ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES, ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT

UNIVERSIDAD DISTRITAL FRANCISCO JOSÉ DE CALDAS

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CERI CENTRO DE RELACIONES INTERINSTITUCIONALES

"Taller de Buenas Practicas H2020"

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About ENEA

- ENEA is the Italian National Agency for New Technologies, Energy and Sustainable Economic Development
- It is a public RTO (Research and Technology Organization) operating in the fields of energy, environment and new technologies to support Country's competitiveness and sustainable development
- ENEA's mission is to develop new technological solutions to meet the societal challenges, fostering transition to the low carbon economy
- The institutional mandate of the Agency is to disseminate and transfer knowledge, innovation and technology to industry, institutions and civil society at large

60-year-old history of research and innovation

1952
- Establishment of the National Committee for Nuclear Research (CNRN) within CNR
- Mission and scope: development of civil applications of nuclear energy in a multidisciplinary approach

1960
- Conversion into the National Committee for Nuclear Energy (CNEN)
- Mission: centre of excellence for technology development to support rising national industry

1982
- Establishment of ENEA, Italian National Agency for Atomic Energy and Alternative Energies
- Energy issues became a major research focus alongside the traditional nuclear research

1991
2003
- Further enlargements of the mission and broadening of the research areas
- Renewable energy, environmental protection, innovation, become central

2009
- ENEA becomes Agency, under the Ministry of Economic Development with a revised mission of R&TD in the fields of energy and new technologies
- The Agency has a leading role in promoting innovation for a sustainable and competitive development

2016
- ENEA confirmed as Agency, under the Ministry of Economic Development with a revised mission of R&TD in the fields of energy technologies, new technologies and sustainability, energy efficiency
- A new BOD and President appointed on March 2016

Activities

ENEA mainly operates to promote and carry out basic and applied research and innovation activities:

- Research: mission-oriented, applied and industrial research, also through development of prototypes and product industrialization, basic
- Technology Transfer: dissemination and transfer of research results to industry and exploitation for production purposes
- Advanced services: studies, measurements, tests and assessements to both public and private bodies and enterprises
- Training and information: activities aimed at broadening sector expertise and public knowledge and awareness

"ALL IN HOUSE"

Research facilities and staff

Research facilities

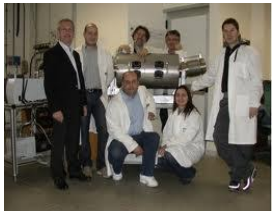
- **9** Research Centres
- **5** Research Laboratories
- **11** territorial offices
- **Brussels** Liaison Office
- **Headquarters** in Rome

Human Resources

2555 permanent staff (30/09/15):

- **36,4%** women
- **58,6%** graduates

100 non permanent staff




Research and Development

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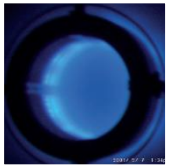

Fusion & Nuclear safety

- Fusion
- Fission (new gen)
- Radiation protection
- Nuclear safety & security
- Ionizing/non ionizing radiation applications

Energy technologies

- CSP and thermal solar energy, including thermal energy storage
- Photovoltaics and smart grids
- Energy efficiency technologies, including efficient conversion and use of energy, electric energy storage
- Bioenergy, biorefinery and greenchemostry
- Smart energy & smart cities
- Sustainable mobility
- Advanced energy materials
- Sustainable use of fossil fuels

Sustainability of territorial systems

- Resource efficiency
- Environmental technologies
- Climate change: modeling, adaptation and mitigation
- Prevention and Recovery
- Seismic and natural hazards assessment and prevention
- Bio and nanotechs
- Agrifood

The Energy Efficiency Agency

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Energy Efficiency

OUR MAIN TASKS

- to provide the Ministry of Economic Development (MiSE), the Regions and Local Authorities with technical-scientific support
- to support the MiSE by developing the National Energy Efficiency Action Plans and drafting the Annual Report on Energy Efficiency
- to develop calculation methods suitable for measuring energy savings in order to verify the achievement of national indicative targets
- to disseminate reliable and timely information on energy efficiency mechanisms and financial and legal frameworks

Involved in the Deep Decarbonization Pathways Project (together with the Studies and Strategies Unit), we recently published the Italy Country Report http://deepdecarbonization.org/countries/#italy: technological mix for achieving 2050 emissions reduction and associated macroeconomic impacts

Agenzia Nazionale
Efficienza Energetica

INTERDISCIPLINARITY

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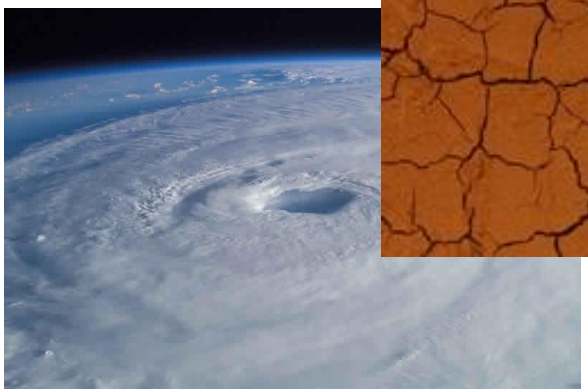
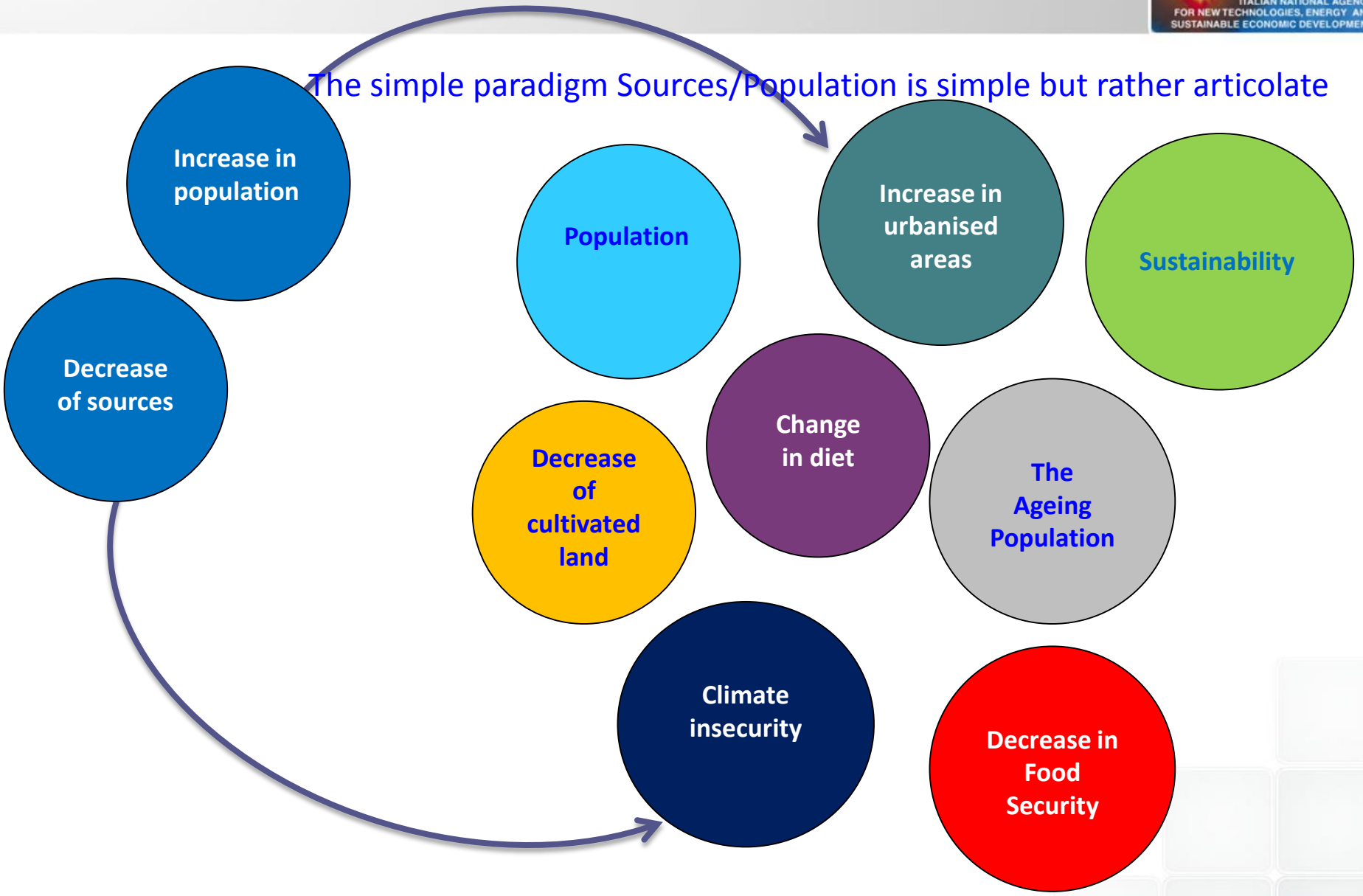
ENERGY not just ENERGY

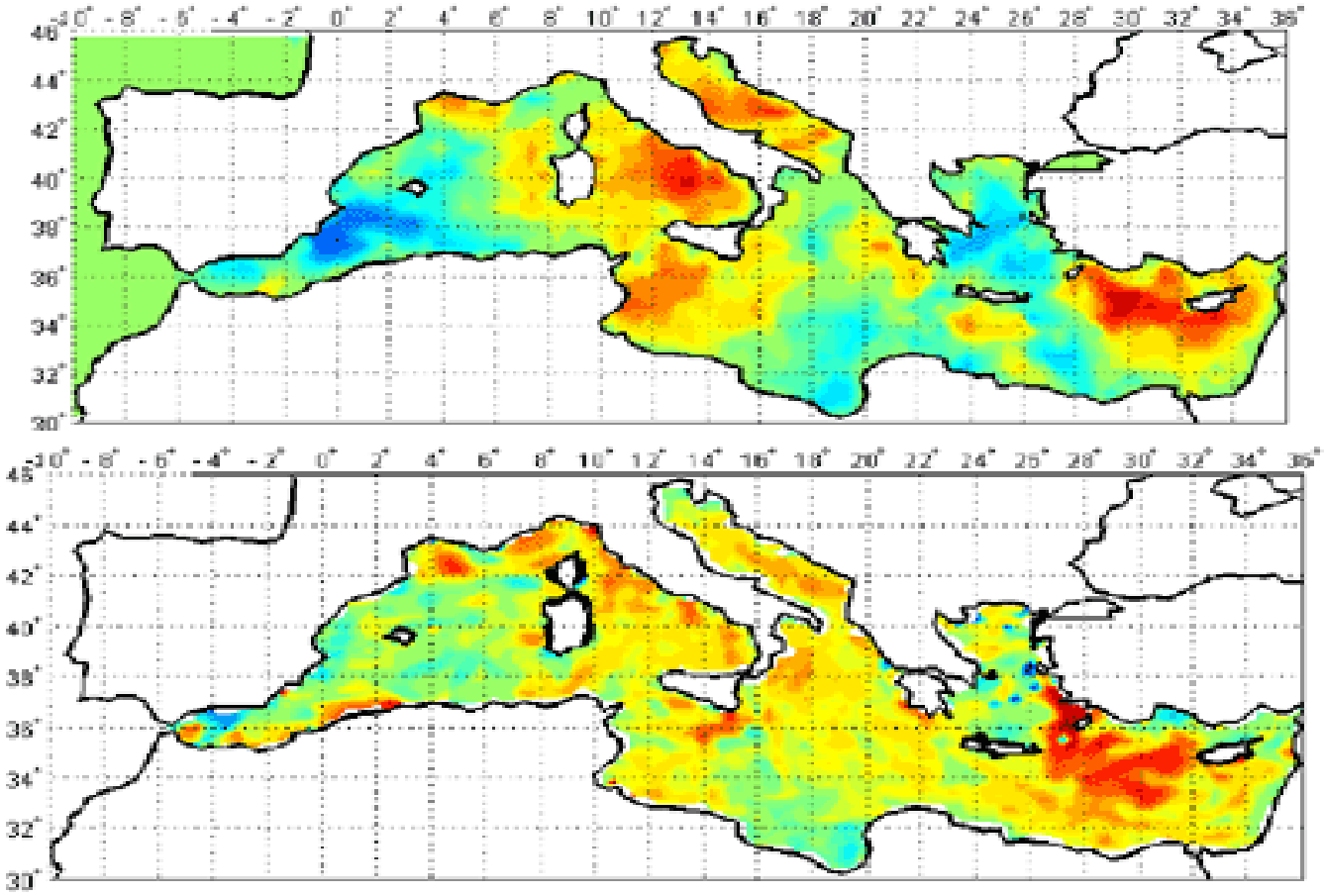


INTERDISCIPLINARITY

The simple paradigm Sources/Population is simple but rather articolate



INTERDISCIPLINARITY



Climate Services

Robust assessment of the expansion and retreat of Mediterranean climate in the 21st century

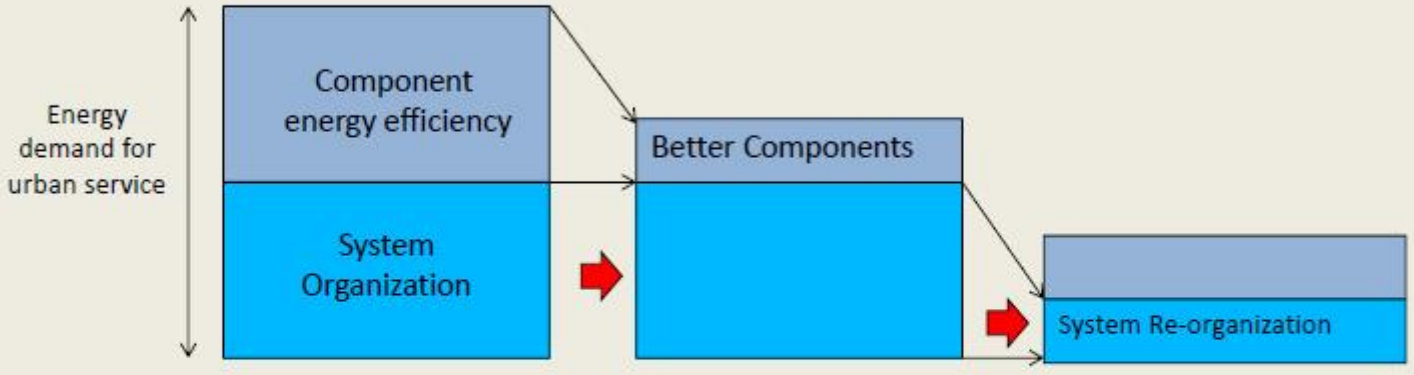
Nature Scientific Reports **2014** doi:10.1038/srep07211

INTERDISCIPLINARITY

THE SMART CITY CONCEPT

INTERDISCIPLINARITY

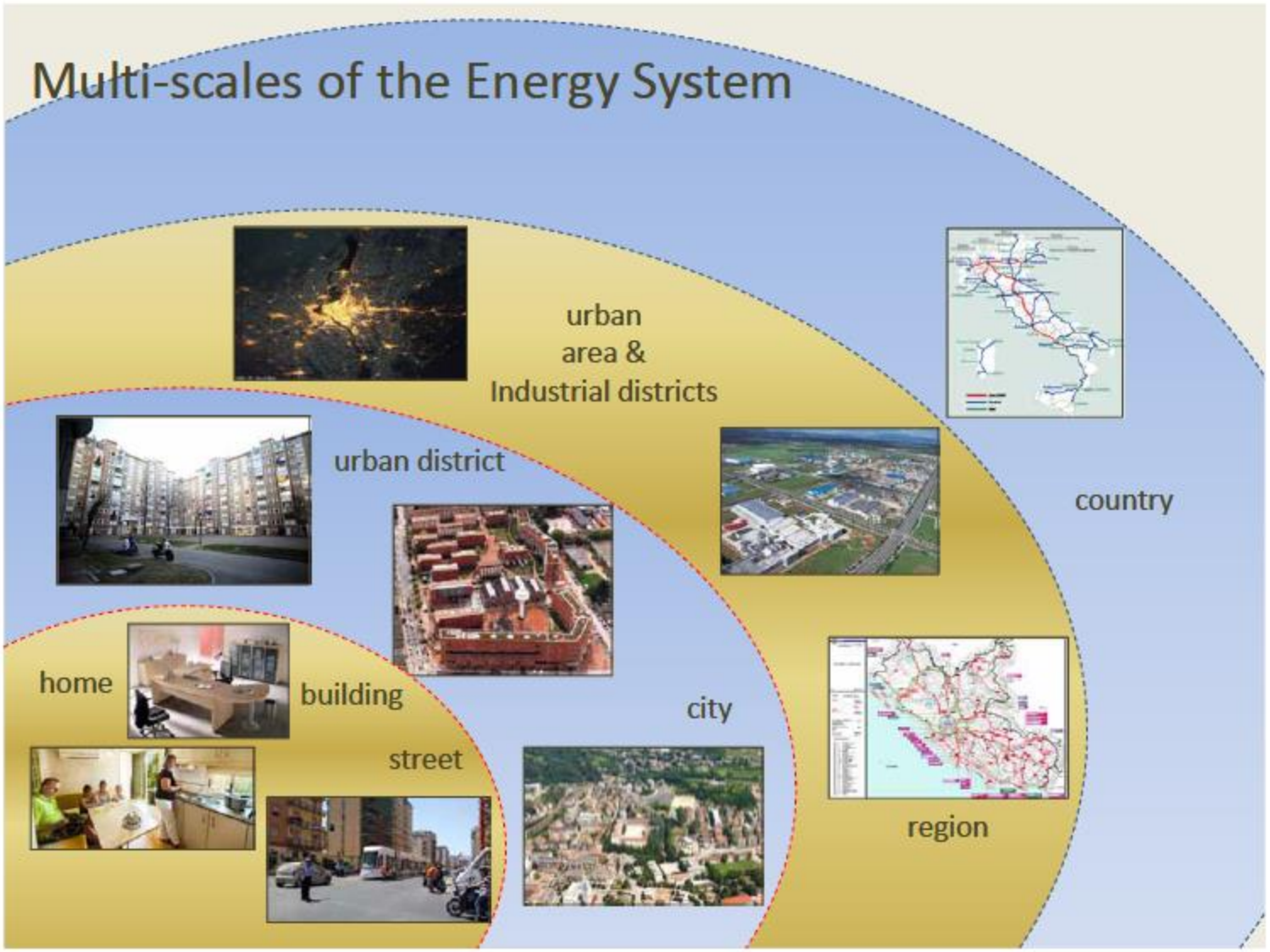
from Energy Efficiency to the Smart City



Energy on demand



INTERDISCIPLINARITY



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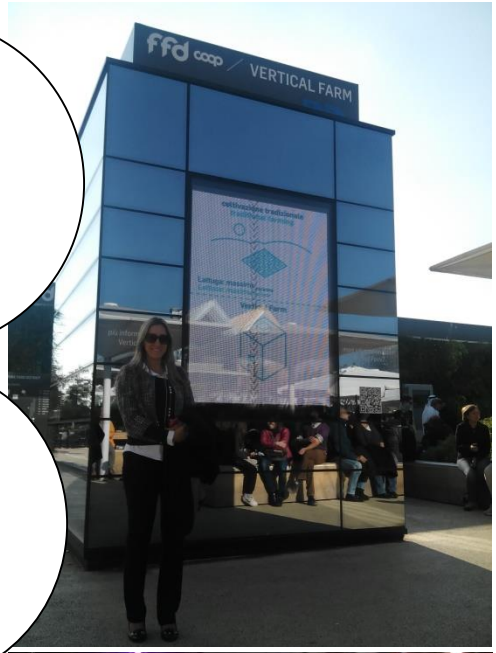
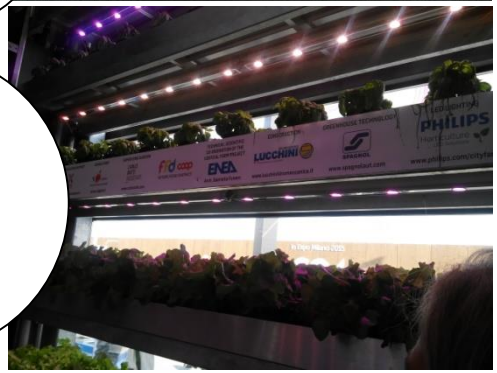
Increase in urbanised areas

Increase in population

Decrease of cultivated land





URBAN-FARMING-UNIT

ENEA per EXPO 2015

AGRICULTURE IN EXTREME CONDITIONS

DESERTS, ARTICS, MEGALOPOLIS, SPACE FARMING

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What are the tools without a Policy?

INTERDISCIPLINARITY

Science, Technology and Education can provide some solutions

Hunger

Food and Water for the future

Health

Renewable energy

Smart urbanisation

Land preservation

Efficiency

WORLDWIDE

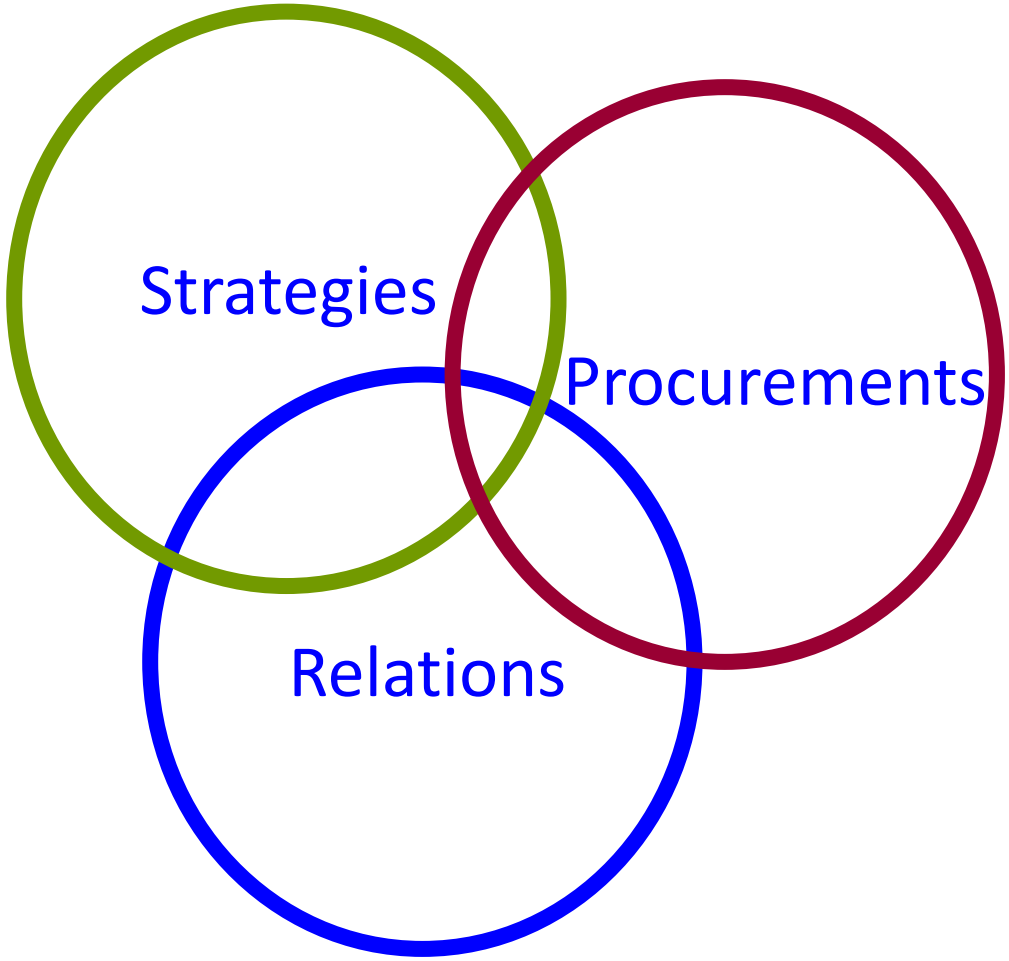
COORDINATED

HARMONISED

INTERDISCIPLINARITY

- The aim of ENEA Research is to develop new technological solutions to meet the societal challenges
- Research Activities are performed in cooperation with utilities and industrial partners interested in developing CSP technologies
- Research can be integrated among different disciplines and with policy and governance aspects

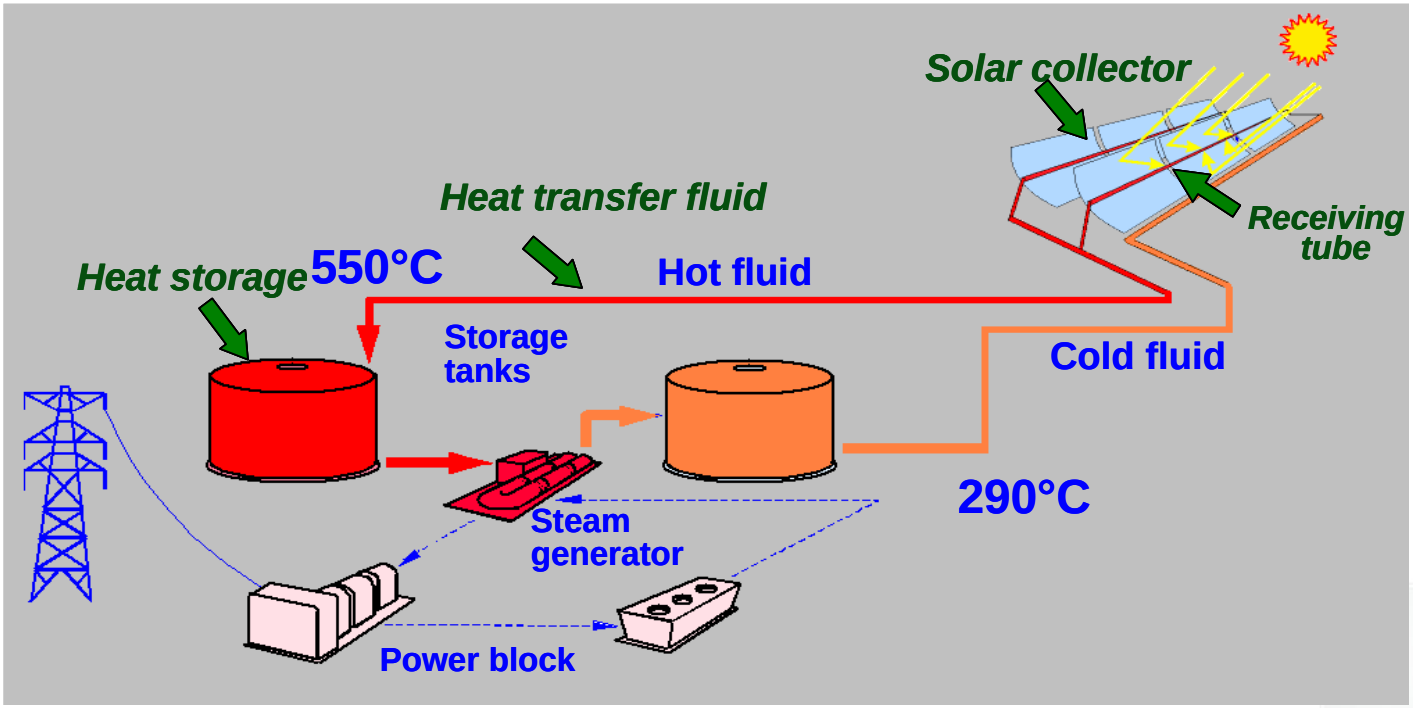
Management (non exhaustive)



Central Services

Concentrated Solar Power –CSP-

- Several CSP projects today make use of molten nitrates up to 565° C heat transfer fluid (HTF) and Thermal Energy Storage (TES) medium in large tower plants
- **ENEA was the first organization in the world that developed to the prototype and commercial level (12.5 MWth) the linear focusing CSP technology with solar salts HTF (up to 550° C)**



ENEA technology of CSP at high temperature

Casaccia Res. Centre

Brief history of ENEA CSP Solar Technology

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2001 To 2003

- Project Start-up Government Role
- Lab R&D: Prototype Design

2004 To 2007

- PCS Facility: Prototype Operation start-up
- Components test and qualification

2008 To 2009

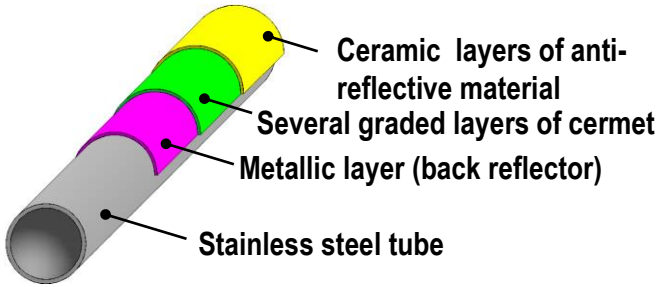
- Industrial Demo plant Industrial Role
- Demo design and construction

2010

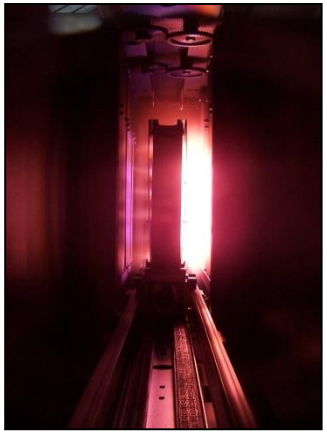
- Start-up demo plant

Development of key components

Stratification of a thin film of nano composite material produced by reactive sputtering (ENEA Patent)



Cermet coating with thin film structure (Total thickness < 0.5 micron)



Reactive Sputtering process

Cermet coating developed and patented by ENEA and granted in license to Archimede Solar Energy (ASE), an Italian Company of Angelantoni Industries

Industrial plant of reactive sputtering realized by Archimede Solar Energy, in Massa Martana (PG), Italy. Productive capacity: 70.000 receivers/year

Thermal Energy Storage with double tank

- Archimedes Plant: Demonstrative solar plant at high temperature, with parabolic linear collectors and molten salt binary mixture as heat transfer fluid and thermal energy storage material

The Archimede plant

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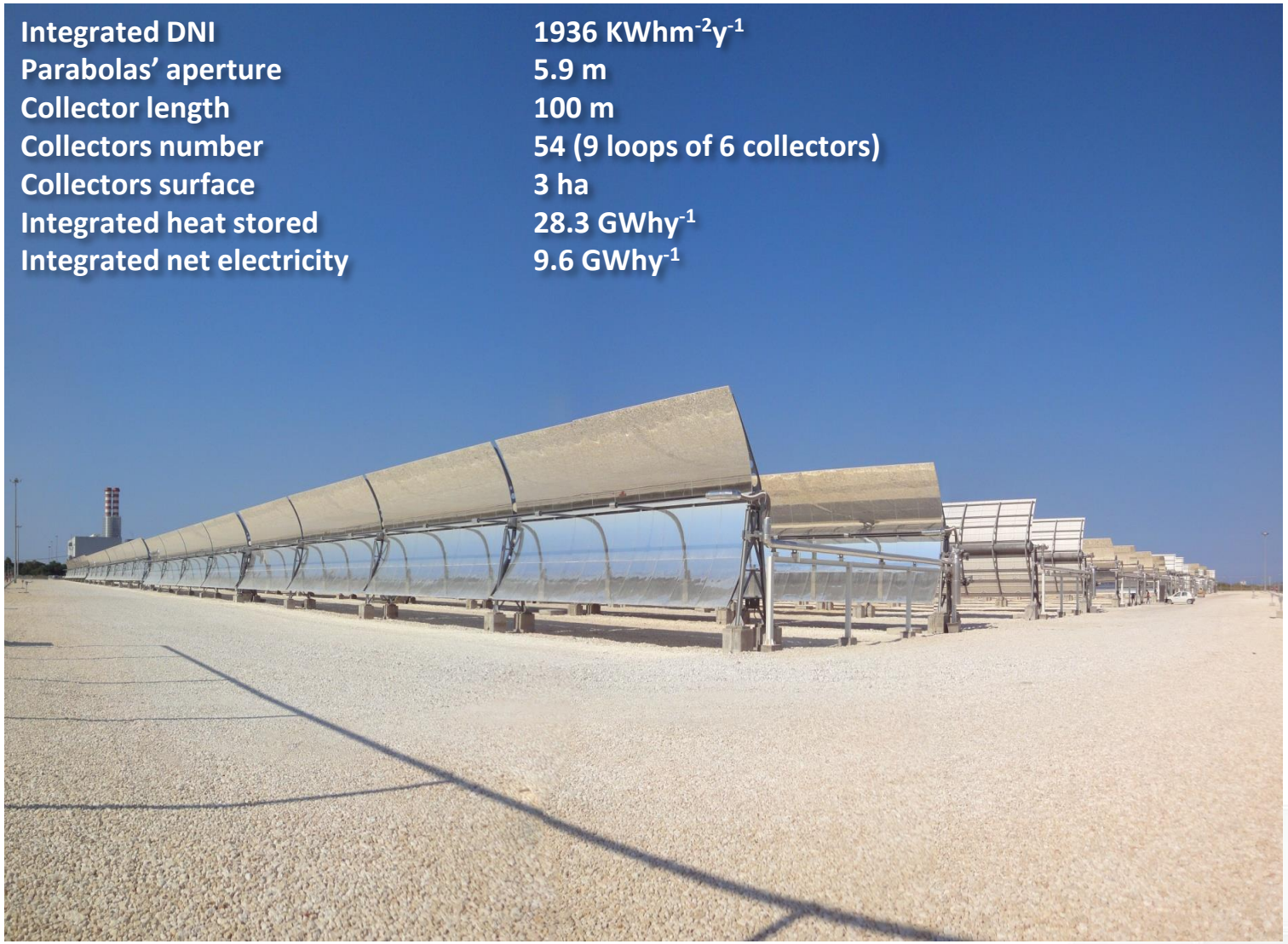
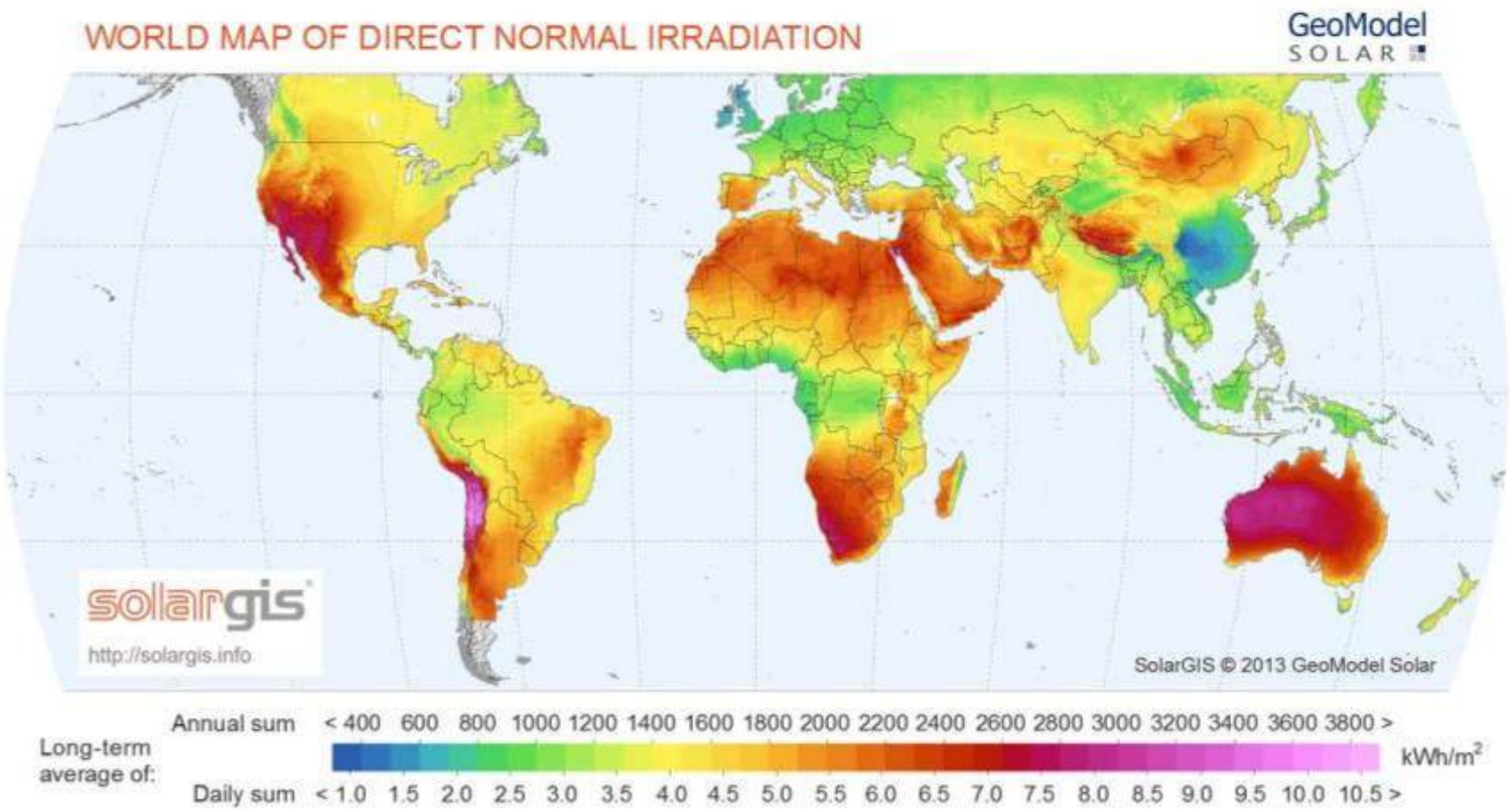
Integrated DNI	1936 $KWhm^{-2}y^{-1}$
Parabolas' aperture	5.9 m
Collector length	100 m
Collectors number	54 (9 loops of 6 collectors)
Collectors surface	3 ha
Integrated heat stored	28.3 $GWhy^{-1}$
Integrated net electricity	9.6 $GWhy^{-1}$



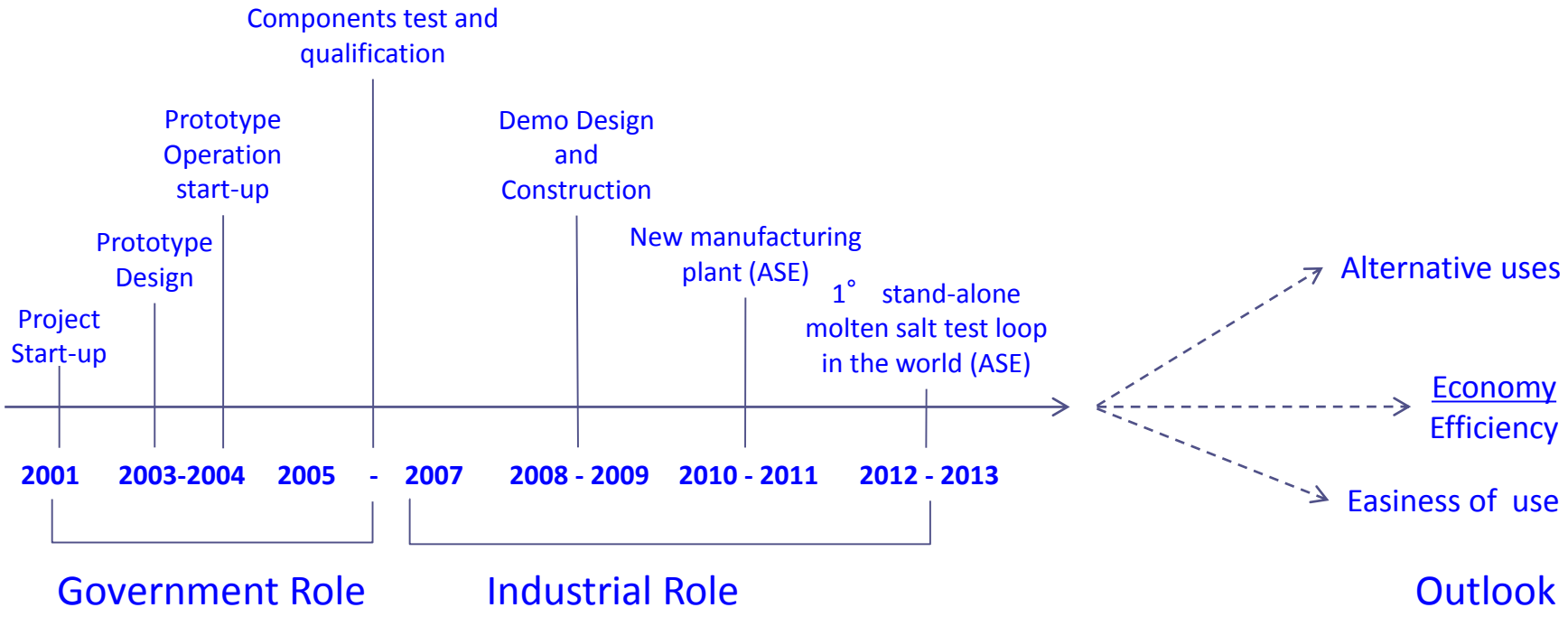
Forecast



• The International Energy Agency forecasts CSP will contribute 28% of all renewable generation by 2060 (the highest growth potential).

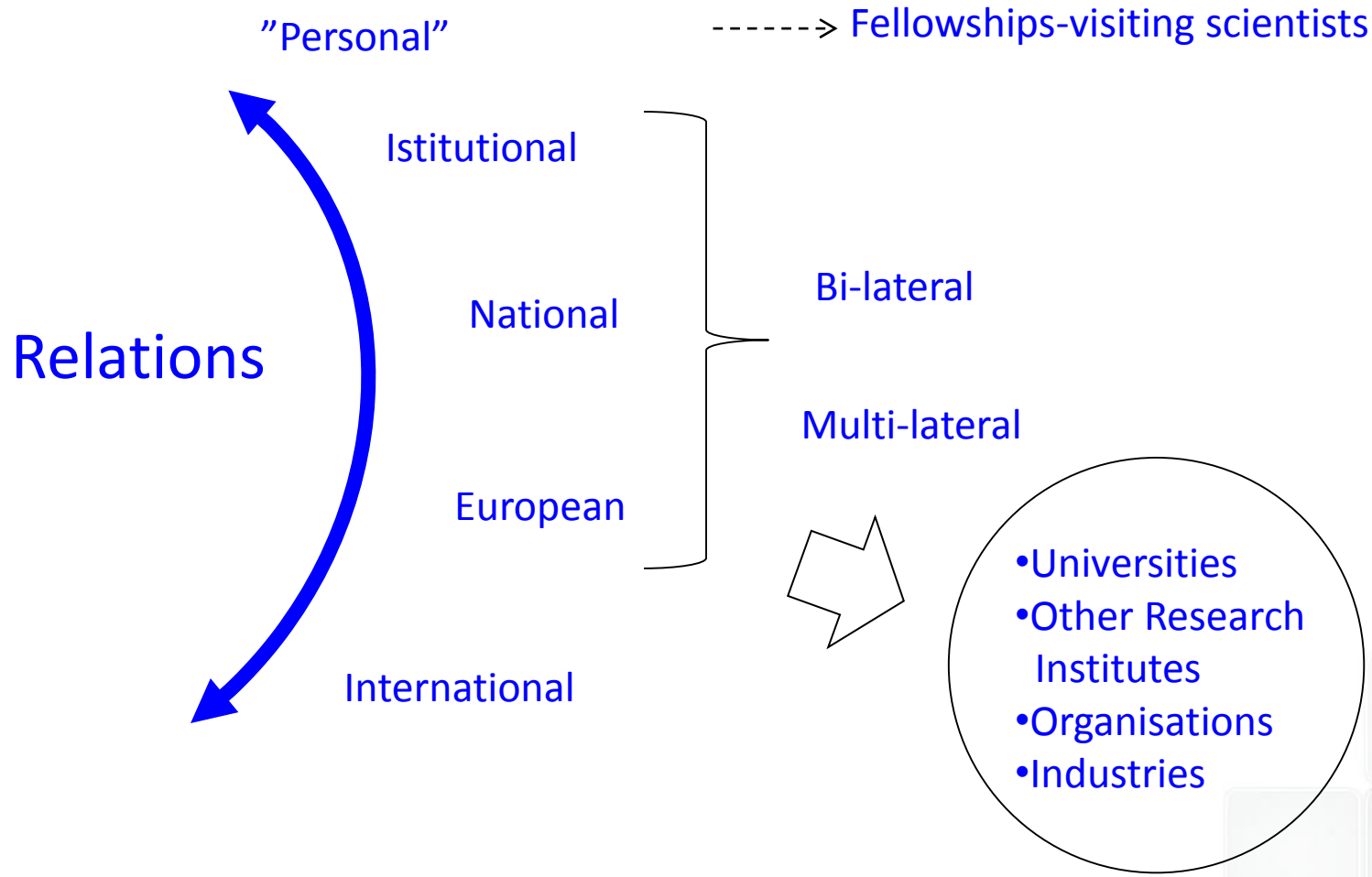
• CSP is the only renewable energy able to store energy (dispatch ability).
• The power installation expected whitin 2030 is 261 GW

Brief history of ENEA CSP Solar Technology



De Martinis and Giaconia: *"Production and management of Energy; the interdisciplinary approach of ENEA to Concentrated Solar Power ".* in Press

Management (non exhaustive)



Central Services

International cooperation

ENEA experts participate in international projects, networks, committees and working groups:

European Research Programmes

- **165** projects in 7FP (including Euratom Fission) with a financial contribution of **47,3 Meuro** (2007-2013)
- **1100** partners from Europe, the Southern Mediterranean Basin and the rest of the world (2013)

International Networks

- EERA (European Energy Research Alliance)
- ECRA (European Climate Research Alliance)
- European Energy Network
- Mediterranean Association of the National Agencies for Energy Conservation (MEDENER)
- TAFTIE - the Association For Technology Implementation In Europe
- Enterprise Europe Network, the most important European network for TT
- ENEA participates in many European Technology Platforms

International Organizations

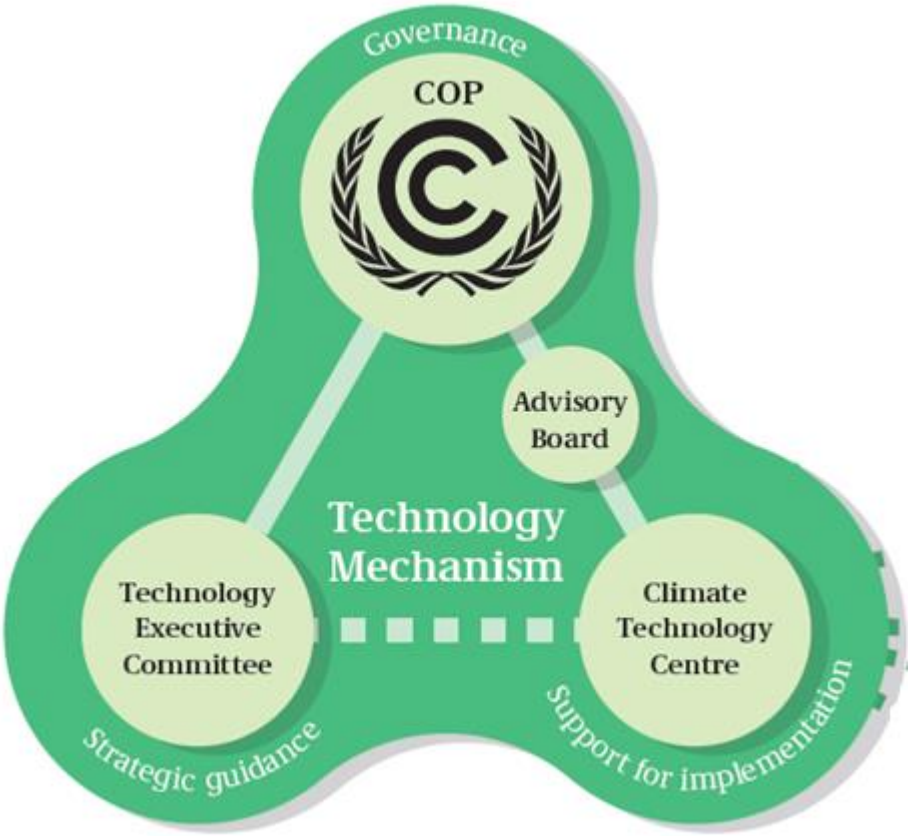
ENEA experts participate in committees and working groups of the following multilateral organisations:

- IAEA - The International Atomic Energy Agency
- IEA - International Energy Agency
- NEA - Nuclear Energy Agency
- OECD – Organisation for Economic Cooperation and Development
- United Nations Convention to Combat Desertification (UNCCD)
- United Nations Framework Convention on Climate Change (UNFCCC) – Climate Technology Centre and Network (CTNC)

Bilateral Cooperation Agreements with major players

- **Europe**: Albania, Cyprus, EU (JRC), France, Germany, Luxemburg, Russia, Sweden
- **extra Europe:** Brazil, China, Colombia, Egypt, India, Israel, Japan, Latin America, South Korea, USA

International cooperation



International cooperation

ENEA 4 COLD FUSION

ENEA 4 SMART CITIES

November 3rd, 2016 archive

Innovation: ENEA among leading members in White House Smart Cities initiative

ENEA is among the members involved in the White House Smart Cities Initiatives, the 80 million dollar investment just launched by the White House. The Agency for new Technologies, Energy and Sustainable Economic Development was called by the NIST (National Institute of Standards and Technology), coordinator of the initiative, to be part of a scientific coalition formed by seven institutions of excellence dedicated to developing an *Internet of Things-Enabled Smart Cities Framework* by summer 2017 *more...*

International cooperation

International cooperation

Energy: International cooperation agreement between ENEA and UNIMINUTO

ENEA signed a collaboration agreement with the Corporación Universitaria Minuto de Dios (UNIMINUTO). This is the latest of a series of initiatives aiming to boost its International relations with Latin America countries *more...*

Science is a tool to support Policy decision making

Beside the technology advances, the global challenge of climate change can't be approached by a single entity (either State, Federation or Continent)

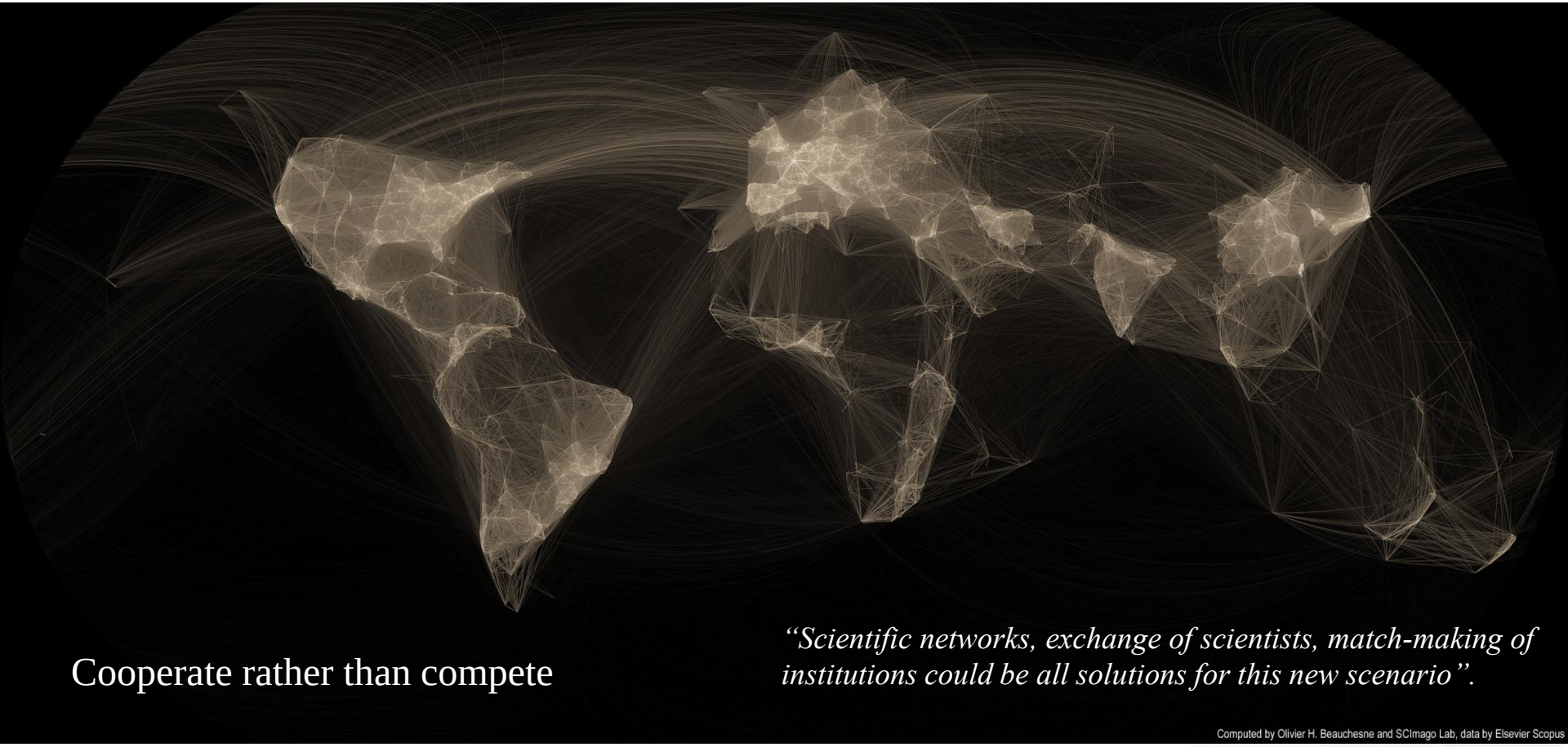
best practice examples are welcome but
it is essential that
common understanding and common policies
are decided
(and then implemented).

International cooperation

International cooperation

Science is nowadays more distributed than it was before. The growth of BRICS, the technological advances of many Asian countries, and the consistency of EU R&D over the last few decades generate a different scenario than in mid-‘90s. USA analysts acknowledge that trend as well14, and suggest ways to create novel beneficial shared opportunities for collaboration, to keep a grip on paramount challenges such as economy, health, security and environment.

In the complex global system of environmental, economic and social interdependencies, sustainable development can only be addressed when global and national efforts are coordinated on an equitable basis



Cooperate rather than compete

“Scientific networks, exchange of scientists, match-making of institutions could be all solutions for this new scenario”.

Computed by Olivier H. Beauchesne and SCImago Lab, data by Elsevier Scopus

Italy

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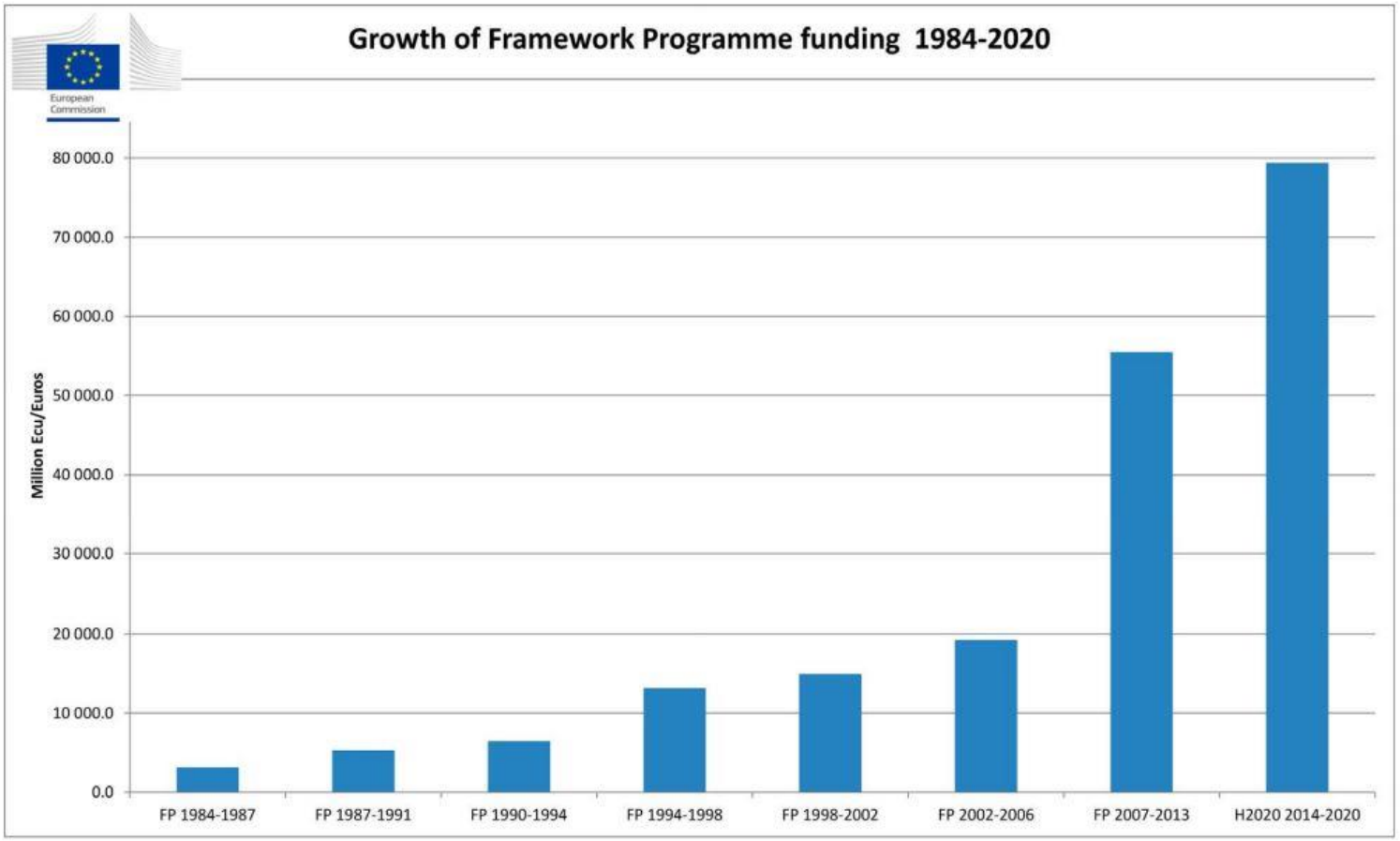
	Country	Documents	Citable documents	Citations	Self-Citations	Citations per Document	H index
1	United States	567007	487064	346567	188398	0.61	1783
2	China	416409	401945	168552	105917	0.40	563
3	United Kingdom	169483	142850	112788	37049	0.67	1099
4	Germany	149773	133962	98755	34123	0.66	961
5	India	123206	113144	37718	17210	0.31	426
6	Japan	109305	100143	47654	15993	0.44	797
7	France	103733	93799	64834	18515	0.63	878
8	Italy	95836	83899	61007	21562	0.64	766
9	Canada	89312	79115	57616	15257	0.65	862
10	Australia	82567	71905	54061	16362	0.65	709

Understanding the European Union

How has EU Research and Innovation funding evolved over recent years?



(c) European Union 2013

Understanding the EU

FP6 17.5 billion euros for the years 2002 – 2006
4 to 5 % of the overall expenditure on RTD in EU Member States

the European Community Framework Programme for Research, Technological Development and Demonstration.

- Life sciences, genomics and biotechnology for health
- Information society technologies
- Nanotechnologies and nanosciences, knowledge-based functional materials, new production processes and devices
- Aeronautics and Space
- Food quality and safety
- Sustainable development, global change and ecosystems
- Citizens and governance in a knowledge-based society

Understanding the EU

FP7 2007 until 2013. over € 50 billion.
to complement national research programmes,: “European added value”.

1. Health√
2. Food, agriculture and fisheries, and biotechnology √
3. Information and communication technologies √
4. Nanosciences, nanotechnologies, materials and new production technologies √
5. Energy
6. Environment (including climate change) √?
7. Transport (including aeronautics) √?
8. Socio-economic sciences and the humanities √
9. Space √
10. Security

Understanding the EU

(FP8) “Horizon 2020” 2014-2020. 75 billion€
is the European Union's Framework Programme for Research and Innovation
the biggest EU Research and Innovation programme ever.

Societal Challenges

1. Health, demographic change and wellbeing √
2. Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy √
3. Secure, clean and efficient energy √
4. Smart, green and integrated transport √
5. Climate action, environment, resource efficiency and raw materials √
6. Europe in a changing world - inclusive, innovative and reflective societies √
7. Secure societies - protecting freedom and security of Europe and its citizens √

Understanding the EU

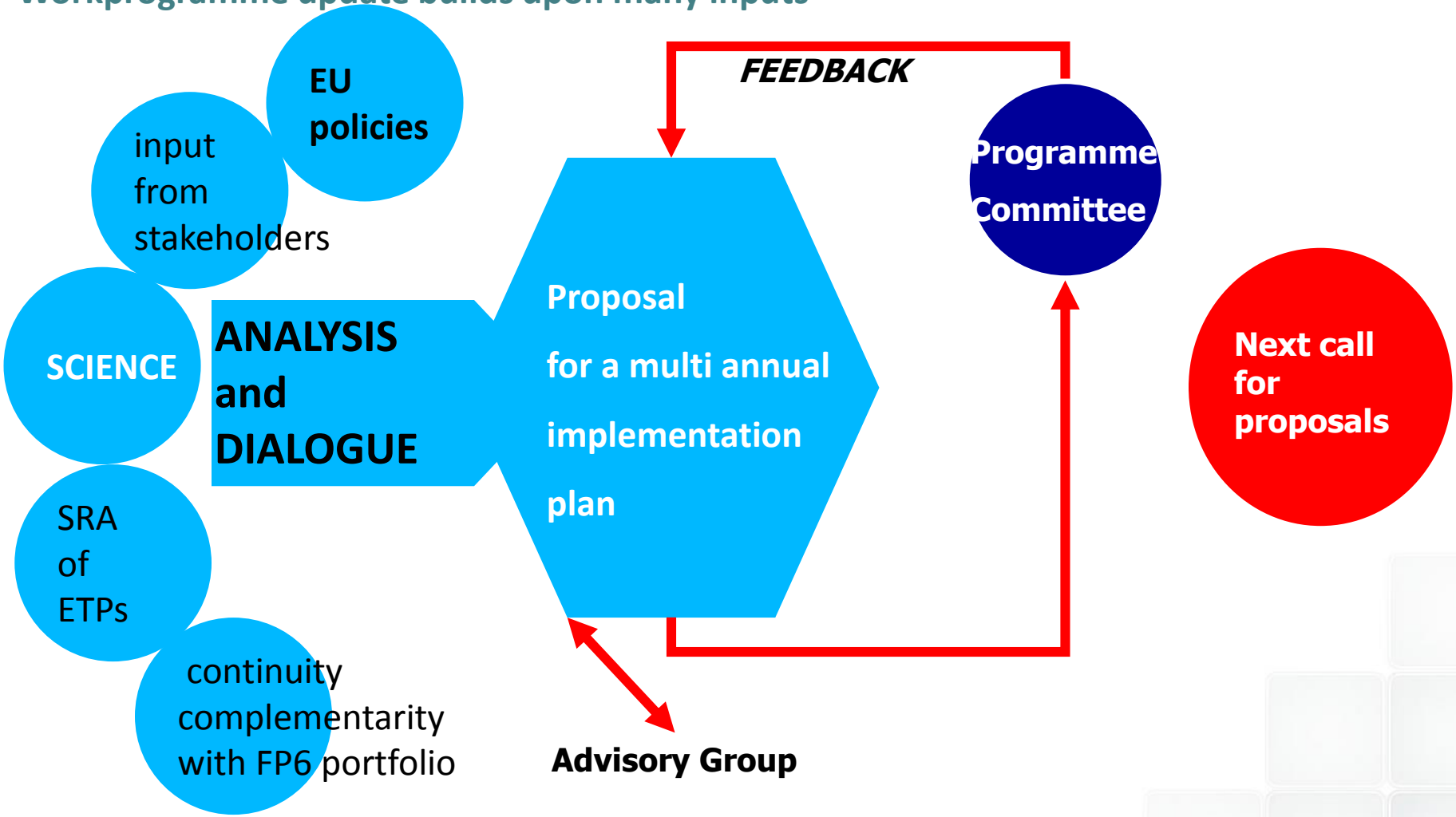
FP6 "*cover those areas where the EU in the medium term intends to become the most competitive and dynamic, knowledge-based economy in the world*"

FP7 "*FP7 is a key tool to respond to Europe's needs in terms of jobs and competitiveness, and to maintain leadership in the global knowledge economy.*"

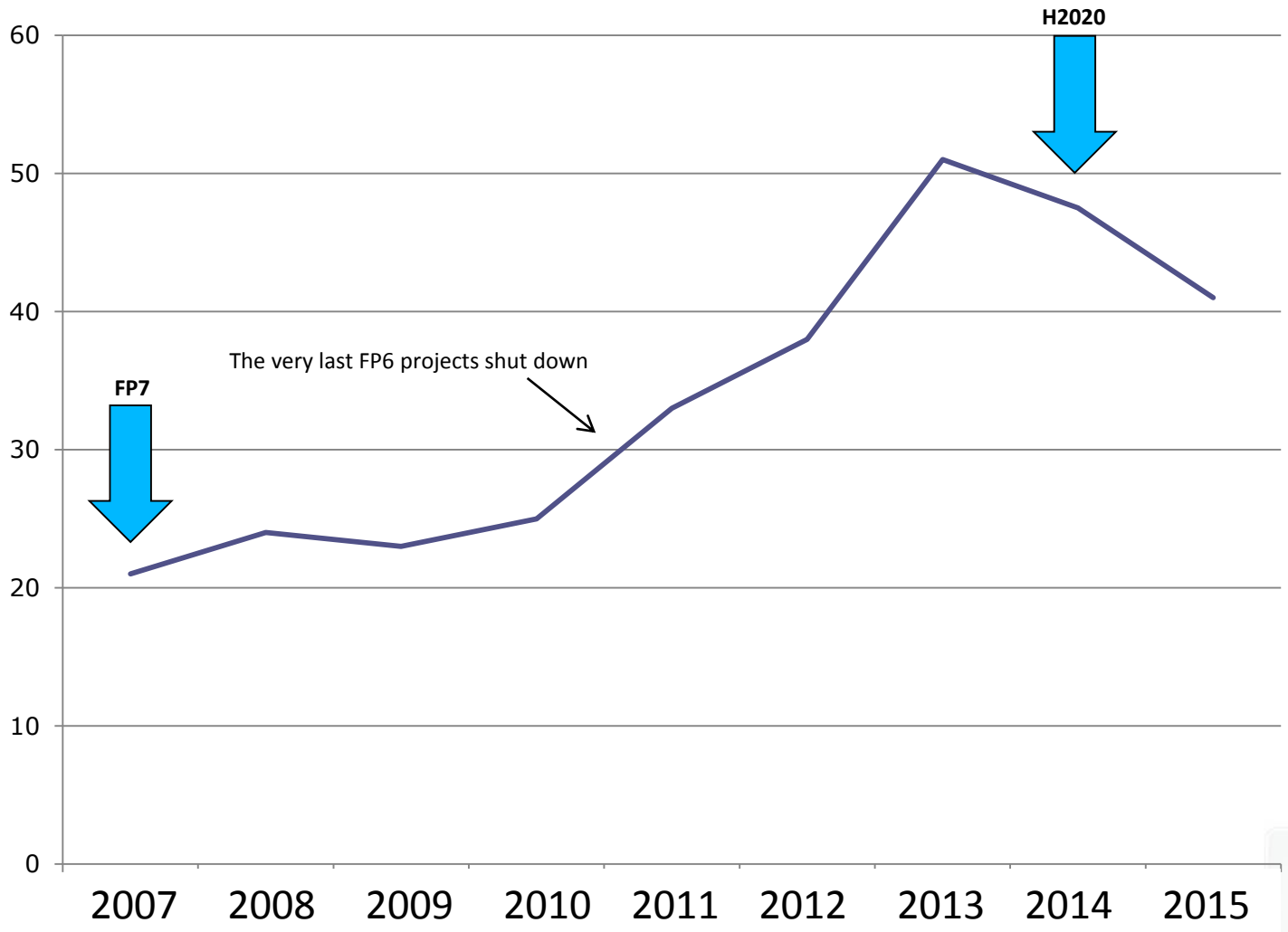
H2020 "*to contribute to sustainable European growth and global competitiveness by reinforcing the innovation capacity of Member States and the Union*".

The definition of the yearly WP (FP7)

Workprogramme update builds upon many inputs



ENEA in the EU



ENEA in the EU

Top-50 REC organisations

	Participant Legal Name	[PJ] Country Name	Number of Participations	EC Financial Contribution Allocated (for signed grants)
1	MAX PLANCK GESELLSCHAFT ZUR FOERDERUNG DER WISSENSCHAFTEN E.V.	Germany	118	358.534.920,80
2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	France	289	194.036.434,63
3	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES	France	149	138.925.988,24
4	FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV	Germany	243	136.237.108,15
5	CONSIGLIO NAZIONALE DELLE RICERCHE	Italy	121	59.189.026,56
6	AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS	Spain	130	58.465.454,61
7	EUROPEAN MOLECULAR BIOLOGY LABORATORY	Germany	45	44.687.670,86
8	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE	Italy	27	44.286.381,77
9	DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV	Germany	76	42.300.561,50
10	Teknologian tutkimuskeskus VTT Oy	Finland	77	39.135.897,81

Source: Horizon 2020 Monitoring Report 2014

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