ESFRI European Strategy Forum on Research Infrastructures

Strategy Report on Research Infrastructures

Roadmap 2010

ESFRI European Strategy Forum on Research Infrastructures

Research Infrastructure (RI) Definition

RIs contribute to the implementation of Europe 2020 strategy and its Innovation Union Flagship Initiative

General

- facilities, resources or services of unique nature identified by European research communities to conduct top-level activities in all fields
- single-sited, distributed, virtual
- Open-Access for basic-research

Distributed

- Common legal form
- Single management board
- Governance structure

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The Roadmap Mandate

- The Competitiveness Council of the EU mandated ESFRI on November 2004 to develop a strategic roadmap in the field of RI for Europe
- The ESFRI roadmap identifies new pan-European Research Infrastructures (RIs) or major up-grades to existing ones, corresponding to the needs of European research communities in the next 10 to 20 years, regardless of possible location

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ESFRI Success Stories

- From more than 260 proposals, 50 projects have been identified through several review stages between 2006 and 2010
- Projects meets the "grand challenges"
- Update in 2010 in the areas Energy and Biological and Medical Sciences (3+3 new projects)
- The Roadmap 2010 contains 48 projects in total; 2 have been removed
- 10 of the projects are in the implementation phase and further 16 are proceeding towards the implementation phase until end of 2012

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ESFRI Projects

Area	Roadmap 2010	Implemented
Social Science and Humanities (SSH)	2	3
Environmental Sciences (ENV)	9	0
Biological and Medical Sciences (BMS)	13	0
Energy	6	1
Engineering, Physical Sciences, Materials and Analytical Facilities (EPS)	8	5
E-Infrastructures	0	1

ESFRI Projects – EPS in the implementation phase

ESRF is the Upgrade of the European Synchrotron Radiation Facility, located in Grenoble, France. Supported and shared by 17 European countries and Israel.
It operates the most powerful high energy synchrotron light source in Europe; and covers a wide range of disciplines.
Industrial applications are pharmaceuticals, cosmetics, petrochemicals and microelectronics.

Construction costs: 241.3 M€
Operation costs: 93.5 M€/year
Decommissioning: not applicable

Capital costs 241.3 M€ (in 2010 prices), of which 67 M€ from the regular budget, recurrent costs 16.4 M€, personnel costs 18.5 M€.

ESFRI Projects – EPS in the implementation phase

European XFEL, the Hard X-Ray Free Electron Laser, under construction in Hamburg, Germany, will be a world leading facility for the production of intense, short pulses of X rays for scientific research in a wide range of disciplines.

Construction costs: 1.082 M€ (incl. commissioning)
Operation costs: 77 M€/year
Decommissioning: 80 M€

Limited Liability Company under German law with international partners founded in 2009; Council, Scientific Advisory Committee and Administrative and Finance Committee are working.

ESFRI Projects – EPS in the implementation phase

ILL 20/20 Upgrade of the European Neutron Spectroscopy Facility, the reactor-based laboratory at the Institute Laue Langevin (ILL), Grenoble, France is recognised as the world's most productive and reliable source of slow neutrons for the study of condensed matter.

Construction costs: 171 M€
Operation costs: 5 M€/year
Decommissioning: 161 M€

Construction costs include 15 M€ of regional and local government funding towards additional infrastructural aspects for the proposed joint site together with ESRF; Upgrade is ongoing.

ESFRI Projects – EPS in the implementation phase

FAIR - Facility for Antiproton and Ion Research will provide high energy primary and secondary beams of ions of highest intensity and quality, Including an "antimatter beam" of antiprotons allowing forefront research in five different disciplines of physics.

Construction costs: 1.027 M€ (2005)
Operation costs: 118 M€/year (2005)
Decommissioning: to be estimated

Limited Liability Company under German law with international partners founded in 2010; Council, Administrative and Finance Committee and Scientific Committee are working; civil construction will start at the end of 2011.

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ESFRI Projects – EPS in the implementation phase

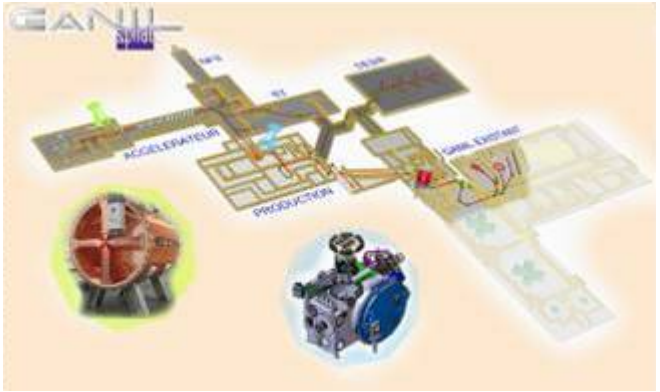
SPIRAL2 is a new facility for the production and study of rare isotope radioactive beams with intensities not yet available with present machines, to be built at GANIL laboratory in Caen, France.

SPIRAL2 will reinforce the European leadership in the field of nuclear physics based on exotic nuclei.

Construction costs: 196 M€

Operation costs: 10-12 M€/year

Decommissioning: to be estimated



The construction phase is being coordinated within a consortium between CNRS, CEA and the region of Basse-Normandie and in collaboration with French, European and international institutions.

ESFRI Projects – E-Infrastructures in the implementation phase

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PRACE - Partnership for Advanced Computing in Europe is a European strategic approach to high-performance computing. A limited number of world-class top-tier centres are forming a scientific computing network as distributed RI at European level connected to national, regional and local centres.

Different machine architectures will fulfil the requirements of different scientific domains and applications.

Construction and operation costs: 100 M€ within the next 5 years + fees

Decommissioning: not applicable

Company under Belgian law founded.

ESFRI Projects – Energy in the implementation phase

JHR - Jules Horowitz Reactor – is a high flux reactor for fission reactors material testing. It will be built on the CEA research centre at Cadarache, France, optimising efficiency and demonstrate safe operations of existing power reactors as well as support future reactor design.

Construction costs: 750 M€

Operation costs: 35 M€/year

Decommissioning: ~80 M€

Construction costs come from consortium agreement (~500 M€) plus support from French "emprunt national" (~250 M€).

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ESFRI Projects - SSH in the implementation phase

SHARE-ERIC is a data Infrastructure for the socio-economic analysis of ongoing changes due to population ageing. The panel database contains data of about 45,000 Europeans aged 50 or over.
The data are harmonised with the U.S. Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (ELSA).

Construction costs: 23 M€
Operation costs: 1,4 M€/year
Decommissioning: not applicable

5 countries have already signed the ERIC Statutes;
8 more have signed the MoU and 6 of these have already announced to step into the ERIC-agreement soon;
SHARE-ERIC will be seated first in Tilburg, the Netherlands.

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VISION 2020

- **Evolve better governance and sustainability, by shared evaluation and prioritization of pan-European Research Infrastructures**
- **Consolidate this approach by focusing and increasing European and national funding in support of internationally benchmarked activities**
- **Extend inclusiveness and outreach, thus ensuring cohesion and increased growth, attracting public-private partnerships and developing high-quality procurements**
- **Strengthen the attraction and mobility of human resources by advanced training of personnel and free movement of knowledge in Europe and from other parts of the world**

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ESFRI's Action Plan

- Monitoring scientific developments and emerging research challenges
- Development of an evaluation methodology for pan- European RI
- Development of closer cooperation between RIs and e.g. Joint Programming Initiatives, Joint Technology Initiatives
- Building up cooperation with European industry
- Addressing the issue of socio-economic impacts
- Promoting greater regional and international cooperation
- Supporting and promoting the use and development of e-infrastructures

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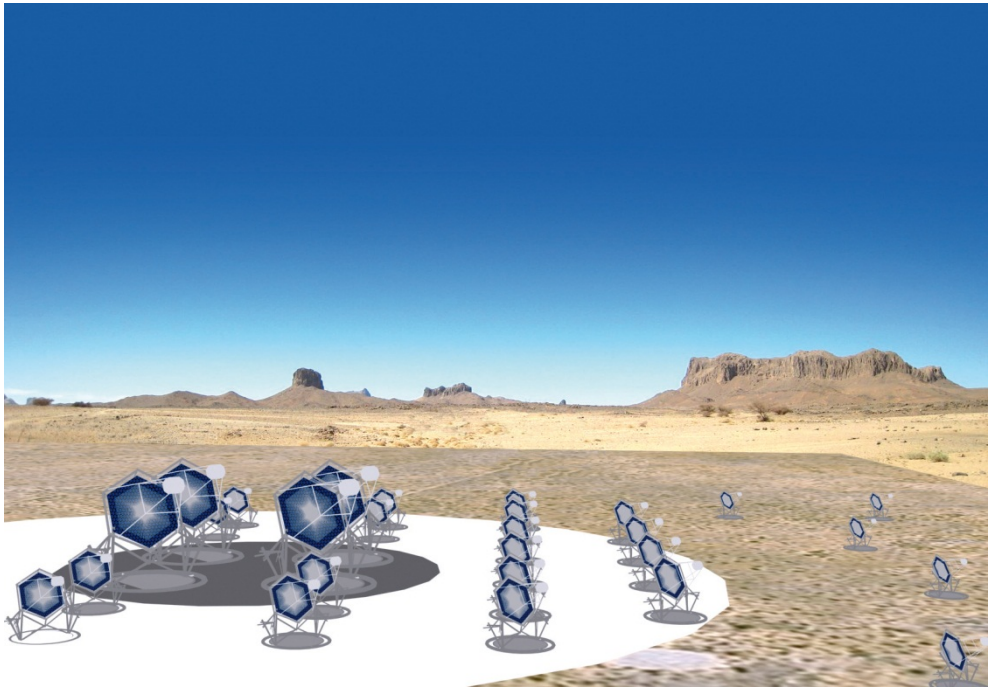
ESFRI-Projects - EPS on the roadmap 2010

CTA – Cherenkov Telescope Array will be an advanced facility for ground-based high-energy gamma-ray astronomy. With two sites, in both the southern and northern hemispheres, it will extend the study of astrophysical origin of gamma-rays at energies of a few tens of GeV and above.

Estimated Costs
Preparation: 8 M€
Construction: 150 M€
Operations: 10 M€/year
Decommissioning: 10 M€

Coordination: Germany

Preparation phase: 2011-2014
Construction phase: 2014-2015
Operation phase: 2019



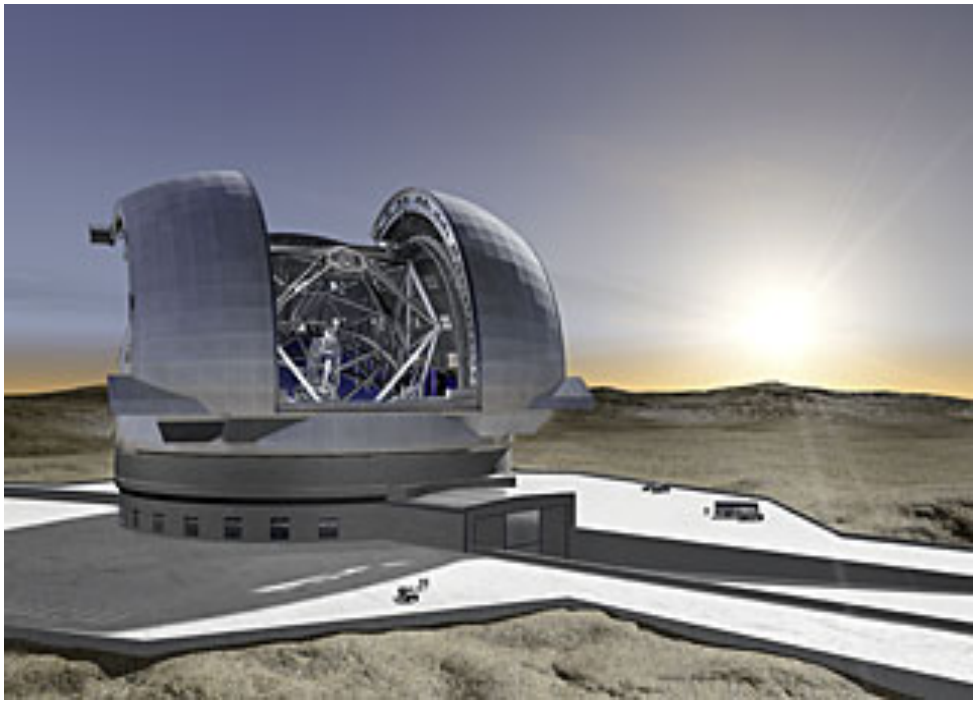
ESFRI-Projects - EPS on the roadmap 2010

E-ELT – European Extremely Large Telescope (42m) will vastly advance astrophysical knowledge allowing detailed studies of inter alia planets around other stars, the first objects in the Universe, super-massive Black Holes, and the nature and distribution of the Dark Matter and Dark Energy.

Estimated Costs
Preparation: 100 M€
Construction: 1000 M€
Operations: 30 M€/year
Decommissioning: n. a.

Coordination: ESO

Construction phase: 2013-2021

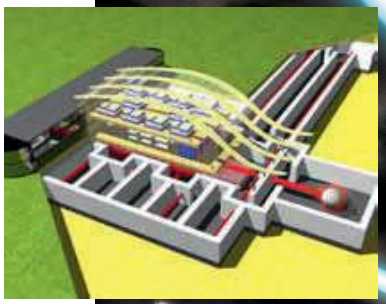


ESFRI-Projects - EPS on the roadmap 2010

ELI – Extreme Light Infrastructure will be an international multi-sited Research Infrastructure for the investigation and applications of laser matter interaction at more than 6 orders of magnitude higher than today's state of the art.

Estimated Costs
Construction: ~ 700 M€
Operations: ~ 70 M€
Decommissioning: n. a.

Selected sites:
Czech Republic, Hungary and Romania



Czech Republic has already received the approval for using Structural Funds for its

Construction phase: 2011-2013
Operation phase: late 2015

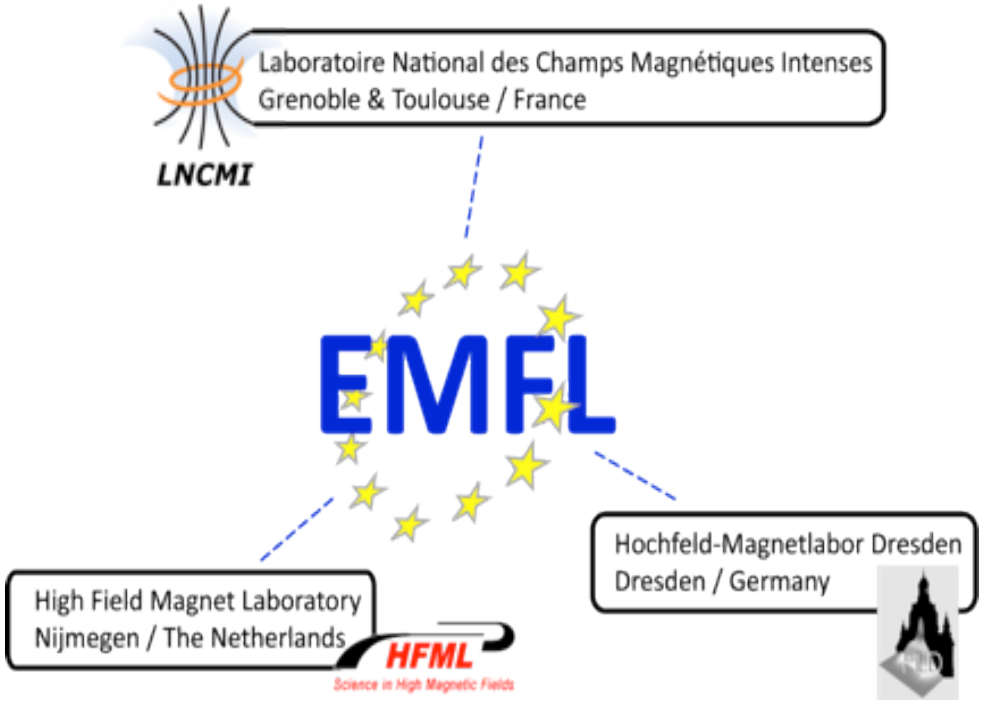
ESFRI-Projects - EPS on the roadmap 2010

EMFL – European Magnetic Field Laboratory will be a dedicated magnetic field laboratory providing the highest possible fields (both continuous and pulsed) to European researchers. It will be operated as distributed RI integrating and upgrading four already existing major European high magnetic field laboratories located in Grenoble, Toulouse, Dresden and Nijmegen.

Estimated Costs
Preparation: 6.7 M€
Construction: 115 M€
Operations: 8 M€/ year
additional to existing budget
Decommissioning: n. a.

Coordination: The Netherlands

Start of Preparatory Phase: 2011
Start of construction: 2014



ESFRI-Projects - EPS on the roadmap 2010

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EuroFEL – Consortium will integrate the national Free Electron Laser (FEL) based facilities currently in operation or emerging in Europe into a distributed and internationally open RI. FEL produce beams of coherent, femto-second light pulses for studying electronic properties of matter.

Estimated Costs
Preparation: 150-200 M€
Construction: 1200-1600 M€
Operations: 120 – 150 M€/year
Decommissioning: n. a.

Coordination: Germany

Preparatory Phase: 2008-2011

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ESFRI-Projects - EPS on the roadmap 2010

ESS – European Spallation Source will be the world's most powerful long-pulse source of neutrons at 5MW. Its built-in upgradeability will make it the most cost effective source for the next 40 years. It will serve a community of 5.000 researchers across many areas of science and technology.

Estimated Costs
Preparation: 30 M€
Construction: 1478 M€
Operations: 110 M€/year
Decommissioning: 300 M€

Coordination: Sweden

2010-2071

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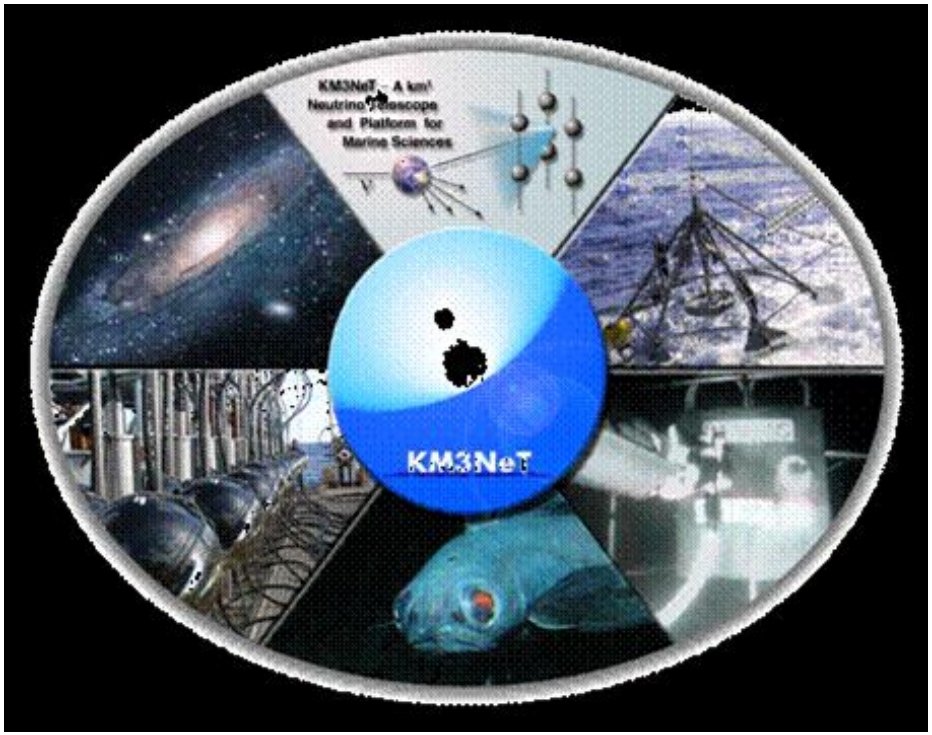
ESFRI-Projects - EPS on the roadmap 2010

KM3NET – Kilometre Cube Neutrino Telescope will be a deep-sea Research Infrastructure in the Mediterranean Sea hosting a cubic-kilometre sized deep-sea neutrino telescope for astronomy based on the detection of high-energy cosmic neutrinos and giving access to long-term deep-sea measurements.



Estimated Costs
Preparation: 32 M€
Construction: 220 M€
Operations: 4-6 M€/year
Decommissioning: 5 M€

Coordination: Italy

2008-2014

ESFRI-Projects - EPS on the roadmap 2010

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SKA - Square Kilometre Array, will be the next generation radio telescope. With an operation frequency range of 70 MHz-25 GHz and a collecting area of about 1.000.000m², it will be 50 times more sensitive than current facilities. SKA will transforms our view of the universe.

Estimated Costs
Preparation: ca. 200 M€
Construction: 1500 M€ (350 M€ for Phase
Operations: 100-150 M€/year

Coordination: United Kingdom

Preparation phase: 2008-2012
Pre-construction phase: 2013-2015
Construction phase:
Phase 1 2016-2018
Phase 2 2018-2022
Start of operations (Phase 1): 2017

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ESFRI-Projects - Energy
new! on the roadmap 2010

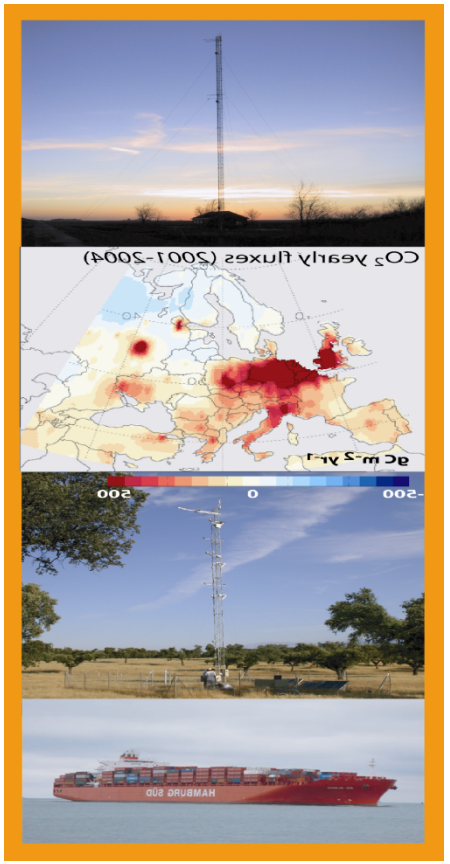
EU-SOLARIS - European Solar Research Infrastructure for Concentrating Solar Power, a distributed RI, will be a networking approach from outstanding solar research centres in 5 European countries to support the scientific and technological development of Concentrating Solar Power. It includes the upgrading of existing infrastructures along with new installations.

Estimated Costs
Preparation: 3,5 M€
Construction costs: 80 M€
Operation costs: 3 M€/year
Decommissioning: 5 M€

Coordination: SPAIN
TIMELINE
The upgrading and new installations are expected to be completed by 2015.

ESFRI-Projects - ENV
on the roadmap 2010

ICOS – Integrated Carbon Observation System will provide across Europe and adjacent regions a distributed RI for standardised long-term high precision monitoring of atmospheric and oceanic greenhouse gas concentrations, ecosystem fluxes and essential carbon cycling variables.



Estimated Costs:
Preparation: 5 M€
Construction: 130 M€
Operations: 36 M€/year
Decommissioning: not applicable

Coordination: France
TIMELINE
Preparation phase: 2008-2011
Construction phase: 2010-2015
Operation phase: 2013 onwards

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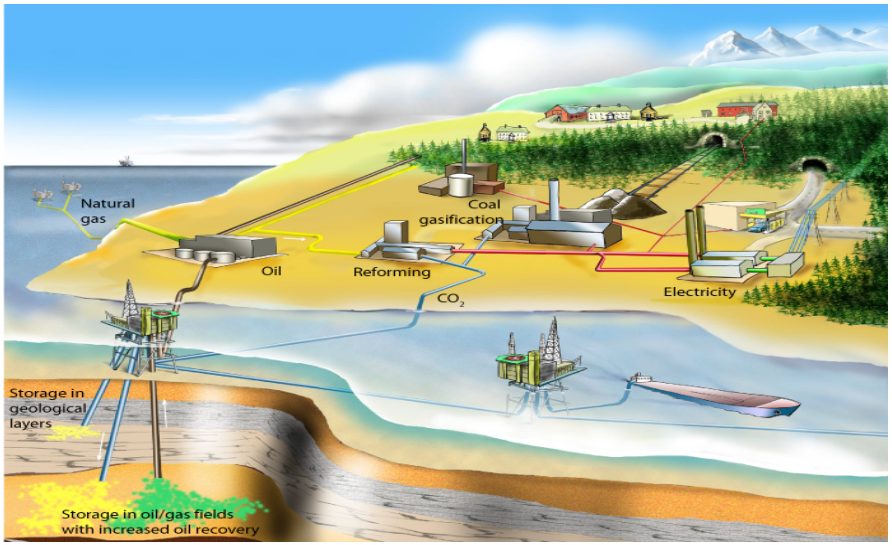
ESFRI-Projects - ENERGY on the roadmap 2010

ECCSEL - European Carbon Dioxide ND Storage Laboratory Infrastructure. The ECCSEL facility combines three approaches to capture and three approaches to carbon storage. The project includes the upgrading of existing national infrastructures to European level. The upgraded facility is composed of distributed parts in different countries and a coordination centre in Norway.

Estimated Costs:
Preparation: 3-4 M€
Construction: 81 M€
Operations: 6.3 M€/year
Decommissioning: 2 M€

Coordination: Norway
TIMELINE
The facility will be in operation in 2015.



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ESFRI-Projects - BMS on the roadmap 2010

ELIXIR – European Life-Science Infrastructure for Biological Information will be a secure, rapidly evolving platform for collection, storage, annotation, validation, dissemination and utilization of biological data. It will comprise a distributed, and interlinked collection.

Estimated Costs:
Preparation: 4.5 M€
Construction: 470 M€
Operations: 100 M€/year
Decommissioning: not applicable

Coordination: EMBL
TIMELINE
Preparation phase: 2007-2011
Construction phase: 2011
Operation phase: 2012 onwards