SET-Plan Energy Education and Training Exercise

IEA's Experts Group on R&D Priority Setting and Evaluation –
Developments in Energy Education: Reducing Boundaries,
Copenhagen, Denmark

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European Commission

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European Strategic Energy Technology Plan (SET-Plan)

Outline

1.	SET-Plan framework and related policy context
2.	Some initiatives and instruments at EU level
3.	SET-Plan energy education and training exercise

1. SET-Plan framework and related policy context

SET-Plan Frame

- **Steering Group** – European Commission and Member States
- Openness and transparency in the decision-making process supported by the SET-Plan Information System **SETIS** - http://setis.ec.europa.eu
- Innovation creation - **the European Energy Research Alliance (EERA)**
- Innovation development and demonstration - **the European Industrial Initiatives (EIIs)**
- Financial and human **resources**

SETIS
Information For Decision-making

European Energy Research Alliance (EERA)

EERA objective: to accelerate the development of new energy technologies by pooling and integrating research activities and resources through Joint Programmes (JPs).

- Development of excellence in the research science base
- Well-established governance: Secretariat, Executive Committee, Chairman since 2008
- 13 JPs launched in 2010-2011: PV, Wind, Geothermal Energy, Smart Grids, Bioenergy, CCS, Materials for Nuclear, CSP, Ocean Energy, Energy Storage, AMPEA, FCH, Smart Cities
- More than 120 research institutes and universities involved in the JPs, representing more than 2000 person years
- A mechanism to realise international cooperation demonstrating EU excellence and critical mass
- EPUE – European Platform of Universities Engaged in Energy Research, EUA – observer in EERA

European Industrial Initiatives (EIIs)

EIIs objective: to address the demonstration/market rollout bottleneck in the innovation chain of low carbon energy technologies via the realisation of large-scale technology development and demonstration projects.

- 6 EIIs launched in 2010: **Wind**, **Solar**, **Carbon Capture and Storage**, **Electricity Grids**, **Sustainable Nuclear (Fission)** and **Bioenergy**
- In 2011: **Smart Cities and Communities** Initiative
- **Structure and Governance:** European Commission, Member States and Industry, steered by the SET-Plan Steering Group
- **Technology Roadmaps** with specific research, development and demonstration actions: Clear 10-year development programmes developed by Industry with the support of Member States and EC
- EII Teams are operational, focus is on the **implementation** following 3-year implementation plans, updated annually
- Calls under FP7, incl. ERA-NET Plus for **joint actions** among Member States

Included in the scope:

- **Fuel Cells and Hydrogen** (Joint Technology Initiative)
- **Nuclear Fusion**

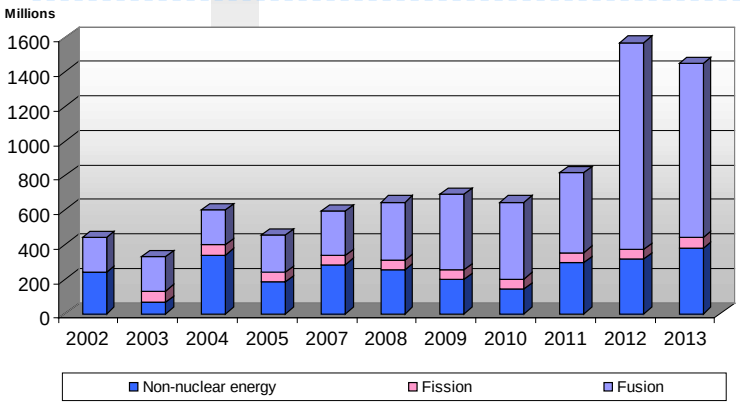
SET-Plan

European Commission

The technology pillar of the EU's Energy & Climate Policy

- Since 2008, EU and MS working together on a voluntary basis to accelerate the development of low carbon energy technologies
- Establishment of an EU governance resulted in a better alignment of national strategies and resources, the launch of 6 EIIs and of 13 JPs under the EERA.
- Need for R&I chain approach (*from ideas to market*) & a supply chain approach (*from materials to system integration and energy services*)
- Increased EU support to Energy research (FP6, FP7 and Horizon 2020):

Annual budget for EU energy research 2002-2013



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Horizon 2020 proposal:

- *EUR 6.5 bn (current prices) for the challenge 'Secure, Clean, and Efficient Energy' for 2014-2020*
- *EUR 1 bn for fission and fusion activities + EUR 0.7 bn (JRC) for 2014-2018 (ITER financing not part of H2020)*

- **But not enough… need for partnerships to pool resources / capacities**

SET-Plan: Resources

Communication "Investing in the Development of Low Carbon Technologies (SET-Plan) [COM(2009) 519]":

- Investment in the EU has to increase from the current €3 bn per year to around €8 bn per year to effectively move forward the SET-Plan actions

  -> priority: mobilisation of financial resources

- Solar energy: More than 200 000 skilled jobs could be created (similar figures for other technologies)

  -> priority: skilled and competent people:

  - On all levels: researchers, engineers, technicians, specialised craftsmen
  - Broad variety of competences needed – STEM (science, technology, engineering, mathematics) including non-technical ones: legal, economic, entrepreneurial, socio-economic, etc.

Energy education and training

- **First addressed in the SET-Plan Communication COM/2007/0723** The challenge to be addressed is to deliver the quantity and quality of human resources essential to support the required technological revolution for the energy sector and to grasp and benefit from the opportunities that the European energy policy creates.

From knowledge creation to competence building:

towards a new generation

of highly qualified European energy experts

A broader context

The education and training initiative is embedded in a broader context –

"Europe 2020 strategy" (March 2010) - Seven Flagship Initiatives for smart, sustainable and inclusive growth were presented, namely:

- Smart growth (e.g. **Innovation Union** - turning ideas into jobs, green growth and social progress)
- Sustainable growth (Resource efficient Europe + Industrial policy in global context)
- Inclusive growth (e.g. an **Agenda for new skills and jobs** – helping Europe reach full employment and create jobs that would be at the same time sustainable, of good quality, and greener)

Momentum

- **ERA Framework** – with the objective to achieve a well-functioning ERA and a single market for research and innovation by 2014 (Communication in 2012)

- **Energy Roadmap 2050 – towards a secure, competitive and decarbonised energy system in 2050**

  Communication COM(2011) 885 (Brussels, 26.1.2011)

- **Instruments to address the needs being developed at EU level:**
  - EU Sectoral Skills Councils (e.g. gas, electricity)
  - EU Skills Panorama

The need to reform

- **Supporting growth and jobs – an agenda for the modernisation of Europe's higher education systems**

  Communication COM(2011) 567 final

  - The EU still lags behind in the share of researchers in the total labour force: 6 per 100, compared to 9 in the US and 11 in Japan.
  - Research intensive sectors, increasingly report mismatches and difficulties in finding the right people for their evolving needs.

COM(2011) 567 final

Reforms are needed in key areas:

- to increase the **quantity** of higher education graduates at all levels;
- to enhance the **quality and relevance** of human capital development in higher education;
- to create **effective governance and funding** mechanisms in support of excellence; and to
- **strengthen the knowledge triangle** between education, research and business.

Moreover, the international mobility of students, researchers and staff, as well as the growing internationalisation of higher education, have a strong impact on quality and affect each of these key areas.

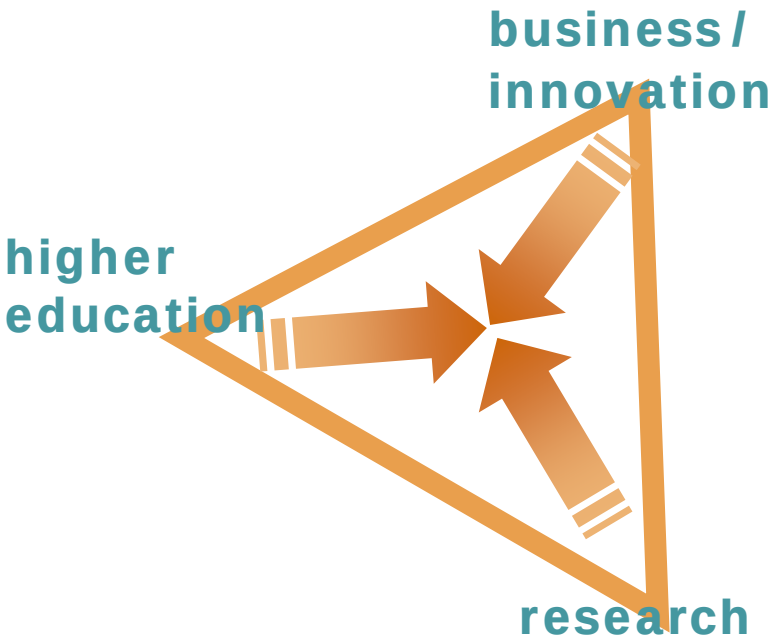
2. Some initiatives and instruments at EU level

EIT

European Commission

The European Institute of Innovation and Technology (EIT)

- **mission:** To contribute to sustainable European economic **growth** and **competitiveness** by reinforcing the **innovation capacity** of the Member States and the EU…
- **concept:**… by promoting and **integrating higher education, research and innovation** of the highest standards (= the **knowledge triangle**)



EIT - Objectives

- New business creation through innovation
- The transfer and valorisation of higher education, research and innovation activities in a business context
- Cutting edge and innovation-driven research in areas of key economic and societal interest
- Development of talented, skilled and entrepreneurial people through education and training activities
- Dissemination of best practices and systemic knowledge sharing

EIT - EU body established by regulation (EC) 294/2008 of 11 March 2008, based on former Art. 157 (3) (Industry)

EIT - KICs

- the EIT operates chiefly, but not exclusively, through the Knowledge and Innovation Communities (KICs)
- in doing so, the EIT not only gives grants to the KICs but actively supports, monitors, evaluates and coordinates them
- beyond the KICs, the EIT carries out complementary activities in order to achieve its mission

eit Knowledge & Innovation Community

KIC InnoEnergy

KIC InnoEnergy consortium consists of 30+ shareholders and additional 50+ partners - companies, research institutes, universities and business schools covering the whole energy mix. They are organised around six regional units, the Co-Location Centres (CC): Alps Valleys, Benelux, Germany, Iberia, Poland Plus and Sweden.

http://www.kic-innoenergy.com/

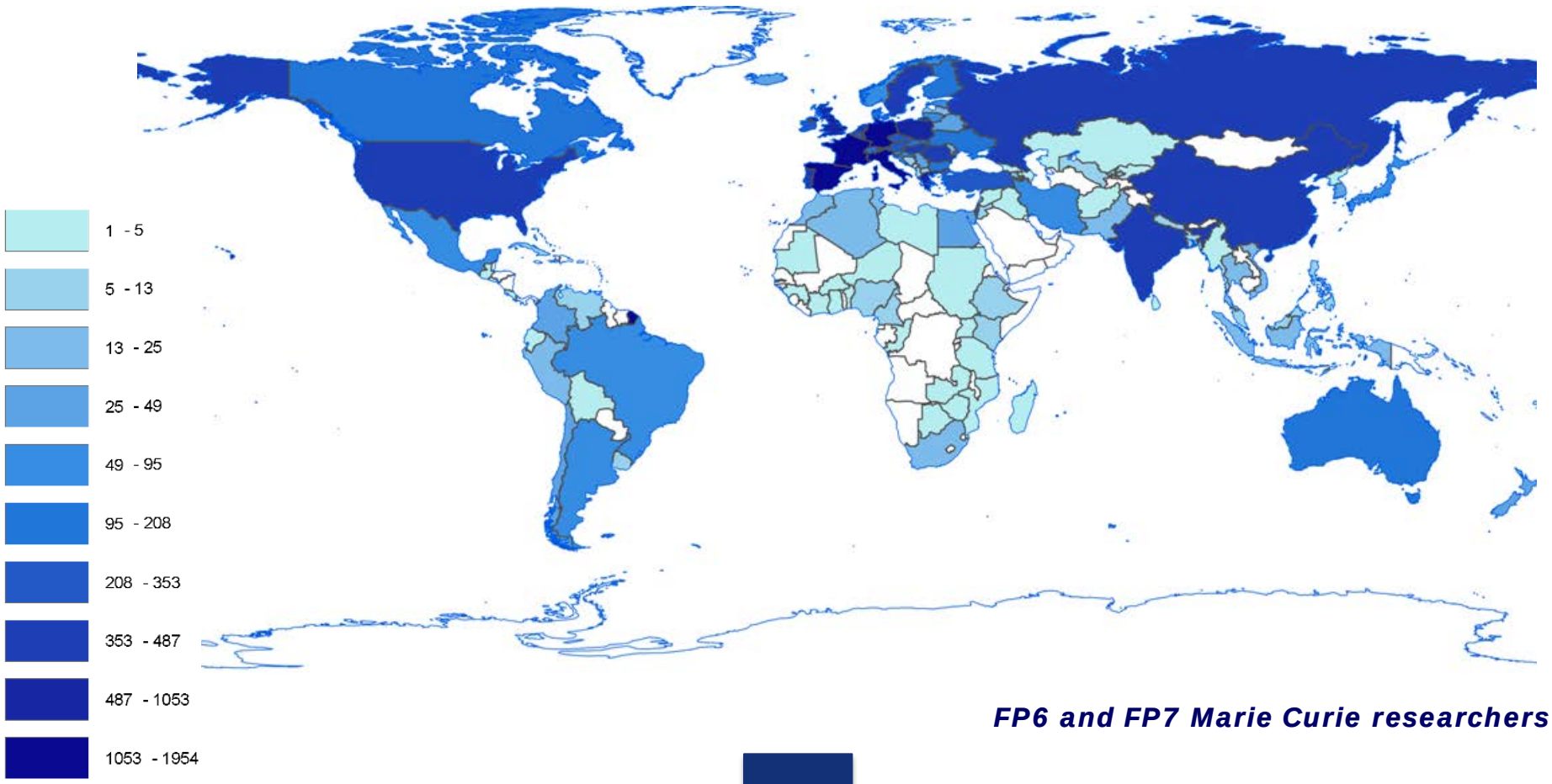
Marie Curie Actions

- The Marie Curie Actions are part of the People Programme of the 7th Framework Programme
- They support the mobility, training and career development of researchers of all nationalities
- They fund all the domains of research (bottom-up approach) and the financing rate is 100%
- The applications are done through competitive calls for proposals
- The proposals evaluation is done by independent experts

Marie Curie Actions

European Commission

Marie Curie researchers coming from all over the world (around 130 nationalities)



FP6 and FP7 Marie Curie researchers

Marie Curie Actions

Marie Curie Action		Objective
Initial training of researchers *(1900 M€)*	**Initial Training Networks (ITN)**	**Improve career perspectives of early stage researchers (ESR) in both public & private sector**
Life-long training and career development *(1170–1400 M€)*	**Intra-European Fellowships (IEF)**	**Career development of experienced researchers (ER) (e.g. diversification of skills/competencies; integrate a stable position after mobility)**
	Career Integration Grants (CIG)	
	Co-funding of regional, national, international programmes (COFUND)	
Industry dimension *(250-450 M€)*	**Industry-Academia Partnerships and Pathways (IAPP)**	**Open and foster dynamic pathways between public research organisations and private research commercial enterprises**
International dimension *World fellowships (1170–1400 M€)*	**International Outgoing Fellowships (IOF)**	**Reinforce the extra-European dimension of the European Research Area (ERA) through mobility, training, knowledge transfer and cooperation**
	International Incoming Fellowships (IIF)	
	International Research Staff Exchange Scheme (IRSES)	

Build Up Skills Initiative

European Commission

BUILD UP SKILLS
ENERGY TRAINING FOR BUILDERS

3-years (2011-2013) new funding initiative under the Intelligent Energy Europe programme

Focus

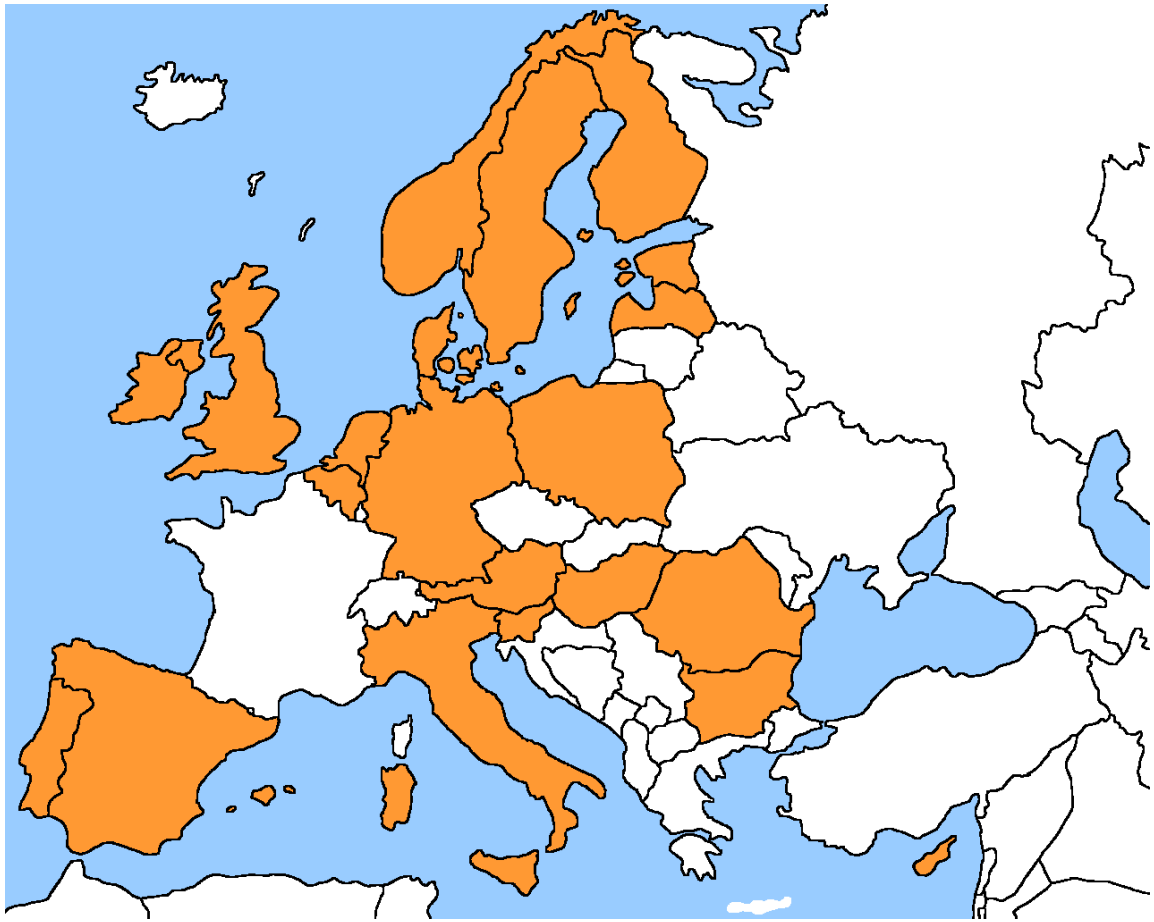
- Continuing education and training of the existing workforce
- Craftsmen and other on-site construction workers and system installers
- Energy efficiency and renewable energy sources in all types of buildings

INTELLIGENT ENERGY EUROPE

Build Up Skills – Objectives

- Initiate national discussion processes that bring together all relevant stakeholders
- Identify and quantify the need for a workforce qualified in energy efficiency and renewable energy in each Member State by 2020
- Set up and agree national qualification roadmaps to achieve the sustainable energy policy objectives for 2020
- Support concrete qualification schemes on the basis of roadmaps to 2020 with identified needs and priorities

Build Up Skills – 21 Projects



Call 2011:

- Austria
- Belgium
- Bulgaria
- Cyprus
- Denmark
- Estonia
- Spain
- Finland
- Germany
- Hungary
- Ireland
- Italy
- Netherlands
- United Kingdom
- Latvia
- Norway
- Poland
- Portugal
- Romania
- Sweden
- Slovenia

Call 2012 will only be open for the remaining countries: Czech Republic, Croatia, Greece, France, Malta, Iceland, Liechtenstein, Lithuania, Luxemburg, Slovakia and the Former Yugoslav Republic of Macedonia

3. SET-Plan energy education and training exercise

Key questions

Demand:

- How many people needed?
- What profiles?
- When?

Supply:

- Are the existing instruments/programmes/activities sufficient to meet the demand?

Measures:

- If not, what measures should be taken to enable/ensure the development of the required workforce?
  - Up-scaling/adapting/linking existing instruments?
  - New instruments/programmes/curricula, etc.?

Answer:

We do not know…

……yet.

→ Education and Training Initiative will deliver the first answers

- A huge diversity of initiatives going on at Member State level
- What is the best strategy for the SET-Plan to deliver the human resources that it needs? What actions at EU level?
- The **role of universities is crucial** in this context.
- At the same time, this initiative should go **beyond the academic world** – it is **essential to work with research institutes and industry** within higher education schemes, as well as in relation to post-graduate education and vocational training schemes.

Current activities - examples

We don't start from scratch.

Example: nuclear fission

- **European Human Resource Observatory in the Nuclear Energy Sector (EHRO-N):** Monitoring of short-, medium- and long term needs of human resources and expertise in nuclear energy and nuclear safety
- **European Nuclear Education Network (ENEN):** To preserve and further develop higher nuclear education and expertise in all areas of nuclear fission and radiation protection
- Takes part in the **European Credit System for Vocational Education and Training (ECVET):** Learning Outcomes (knowledge, skills, comptences); Borderless mobility and life long learning
- **7 EURATOM Fission Training Schemes**

ECVET

The ECVET system aims at allowing the transfer, recognition and accumulation of learning outcomes to obtain a qualification. It gives European Union citizens the possibility to obtain professional qualifications through personal learning outcomes, regardless of the country or educational system.

→ *Cooperation within the "European Higher Education Area" (EHEA): changes in the EU governance framework in higher education & training.*

Graduate or young professional :

principal question asked will no longer be:

"what did you do to obtain your degree (or your qualification) ?"

but rather:

"what can you do now that you have obtained your degree ?"

new concepts:

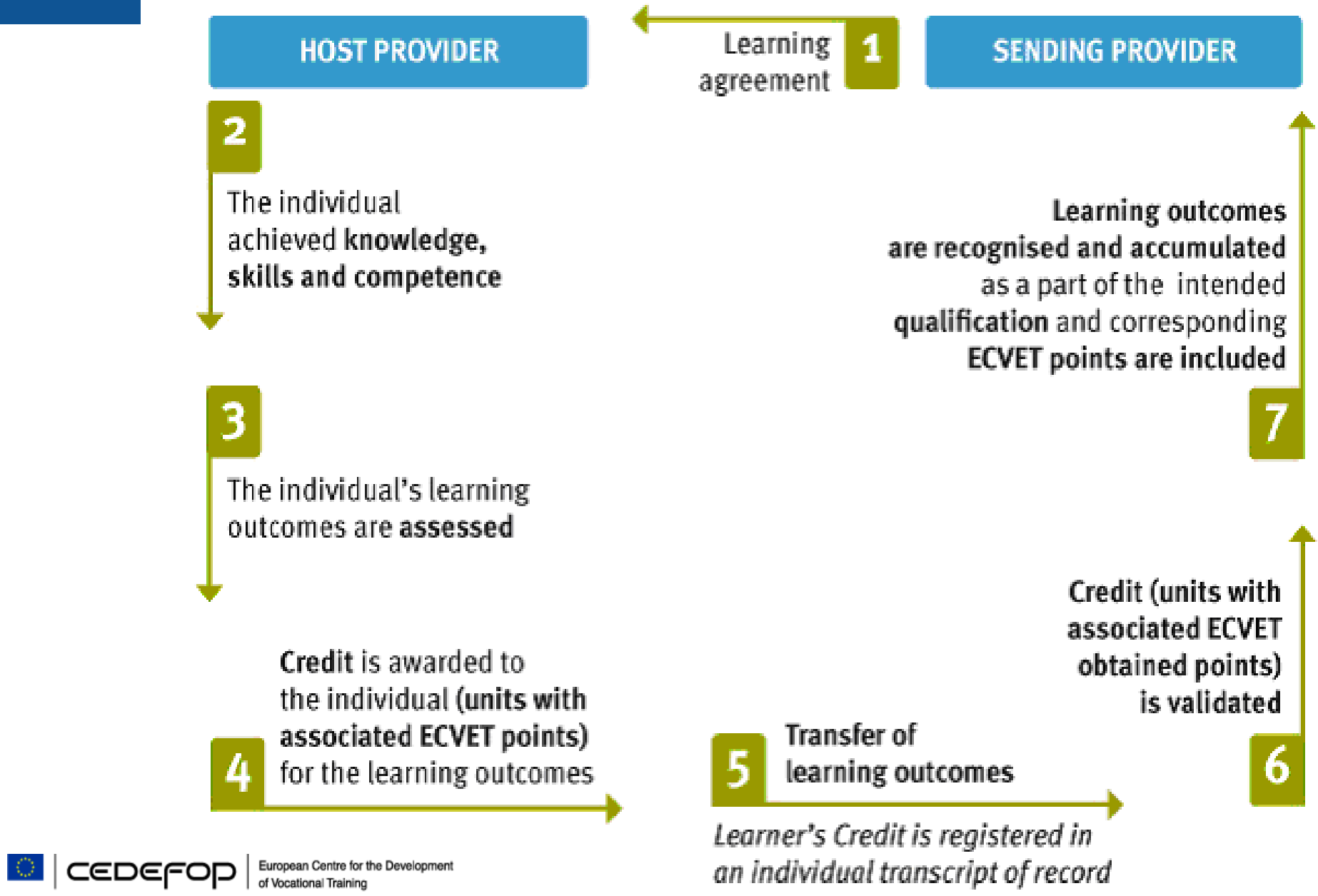
"Learning Outcomes" (units of L.O., assessed and recognized by competent authorities)

ECVET definition: "learning outcomes" means statements of what a learner knows, understands and is able to do on completion of a learning process.

Learning outcomes may be acquired through a variety of learning pathways, modes of delivery (school-based, in-company, workplaces, etc.), in different learning contexts (formal, non-formal and informal) or settings (i.e. country, education and training system ...)

"Personal Transcript" (portfolio of assessed learning outcomes, units and ECVET points expressed in KSC) KSC = Knowledge, Skills and Competences

Application of ECVET



Defining a European Energy Education and Training Initiative

General objectives:

- Define and assess the rationale for a European Energy Education and Training initiative;
- Elaborate a vision on how to address this SET-Plan pillar dealing with human resources and capacities;
- Investigate a number of avenues that could be the core of this initiative.

Process:

- Firstly, **assessment reports** will be produced in order to ensure a comprehensive analysis of the current situation and future needs. They will be used as a basis for the drafting of a strategic document.
- The **strategic document** will define a set of proposals for actions to address the current and future needs within the framework of a SET-Plan European Energy Education and Training Initiative.

Key players

Core group – list of organisations and EC services:

- European Platform of Universities engaged in Energy research (**EPUE**), European University Association
- European Energy Research Alliance (**EERA**)
- **KIC InnoEnergy**, European Institute of Innovation & Technology
- European Strategic Partnership for Sustainable Energy Education, Innovation and Technology (**SEEIT**)
- European Sustainable Energy Innovation Alliance (**eseia**)
- European Strategy Forum on Research Infrastructures (**ESFRI**)

- DG Research and Innovation, DG Education and Culture, DG Employment, Social Affairs & Inclusion, Executive Agency for Competitiveness & Innovation, JRC – SET-Plan Information System (SETIS), in coordination with DG Energy

  - Industry representatives within the different working groups.

13 Assessment Reports

13 Working Groups

- bioenergy
- carbon capture and storage (CCS)
- concentrated solar power (CSP)
- electricity grids
- energy efficient buildings (EEB), heating & cooling networks, smart cities integration aspects
- energy storage
- fuel cells and hydrogen (FCH)
- geothermal energy
- nuclear energy
- photovoltaics (PV)
- wind and ocean energy
- horizontal field 1: system integration
- horizontal field 2: coordination of education and training systems

members: **universities**, **R&D institutes**, **industry**

Cross-cutting: Infrastructures (to be addressed in each group)

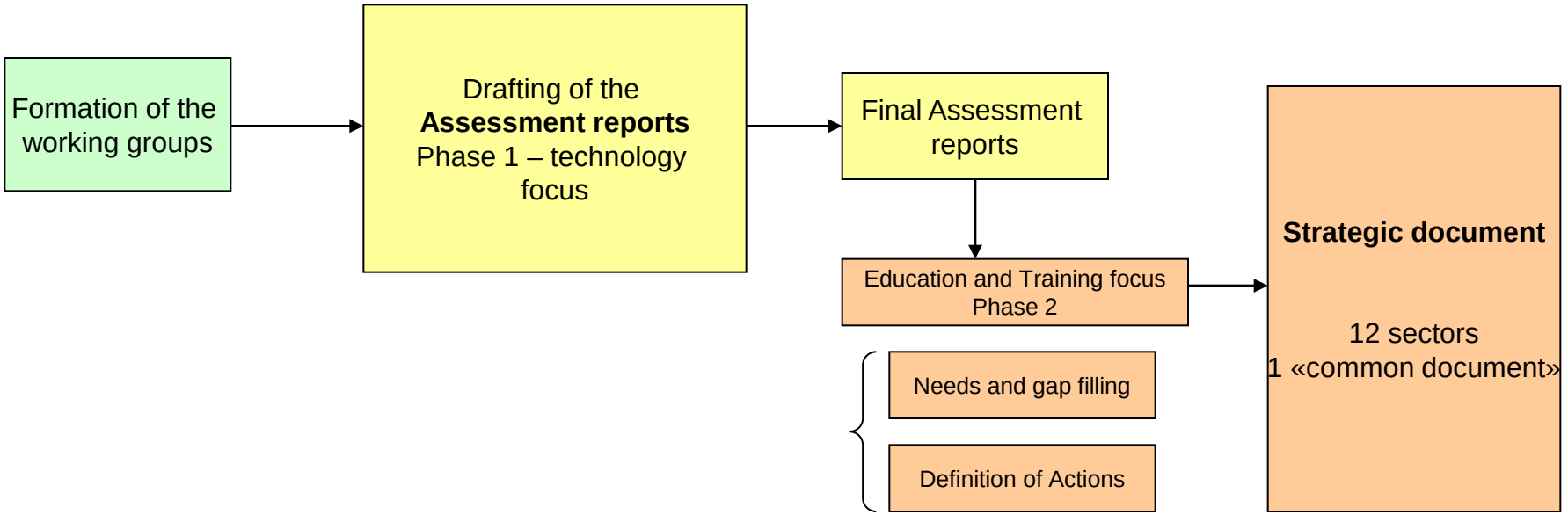
Sector reports

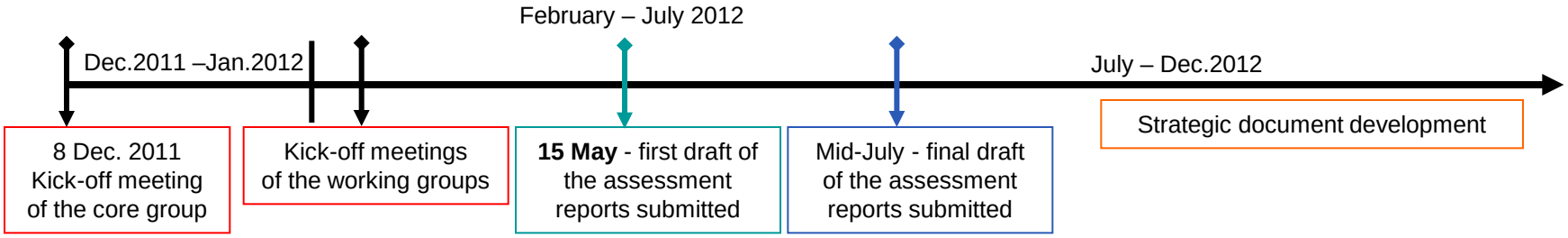
Sector assessment report structure

- **Section 1:** Current situation – existing workforces (value chain), labour intensity, future trends, and workforces required to achieve the SET-Plan vision.
- **Section 2:** Ongoing actions
- **Section 3:** Needs and gaps, in particular main barriers or bottlenecks for the different industrial sectors and their markets
- **Section 4:** Recommendations at EU and MS level within specific target dates

The whole innovation chain, all profiles: researchers, engineers, technicians…

Process overview





core group + working groups + EC
Primarily lead: core group + EC

EC + core group
Primarily lead: EC

International Dimension

- Various programmes under FP7/Horizon2020 and other frameworks (Marie Curie Actions, etc.).
- A move towards internationalisation and openness of European higher education systems – openness to students, staff and researchers from around the world, fostering **international networks for excellence** and **mobility partnerships**.
- Consistency between EU and national actions for research through the **Strategic Forum for International Scientific and Technological Cooperation (SFIC)** – structuring science and technology cooperation activities and objectives.
- Supporting higher education in developing countries.

Thank you for your attention!

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