



NER 300
A funding programme
for innovative low-carbon demonstration projects



**What is available for innovation
at national level?
An illustration through
the French RDI system**

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Some contextual information:

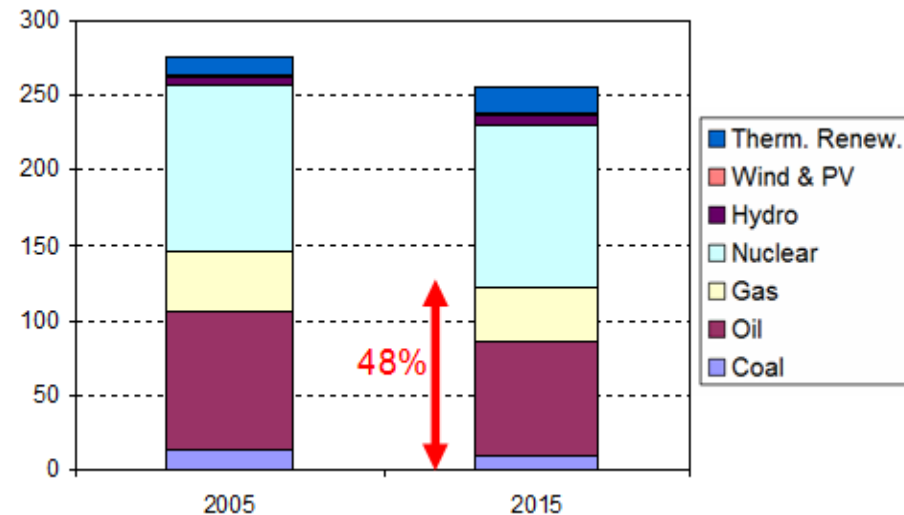
Key energy and climate figures

**Energy transition for green growth act
(2015)**

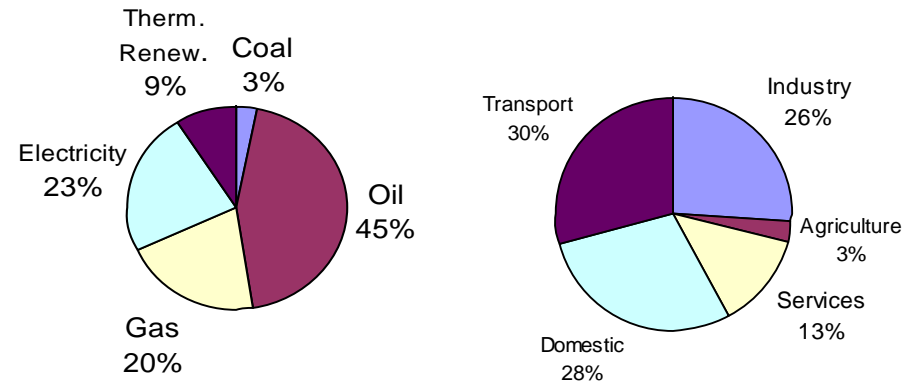
**«Towards» the energy research strategy
(coming soon...)**

Context: key energy and climate figures about France

Gross inland consumption (2015): 257 Mtoe



Total final energy consumption (2015): 162 Mtoe



- Final energy intensity (2014): 73 toe/M€ GDP or 2.4 toe/capita
 - EU average : 83 or 2.3
- Energy import dependancy (net imports/gross consumption, 2015) : 45%
 - EU average (2013) : 53%
- Energy related CO₂ emissions (2014): 324 Mt or 151 t/M€ GDP or 4.9 t/capita
 - EU average : 245 or 6.7

Energy transition for green growth act (2015) : clear and ambitious goals



40% less greenhouse gas emissions in 2030 compared to 1990



30% less fossil fuel consumption in 2030 compared to 2012



Increase the share of renewable energy sources to **32%** of the final energy consumption in 2030 and **40%** of the electricity production



Reduce final energy consumption by **50%** in 2050 compared to 2012



- **50%** less waste in landfill by 2025



Diversify electricity production and reduce the share of nuclear power to **50%** by 2025

Carbone price : a target of 56 € in 2020 and 100 € in 2030 for a ton of carbon

- For the carbon component of the domestic tax on consumption of energy products
- In order to focus investments on long term horizons and to channel behaviours into low carbon economy
- Will be compensated by a taxation reduction for products and services contributing to the energy transition

The national energy research strategy

- **Energy transition for green growth act (article 183): need for a national energy research strategy (SNRE)**
 - ✓ Takes into account the national low carbon strategy (2015) and the energy multiannual plan (end 2016)
 - ✓ Precise the national research strategy (2015) in the field of energy
 - ⇒ *Work in progress with stakeholders, to be finalized by the end of 2016*

- **The national research strategy (SNR)**
 - ✓ Must be taken into account in the contracts with research organizations, and in the annual programming of funding agencies
 - ✓ Built around 10 great societal challenges setting priorities, in particular:
 - Secure, clean and efficient energy
 - Sustainable resources and adaptation to climate change
 - Mobility and sustainable urban systems

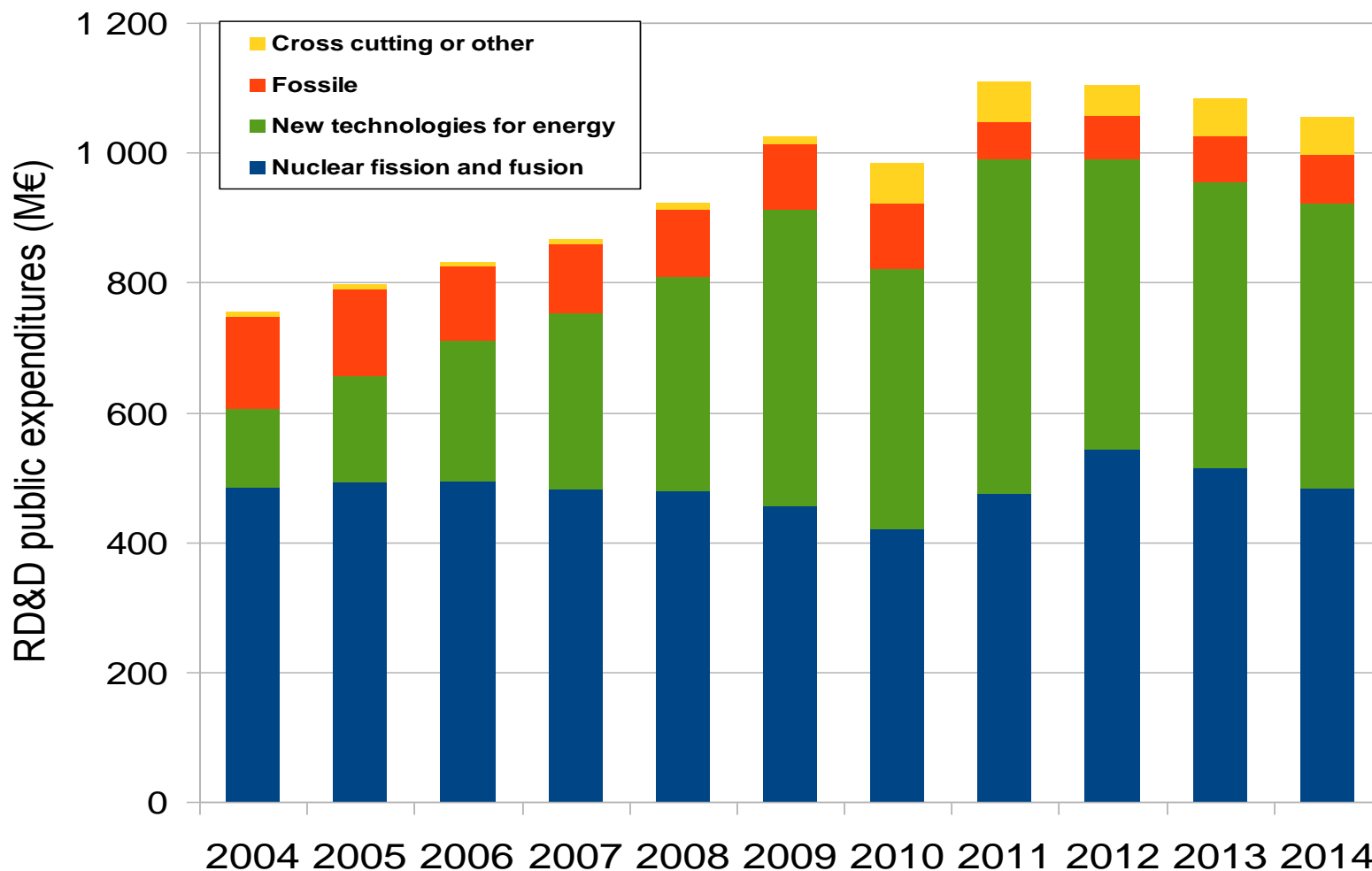
The national energy research strategy

- **The secure, clean and efficient energy challenge of the national research strategy**
 - Dynamic management of energy systems
 - Multi-scale governance of new energy systems
 - Energy efficiency
 - Reduced need for strategic materials
 - Decarbonisation of energy and chemistry sectors

- **Some orientations for national energy research strategy (draft)**
 - *Adopt a systemic approach and focus on transversal issues related to energy (impact on environment, social and economic issues, digital revolution)*
 - *Consolidate a basic energy research community*
 - *Foster public-private collaboration, through industrial research and demonstration*
 - *Articulate the RDI policies at different geographic levels (local, national, European and international)*

Financing

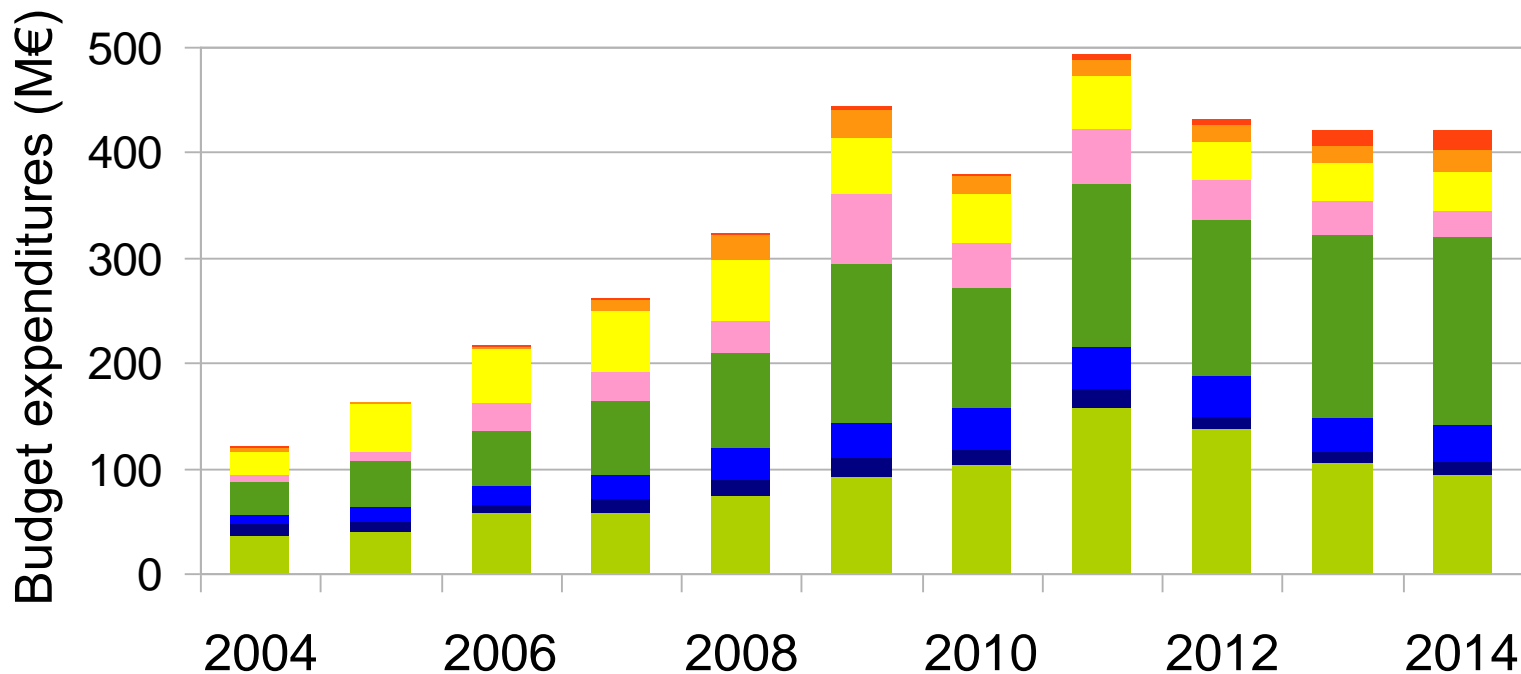
Energy public R&D budget



A rise (source: IEA reporting) in the last 10 years, especially on « new technologies for energy » = RE + energy efficiency + grids and storage

Energy public R&D budget

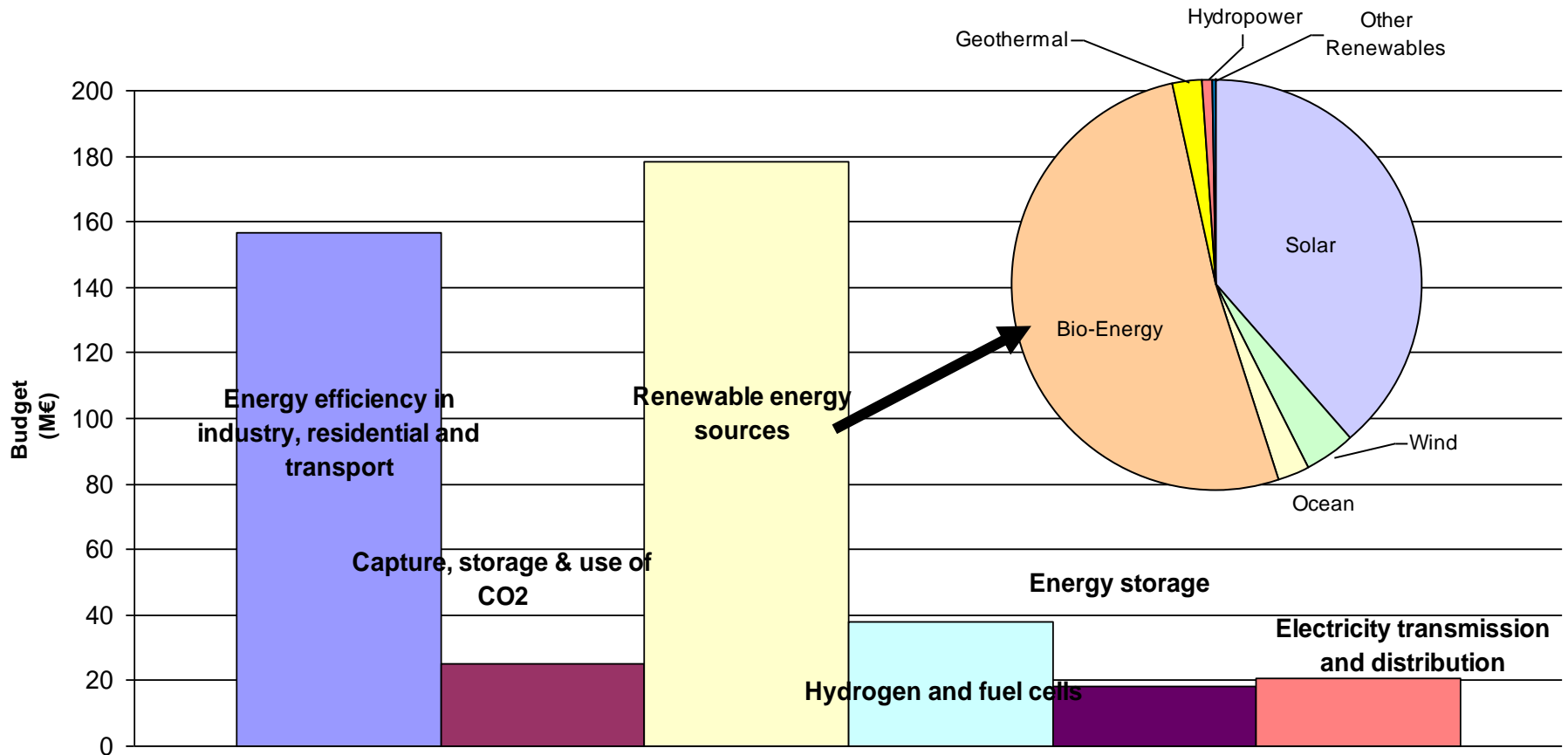
Public R&D budget for energy new technologies



A rise (source: IEA reporting) in the last 10 years on « new technologies for energy » = RE + energy efficiency + grids and storage

Energy public R&D budget

Distribution of fundings for new technologies for energy in 2014

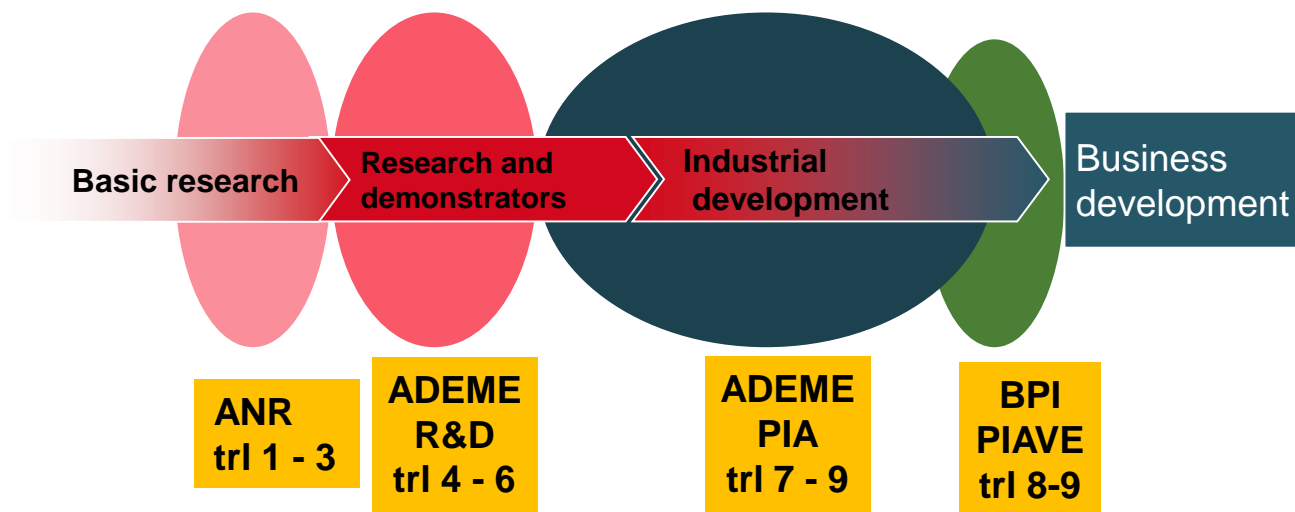


The ecosystem for low carbon RDI :

Public support

Public support for RDI on low carbon technologies

- **Public research organisms support basic or industrial research conducted by their researchers**
 - ✓ CNRS, CEA, IFPEN, ...
- **Public funding agencies driving RDI programs on energy technologies through call for projects:**
 - ✓ ANR (research generalist)
 - ✓ ADEME (energy & environment),
 - ✓ BPI (generalist innovation)



PIA slides:

Entire innovation chain covered

**High level of financial effort for low
carbon innovation**

**Various type of support: grants, advances,
equity, loans**

Various national operators

The “Programme d’Investissements d’Avenir” (PIA)

“Excellence,
Innovation
Cooperation”.

- **Supporting the whole chain of innovation**
 - To share risks with companies and research organisms developing innovative solutions and access (new) markets
 - From basic research to industrial demonstrators

- **An important financial effort for low carbon innovation**
 - Around 5 bn€ on clean energy from 2010 to 2017 (« PIA 1 & 2 »)
 - in the form of subsidies, refundable grants, equity and loans
 - out of a total amount of 47 bn€ (education, digital, health, ...)

 - « PIA 3 » in preparation (budget law for 2017) : a total of 10 bn€ with a significant part on the energy transition

The “Programme d’Investissements d’Avenir” (PIA)

- **Support from ADEME offers:**
 - **state aid** (EU competition regulations) with systematic profit-sharing, known as "repayable advances“
 - **grants**, which are primarily reserved for research bodies;

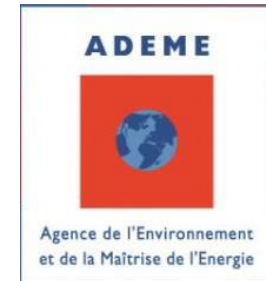
- **ADEME or BPI France** can also make **equity investments** for first-of-a-kind innovative industrial solutions.

- **Non-French companies can be founded:**
 - for their innovative projects
 - where the demonstrators or projects are located in the country

- **PIA Calls for projects in the Energy area are open:**
 - to collaborative projects: within European SET-Plan countries
 - to international cooperation

- **Main actions related to clean energy:**
 - Institutes of the energy transition
operated by Agence Nationale de la Recherche
 - Demonstrators of ecology & energy transition
operated by Ademe
 - Vehicles & transports of the future
operated by Ademe
 - Industrial project of the future
operated by BPI France

ANR



bpi**france**

Examples of actions and project from PIA:

ANR actions

Ademe actions

- **TRLs \leq 5**
- **Four Main instruments**
 - Collaborative Research Project (PRC)
 - Collaborative Research Project – Enterprises (PRCE)
 - Collaborative Research Project – International (PRCI)
 - Young Researchers (JCJC)

= Grants 50 to 900 k€ during 24 to 48 months depending on the project
(number of partners, type of project...)

= in 2016 => 801 projects received 341 M€ grants

- **PCRI for European collaboration :**
 - Germany, Austria, Luxembourg, Switzerland

**On Energy
area**

- **PCRI for International Collaboration :**
 - Brazil, Canada, China, Hong Kong, Japan, Mexico, Singapour, Taïwan, Turkey

■ On the Energy area

➤ Energy is one of the 9 Societal challenges

- 1. Climate change and management of scarce resources
- 2. Energy
- 3. Industrial renewal
- 4. Health
- 5. Food safety and demographic challenge
- 6. Mobility and sustainable cities
- 7. ICT
- 8. Innovative and Inclusive Societies
- 9. Liberty and Security in Europe.

2016 :
40 projects
received
23M€

2016 :
800 projects
received
340M€ grants

➤ Energy Challenge 2014-2016 = 135 projects received 60M€ grants

Key figures from PIA 2011 – 2016

- 85% of budget to companies
- Half of beneficiaries are SBCs

2 kinds of call for proposals (CFP):

➤ Large size project (67 CFP since 2011)

- Contracts with mixed aids, as an average:
 - 2.6M€ reimbursable aid by partner
 - 380k€ grants by partner (public labs and SBCs mainly)
- 4-5 partners consortium (large company, SBCs, public lab)

➤ Dedicated to SBCs (13 CFP since 2015):

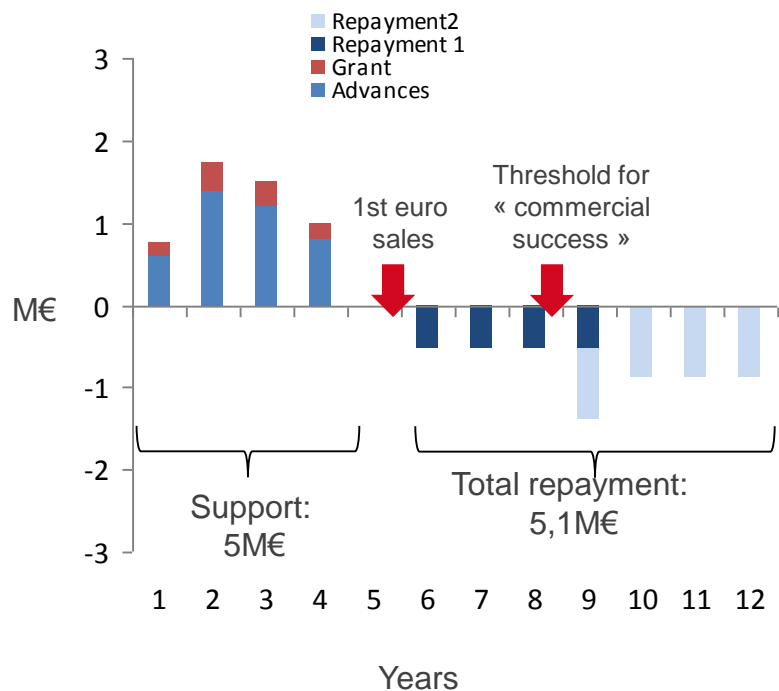
grants only, maximum aid 200 k€

- 502 projects selected
- 1 519 contracts funded
- Strong leverage effect : project cost / public aid = 2.9

- 1.247 billion € engaged (state aids)
- 431 M€ invested in venture capital directly by ADEME (through special purpose vehicle companies : SPV)
- 37 M€ invested in SBCs venture capital through dedicated Fund (Eco-technology)

Illustration of payment and repayment

Rate 1= -0.05% Rate 2= 5.95%



- Example from a typical funding of 5M€
 - Grant 20% => 1M€
 - Repayable advances 80% => 4M€
- Payment according project progress
 - 15% upfront + payment at each milestone (maxi 80% total)
 - 20% kept till the end of the project
 - Each payment includes 20% grant + 80% advance
- Repayment
 - Repayment of 50% of advance in 4 terms with a low rate
 - Repayment of 50% of advance in 4 terms with a majorated rate e.g. 600bps
 - Anticipation of repayment possible

Conclusion

Key messages and suggestions from experiences

- Ease MS cooperation :
 - ERANET : open to low TRL, adapt to MS funding system
 - Identify possible existing cluster e.g. Eurogia (industry)
 - Open national calls to EU and international cooperation

- Share risk with project sponsors and MS:
 - Upfront funding for innovative projects
 - Ease cleaning phase from State aid regulation

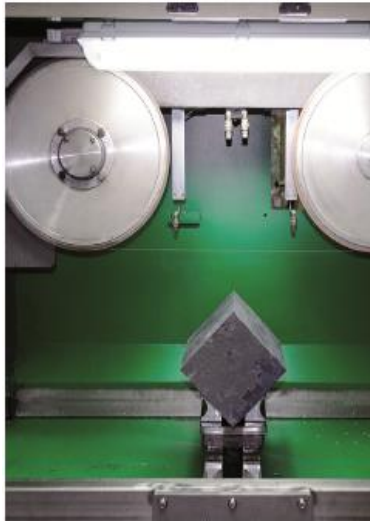
- Stimulate information exchange:
 - A common EU web site: e.g. setis ?
 - National contacts from MS and funding agencies
 - Main calls for projects dead lines and contents

Thank you for attention !

Backup slides:

- **Ademe illustration projects**
 - **France RDI Ecosystem**
- **Mission innovation commitment to double R&D budget**
- **ITE Institutes for energy transition**

Project PV800 : Manufacturing Solar quality Si wafers from metallurgic Si



Diamond wire saw

Coordonnateur



Partenaires






Launched	May 2011
Duration	5 years
Total cost	22.2 Millions €
PIA aid	6.7 Millions €
Type of aid	Grant and reimbursable aid
localisation	Rhones Alpes

ECM is a crystallisation furnace manufacturer. ECM developed an innovative furnace allowing to transform metallurgic silicon in solar quality silicon wafers with a high efficiency and less energy consumed in the process. ECM already sold 10 furnaces at international level.

Project EXOSUN : Solar trackers for utility-scale power plants



Exotrack CPV

Launched	2011
Total investment	12 Millions € (capital investment)
Investors	ADEME, Omnes Capital, EDF-EN, Aquitaine expansion
localisation	France, USA, South Africa

Exosun - founded in 2007 and leader in the French market - designs, develops and supplies the a patented range of solar Exotrack trackers, which can increase the PV power plant yield up to 40%. Located in Gironde, this SME also offers a full range of engineering services covering the entire life cycle of a plant, from the initial studies to commissioning, operation and maintenance.

To date, Exosun has installed a capacity of 400 MW



Objectives :

- Test and deploy innovative solutions for the electric system (decentralized electricity generation, smart meters, management of distribution grids, new load-shifting and DSM offers and energy management solutions for customers) ;
- Define a value chain for customers, distribution grid managers, energy suppliers, energy generators, industrial equipment manufacturers and local authorities ;
- Design and ensure the integration of components into the smart electric system while conforming to key environmental, societal, technological and economic issues.



Total Budget	36,8 M€
PIA subsidy	9,3 M€
Type of demonstrator	<ul style="list-style-type: none"> Urban 1000 residential customers 40 tertiary sites
Localization	Lyon & Grenoble
Duration	4 years
State of implementation	100%

Example of project : Tidal Energy Pilot Farms, last step before commercial deployment

NEPTHYD Project: 5.6 MW, 4 turbines
Project cost: 101 M€ subsidies: 51 M€

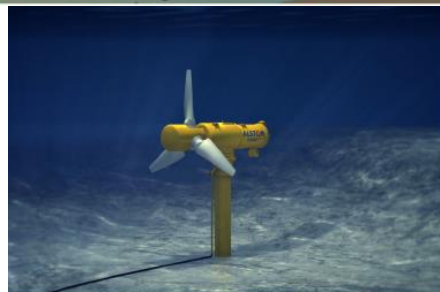
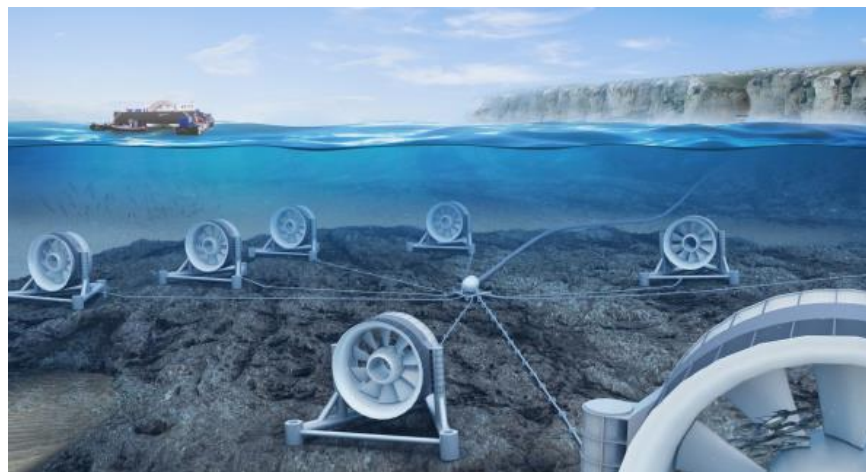
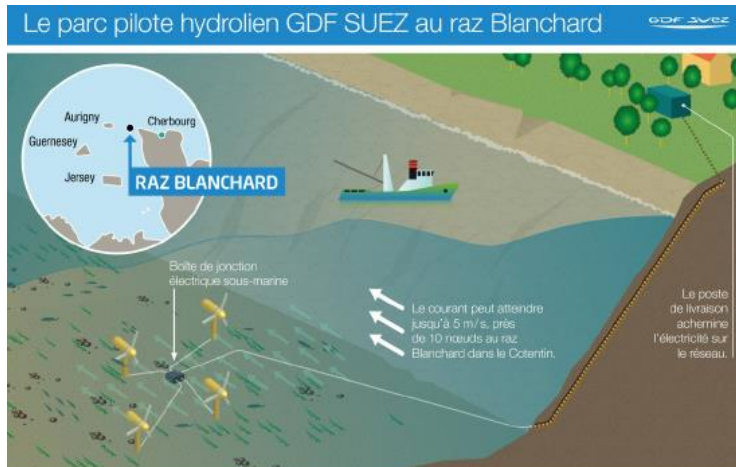
NORMANDIE HYDRO: 14 MW, 7 turbines
Project cost 112 M€ subsidies: 52 M€

GDF SUEZ

ALSTOM

EDF
energies nouvelles

DCNS

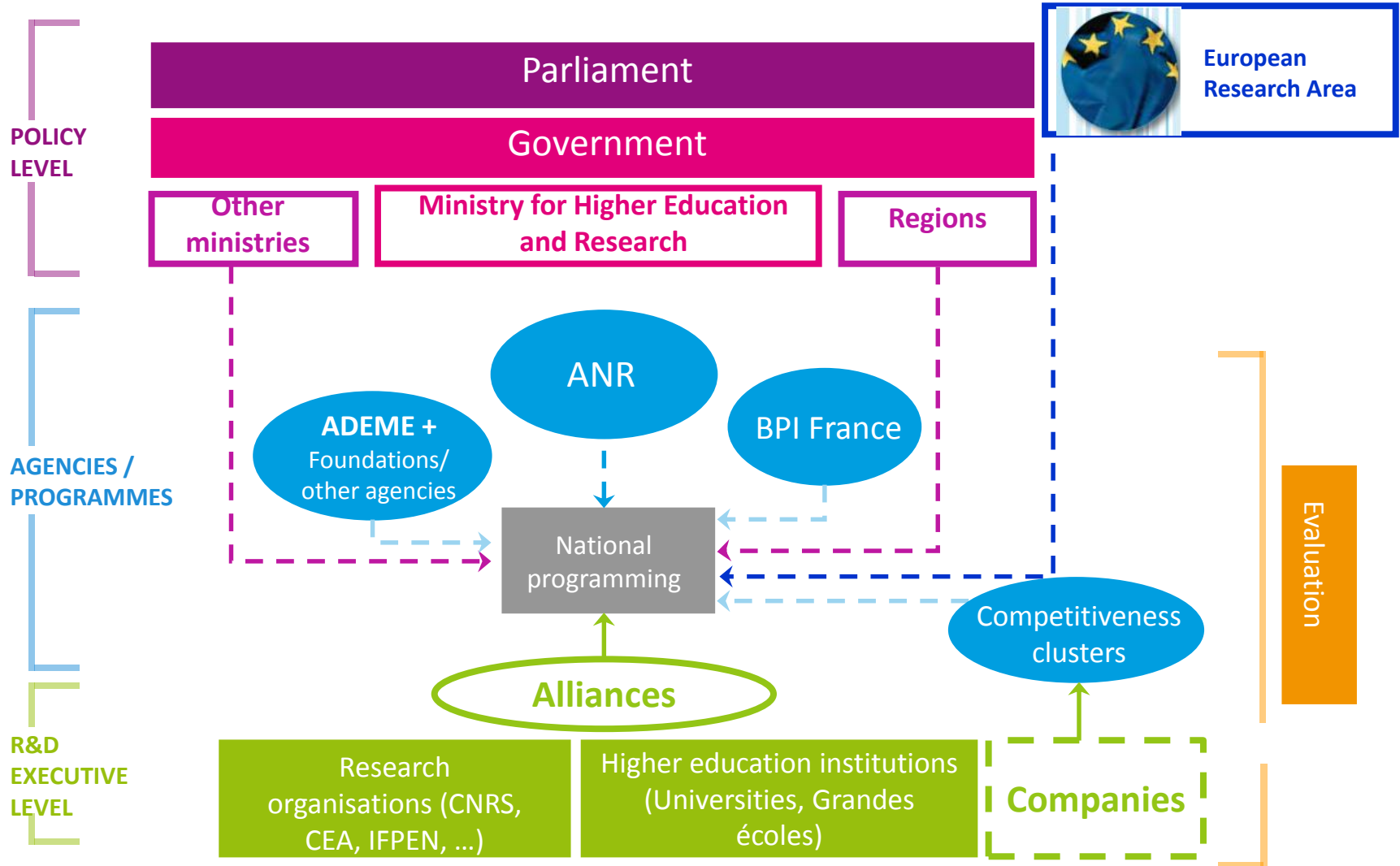


Hydrolienne OCEADE 18 - 1.4 MW



Hydrolienne Open Hydro sur la barge d'installation

France general RDI system



France's commitment to Mission innovation



COP21 · CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

- France will focus on :
 - ✓ renewable energy, energy storage and smart grids
 - ✓ energy efficiency (industry, buildings, transports, circular economy)
 - ✓ carbon capture storage and use
- Over the 2012-2014 period, average state-directed public investments in these areas of **440 M€ per year = France's baseline**



France's commitment to Mission innovation



COP21 · CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE



- Doubling effort mainly through the “**Programme d’Investissements d’Avenir**” (PIA) and will cover the whole chain of innovation, from basic research to demonstration.

- NB: besides, France also contributes significantly (around 16%) to the **European programme Horizon 2020** on clean energy

- **An ambitious model : creation of public-private structures for R&D and innovation in the field of clean energy**
 - ✓ Private companies and public laboratories working together in a common structure with dedicated assets and staff
 - ✓ Activities ranging from basic research to industrial development and launch of new products on the market
 - ✓ Actions of RDI but also training (initial or continuous) to disseminate knowledge

- **Initial budget of 1 bn€**
 - ✓ including both capital and subsidies

- **10 ITE active on various topics of the energy transition**
 - SUPERGRID is focused on future electric transmission grids,
 - VEDECOM is specialized on sustainable mobility and connected vehicles,
 - INES2 and IPVF are dedicated to solar energy,
 - PIVERT and IFMAS are focused on bio energy,
 - EFFICACITY on urban systems,
 - etc.

■ **Useful links:**

➤ **SNR/SNRE:**

- <http://www.developpement-durable.gouv.fr/-Recherche-et-demonstration-.html>
- <http://www.enseignementsup-recherche.gouv.fr/pid24538/strategie-nationale-de-recherche-s.n.r.html>

➤ **PIA:**

- <http://www.gouvernement.fr/investissements-d-avenir-cgi>
- <http://www.ademe.fr/entreprises-monde-agricole/innover-developper/programme-investissements-avenir-pia>
- <http://www.bpifrance.fr/Actualites/Appels-a-projet-concours/Appel-a-projets-PIAVE-9657>

➤ **ITE:**

- <http://www.supergrid-institute.com/en/home>
- <http://vedecom.fr/en/>
- <http://www.ines-solaire.org/>
- <http://www.ipvf.fr/en/>
- <http://www.institut-pivert.com/?lang=en>
- <http://www.ifmas.eu/>
- <http://www.efficacity.com/en/>