

AZ EU KUTATÁSI ÉS INNOVÁCIÓS KERETPROGRAMJA



HORIZON 2020 – Biztonságos, Tiszta és Hatékony Energia *Európa válasza egy globális kihívásra*

Siegler András
Igazgató

Európai Bizottság
Kutatási és Innovációs
Főigazgatóság

Research and
Innovation



Eurocom

Europe is being hobbled by its expensive energy

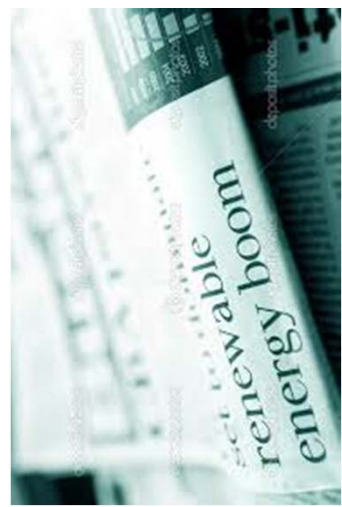
Paolo Scaroni
on top of other factors that make the US a good place for an industrial past five years. There is certainly something on it - for instance in France, Germany and the UK. But to produce it we



The Daily Telegraph

The thriving community turned into a blackened wasteland by Sandy
Death knell for wind farms
Enough is enough, says senior Tory energy minister. He can no longer hear seabirds swooshing over an unrecognisable

THINK AGAIN: ENERGY



Profits Soar

DAILY NEWS
Wednesday, 13 November 2013

Local entrepreneur wins Best New Business Award

Cheap Energy Giving US Advantage
The EU has agreed on ambitious Energy and Climate targets for 2020 and beyond to reduce greenhouse gas emissions, increase the share of renewable energies and improve energy efficiency. Achieving these objectives advances Europe along the path to an energy system that will deliver competitive and secure energy supply which is sustainable.

New technologies and solutions must compete on cost and reliability against energy systems with well-established (and amortised) technologies. Research and innovation are critical to make these new, cleaner, low-carbon, efficient, cost-effective energy systems a commercially attractive option.

Shale gas boom to power US lead over Europe and Asia for decades

By Ajay Maken and Neil Hume in London
already invested heavily in US plants to take advantage of cheap energy costs and the IEA. "Europe faces critical challenges. Energy policies have never played such a pivotal role

VILÁGGAZDASÁG

A cégek energiaár-növekedést várnak

A Policy Agenda – Ipsos KKV-konjunktúra index elemzésében a megkérdezett vállalatvezetők túlnyomó többsége, 82 százalékta az energiaárak növekedésére számít a következő félévben, közülük 29 százalék jelentős mértékű drágulásra.

Energy Prices Soar

Britans big energy suppliers are hiking up energy prices due to soaring wholesale costs. Electricity prices are set to rise 11% and gas prices by 18%. Households and businesses have 3 options.....



Energy – A global challenge

The right response? A European one

- **Critical mass** needed
- Acting **collectively** at EU level
- Build on, reinforce and create **synergies in national capacities**
- Unlock **excellence** and deliver **competitiveness**
- An **energy mix** that presents a true ecosystem incorporating *non-nuclear* and *nuclear* technologies

**Turning a fragmented mosaic of 28 markets
into a
Single European Energy Market**



CURRENT EU POLICY FW AND ACHIEVEMENTS

- Clear EU framework and support by SET-Plan
- Three **headline targets 20/20/20** + specific transport targets
- **2011 GHG** emissions estimated at **16% below 1990** - EU on track
- Progress: **2010 EU renewables share 12.7% vs. 8.5% in 2005** - new measures needed for most MS to achieve their 2020 targets
- **Energy savings target** not legally binding for MS but significant progress made – though current policy targets likely not to be met



The Energy Roadmap 2050

- reducing greenhouse gas emissions before 2050 by 80-95% below 1990 levels
- ensuring security of energy supply and its competitiveness



The Energy Roadmap 2050 is the basis for developing a long-term European framework together with all stakeholders



GREEN PAPER TOWARDS A EU 2030 FW for Climate and Energy policies

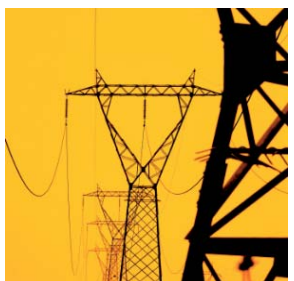
- Need to reflect on a **new 2030 framework**
 - take into account **Energy Roadmap 2050** and **Transport White Paper**
 - investors need certainty and **reduced regulatory risk**
 - support progress towards a **competitive economy** and a **secure energy system**
 - set EU ambition level for **international agreement on climate change mitigation**
- Public consultation closed on 2 July 2013
- Commission intends to table the **Communication** on the 2030 framework by early 2014



European
Commission



SET-Plan ...in motion



Innovative holistic solutions to respond to needs of the European energy system by 2020, 2030 and beyond

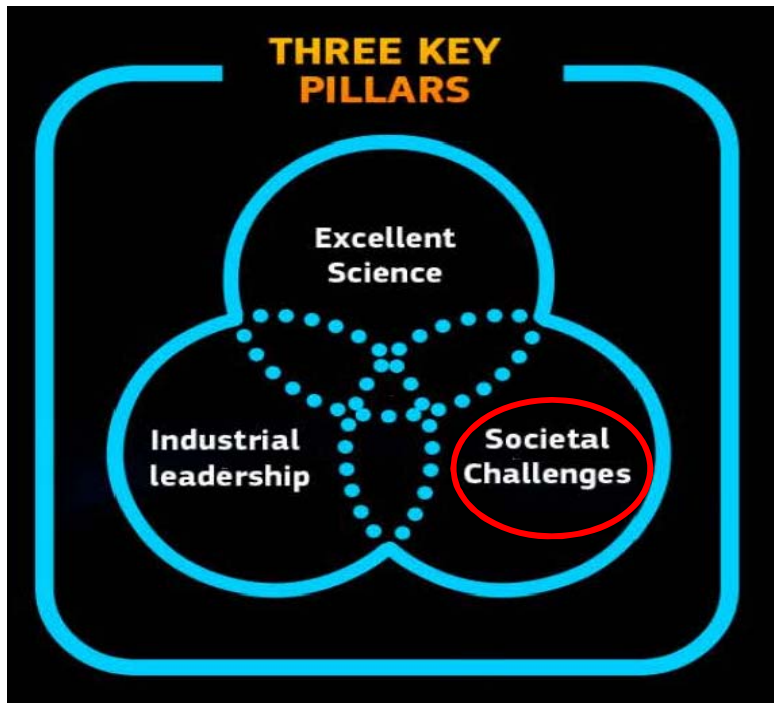
Addresses the **entire energy system** in an **integrated** way, incl. supply chains of innovative solutions and research and innovation chains consolidated at EU level.

Research and
Innovation



SETIS
Information For Decision-making

Energy research and innovation in Horizon 2020



- **Health**, demographic change and well-being
- **Food** security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bioeconomy
- **Secure, clean and efficient energy**
- Smart, green and integrated **transport**
- Climate action, **environment**, resource efficiency and raw materials
- Europe in a changing world, - inclusive, innovative and reflective **societies**
- Secure societies – protecting freedom and **security** of Europe and its citizens



Securing Europe's Energy Needs

Research and
Innovation

Clean Energy



Energy Efficiency





Secure, Clean and Efficient Energy (EU+EURATOM) The first Work Programme of Horizon 2020

2-year work programme for 2014-15

- **Challenge-based** approach
 - Definition of specific problem to be tackled - broader scope of individual topics
 - Applicant can propose the most appropriate solution to the challenge
- Integration of **cross-cutting issues** (social sciences, international cooperation, etc.)
- Cross-thematic cooperation in strategic '**focus areas**'
- Covering the **full innovation cycle** (use of TRLs to specify scope of activities)

Publication of the first calls for proposals: **11 December 2013**



Energy work programme 2014-2015

Support the transition to a reliable, sustainable and competitive energy system by:

- Reducing energy *consumption* and *carbon footprint*
- Boosting development of *renewable and alternative energy* technologies and their *integration in the energy system*
- Making the *grid* more flexible (inclusion of new energy sources, lowering costs of necessary infrastructure upgrades)
- *Decarbonising* the power and other industrial sectors

Increase the competitiveness of European industry

- Addressing the whole *supply chain*
- Increase *energy efficiency* in industry, decrease energy costs

Building a European Research Area in the field of energy

- *Coordinating research activities* of Member States, Associated States and Regions (promoting SET-Plan)



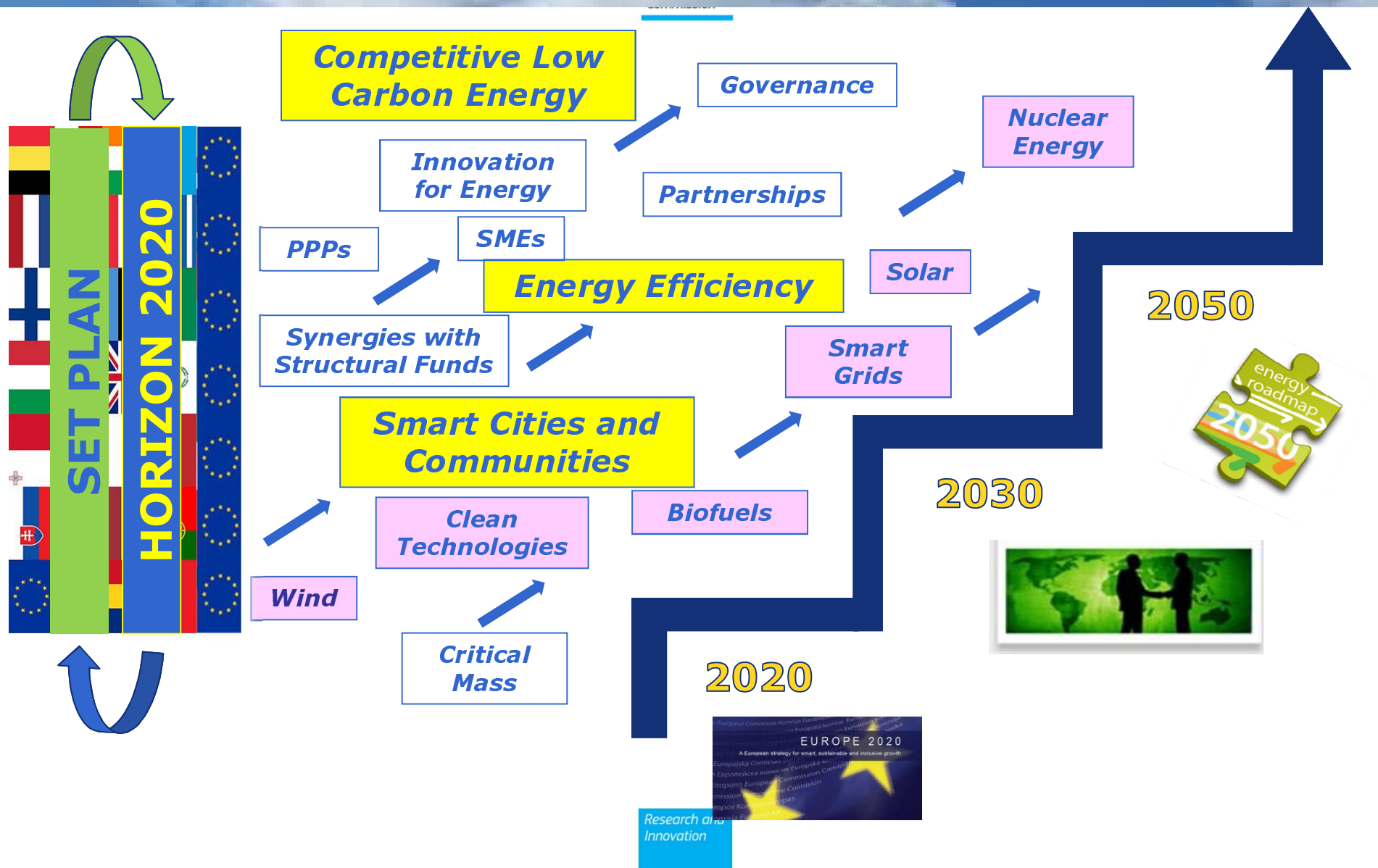
Energy work programme 2014-15

4 Calls:

- *Competitive low-carbon energy*
- *Energy efficiency*
- *Smart cities & communities*
- *SMEs and Fast Track to Innovation for Energy*

+ targeted procurements, grants to identified beneficiaries etc. ('other actions')

Towards a Sustainable Low Carbon Society





Energy Efficiency Call

- Buildings and Consumers
- Heating and Cooling
- Industry and Products
- Finance for sustainable energy

Includes topics of contractual PPPs
(Energy Efficient Buildings, SPIRE)

ENERGY EFFICIENCY

DOING MORE WITH LESS





Energy Efficiency Call (1)

Buildings and Consumers (1) – *Research & Demo:*

- Prefabricated modules for **renovation of buildings** (EE1)
- **Buildings design** for new buildings (EE2)
- Deep renovation of **historic buildings** (EE3)
- **Demand response** in **blocks of buildings** (EE6)
- Developing new **ICT-based solutions** for improving energy efficiency (EE11)
- **Socio-economic research** on energy efficiency (EE12)



Energy Efficiency Call (2)

Buildings and Consumers (2) - *Support Actions:*

- Improving **skills** of construction workforce (EE4)
- Improve market conditions and **remove barriers for renovation** (EE5)
- Building **capacities of public authorities** for sustainable energy policies and plans (EE7)
- Helping **public procurement** authorities to purchase best available **sustainable energy products** (EE8)
- **Empowering stakeholders** to assist public authorities in sustainable energy policies and measures (EE9)
- Changing **consumer behaviour** (EE10)



Energy Efficiency Call (3)

Heating and Cooling

- Improving technologies for **district heating and cooling** (EE13)
- Accompanying support measures for **removing non-technological market barriers** for efficient heating and cooling solutions (EE14)



Energy Efficiency Call (4)

Industry and Products - *Demo actions:*

- New technologies for **recovering waste heat** from industrial processes and transforming it into useful energy forms (EE18)

Accompanying support actions aiming at

- Effective implementation of ambitious EU **product efficiency legislation** (EE15)
- Removing market barriers for energy efficiency in industry through **organisational innovations** (EE16)
- Helping **large buyer groups** to demand energy products with high performance levels (EE17)



Energy Efficiency Call (5)

Finance for Sustainable Energy

Support Actions aiming at

- Improving financeability of sustainable energy investments by stimulating **new financial products** and **business models** (EE19)
- Supporting project developers to set up innovative **bankable sustainable energy investment** schemes and projects (EE20)
- Rolling-out **innovative energy services and financial schemes** for sustainable energy (EE21)



Competitive Low-Carbon Energy (1)

Renewable electricity and heating/cooling

- **Research** on the next generation technologies (including *photovoltaics, concentrated solar power, wind energy, ocean energy, hydropower, deep geothermal energy and renewable heating and cooling*) (LCE2),
- **Demonstration** of renewable electricity and heating/cooling technologies (including *photovoltaics, concentrated solar power, wind energy, ocean energy, deep geothermal energy and renewable heating and cooling*) (LCE3)
- Accompanying **market uptake measures** removing *non-technological market barriers* for existing and emerging renewable electricity, heating and cooling technologies (LCE4)



Wind Energy FP7: RELIAWIND

Total cost: 7.7 M€
EU contribution: 5.2 M€

Cooperation

10 partners from 8 MSs (ES, UK, BE, UK, FI, HU, DK, IT)

*Magyar Tudományos Akadémia
- Számítástechnikai és
Automatizálási Kutatóintézet,
Magyarország*

***Reliability focused research
on optimizing wind energy
systems design, operation
& maintenance***





Competitive Low-Carbon Energy (2)

Sustainable biofuels and alternative fuels for the European transport fuel mix

- **Research** on next generation technologies for **biofuels and sustainable alternative fuels** (LCE11)
- **Demonstration** of advanced **biofuel** technologies (LCE12, LCE13 cooperation with Brazil)
- Accompanying **market uptake measures** for removing non-technological market barriers for existing and emerging **sustainable bioenergy** (LCE14)



Competitive Low-Carbon Energy (3)

Modernising the European Electricity Grid

- ***Demonstration*** of innovative components for **meshed off-shore grids** linking off-shore energy generation resources with on-shore grids in different countries (LCE5)
- ***Demonstration*** of integration of the **transmission system** and the **wholesale market** (LCE6)
- Integration and validation of solutions for the main challenges of the **distribution grid** and **retail market** (LCE7)



Competitive Low-Carbon Energy (4)

Providing the energy system with flexibility through enhanced energy storage technologies

- Advancing **local/small-scale energy storage** and their integration into the distribution grid and at building/house level (LCE8)
- Further develop **large scale energy storage** and reduce the barriers for new storage concepts (LCE9)
- Developing the **next generation** of energy storage technologies (LCE10)



Competitive Low-Carbon Energy (5)

Enabling the decarbonisation of the use of fossil fuels during transition to a low-carbon economy

- Enabling decarbonisation of the **fossil fuel-based power sector** and **energy intensive industry** through **CCS**, including **geological CO2 storage** (LCE15)
- Understanding, preventing and mitigating the potential environmental impacts and risks of **shale gas** exploration and exploitation (LCE16)
- Improving operational flexibility of efficient **fossil fuel power plants** to facilitate integration of renewables with variable output (LCE17)



Competitive Low-Carbon Energy (6)

Social, environmental and economic aspects of the energy system

- Understanding the **role of the human factor** in the energy transition, including support for **education and training** networks (LCE20)
- **Modelling** and analysing the energy system, its transformation and impacts (LCE21)



Competitive Low-Carbon Energy (7)

Cross-cutting issues

- Early stage **transformative energy technologies** or enabling technologies (LCE1)
- **Joint Actions** (e.g. ERA-NETs) between Member States demonstrating and validating innovative energy solutions (all technology areas in the LCE and the Smart Cities and Communities call) (LCE18)
- **Coordination of national R&D** activities (all technology areas included in this call) (LCE19)
- Fostering trans-national co-operation between **National Contact Points (NCPs)** for the Energy Challenge (LCE22)

PV Energy FP7: SOLARH2

Total cost: 5.5 M€
EU contribution: 3.9 M€

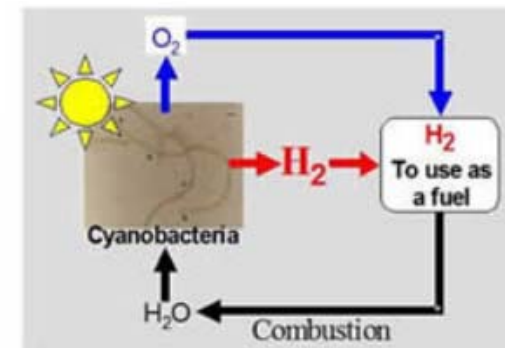
Completed, 2008-02-01 to 2012-01-31

**European solar-fuel
initiative: renewable
hydrogen from sun
and water**

Cooperation

12 partners, world-leading European laboratories (SE, FR, DE, CH, FI, NL, ES, HU)

Magyar Tudományos Akadémia Szegedi Biológiai Központja, Magyarország





Smart Cities and Communities

- Large scale ***demonstration*** of ***integrated solutions*** between the energy, transport, and ICT sectors through **partnerships between municipalities and industries**
- Accompanying ***support measures*** focusing on:
 - ✓ Developing a framework for **common data and performance measurements** (SCC2)
 - ✓ Developing **system standards** for smart cities and communities solutions (SCC3)
 - ✓ Establishing **networks of public procurers** in local administrations on smart city solutions (SCC4)
 - ✓ **Prize competition** for smart solutions (SCC5)

STACCATO

- Óbuda (Budapest) – Saving energy by **retrofitting**
- Accelerated transition to a **sustainable energy supply**
- Results: 5 buildings (900 apartments) complete insulation makeover, windows replaced, the heating systems renewed.
- Supported under the FP7 Concerto initiative





SMEs and fast track to innovation for Energy

Support for

- Stimulating the **innovation potential of SMEs** for a low carbon and efficient energy system (SME instrument) (SIE1)
- Fast track to Innovation (SIE2)



Joint Technological Initiative under § 187 Fuel Cells and Hydrogen 2

Sustainability

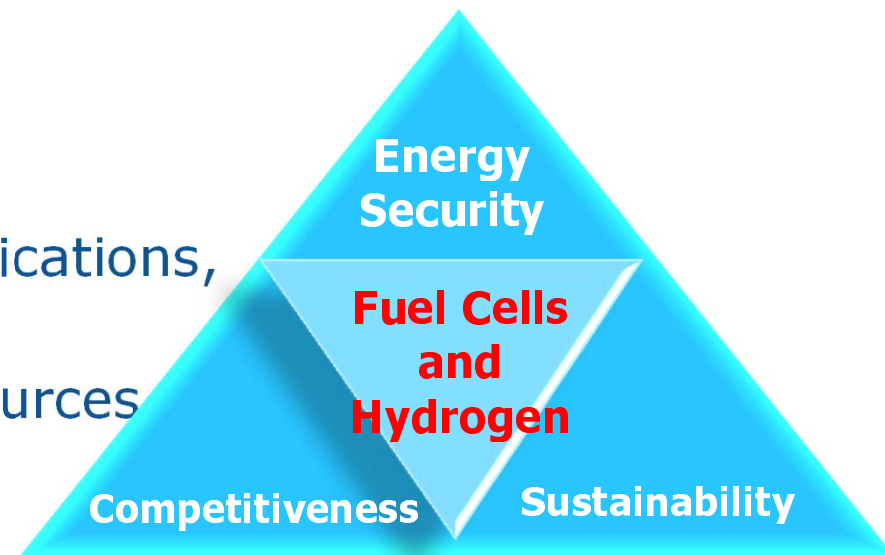
- **H₂** is a **clean** carrier of energy
- **Transport and stationary** applications, generate electricity and heat
- **Storage** of renewable energy sources
- Reduction of CO₂ emissions

Energy Security

- Increase independence from unstable outside regions

Competitiveness

- research excellence leading to industry innovation and growth

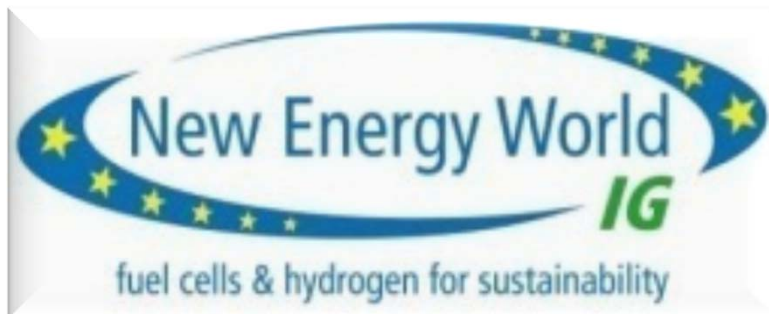


Members of FCH 2 JU



European Union

represented by European Commission



Industry Grouping - IG

Over 60 members
Of which >60% SMEs



Research Grouping - RG

Over 60 members

FCH-2 Operational activities



Transport

- Road vehicles
- Non-road vehicles and machinery
- Refuelling infrastructure
- Maritime, rail and aviation applications

Energy

- Hydrogen production and distribution
- Hydrogen storage for renewable energy integration
- Fuel cells for power and combined heat & power generation

Cross-cutting Issues

(e.g. standards, consumer awareness, manufacturing methods)

- Implemented mainly through calls for proposals
- Follow H2020 Rules for Participation, **no derogations**

Main achievements of FCH 1 JU



- Stronger community in Europe
- Pre-competitive collaboration
- Market introduction for early applications
- Progress in
 - materials performance
 - durability
 - cost reduction
- 430 participants in 127 projects
- SME participation 25%



Success story : CHIC Project

- 26 FCH buses in five locations across Europe including Budapest



€971
million

HORIZON 2020 *Euratom* Programme (2014-18)

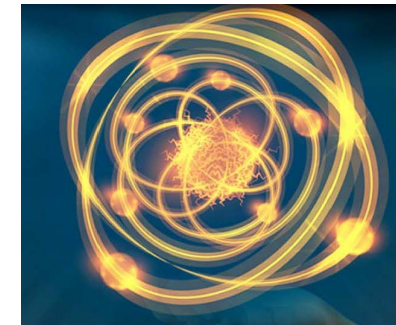
What's new?

- Euratom Programme complements Horizon 2020 and addresses the **same key energy challenges**;
- The **same rules for participation** apply to Horizon 2020 EU and Euratom Programme;
- A **single regulation** instead of four separate decisions during FP7 (including **fission and fusion**);
- A **streamlined fusion research programme** implementing of the fusion research roadmap;
- **ITER** will be financed outside H2020 but within MFF (**2,707 Bn €**)



HORIZON 2020 Euratom Programme (2014-18) – Fission energy

- Supporting indirect research in nuclear fission, radiation protection and fusion
- A 5 year programme, in line with the Euratom Treaty
- A continued focus on safety aspects
- Growing importance of research for radiation protection and medical applications of radiation





Euratom Work Programme 2014-15

Main features:

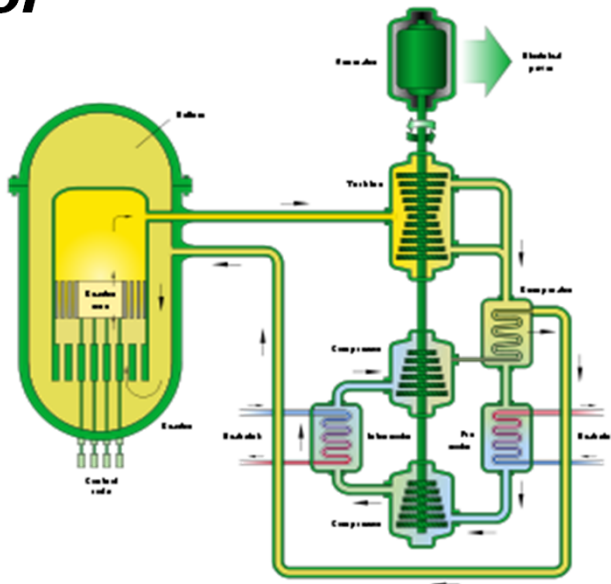
- One call in **fission** for the first 2 years
- Challenge based approach
- New instruments: **European Joint Programme** co-fund grants for research in **fusion energy** (and planned in radiation protection)
- Support for capacity building in the Baltic and Central/Eastern European region
- Cross-cutting issues (i.e. socio-economic research, research for production of medical radioisotopes etc.)

Publication of the call for proposals: **11 Dec. 2013**

FP7 EURATOM Fission: ALLIANCE

Major project Aims and achieved Results

ALLIANCE - ALLEGRO gas cooled fast reactor demonstrator, complementary option of sodium fast reactor



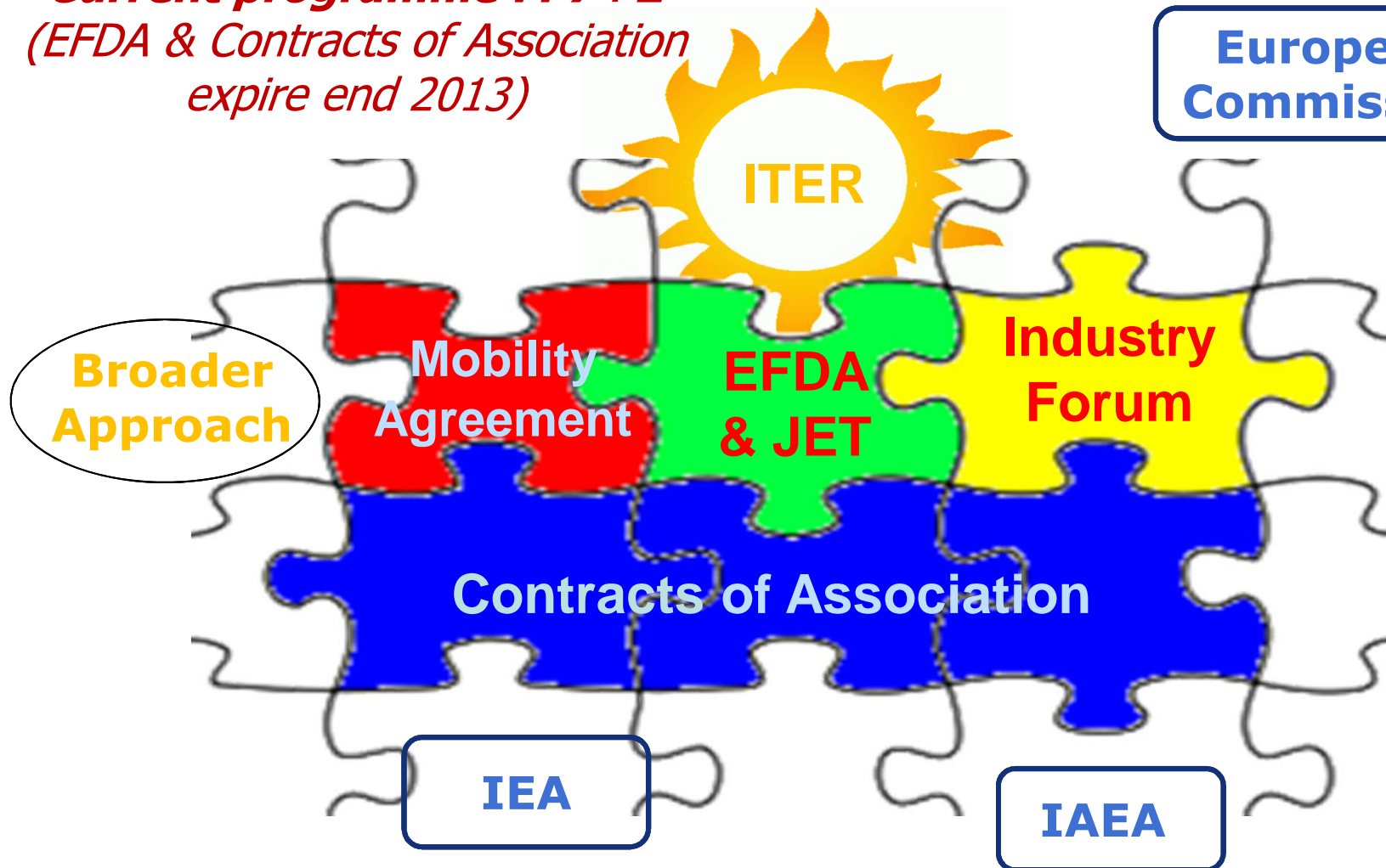
ALLIANCE covers studies on fuel management, R&D roadmap & infrastructures needs, siting, licencing roadmap, preliminary design and safety analysis;

Integrates experience and knowledge gained from the past or on-going related initiatives;

Will map and highlight national and regional initiatives supporting this technology and list of countries interested to host the demonstrator

Current programme FP7+2
*(EFDA & Contracts of Association
expire end 2013)*

**European
Commission**



26 national 'Fusion Associations' with Euratom ...



... all labs are EFDA signatories = an integrated programme

Countries participating in the European Fusion Programme

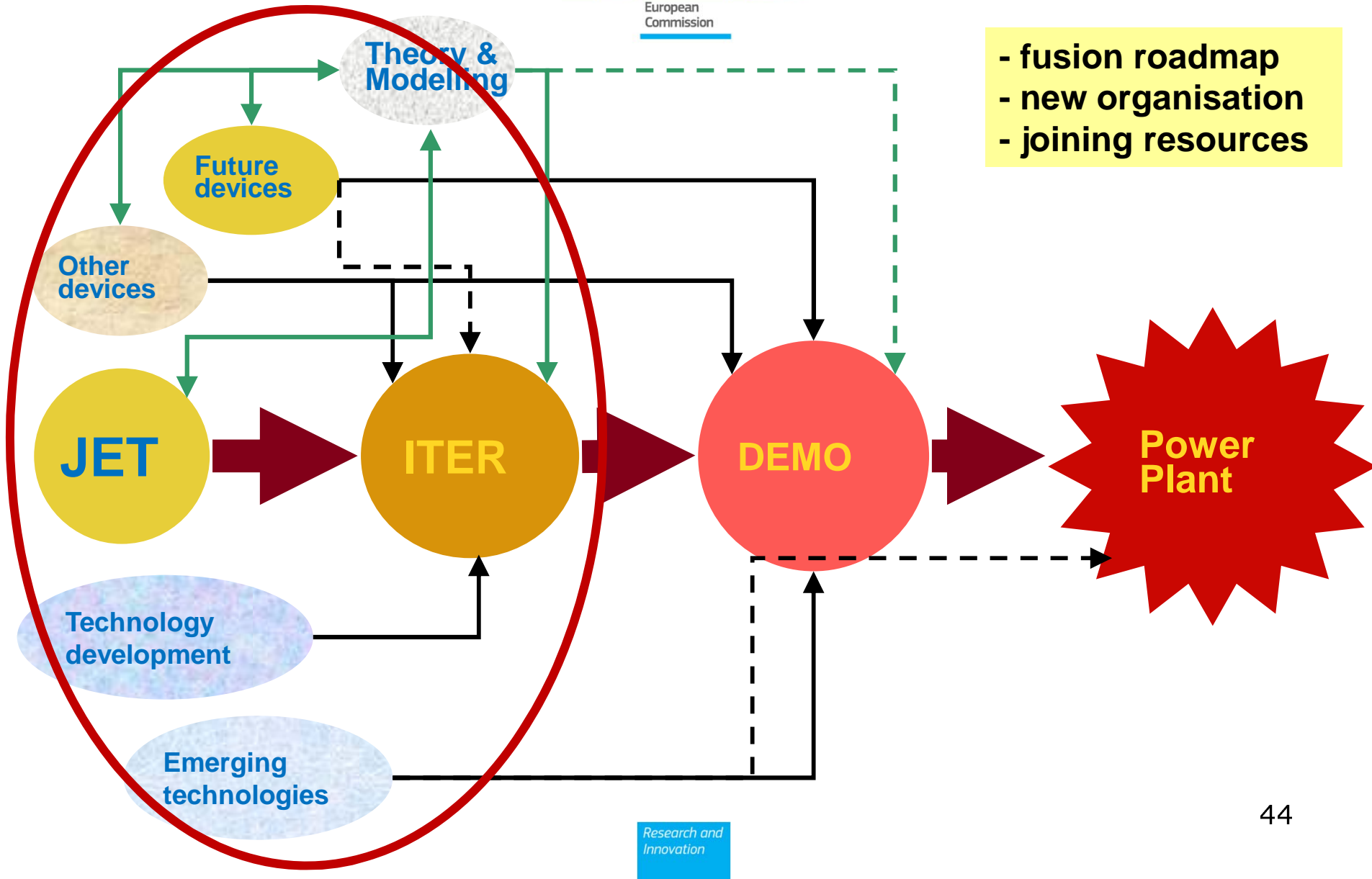
- Member States
- Countries associated to the Euratom Framework Programme
- Laboratories of Euratom Fusion-Associations



- Euratom - CEA (1958)
France
- Euratom - ENEA (1960)
Italy (incl. Malta)
- Euratom - IPP (1961)
Germany
- Euratom - DIFFER (1962)
The Netherlands
- Euratom - FZJ (1962)
Germany
- Euratom - Belgian State
Belgium (1969)
(incl. Luxembourg)
- Euratom - DTU (1973)
Denmark
- Euratom - CCFE (1973)
U.K. (incl. Croatia)
- Euratom - VR (1976)
Sweden
- Euratom - Conf. Suisse
Switzerland (1979)
- Euratom - KIT (1982)
Germany
- Euratom - CIEMAT (1986)
Spain
- Euratom - IST (1990)
Portugal

- Euratom - TEKES (1995)
Finland (incl. Estonia)
- Euratom - DCU (1996)
Ireland
- Euratom - ÖAW (1996)
Austria
- Eur-Hellenic Rep. (1999)
Greece (incl. Cyprus)
- Euratom - IPP.CR (1999)
Czech Rep.
- Euratom - HAS (1999)
Hungary
- Euratom - MEdC (1999)
Romania
- Euratom - Univ. Latvia
Latvia (2002)
- Euratom - IPPLM (2005)
Poland
- Euratom - MHEST (2005)
Slovenia
- Euratom - CU (2007)
Slovakia
- Euratom - INRNE (2007)
Bulgaria
- Euratom - LEI (2007)
Lithuania

Towards a reorganised European Fusion Programme under Horizon 2020





JOINT PROGRAMME

combining all national efforts in line with the commonly agreed Fusion Roadmap

- Consortium Agreement
- Appropriate governance
- Programme Leader & Management Unit
- Cooperation with international partners

Other devices

JET

co-funding

JET operation contract (bilateral with CCFE)

European Commission

• **Horizon 2020**
(Euratom 2014-18)



Euratom Horizon 2020 support to the European Joint Programme

- ***Grant Agreement with the new consortium***
 - ✓ The consortium to submit a **detailed proposal in response to the Euratom Work Programme** to be published on 11 Dec.
 - ✓ The proposal will then be **evaluated by external experts**
 - ✓ The Commission will then **negotiate the terms of a Grant Agreement** for a '**programme co-fund action**' with the consortium, to be signed in the summer next year
- ***Continued support for Joint European Torus (JET)***
 - ✓ From 1/1/14, JET operation will be funded via a **new bilateral contract** between the Commission and the operator, CCFE
 - ✓ JET will then be offered to the consortium as an **in-kind Euratom contribution** to the joint programme; the **scientific exploitation of JET is the responsibility of the consortium** and is an eligible cost under the joint programme
- ***Total funding from Euratom over the 5 years = c. €677M***



The future of EFDA activities

- **EFDA is being replaced by a consortium agreement** to implement the new joint programme in line with the roadmap
- Resources will be more **focused on** the key issues of importance to the **realisation of fusion electricity** in a reasonable time horizon
- **JET** remains the **key research infrastructure** over the next 4-5 years in view of its **importance for ITER** (characterisation of the ILW, a further D-T phase)
- The Euratom support follows a more classic 'Framework Programme' approach ('donor-grantee'), though this is possible only because new Horizon 2020 instruments such as the 'programme co-fund action' are now available
- The **international cooperation** role of EFDA becomes the **responsibility of the consortium** and must be addressed in their proposal



Hungarian participation in EURATOM Fusion

- *The ITER « Tokamak Services" Framework Partnership Agreement with Fusion for Energy*
- *The fusion diagnostic technologies developed in the framework of the EU fusion program are used on the Korean KSTAR and Chinese EAST tokamak.*
- *2 FP7 Fusion projects: FEMAS CA and FUSENET*
- *Euratom Association of the Hungarian Academy of Science*



Further Information:

Introducing Horizon 2020 and the Energy Challenge

INFORMATION DAY 2013

5 December 2013, Brussels

Join us via live web stream:

http://ec.europa.eu/research/energy_infoday/



HORIZON 2020

Köszönöm a figyelmet!

További információ:
www.ec.europa/research/horizon2020