



FONDAZIONE ROSSELLI

**“National Priorities of  
Industrial Research  
in Italy”**

**3<sup>rd</sup> Report**

**June 2009**

## 1. The approach

The case of the most industrialised countries, first of all the U.S.A., proves the usefulness of carrying out in a systematic and continuative way a Technology Foresight analysis, aiming at formulating the policy guidelines for the technology development of a country in the long run.

All of this stems from the dynamics of the political, social, and economic context of a country, within the framework of globalization, which elevates to the forefront new needs, as drivers of development, but also new problems which must be solved by means of new technologies. Hence comes the need of periodically revise the set of critical technologies for the long term future of the national socio-economic system.

Rosselli Foundation is now carrying out the 3<sup>rd</sup> edition of the Report “National Priorities of Industrial Research”. The main goal of this foresight exercise is to provide a concrete contribution to the formulation of public policies in the field of research and innovation at the many levels of government of Italy, first of all the national government.

Recently, through the framework program “Industry 2015”, the Italian government issued some basic guidelines for the development of the national industry in a 10 year horizon. Therefore we decided to link our 3<sup>rd</sup> Report with these guidelines. In particular we decided to adopt for the foresight exercise a demand oriented approach, instead of the technology oriented one which was at the root of the two previous editions of the Report. So we aimed at selecting the emerging technologies that might enable relevant applications in some strategic fields of the socio-economic system of Italy in the next 10 years, as selected by “industry 2015”, that might be developed from the research phase to the industrialization phase by means of the scientific and industrial capabilities and resources available in the country (critical technologies).

## 2. The topics

The main strategic fields of the foresight analysis are:

- Human life
- Energy
- Sustainable mobility
- Security
- Cultural heritage
- Made in Italy

The emerging technologies are to be selected within the following areas:

- Advanced Materials
- Information and Communication Technologies (ICT)
- Biotechnologies
- Nanotechnologies

These emerging technologies are to be selected on the basis of the following features:

- transversality;
- pervasiveness;
- current state of development at the initial stages of their life cycle;
- possibility of reaching a state of industrial development (at least as a prototype) within the next ten years.

The evaluation of the criticality of the emerging technologies is carried out on the basis of the following criteria:

- performance of the applications that they enable (Attractivity)
- amount, quality and adequacy of the knowledge and capabilities available in the national system of research and innovation for the development of the technologies (Feasibility).

In details, the output of the foresight exercise is to contribute to the formulation of R&I policies by providing a sound information basis which encompasses:

- the alternative scenarios which could plausibly characterize the evolution of the country's scientific and industrial system, resulting from the innovation of technologies and of industrial strategies, and the needs of Italian society.
- the emerging technologies that are necessary to meet the requirements of the Italian industrial system and society.

Beyond the national government, this informative basis will support the decisions taken by governmental bodies at local level and by all public and private players in the national research and innovation system, for elaborating their policies and programmes.

### **3. Methodological approach**

For each selected field we adopt a methodological framework articulated in the following steps:

- a) definition of key functions, the performance of which can to be enhanced through the development of innovative technologies in a time horizon of ten years;
- b) identification of the innovative technologies required for achieving this performance in the key functions;
- c) building of the likely trajectories of evolution of each key technology from its current stage in the next ten years;
- d) evaluation of the position of the technical, scientific and industrial national system with regards to the basic requirements and the conditions for developing the key technologies, in the context of global competition.

The results of stages a) and b) allow to evaluate the Attractiveness of the key technologies, in relation to their capability of achieving significant improvements of the applications for each field.

The results of stages c) and d) allow to evaluate the Feasibility of developing the key technologies by the research institutions and the firms of the country.

In order to evaluate the Feasibility of the key technologies a set of criteria, both qualitative and, when possible, quantitative, is used, which measure the following relevant topics:

- level o knowledge and competencies available in the national research and innovation system, in comparison to international state of the art.
- human, financial, infrastructural resources available in this system and their appropriateness in comparison with the minimal threshold required for the competitive development of the key technologies, and the need of integrating and expanding them in order to achieve this goal.

#### 4. Organization

The following organizational structure is in charge of the execution of the project:

- Steering Committee, made up by representatives of the organizations and firms that support the foresight exercise, with the main task of designing the general framework of the exercise, monitoring its execution, evaluating the intermediate and final results, and setting up the links with the main representatives of the technical, scientific and industrial system of the country.
- Project team, made up by experts of Fondazione Roselli, with the main task of designing the foresight methodology, making the operational programming, coordinating all the activities, providing background materials, editing the intermediate and final reports, communicating the results.
- Panels of experts from the sectors of industrial research, higher education and public research, one for each field. A panel leader is set up for each panel with the task of guiding and coordinating the work of the experts, and to drafting the final report.

The experts are selected according to the following criteria:

- Long term vision capability;
- Capability of bringing new perspectives and insights;
- Autonomy and authoritativeness;
- Deep and wide knowledge of the scientific and industrial features of the national system

## 5. Implementation

So far the Foresight exercise has been completed for the following fields:

- Human Life
- Energy
- Sustainable mobility

The corresponding expert panels are:

### *Panel “Human Life”:*

- prof. Umberto ROSA - Nerviano Medical Sciences (Coordinator)
- prof. Alberto ALBERTINI - ITBM-CNR
- dr. Antonio BONIOLO - DIASORIN
- dr. Germano CARGANICO - Fondazione Toscana Life Sciences
- dr. Giuseppe CARUSO - Farmindustria
- dr. Carlo CASTELLANO - ESAOTE
- prof. Francesco COLOTTA - Nerviano Medical Sciences
- prof. Cristina MESSA - Università Milano Bicocca
- dr. Fulvio UGGERI - Bracco
- eng. Franco VALLANA - SORIN BIOMEDICA CARDIO
- dr. Leonardo VINGIANI - Assobiotec

### *Panel “Energy”:*

- prof. Stefano CAMPANARI - Politecnico Milano (Dip. Energia) (Coordinator)

- eng. Andrea APARO - Finmeccanica SpA
- eng. Marco BARESI – Turboeden
- eng. Stefano BEDOGNI - Edison R&D
- eng. Roberto BIANCHI – MES-DEA SpA
- eng. Enrico BORGARELLO - Italcementi SpA
- prof. Federico BUTERA - Politecnico Milano (Dip. BEST)
- dr. Gaetano CACCIOLA - ITAE-CNR
- eng. Pasquale CAMPANILE - Centro Ricerche Fiat
- eng. Andrea CASALEGNO – Politecnico Milano (Dip. Energia)
- prof. Paolo CHIESA – Politecnico Milano (Dip. Energia)
- eng. Sergio DE SANCTIS - GasTec Vesta SpA
- eng. Lorenzo DE VITA - Eni SpA
- eng. Paolo DI GIORGIO - A2A SpA
- eng. Martina FANTINI Politecnico Milano (Dip. Energia)
- prof. Mario GAIA - Turboden Srl
- dr. Alessandro GUERCIO – Turboden Srl
- eng. Roberto LOLLINI - ITC-CNR
- prof. Ennio MACCHI - Politecnico Milano (Dip. Energia)
- eng. Giampaolo MANZOLINI - Politecnico Milano (Dip. Energia)
- eng. Luigi MAZZOCCHI - CESI Ricerca
- eng. Leonardo MERLO - Enel SpA
- dr. Italo MERONI – ITC CNR
- dr. Stefano MONTI - ENEA
- eng. Angelo MORENO - ENEA Hydrogen and Fuel Cell Project

- eng. Emanuel PESATORI - Franco Tosi Meccanica SpA
- eng. Gianmario PICCIOTTI – MES-DEA SpA
- prof. Marco RICOTTI - Politecnico Milano (Dip. Energia)
- eng. Giovanni RONCHETTO - Mangiarotti SpA
- eng. Valentina SAVINO - Enel SpA
- eng. Claudio SERRACANE - Edison R&D
- eng. Paolo SILVA - Politecnico Milano (Dip. Energia)
- eng. Gaetano SQUADRITO - ITAE-CNR
- eng. Lorenzo TARDINI - Idrogen2
- eng. Giorgio TUROZZI - Franco Tosi Meccanica

*Panel “Sustainable Mobility”:*

- prof. Alessandro PEREGO - Politecnico Milano (Coordinatore)
- dr. Enrico ALBIZZATI - Pirelli Labs
- dr. Roberto ANDREOLI - ATM Milano
- dr. Luca AVEGNO - Gruppo Fantuzzi
- dr. Giancarlo BALBONI - TI Lab
- prof. Luigi BATTEZZATI - Politecnico Milano
- eng. Paolo BERIA – Politecnico Milano
- dr. Ascanio BORCHI - Argo Finanziaria - Gruppo Gavio
- prof. Flavio BOSCACCI - Politecnico Milano
- dr. Marco BOSI - Siemens
- prof. Maria BROVELLI – Politecnico Milano
- sig. Andrea CAMPI - Italsempione

- dr. Edoardo COLOMBO - Infomob
- dr. Bruno CONTERNO - ELSAG
- dr. Pietro EVANGELISTA - Università di Napoli Federico II
- dr. Giuseppe FRESA - Centro Ricerche FIAT
- dr. Giovanni LEONIDA - Assologistica
- dr. Francesco MAZZONE - ACI
- eng. Riccardo MOGRE – Politecnico Milano
- dr. Marco MORFINO - Cargoclay
- dr. Roberto MORO - Project Automation Spa
- dr. Luca NEGRI - Pirelli Pneumatici
- dr. Stefano NOVARESI - Consorzio Dafne – Gruppo Comifar
- arch. Alessandro PANIGHETTI - Autostrade Milano - Serravalle
- eng. Stefano PASETTI - ATM Milano
- eng. Enrico PISINO - Centro Ricerche FIAT
- dr. Mario REBUSCINI - Laser Navigation
- eng. Antonio SCIARAPPA - Istituto Superiore Mario Boella
- prof. Fernando SANSONE – Politecnico Milano
- dott. Alvaro SPIZZICA - Euromodale - Gruppo Gavio

The Foresight analysis of the other fields will be completed in 2009.

The scientific coordination and the management of the foresight process are carried out by a project team of Fondazione Rosselli, directed by prof. Claudio Roveda.

## 6. Sponsors

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