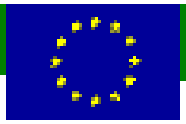


PRELIMINARY DRAFT

THE EUROPEAN HYDROGEN AND FUEL CELL TECHNOLOGY PLATFORM

Outline concept and structure

Version 3.7

7 November 2003

Important Note : this preliminary draft document will evolve in time as reflections on the concept and structure of the technology platform continue. The present document does not engage the Commission in any way.

OVERVIEW

The European Commission is facilitating the establishment of a European Hydrogen and Fuel Cell Technology Platform aimed at accelerating the development and deployment of these key technologies in Europe. The platform should assist in the efficient co-ordination of European, national, regional and local research, development and deployment programmes and initiatives and ensure a balanced and active participation of the major stakeholders (i.e. industry, scientific community, public authorities, users, civil society). It should help to develop awareness of fuel cell and hydrogen market opportunities and energy scenarios and foster future co-operation, both within the EU and at global scale.

The technology platform will be instrumental in structuring socio-economic and technical research on hydrogen and fuel cells at European level, as well as for stimulating increased public and private investment in research and development. The platform will also help to identify and to promote deployment opportunities both for energy infrastructure and services. The platform will be built up from ongoing and new projects, clusters and networks in the Commission's Framework Programme and in Member States, and will also include a number of specific steering panels and initiative groups as may be necessary to optimise its functioning and realise the platform's overall goals. These activities will be complemented by new initiatives for public-private partnerships and linked to industry projects, when appropriate.

The results of activities, including research and demonstration projects, undertaken under the auspices of the platform will be widely disseminated and communicated to the appropriate policy making bodies. These bodies themselves will be represented in the platform governance structure and play a crucial role in target setting and assessment. Regular annual or bi-annual meetings of platform participants will ensure shared ownership and a common vision.

The technology platform and all its activities should contribute to an integrated strategy to accelerate the realisation of a sustainable hydrogen economy in Europe, a concept endorsed by the European Commission on 10 September 2003.

CONTENTS

1. BACKGROUND AND RATIONALE TO THE H/FC TECHNOLOGY PLATFORM

1.1. The drivers for hydrogen and fuel cells

The European Commission has devoted increasing attention and resources to hydrogen and fuel cells for many years due to growing concern over meeting increased energy demand (especially in the transport sector), security of energy supply, greenhouse gas emissions and air pollution. As an energy vector, hydrogen can be produced from many different renewable and conventional primary energy sources, including nuclear. Fuel cells are very efficient and intrinsically clean energy converters. It is possible to construct effective bridging strategies from today's fossil energy systems to future sustainable, renewable based systems, based on hydrogen and fuel cells.

Hydrogen has been identified by the European Commission as an alternative motor fuel with the potential for a substantial contribution to reduce oil dependence in transport in the long term. It is also envisaged that hydrogen and fuel cell technologies can be integrated in "intelligent" energy networks with conventional and distributed renewable electricity systems and enable flexible and adaptable fuelling strategies, according to local resources, with fossil, bio-fuels or synthetic fuels - to reduce impact on air pollution and climate change.

Energy is key to almost all human work and leisure activity, to wealth creation, and above all, to improving health and welfare. Introducing hydrogen and fuel cells is expected to deliver substantial economic and environmental benefits and result in a paradigm shift in the way that energy and power will be delivered. To effect a transition in the way Europe produces and consumes energy is a major and complex task, with potentially large socio-economic and environmental consequences for the developed world. It will also open up opportunities for developing countries to prosper, by reducing infrastructure barriers associated with centralised energy supply, and creating new opportunities for energy services through decentralised generation. However, a great deal of work remains to be done to achieve this transition, with a 20 to 30 year perspective.

1.2. The high level group

Large capital investments are implied, as are changes to long-established industrial structures, employment, education and training. Recognising this, the Commission established a high level group on hydrogen and fuel cells in October 2002. The group's mandate was to come forward with a vision on the role that hydrogen and fuel cells could play in achieving sustainable energy, and on how to make that potential into reality in the next twenty to thirty years. The group comprised top-level stakeholders from across Europe, representing the various industries and research community interested in these technologies.

The high level group presented its summary vision report "*Hydrogen and fuel cells – a vision of our future*" as a communication to a major European conference on the hydrogen economy, held in Brussels on 16-17 June 2003. The conference brought together, under the aegis of the Commission President, around 450 participants representing high-level policy and decision makers from public administrations and from the industrial, financial, scientific and research communities as well as recognised representatives of civil society. The group's vision and recommendations were discussed and strongly endorsed by the conference.

A broad consensus emerged that the overall policy of the Union on sustainable development must encompass an ambitious strategy on hydrogen and fuel cells, given their potential for reversing the non-sustainable trends currently prevailing in the energy and transport sectors. Furthermore, the ultimate goal for Europe was considered to be a hydrogen economy based substantially on renewable sources of energy, even though in the short and medium term hydrogen may be produced largely from fossil fuels or nuclear energy in those countries which retain that option.

The key recommendation made by the high level group and endorsed at the June conference was to set up a ***European Technology Platform for Hydrogen and Fuel Cells***. It was further recommended to establish an advisory council to give guidance on initiating, structuring, implementing and monitoring the work being carried out within this platform.

1.3. The policy context

The establishment of a Hydrogen and Fuel Cell Technology Platform will contribute to the goal set for 2010 at the European Council in Lisbon in March 2000. Europe aims to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion. It will also contribute to the European strategy for increasing the R&D investment in the Member States to 3% of GDP by 2010, as stated in the Barcelona Council and in the Commission's Communication on "*Investing in research – an action plan for Europe*". The platform will also be a key element in developing the ***European Research Area*** in this field, which is a key EU research policy objective.

In addition to the European research policy, a wide range of European policies will have to be taken into account in developing the technology platform – most notably energy and transport policy, as well as environment and enterprise policy. Similarly the H/FC Technology Platform will be expected to provide recommendations for policy development. Whilst the interactions with different EU policies will vary according to the challenges to be addressed, effective mechanisms will need to be developed to ensure adequate co-ordination between the relevant stakeholders. The Commission will undertake to establish appropriate linking networks to facilitate this interaction.

1.4. The benefits and added-value of the platform

In order to realise its full potential, the European Hydrogen and Fuel Cell Technology Platform will require the active participation of all the major stakeholders – not only as partners to research projects, but also as participants to platform steering panels and initiative groups.

If it can succeed in mobilising all relevant stakeholders towards a common goal, the H/FC Technology Platform is expected to deliver substantial benefits, including:

- Accelerating the introduction of hydrogen and fuel cells to achieve sustainable and clean energy systems, whilst securing economic prosperity and creating new employment opportunities;
- Improving the effectiveness of European, Member State and private R&D investment in the hydrogen and fuel cell sector, through a common vision and a consistent strategic framework at EU level for both R&D funding and deployment initiatives. This common vision/path will help concentrate efforts and resources

and avoid fragmentation, thus contributing to restructuring and optimising research in Europe and building the ERA;

- Accelerating the generation of new knowledge, innovation and the uptake of research and technologies, improving competitiveness and productivity;
- Supporting the development and networking of regional clusters in research and demonstration will help regions to identify and address their own particular challenges and opportunities and enhance technology to meet these specific needs;
- By developing a framework for policy interface, it will help remove obstacles at EU, national and regional levels for deployment and accelerate the market penetration of new technologies. Technology demonstration will form an important element in this process and should lead to early deployment initiatives;
- Maintain an appropriate balance between innovative and policy oriented research while contributing to aligning in a coherent and consistent way research and technology developments with European policies and regulatory frameworks;
- Make the EU more attractive both for researchers and industrial investment;
- Inform policy makers about market trends, the changing needs of the sector and the consequences for society, for example in terms of skill shortages or research infrastructure deficiencies;
- Increase public awareness, understanding and acceptance of the technologies concerned and the research policy choices necessary to maximise the benefits for all stakeholders.

2. OBJECTIVES AND GUIDING PRINCIPLES OF THE H/FC TECHNOLOGY PLATFORM

2.1. Objectives

The main goal of the European Hydrogen and Fuel Cell Technology Platform (H/FC TP) is :

Facilitating and accelerating the development and deployment of cost–competitive, world class European hydrogen and fuel cell based energy systems and component technologies for applications in transport, stationary and portable power.

The scope and operational structure of the platform should be such as to ensure a balanced and active participation of the major stakeholders at the appropriate levels, as well as to allow efficient co-ordination of the European, national, regional and local research, development and deployment programmes and initiatives. It should help to develop awareness of fuel cell and hydrogen market opportunities and energy policy scenarios and to foster future co-operation, both within the EU and at global scale. On the latter aspect, the H/FC technology platform should contribute to the necessary co-ordination for optimising co-operation between the European hydrogen strategy and international initiatives, such as the International Partnership for the Hydrogen Economy (IPHE) recently proposed by the US Government.

The platform would act as a catalyst for establishing effective public-private partnerships and provide an interface between the EU and Member States for coherent policy development and consistent programme planning and implementation.

2.2. Values and principles

The H/FC technology platform will establish operational approaches and procedures reflecting the following basic values and principles:

- ***Providing overall direction (vision) and target setting:*** responding to the European Union's aspirations to sustainable development, world-class industrial competitiveness, and a global, knowledge-based society underpinning wealth creation and equal opportunities for Europe's citizens.
- ***Proving cost-effective solutions :*** assessing the potential of hydrogen and fuel cells to contribute cost-effectively to these aspirations, and in particular to future energy and environmental trends and policies such as security of supply, mitigating climate change and improved air quality.
- ***Acquiring world-class technology:*** seeking to ensure that appropriate public and private European efforts, including research, industrial and commercial interests, are engaged, mobilised and co-ordinated on a sufficient scale to acquire world class capability in developing and exploiting hydrogen and fuel cell technologies.
- ***Developing an exploitation strategy:*** fostering the emergence of a favourable business development environment, addressing the reduction of technical and non-technical barriers to investment and commercialisation, including those of a normative, regulatory or legislative nature. Identifying opportunities for public-private partnerships based on the most efficient use of hydrogen and fuel cell applications, including measures to encourage innovative small and medium enterprises.
- ***Providing human capital:*** stimulating the development of human resources at all levels and in all relevant skills.
- ***Dissemination and Communication:*** promoting public awareness and understanding through information, education and training.
- ***Maintaining the global context:*** developing international co-operation as appropriate to meeting the global requirements for development and deployment of hydrogen and fuel cells.

2.3. Scope of activities and deliverables

In order to contribute to the formulation and implementation of an integrated strategy for hydrogen in Europe, the H/FC technology platform would assist in taking forward the coherent and integrated development and implementation of a broad and far-reaching series of hydrogen and fuel cell programmes and initiatives, comprising:

- creation of ***a policy framework that is coherent across transport, energy, and environment*** to reward technologies that meet policy objectives;
- a ***substantial increase in technical research and development efforts and budgets*** in hydrogen and fuel cell technologies, from fundamental science to validation programmes, co-ordinating efforts at EU and Member State levels;

- a ***demonstration and pilot programme*** to extend the technology validation exercises into the market development arena, through "lighthouse" demonstration projects;
- an ***integrated socio-economic research programme*** to complement and steer the technical support and to provide a rational basis for guiding policy decisions;
- a ***business development initiative***, bringing together different financing organisations to provide leadership for technology exploitation;
- a ***Europe-wide education and training programme***, from schools to world-class research;
- ***enhanced international co-operation***, working in partnership with North America and the Pacific Rim, as well as the developing world, to speed up the introduction of sustainable energy technologies;
- a ***communication and dissemination centre*** for all these initiatives.

Following the recommendations of the high level group, specific deliverables of the platform in the short to medium term will include advice on:

- a **strategic research agenda** to define performance targets, priorities, timelines and budgets for industry and publicly funded research and development, including measures for enhancing networking and clustering of the R&D capacity in Europe, and ways for leveraging public and private investment in R&D;
- a **deployment strategy**, including recommendations on policy measures and lighthouse demonstration and deployment projects;
- a **European Roadmap for Hydrogen and Fuel Cells**, and
- **public-private partnerships** to promote commercialisation;
- a **policy interface, or framework,** to promote interaction between the platform and the political institutions and policy making;
- a strategy to develop and implement **international co-operation**.

The platform will also need to put into place mechanisms to measure the success of its various activities and progress towards achieving the European vision.

3. THE STRUCTURE AND OPERATION OF THE H/FC TECHNOLOGY PLATFORM

The technology platform will be an autonomous body, not dependent on the European Commission or any other body. It will develop its own methods of working and establish interfaces with other appropriate institutions, bodies and initiatives.

The European Commission will have a direct interface with the platform and will participate in it as appropriate to preserve the interests of the European Union.

3.1. Participants in the H/FC technology platform

The H/FC technology platform will have an open and accessible structure allowing the participation of all active stakeholders. However, involvement in the platform, especially its support mechanisms, will require a level of commitment appropriate to the level of participation, so as to ensure that initiatives are taken forward in an active and dynamic manner. Participation in one of the steering panels or initiative groups of the platform would clearly require a high level of commitment.

The technology platform will be built upon the foundations of existing European initiatives, networks and structures. Participants in the technology platform should represent a balance of expert knowledge and stakeholder interests.

Stakeholders include, for example, energy companies and utilities, fuel cell, energy equipment and vehicle manufacturers, component suppliers, system operators and developers, users and consumers, financial institutions, service providers, technical and socio-economic research providers, cities and regions as well as other public authorities, non-governmental organisations and representatives of civil society.

The technology platform should be steered and monitored by an advisory council, which should provide guidance on how to initiate and push forward the work programme. This and other support mechanisms are described in section 3.3 below.

3.2. The core of the H/FC technology platform (Platform Operations (PO)

The "beating heart" of the technology platform are the projects, initiatives, networks and structures that are actively working in the field of hydrogen and fuel cells. As a start, all current and future EU funded RTD projects (DG RTD and TREN) would automatically become part of the Platform Operations. Annex I provides a list of such projects, demonstrating that the technology platform will already be building upon a solid base of existing effort. New FP6 projects will also automatically join the platform. Completed projects will be made accessible to the platform through the targeted dissemination of available results.

The technology platform would actively seek to bring national, regional and local projects and initiatives, as well as privately-funded industrial RTD, within its framework. The aim is to have the widest possible European participation in the platform to ensure that the currently fragmented RTD effort in Europe is efficiently harnessed to achieve the vision of the platform. An inventory and mapping of such activities would need to be carried out to maximise the coverage of the technology platform.

[Annex II shows an illustration of the "Platform Operations", showing how it could be organised into coherent components and built upon existing RTD effort.]

Enabling mechanisms need to be established to create dynamic interactions between the multitude of projects and initiatives. The General Assembly described below is one mechanism, but is not sufficient.

3.3. The support mechanisms for the H/FC technology platform

An illustrative diagram of a possible support structure of the H/FC technology platform is shown in Annex III and the various component bodies described in outline below. These bodies would provide a structuring dimension to the platform to "make things happen" and optimise its functioning.

Advisory Council (AC)
Comprising 20-25 members representing the stakeholders, the Advisory Council would provide advice, stimulate initiatives and monitor progress. It will provide governance and input from the different stakeholders in the hydrogen energy arena, and oversee the establishment and deliverables of specific "steering panels" and "initiative groups".

The chairmanship, vice-chairmanship and membership would rotate on a regular basis, to keep it "fresh" and help maintain the momentum. Appointments to the Advisory Council would be for a fixed term, which would be renewable. The aim would be to replace at least a third of membership at every rotation.

The chairman, vice-chairmen and, if appropriate, steering panel and initiative group chairmen may meet more regularly than the Advisory Council in an "Executive Group (EG)", whose role would be to give real impetus to the effective functioning of the platform.

For further detail, the Terms of Reference for the Advisory Council are provided in Annex IV.

The first composition of the Advisory Council, for an initial start-up period of 18 months, is crucial to the success of the technology platform and needs to be carefully worked out, in terms of commitment to the process, transparency and balance.

The participation of high-level EC officials in the Advisory Council and, possibly, the Executive Group could be desirable, particularly in the initial stages.

TP Secretariat (PS)
The PS would provide organisational support to the Advisory Council, Executive Group, Steering Panels, Initiative Groups and General Assembly. It would also provide an Information Centre and IT support service. The secretariat would ideally be funded jointly by the EC and stakeholders. An FP6 Co-ordination Action might be the most appropriate short-term solution to public-private co-funding. In the interim period, Commission staff may provide secretariat support to kick-start the TP, within available resource constraints.

Annex VI describes the possible scope of activities of the secretariat.

General Assembly (GA)
Bi-annual (or annual) forum for all participants in the technology platform, to ensure shared ownership and a common vision. The GA would help ensure that projects and initiatives both exchanged information and results and were steered in the right direction to contribute to achieving the overall platform vision. It will also help the technology platform to monitor its own progress.

Organised in a conference and workshop format, with plenty of opportunities for networking and information exchange.

Virtual events and internet-based collaborative activities could be used to supplement the regular physical events.

Steering Panels (SP)
These groups would take responsibility for the next phase of the work recommended by the High Level Group – e.g. drafting the Strategic Research Agenda, Deployment Strategy etc. Establishing these panels would be an immediate priority for the Advisory Council, to which they would report.

The chairmen of these panels would be drawn from the membership of the Advisory Council and should be recognised "movers" or "champions". A typical size for a Steering

Panel would be 10-15 members, striking a balance between representativeness and efficiency. They would be expected to build upon and include existing projects and initiatives.

Initiative Groups (IG)

In a second stage, following the establishment of the Advisory Council and Steering Panels, these initiative groups would be formed and dissolved as necessary to address specific topics of interest identified by the Advisory Council, particularly in relation to the recommendations of the High Level Group's vision report. They would report to the Advisory Council and their composition, structure and functioning would be determined by the council.

Member States' Mirror Group (MG)

Actively involving the Member States (and Associated Candidate Countries) in the technology platform is essential to generate the leverage associated with drawing national, regional and local research programmes, projects and initiatives into the platform.

Given the size and balance envisaged for the Advisory Council, it would not be appropriate or efficient for Member States' representatives to meet in the council. The Mirror Group would be designed to fully involve the Member States in the technology platform, without creating inefficiencies at either the Advisory Council or Mirror Group levels. Of course, there must be a close interaction between the two bodies as well as with the steering panels and initiative groups. At least the chairman of the Mirror Group would be a member of the Advisory Council.

The Mirror Group has a key role to play, particularly with regard to the furthering the ERA in hydrogen and fuel cell technologies. The initial chairman would need to be a "champion" of closer co-ordination and co-operation between Member States' and regional research programmes and the members should be high level representatives of the relevant parts of the Member States' administrations (e.g. programme managers). The participation of other FP6 Associated States would also need to be ensured. The Group would establish its own provisions for rotating the chairmanship and membership, as appropriate. The possibility of including the activities of the Mirror Group under an FP6 ERA-Net initiative will also be explored.

The precise role and functioning of the Mirror Group will be determined in discussion with the Member States and the advisory council. A draft skeleton of possible terms of reference for the Mirror Group is presented in Annex V.

EC H2/FC Project Team

An inter-service (RTD, JRC, TREN, ENTR, ENV, RELEX, ECFIN, EAC) team of EC staff actively working on establishing and furthering the aims of the technology platform. In the first phase, this team would be a driving force behind the whole initiative, but it is expected that its direct involvement would decrease substantially in time, as the various platform components become fully operational. The team would thus progressively become more involved in receiving and analysing the various outputs and products delivered by the platform and incorporating them into policy and decision making.

ANNEX I – List of EU funded RTD projects (FP5) participating in the H/FC technology platform

Fuel Cell Projects

Solid Oxide Fuel Cells (SOFC)

- Scale-up of the IP-SOFC to multi-tens of kW Level (MF-SOFC)
- Decentralized Power Generation Plants based on Planar SOFC Technology; Proof of Concept (PROCON)
- Integrated Modelling Study of FC/GT Hybrids (IM-SOFC-GT)
- Component Reliability in Solid Oxide Fuel Cell Systems for Commercial Operation (CORE-SOFC)
- SOFC Stacks by using Advanced Spray Techniques (CEXICELL)
- Natural gas SOFCs for Co-generation of Electricity and Chemicals (NG-SOFC-COGEN)
- Demonstration of a MWel Class Power System using High Temperature Fuel Cells (SOFC) combined with Micro-Turbine Generators (1MWSOFC)
- Pressurized IP-SOFC: a path to successful SOFC/Hybrids (PIP-SOFC)

Molten Carbonate Fuel Cells (MCFC)

- Biogas-MCFC Systems as a Challenge for Sustainable Energy Supply (EFFECTIVE)
- Integrated Researches on Materials, Technologies and Processes to Enhance MCFC in a Sustainable Development (IRMATECH)
- MCFC Twinstack® Powered – First of a Kind (TWINPACK)
- MCFC/MTG Hybrid Power Plant Toward Low-cost Production (MOCAMI)

Polymer Electrolyte Membrane Fuel Cells (PEMFC) – Stationary Applications

- Hydrogen-based Electrical energy system for Local Power Storage (HELPS)
- Hybrid Fuel Cell/Heat Pump System (FUEL-SAVE)
- 50 kW PEM Fuel Cell Generator for CHP and UPS applications (50PEM-HEAP)
- Europe's first Virtual Fuel Cell Power Plant (VIRTUAL FC POWER PLANT)

Polymer Electrolyte Membrane Fuel Cells (PEMFC) – Transport Applications

- Fuel cell Energy systems standardised for large transport, BUSses and Stationary applications (FEBUSS)
- European Development of a Fuel-Cell Reduced-Emission Scooter (FRESCO)
- The Largest Fuel Cell Bus Fleet Trial Worldwide (CUTE)
- Fuel Cell Energy in Cities (CityCell)

Polymer Electrolyte Membrane Fuel Cells (PEMFC) – Membrane, Catalyst Development

- Proton exchange membranes for applications in medium-temperature electrochemical devices (PEM-ED)
- High-temperature PEMFC Stack with Methanol Reforming (AMFC)
- Development of Low-Cost, High-Efficiency PEM Fuel Cells (APOLLON)
- High-temperature PEMFCs for Industrial Use (OPTIMERECELL)

Polymer Exchange Membrane Fuel Cells (PEMFC) – Portable Applications

- Fuel cell Innovative Remote System for Telecommunications (FIRST)
- Hydrogen-fed miniature fuel cell for portable applications (H2-MINIPAC)

Direct Methanol Fuel Cells (DMFC)

- Direct Methanol Fuel Cell System for Car Applications (DREaMCAR)
- A 1 kW DMFC Portable Power Generator (PORTAPOWER)

Fuel Processors

- On-board Gasoline Reforming for Fuel Cell Vehicles (PROFUEL)
- Plasma Reforming of Fuels and Hydrogen Purification (PMFP)
- Biodiesel Processor for an On-Board Fuel Cell Auxiliary Power Unit (BIOFEAT)
- Fuel Processor Miniaturisation for Portable Power (MiRTH-e)
- Miniaturised Gasoline Fuel Processor for Fuel Cell Vehicle Applications (MINIREF)
- Diesel-fed SOFC Auxiliary Power Unit (DIRECT) .

Fuel Cell Networks
- Fuel Cell Systems and Components General Research for Vehicle Applications (FUERO)
- Thematic Network on SOFC Technology (SOFCnet)
- Fuel Cell Testing and Standardisation Network (FCTESTNET)
- European Fuel Cell Vehicles Technologies Validation (FUEVA)
- Marine Applications of Fuel Cells (FCSHIP)
- Thematic Network on Fuel Cell Vehicles (ELEDRIVE)
- Fuel Cells Performance Testing and Standardisation (FCTEST)

Hydrogen Projects

Hydrogen Production
- Low-cost, high-capacity Pressure Module Electrolyser for the Energy Hydrogen Market (HYSTRUC)

Hydrogen Storage
- Solid-state Hydrogen Storage for Light Vehicles (FUCHSIA)
- Hydrogen Storage in Hydrides for Safe Hydrogen Systems (HYSTORY)
- Advanced Hydrogen Storage Material (HYMOSSES)
- Systems for Alternative Fuels (SYSAF)

Renewable hydrogen
- Producing Clean Hydrogen from Bioethanol (BIO-H2)
- Decentralised CHP with the Biomass Heatpipe Reformer (BIOHPR)
- Progress in Coupling Biomass Gasification and MCFC Stack (CLEAN ENERGY FROM BIOMASS)
- Cluster Pilot Project for the Integration of RES into European Energy Sectors using Hydrogen (RES2H2)
- New Approach for Biomass Gasification to Hydrogen (AER-GAS)
- Hydrogen-Rich Fuel Gas from Supercritical Water Gasification of Wine Grape Residues and Greenhouse Rest Biomass (WINEGAS)
- Efficient and Clean Production of Electricity from Biomass via Pyrolysis oil and Hydrogen, utilizing Fuel Cells (BIO-ELECTRICITY)
- Integration of Renewable Hydrogen into the Hydrogen Economy (RENEWABLE–H2)
- Biomass and waste conversion in supercritical water for the production of renewable hydrogen (SUPERHYDROGEN)
- Feasibility study for export of hydrogen from Iceland to the European continent (EURO-HYPORT)
- Ecological City Transport System (ECTOS)
- Urban Solar-Hydrogen Economy Realisation (USHER)

Hydrogen Networks
- Fuel Cells and Hydrogen Improved R&D Strategy for Europe (FHIRST)
- European Integrated Hydrogen Project – Phase II (EIHP2)
- The European Hydrogen Network (HyNet)
- The European Hydrogen (based) Society (HYSOCIETY)

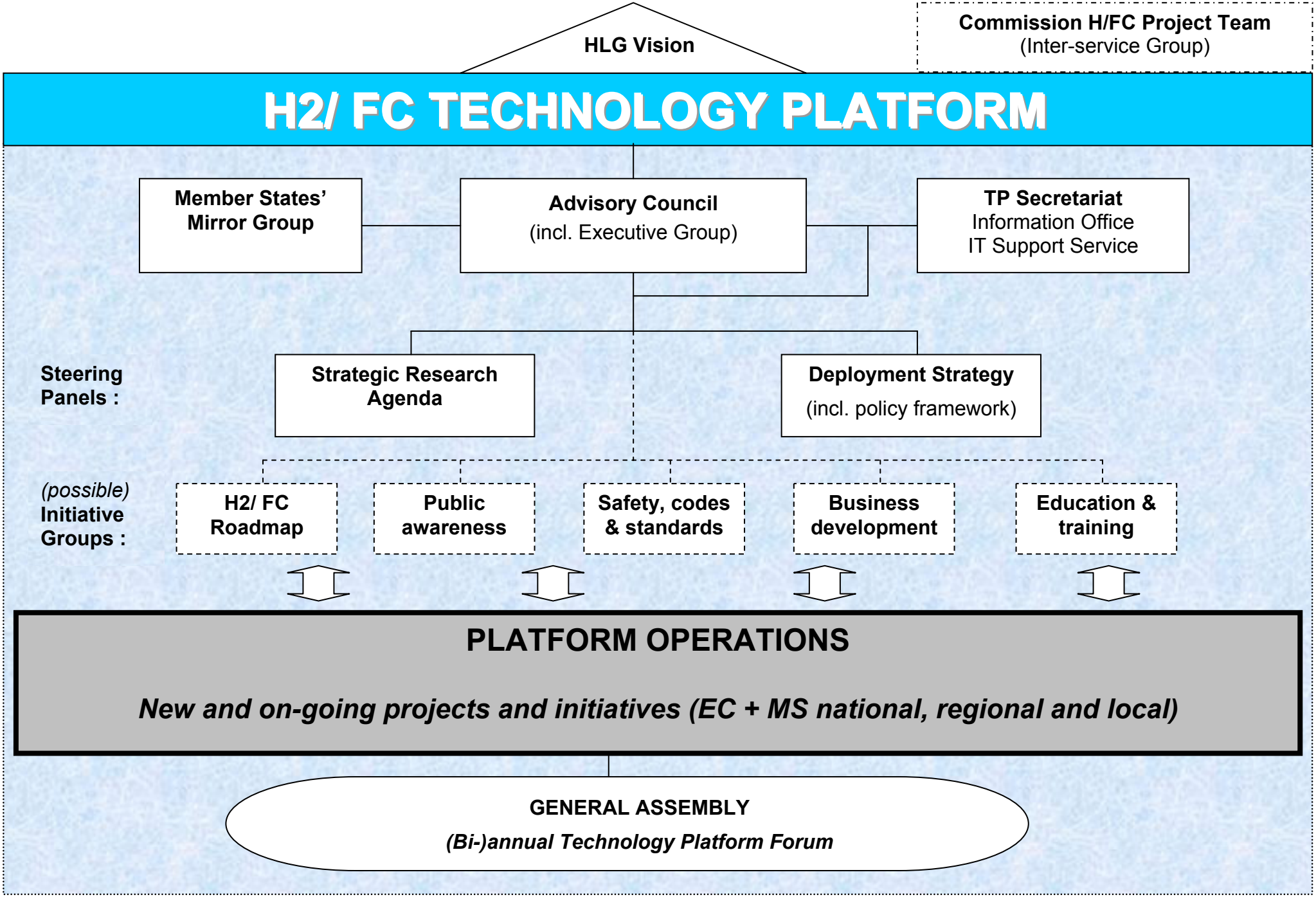
Other Support Actions
- Numerical Fuel Cell Component Performance Prediction Tool (NFCCPP)
- Advanced Ultra-Thin Ceramic Membranes for Efficient Industrial Processes (CERMOX)
- Sustainable Energy Technologies Reference and Information System (SETRIS)
- Public Acceptance of Hydrogen Transport Technologies (ACCEPTH2)

Annex II: Illustrative Diagram of the European H/FC Technology Platform Operations

(including mapping ongoing FP5 projects and networks)

(TO BE DEVELOPED)

ANNEX III – ILLUSTRATIVE DIAGRAM OF A POSSIBLE SUPPORT STRUCTURE FOR THE H/FC TP



ANNEX IV: TERMS OF REFERENCE FOR THE ADVISORY COUNCIL

1. Advisory Council Mission

To take forward and consolidate the "vision" of the High Level Group and to facilitate the smooth and efficient running of a European Hydrogen and Fuel Cell Technology Platform, ensuring its strategic relevance within a global context and that its direction is consistent with European Union policy.

2. Role of the Advisory Council

In guiding the implementation of the European Hydrogen and Fuel Cell Technology Platform, the Advisory Council (AC) will take into account and further develop the vision and recommendations of the High Level Group, as set out in its report. It will :

- set overall scope, strategic goals, performance targets and deliverables for the platform;
- steer the platform technical and non-technical operations, by proposing efficient organisational structures, and implementing procedures aimed at meeting the goals and deliverables and for monitoring progress and quality;
- seek to advise on public private partnerships and initiatives that are mutually beneficial;
- act as a focal point for developing a policy interface between platform operations and policy-making bodies.

3. Guiding principles and values

The advisory council will seek to ensure that EU policy objectives, principles and values are fully reflected in target setting and implementation of platform operations.

To enable the platform to realise its full potential, the Advisory Council will support the development of an integrated EU strategy for hydrogen and fuel cell technologies, stimulating the mobilisation of all major stakeholders – as partners to research and demonstration projects, or as participants to Steering Panels and Initiative Groups.

The Advisory Council will ensure that the results of target-driven research and demonstration projects undertaken as part of the platform operations will be widely disseminated to maximise transparency and encourage inclusion.

This will include reviewing existing activities and recommending and undertaking, with the assistance of the secretariat, or other such bodies as may be established, the creation of steering panels and initiative groups, as well as fostering the setting up of projects, clusters and networks (for the operational part of the platform). These groups and activities will complement the steering functions of the Advisory Council and will be charged with defining and implementing specific activities and deliverables relevant to steer the platform towards its goals.

4. Deliverables

The advisory council will deliver, with the assistance of the secretariat or other activities established for the purpose:

1. Proposals for an efficient platform governance structure and its implementation, showing the inter-relationships, traceability and accountability between the advisory council, thematic panels, initiative groups and other activities being carried out under the platform operations and links with complementary initiatives.

2. An action plan defining the scheduling of main lines of activity and indicative timing of the platform deliverables.

3. Procedures for monitoring and quality assurance of platform operations.

4. Annual reports on platform progress, including a non-technical section to inform policy-makers and the general public.

Other main platform deliverables, including advice on:

- strategic research agenda
- deployment strategy and lighthouse projects
- policy interface, or framework, and business development initiatives
- European Roadmap for Hydrogen and Fuel Cells
- strategy for international co-operation
- action plan on safety, codes and standards
- action plan for education and training and promoting public awareness

will be co-ordinated by the advisory council.

5. Scope of activities of the Advisory Council

The advisory council will ensure the following activities are fully addressed, by means of its own resources (stakeholder organisations), with the support of the secretariat, or through other means of support, such as may be defined.

1. Structuring: Develop and evolve the structure of the activities that make up the European Hydrogen and Fuel Cell Technology Platform – e.g. initiate specific steering panels, initiative groups on key themes/issues;

2. Monitoring: Regularly review progress on platform activities and deliverables, identifying EU strengths and weaknesses from both technical and socio-economic points of view;

3. Quality assurance: The Advisory Council shall assume responsibility for reviewing the quality and timely preparation of the annual reports and specific deliverables.

4. Recommendations for policy development: Where appropriate, contribute objectively to policy development through providing advice, representation and reporting on key issues (legislation, fiscality, non-fiscal incentives, financing research) that affect development and commercialisation of hydrogen and fuel cell technologies

5. Reporting: Define scope and content of the periodic technical reports, the political interface, and reports to the general public, as set out in Section 4 – Deliverables. These will include a technical section covering EU and MS programmes and initiatives, and report on progress towards a European Research Area. To assist with

the compilation of these reports, managers of platform operational activities and steering activities should be invited to contribute.

6. Communication: Develop and ensure the implementation of a communications strategy based on internet and other media.

7. International Co-operation: Ensure the necessary co-ordination for optimising the interface between the European hydrogen strategy and international initiatives, such as the envisaged International Partnership for the Hydrogen Economy recently initiated by the US Department of Energy. Report on international competitiveness issues.

8. Technology watch and strategic studies: Ensure a process for reporting and assessing technology breakthroughs – liaison should be established with relevant bodies, institutes and networks, such as the Science and Technology Observatory of the European Parliament (STOA) and the Commission Joint Research Centre (JRC), including the Institute for Prospective Technological Studies (IPTS), Seville. Identify and specify requirements for key strategic studies needed to support technical and non-technical actions, and/or respond to emerging political issues.

9. Complementary initiatives: This initiative also complements other similar initiatives, such as those in the road transport, railway and aeronautic sectors. The advisory council will undertake to exchange information, guide the platform activities, and explore mechanisms for ensuring that these initiatives are mutually complementary. It will also establish appropriate dialogue with other relevant bodies, such as the various committees of the European Parliament.

6. Advisory Council composition and membership

6.1 Composition, balance and inclusivity

The advisory council will be composed of between 20 and 25 appropriate members, as deemed necessary to carry out its mission. They will be drawn from a range of relevant stakeholders including, but not exclusively, those listed hereunder:

- Hydrogen and Fuel Cell equipment and component manufacturers, including system integrators for automotive, stationary and portable power applications (9)
- Energy companies, hydrogen production and supply, and utilities (6)
- Technical and socio-economic research providers, including academe (3)
- Representative User / Consumer associations, civil society (3)
- Cities, Regions and Member States (*up to 3, reflecting the new constitution, including, ex officio, the chairman of the MS mirror group*)
- European Commission (*up to 2, to be defined*)
- ……

The range of stakeholders will reflect the need for maximum efficiency and transparency. Stakeholders should reach consensus to facilitate a balanced composition of the advisory council with regard to members' nationalities, gender, industrial sectors as well as company and association representation.

6.2 Executive Group

In the interests of maintaining dynamics and efficiency, the advisory council shall appoint from its members a limited number of highly committed stakeholders (including the chairperson, vice-chairpersons), who will form an executive group. The executive group will have a key role in assisting the chair, proposing initiatives to the advisory council and developing operational mechanisms. It will undertake to liase closely with the secretariat, steering panels, initiative groups and platform operations, to ensure the implementation of activities recommended by the council.

The chairperson of the advisory council will also chair the executive group. Where chairpersons of steering panels or initiative groups are also members of the advisory council they should normally be considered for membership of the executive group.

The executive group, acting through the secretariat shall also be responsible for proposing the agenda and assembling the necessary documentation for the advisory council meetings.

The executive group will, at its discretion, convene such meetings as needed to progress initiatives and platform operations, and shall maintain a record of these meetings, to be circulated within two weeks to the full council for its information, approval and endorsement of any proposed actions, as appropriate.

The executive group will be authorised to invite additional expert participants (such as project and network co-ordinators) to its meetings.

6.3 Rules and procedures

The Advisory Council shall develop its operational rules and procedures, including participation rules. These will include procedures for decision-making, selection procedures and criteria for members, defining meeting frequency, members' commitment and obligations, procedures for replacing non-active members, etc.

6.4 Selection of Advisory Council Members

The Advisory Council will appoint its members, except in the first instance (see section 6.5). Where appropriate, selection will take place in consultation with the respective stakeholders' associations. Members will be expected to liase with their respective stakeholders' associations, or such other established consultation channels.

Selection criteria will be defined by the Advisory Council, based on an offer of commitment, demonstrated experience relevant to the objectives of the platform and a track record of high level management and strategy development (see member profile, section 6.7).

6.5 Initial selection to start the process

To ensure rapid progress, the Commission Services intends to propose the initial members of the Advisory Council as well as the chairperson and members of the Executive Group. In the interests of transparency and inclusion the initial appointments will be for a temporary period of 18 months, but with the option to extend by a further term of three years.

The Commission will publish an invitation to all interested parties to register their interest to serve on the Advisory Council or to be involved with other parts of the platform. Registrants' names and affiliations will be published. A short list of potential council members will be drawn up by the Commission Services with the assistance of representative stakeholders.

6.6 Declaration of commitment

Members will be required to demonstrate a high degree of commitment to promoting hydrogen and fuel cells as part of their regular activities, in accordance with participation rules to be developed under 6.3.

6.7 Member profile

Members will normally be of sufficient international standing and key actors in the hydrogen and fuel cell community, or related applications area, and be involved in a wide range of activities relevant to the Hydrogen and Fuel Cell Technology Platform. They will participate in a personal capacity, not representing their specific organisation.

Members will be able to provide substantial advice and be in a position to influence stakeholders in planning research and deployment programmes, fostering partnerships and leveraging resources.

The appointment of substitutes is not envisaged.

6.8 Chairperson and Vice-chairpersons

The members will select a Chairperson and two Vice-Chairpersons from their number. They will serve for a 3-year period and may be re-appointed once. In this case, one of the Vice-Chairpersons will become Chairperson in the second term.

6.9 Invited participants

The Advisory Council may invite other participants to its meetings, as appropriate, e.g. in cases where specialist expertise is required to deal with specific issues.

6.10 Procedures for decision-making

The chairperson shall make every reasonable effort to facilitate consensus amongst council members. In the event the council remains divided on an issue, the chairperson may exceptionally request members to vote. Rules for decision-making will be developed by the Advisory Council.

6.11 Meeting frequency

Plenary sessions of the Advisory Council will normally be held at least twice per year, or as determined by the Advisory Council itself.

6.12 Support

The Commission may assist initially with limited support for travel and subsistence in connection with plenary and executive group meetings. It is expected that in due course the membership will become self-sustaining.

7. Method of Working

The advisory council will maintain a vision and direction for hydrogen and fuel cell technologies.

Periodic reports together with platform deliverables, position papers, opinions, and recommendations as necessary will be communicated to the Member States, the European Institutions, relevant non-governmental organisations and all stakeholders. Copies of these documents will be made available to the public (e.g. by web site).

An annual executive summary will be sent to appropriate committees of the European Parliament, and other European Institutions.

7.1 Quality assurance

The Advisory Council shall take responsibility for reviewing the quality and timely preparation of the annual reports and specific deliverables listed in section 4.

In the event that contributions from working groups are not of a sufficient standard, the council should request in writing items that require to be improved.

7.2 Secretariat

A secretariat will be created to assist the technology platform, including its advisory council. The secretariat will be responsible for the organisation of meetings, the execution of the advisory council's calendar, the preparation of minutes of the meetings, and the publication of annual reports and maintenance of an internet site.

The secretariat will also support the organisation of steering panels and initiative groups, by acting as the focal point for collecting and disseminating their reports. Steering panels and initiative groups are however expected to be self-supporting in terms of progressing work, scheduling and organising meetings and in the preparation and delivery of reports.

ANNEX V: OUTLINE TERMS OF REFERENCE FOR THE MEMBER STATE MIRROR GROUP

1. Member State Mirror Group Mission

To take forward and consolidate the "vision" of the High Level Group at Member State level by deepening co-operation among Member States and with the European Activities on technical and non-technical matters relating to the Hydrogen and Fuel Cell Technology Platform, with a view to promoting a European Research Area, facilitating public/private partnerships and removing national barriers to commercial development and exploitation and by contributing to the realisation of a consistent European policy framework.

2. Main Objectives

- Ensure an appropriate interface for coordination and the representation (or inclusion) of relevant national, regional or local initiatives and activities under the H2/FC technology platform.

- Provide representation and input to the Advisory Council, Steering Panels and Initiative Groups, from a national, regional or local perspective.

- Advance the European Research Area by initiating activities for closer coordination and co-operation between national and regional programmes, under the orientations provided by the H2/FC technology platform.

3. Role and tasks of the Member State Mirror Group

The Member State Mirror Group, acting in co-operation with the platform Advisory Council and its Executive Group has a crucial role to play in goal and target setting, proposing actions and providing opinion and feedback on strategies, activities and results generated through the platform operations. It will address the following activities:

Providing opinion and advice: Provide information and advice on a periodic, voluntary basis to the Advisory Group on policies and programmes in MS that are relevant to realising the goals and deliverables of the technology platform.

Promoting an enhanced co-operation and co-ordination among Member States and European activities : Explore mechanisms for developing synergies and reinforce the co-operation among national initiatives, programmes and projects, including information exchange, co-ordination in programme development and possibly joint implementation of programmes and initiatives.

Structuring and strategy development: Contribute to building a coherent EU strategy on research and deployment and exploring possible mechanisms for achieving greater integration, such as Article 169 or other instruments of the EU treaties.

Scoping activities and target setting: Propose actions to the Advisory Council relevant to concerns of Member States. Work with the Advisory Council to set goals and targets; provide reflection on overall European goal and target setting, having regard to national aspirations and circumstances, including those relating to economics, demography, climate, and geography.

Closing the loop between technology development and policy-making: identify mechanisms and develop suitable links with economic, energy, transport and environment policy to promote understanding and awareness of technology developments and to establish agreed criteria for proving cost-effectiveness of these technologies to meet policy objectives.

Act as informal moderating body: representing collectively and individually the interests and views of the Member States; or/and their respective regions and cities, provide responses to the recommendations and actions of the Advisory Council and assist in the dissemination of results of Platform Operations.

Promoting public/private partnerships and lighthouse projects: identify interlocutors in Member States, including cities and regions, to develop dialogue and inform and stimulate activities leading to definition of prestigious lighthouse demonstration projects based on public/private partnerships and demonstrating the potential of integrated renewable energy systems for transport and stationary applications; acting together to develop common technology procurement programmes will provide leverage on public funding, and provide a sound basis for future industrial investment; exploring possible opportunities to showcase technologies in regional development projects.

Reviewing the defence implications: identify interlocutors and develop dialogue with defence interests to establish opportunities for developing dual-use technologies and interest in promoting procurement programmes

4. Rules for Participation

The Member State Mirror group will establish its own rules and procedures for operation, membership, invited participants, meeting schedules, procedures for decision making and rotation (if any);

5. Membership

One representative from each interested Member States, Associated Candidate Country and FP Associated States with a senior administrative level and access to government channels (e.g.. Programme Managers). Interested Member States should have active and ambitious policies and programmes to develop and deploy Hydrogen and Fuel Cells technologies. Additional participation from Regions or large Cities having ambitious integrated initiatives may be considered.

6. Obligation for members' commitment

It is crucial that Member States' representatives are empowered to devote time and effort to participation of meetings and development of Member State position papers responding to recommended actions and reports from the Advisory Council and platform operations.

7. Chairperson and Vice-chairpersons

The Member State Mirror Group will select a committed member to act as chairperson to stimulate and co-ordinate Member States' activities and interact with the Advisory Council and participate to its meetings, representing the Member State Mirror Group.

In addition two vice chairpersons shall be appointed.

Procedures for constituting the Member State Mirror Group and selecting the chairperson may subsequently be aligned with the final decisions for the new European Constitution.

8. Structure and Method of Working

The Mirror Group will interact strongly with the Advisory Council and Executive Group. Links will be established implicitly, through an appropriate level of cross representation to be determined. The Advisory Council shall be responsible for initiating proposals for structuring, and implementing the technology platform. The Mirror Group will provide responses to the Advisory Council's proposals for structuring the platform, and for technical and non-technical actions to be carried out in the platform operations.

The Mirror Group may choose to structure their work in the most appropriate way (i.e. establishing groups to contribute to the research agenda, the deployment strategy or other working groups) to provide input as well as feedback and advice on the Advisory Council's reports and the feasibility of implementing its recommendations.

In addition it will propose and initiate actions relating to structuring EU research programmes with a view to optimising efficiency, minimising overlaps and filling gaps in technical programmes.

9. Resource Allocations

To be determined by the group.

10. Commission's role

The Commission may provide initial secretarial support to the Mirror Group through organising and convening meetings to start the process. The Mirror Group should define its own rules and procedures and may be assisted by a secretariat to be established.

11. Secretariat

A secretariat will be established to support the activities of the Mirror Group. The secretariat will act in a purely administrative capacity. This could possibly be supported through a funded ERA-net co-ordination action under FP6.

ANNEX VI: POSSIBLE SCOPE OF ACTIVITIES OF THE TECHNOLOGY PLATFORM SECRETARIAT

The main activities of the technology platform Secretariat should be to :

1. Provide **organisational support** to the Advisory Council, Executive Group, Steering Panels, Initiative Groups and General Assembly, as required – keep electronic diaries, organise meetings, receive and distribute documents, prepare minutes etc.
2. Act as an **Information and Communication centre** for the technology platform, including the maintenance of a dedicated web-site. The secretariat will be responsible for implementing the platform's I&C strategy, once developed.
3. Provide an **IT support service** for the technology platform – electronic communication and document handling will be the norm for the platform. The secretariat must put into place an efficient information handling system to optimise the working of the various bodies.

Possible structures for the H2/FC-TP Secretariat

The secretariat should be a body facilitating the various processes of the technology platform (TP) and providing its management, administration and information and communication functions.

Reflecting the private-public partnership nature of the TP, it should preferably be financed by both public and private funds. In the start up period, it may be expected that a major part of the funds may come from the EC framework programme through the funding instrument of a Co-ordination Action or a Specific Support Action.

1) An example of a possible Co-ordination Action structure

Public funds could initially cover up to around 75% of the total costs of a possible Co-ordination Action and would be devoted mainly to the core secretariat functions (i.e. management and administration, secretariat and co-ordination of the Advisory Council and Steering Panels/ Initiative Groups and information and communication). The financial and in-kind contributions of stakeholders could be used to top-up the public funds, allowing the participation of stakeholders in the various steering panels and initiative groups, as well as sponsoring the presence in these groups of financially dependent organisations, such as academia, users groups, civil society, etc.

The expected duration of a possible Co-ordination Action could be 4 or 5 years.

The overall management of the secretariat could be provided by an independent organisation able to deliver a strong professional management expertise, whilst at the same time satisfying the criteria of credibility and acceptability (in terms of neutrality, objectivity and absence of a potential conflict of interest) to the stakeholders of the TP. It should also possess a solid financial structure and administrative experience in order to guarantee a sound and efficient management of the funds provided by both public and private institutions. The managing organisation could also provide, directly or through subcontracted work, studies and deliverables needed by the TP in some of the more general horizontal issues identified by the High Level Group (i.e. business initiative, education and awareness).

In addition to the managing organisation, a consortium could associate one or more major partners, such as independent, not-for-profit, organisations having the technical competence and motivation to ensure the secretariat functions of the envisaged steering panels (e.g. strategic research agenda and deployment strategy) and the initiative groups to be created under the orientations of the Advisory Council. These major partners should also be able to collect, convey and digest from the platform operations any results or deliverables of relevance to the steering panels or initiative groups, as well as contributing from their own resources to studies or issues needed by the Advisory Council or the different groups and structures of the TP.

The consortium could also incorporate a major partner to carry out the information and communication functions of the TP (alternatively this might be provided by the managing organisation or one of the major partners having the relevant background and experience in these aspects).

The rest of the partners in the consortium could be TP stakeholders prepared to contribute both in kind and financially to the TP and the steering structure (Advisory Council, Steering Panels and Initiative Groups). The level of contributions that could be expected from TP stakeholders could vary (e.g. from a few K€/year to some tens of K€/year) in function of the size and financial means of the organisations and their degree of motivation.

Participation in the possible Co-ordination Action through the group of stakeholders should remain open and be subject to the evolution of the work of the TP and its steering bodies.

2) An example of a possible <u>Specific Support Action</u> structure

The expected duration of a possible Specific Support Action could be 2 or 3 years.

The overall management of the secretariat could be provided by an independent organisation able to deliver a strong professional management expertise, whilst at the same time satisfying the criteria of credibility and acceptability (in terms of neutrality, objectivity and absence of a potential conflict of interest) to the stakeholders of the TP. It should also possess a solid financial structure and administrative experience. The managing organisation could also provide, directly or through subcontracted work, studies and deliverables needed by the TP in some of the more general horizontal issues identified by the High Level Group (i.e. business initiative, education and awareness).

In addition to the managing organisation, a consortium could associate one or more other organisations having technical competence in specific fields and the motivation to ensure the secretariat functions of the envisaged steering panels (e.g. strategic research agenda and deployment strategy) and the initiative groups to be created under the orientations of the Advisory Council. These partners should also be able to collect, convey and digest from the platform operations any results or deliverables of relevance to the steering panels or initiative groups.

The consortium could also incorporate a partner to carry out the information and communication functions of the TP (alternatively this might be provided by the managing organisation or one of the other partners having the relevant background and experience in these aspects).