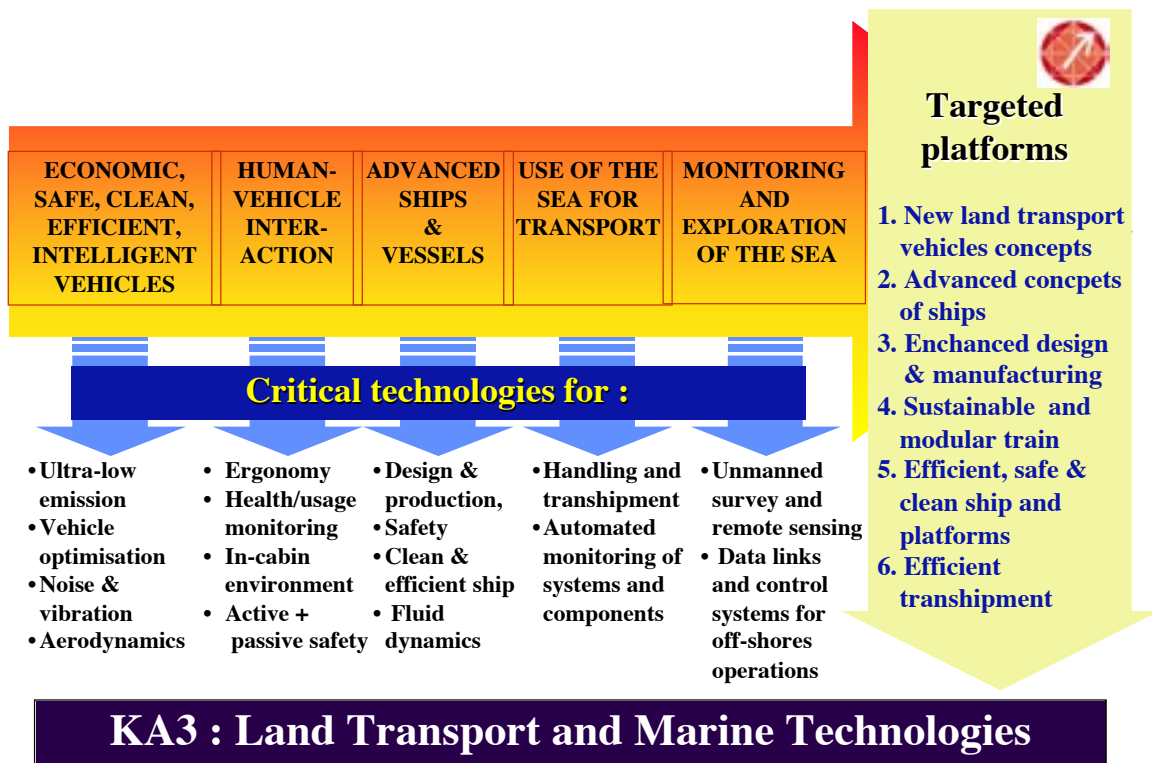


Figure 2:/ Land Transport and Marine Technologies

Linking with other Key Actions - Clustering opportunities

The interaction between the various elements of the Fifth Framework Programme allows for the formation of clusters allowing an interdisciplinary approach of selected issues. The opportunities for cluster formation and interaction with other Key Actions for the Key Action "Land Transport and Marine Technologies" are given as an example in Figure 3.

This close interconnection between several aspects is one of the main characteristics of the 5FP.

Typical examples of potential clusters involving environmental vehicle technology include:

- "Land transportation by fuel cell technologies", with as target a long term integrated transport means with minimal CO₂ and zero emissions.
- "Safe and friendly vehicle", with as target: the friendly vehicle with near zero crash casualties and fatalities.
- "Sustainable Mobility and Intermodality for the City of Tomorrow", with as target the integrated traffic flow of autonomous unmanned vehicles and conventional vehicles under infrastructure supervision.

EU's FIFTH FRAMEWORK PROGRAMME FOR RESEARCH AND TECHNOLOGICAL DEVELOPMENT

Synthesis of links among the Key Action "Land Transport and Marine Technologies" and other Key Actions

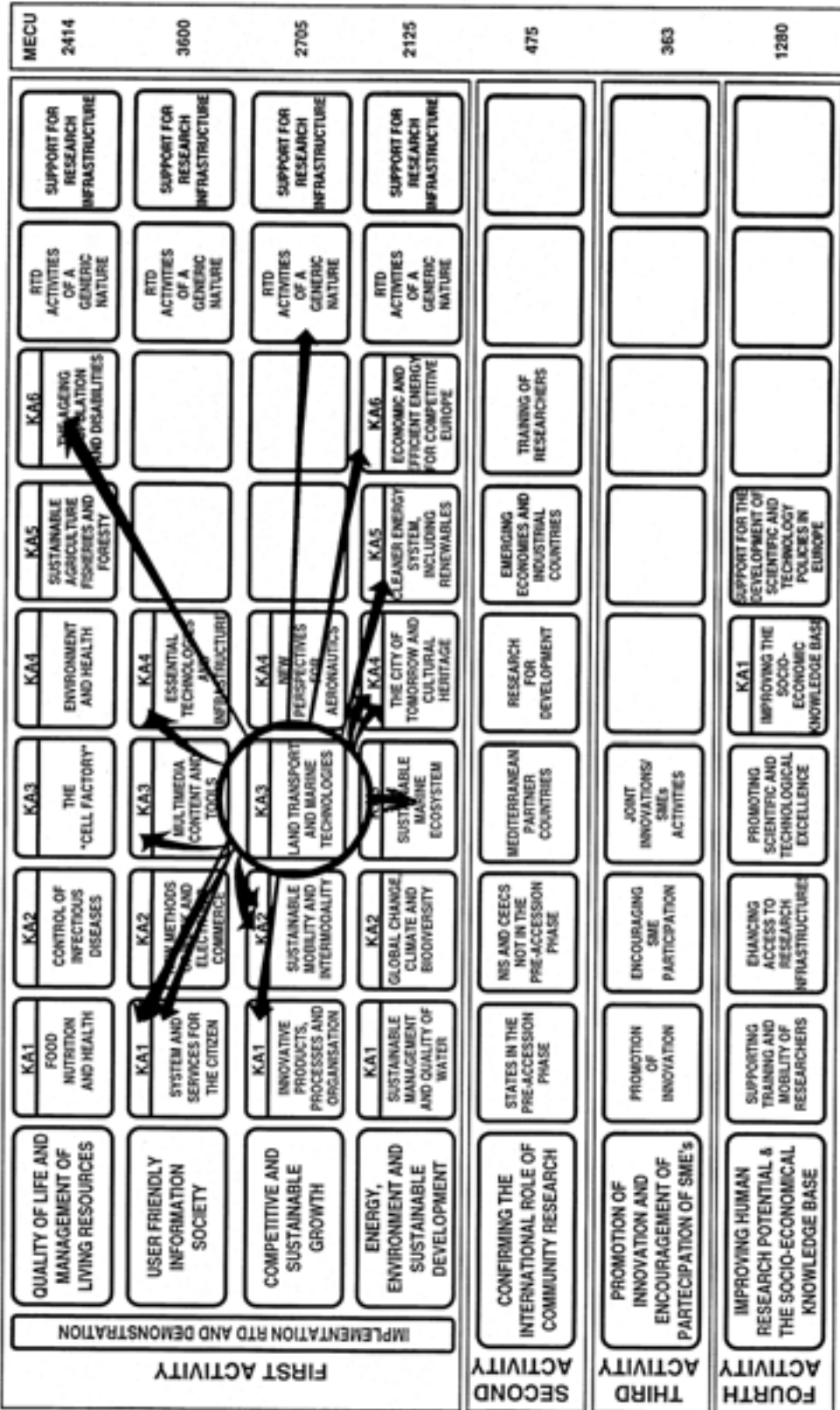


Figure 3: Clustering and interlinking of Key Actions in 5FP

The “Energy, environment and sustainable development” programme

Objectives

The strategic goal of this programme is to contribute to sustainable development by focusing on key activities crucial for social well-being and economic competitiveness in Europe.

Strategy

In line with the principles laid down for selecting major research themes for the Fifth Framework Programme, which is aimed at addressing socio-economic issues, emphasis will be placed in this programme on the following.

- European added value and the subsidiarity principle: By mobilising resources and focusing on key targets, the specific programme will form a key part of the European contribution to global initiatives and programmes. Knowledge generated through collaborative RTD at the European level is essential to addressing the serious issues of sustainable development facing the EU. These efforts, including pre-normative research, will confer genuine European added value to the process of developing appropriate regulatory frameworks, for example in the post-Kyoto context.
- Social objectives: Society is making increasing demands for better living conditions, better safety, and better use of vital and scarce resources including secure and economic energy supplies and services. These key societal issues will only be solved if in addition to developing technologies, the socio-economic context is appropriately analyzed and taken into account.
- Economic development and scientific and technological prospects: The promotion of sustainable development will not be possible unless economic objectives relating to technological development, competitiveness and growth are reconciled with societal goals. This challenge must be met in the context of significant structural and demographic changes, and globalisation of the economy. Enormous potential will exist for global exploitation from several areas of the programme, strengthening economic competitiveness and creating new jobs.

Structure and contents

The programme is composed of two sub-programmes, "Environment and Sustainable Development" and "Energy", which makes it possible to address complex societal-driven issues through integrated, multidisciplinary and multisectoral activities.

In order to meet the goal of the programme, a set of key actions identify **targets and deliverables** to be addressed through an integrated, multidisciplinary, problem-solving approach. The RTD activities associated with each key action should be seen as a coherent grouping of small and large, basic, generic and applied research and demonstration activities directed towards a common European challenge or problem identified through the key action, not excluding global issues. Accordingly each proposal will have to show, with supporting evidence including quantitative objectives, the extent to which it can address most efficiently the targets and deliverables set for the key action.

Environment and sustainable development

The strategic goal of this part of the programme is to promote environmental science and technology so as to improve our quality of life and boost growth, competitiveness and employment, while meeting the need for sustainable management of resources and protection of the environment. One Key Action will specifically address transport issues:

Key Action 4: The city of tomorrow and cultural heritage (170 M€ budget)

The overall goal of this action is to support sustainable economic development and competitiveness, improved urban management and integrated planning policy, and help safeguard and improve the quality of life and cultural identity of citizens

The focus will be on the provision of an integrated socio-economic knowledge-base, and products, services, tools and technologies for better city management and on the environmental challenges, particularly in relation to reducing pollutant emissions

The approach will focus on socio-economic, environmental and technological issues including the development, integration, and demonstration of technologies, tools and methodologies to improve forecasting, monitoring and assessment and establishing best practice

Emphasis will be put on increasing citizen and stakeholder participation in urban decision making and helping ensure the availability of reliable, efficient and affordable services for all urban citizens, including those with special needs.

Transport-related content of this workprogramme focuses on the following issues:

- Comparative assessment and cost effective implementation of strategies for sustainable transport systems in an urban environment (4.4)

The main objective is to reduce urban pollution and congestion and to ensure accessibility and mobility. This is performed through two specific actions :

- 4.4.1.Strategic approaches and methodologies in urban planning towards sustainable urban transport (4.4.1). This area has been subject of the first call for proposals in 1999.

Objectives:

- Integration between land use planning and transport planning
- Strategic approaches towards land use patterns favorable to the alternatives to the individual motorised vehicles, such as collective or other sustainable transport forms

Anticipated deliverables:

- definition and development of indicators, scenarios, models, planning tools, assessment methodologies to describe and optimise the interactions between urban land use and transport patterns
- analysis of the institutional, legal and financial barriers associated with optimised planning
- evaluation of urban infrastructure and facilities promoting the use of non motorised modes

- Comparative assessment and demonstration of new transport technologies and related infrastructure (4.4.2). This area will be subject of the second call for proposals (to be published October 1999 – deadline January 2000)

Objective: Strategic approaches towards the introduction of new urban transport technologies compatible with the overall transport system

Anticipated deliverables:

- improved concept simulation and evaluation of innovative urban transport/transit means in a specific urban context

- vehicle/transport system modelling, simulation, and cost benefit analysis and assessment, life-cycle analysis, niche management supported by prototype testing, demonstration, and validation.
- real-scale demonstration and assessment of user-friendly new vehicle concepts for personal, or freight transport.
- analysis of improved vehicle/urban infrastructure compatibility.

Energy

The strategic goal of this part of the programme is to develop sustainable energy systems and services for Europe and contribute to a more sustainable development world-wide, leading to increased security and diversity of supply, the provision of high-quality, low-cost energy services, improved industrial competitiveness and reduced environmental impact.

RTD will concentrate through two key actions on tackling the following issues. Generic activities essential to achieve the objectives of the programme will also be carried out.

Key actions relevant for transport include:

Key Action 6: Economic and efficient energy for a competitive Europe (547 M€ budget)

Within this Key Action, the following areas have been subject of the first call for proposals in 1999 (deadline was 15 June):

- Hybrid and electric drivelines, and energy storage and conversion devices (6.1.5): For alternative propulsion systems to become competitive, challenging performance, lifetime and cost targets have to be met, established and validated in bench and prototype vehicle demonstrators. This includes batteries, fuel cells and fuel processors and other energy storage and conversion devices and hybrid systems, aiming at overall "well to wheel" driveline efficiencies of 35% for the standard European drive cycle.
- Proving innovative public and private transport means (6.1.6): The target is the demonstration and comparative assessment of energy efficiency, emissions, feasibility, reliability, safety, operability and economics of alternative propulsion vehicles, (e.g., buses, two and three wheelers, passenger cars, trucks, light personal rapid transit systems) and fixed infrastructure (e.g. fueling). In all cases the aim is achievement of substantial energy savings including heat recovery, consistent with improving mobility. An additional target is to realise rational indicators of cost-effective, energy efficient and cleaner evolution pathways for vehicle propulsion, including development of high accuracy vehicle / emission simulation and procedures for life cycle assessment, bench, field and safety testing. This will demonstrate measures and technologies capable of achieving a long term aggregate target of 50% reduction in CO₂ emissions per passenger-kilometre and per payload-kilometre, and >90% reduction in harmful emissions.

The second deadline call (4 October) will include the following:

- Transport combustion optimisation with cleaner hydrocarbon and alternative transport fuels (6.1.4): The target is to further improve peak (e.g. 45% Otto, 55% Diesel) and part-load efficiency, specific power (e.g. 3kW/kg Otto, 2kW/kg Diesel), and torque, whilst exceeding "EURO IV" emissions and particulate targets, and reduced noise, whether using hydrocarbon or alternative fuels. Another target is efficient processes to produce intrinsically cleaner hydrocarbon and alternative fuels, including hydrogen.

Synergies with other programmes

Collaboration, coordination and complementarity will be fostered within and between key actions in this and other programmes, including the activities of the JRC, national research programmes and international research programmes.

Co-ordination with other thematic programmes is based on promoting synergetic interactions and complementary activities and avoiding unnecessary duplication. Co-ordination with the horizontal programmes strives to reinforce policy-based objectives linked to the involvement of SMEs and the innovation process, training, and international co-operation.

Special attention will be given to the co-ordination of relevant activities across the Framework Programme in the areas of marine research, urban issues, transport issues, global change, space and energy technologies.

Integration will be an important feature of the programme, focusing and co-ordinating shared-cost actions by taking advantage of the possibilities offered by Marie Curie Fellowships, Concerted Actions, Thematic Networks, Accompanying Measures, and clustering.

Conclusions

The Fifth Framework Programme offers several interesting opportunities for research and demonstration projects involving environmentally friendly vehicles. The proposed Work Programmes and the definition of research priorities clearly highlight the recognition by the European Union of the significance of the problem caused by the environmental and societal impact of traffic, particularly in urban areas.

The foreseen interaction scheme between different 'legs' of the Programme is most promising as it will allow true interdisciplinarity of the projects, an aspect which has been lacking in a number of former actions.

When these words are being written, the proposals submitted in the first 1999 call are being evaluated. New proposals are being prepared for the second 1999 call. From early 2000, research work will start on the selected projects.

It is hoped that the aims of the Fifth Framework Programme will be realised through these projects, and that the intended interactions will come true, in order to benefit the whole of Europe.

References

The main source for Fifth Framework Programme information is the Cordis website at <http://www.cordis.lu> where all necessary documents (work programme, info for proposers, ...) can be accessed and downloaded.