LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Ministère de l'Environnement, de l'Énergie et de la Mer

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
MINISTÈRE DE L'ÉDUCATION NATIONALE, DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE

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

Pascal Barthe

Ministry of Environment, Energy and the Sea

Pascal.barthe@developpement-durable.gouv.fr

Pascal Newton

Ministry for Research and Higher Education

Pascal.newton@recherche.gouv.fr

Bratislava-, 30th November 2016









Some contextual information:

Key energy and climate figures

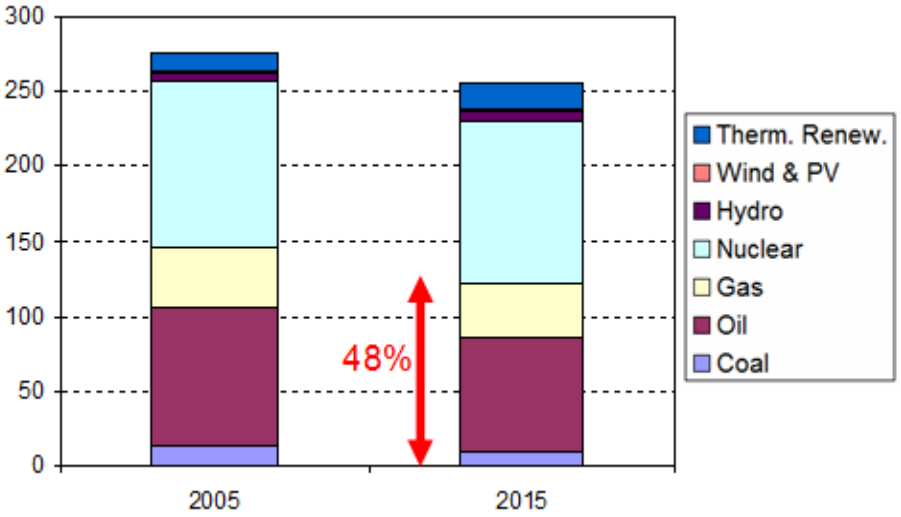
Energy transition for green growth act (2015)

«Towards» the energy research strategy (coming soon…)

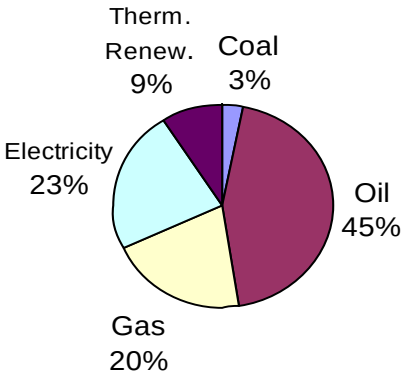
LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

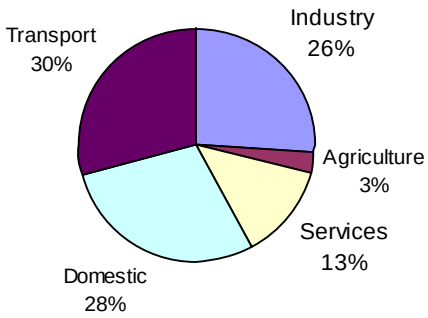
Context: key energy and climate figures about France

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 consuption, 2015) : 45%
  - *EU average (2013) : 53%*
- Energy related CO_2 emissions (2014): 324 Mt or 151 t/M€ GDP or 4.9 t/capita
  - *EU average : 245 or 6.7*

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

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

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

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

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

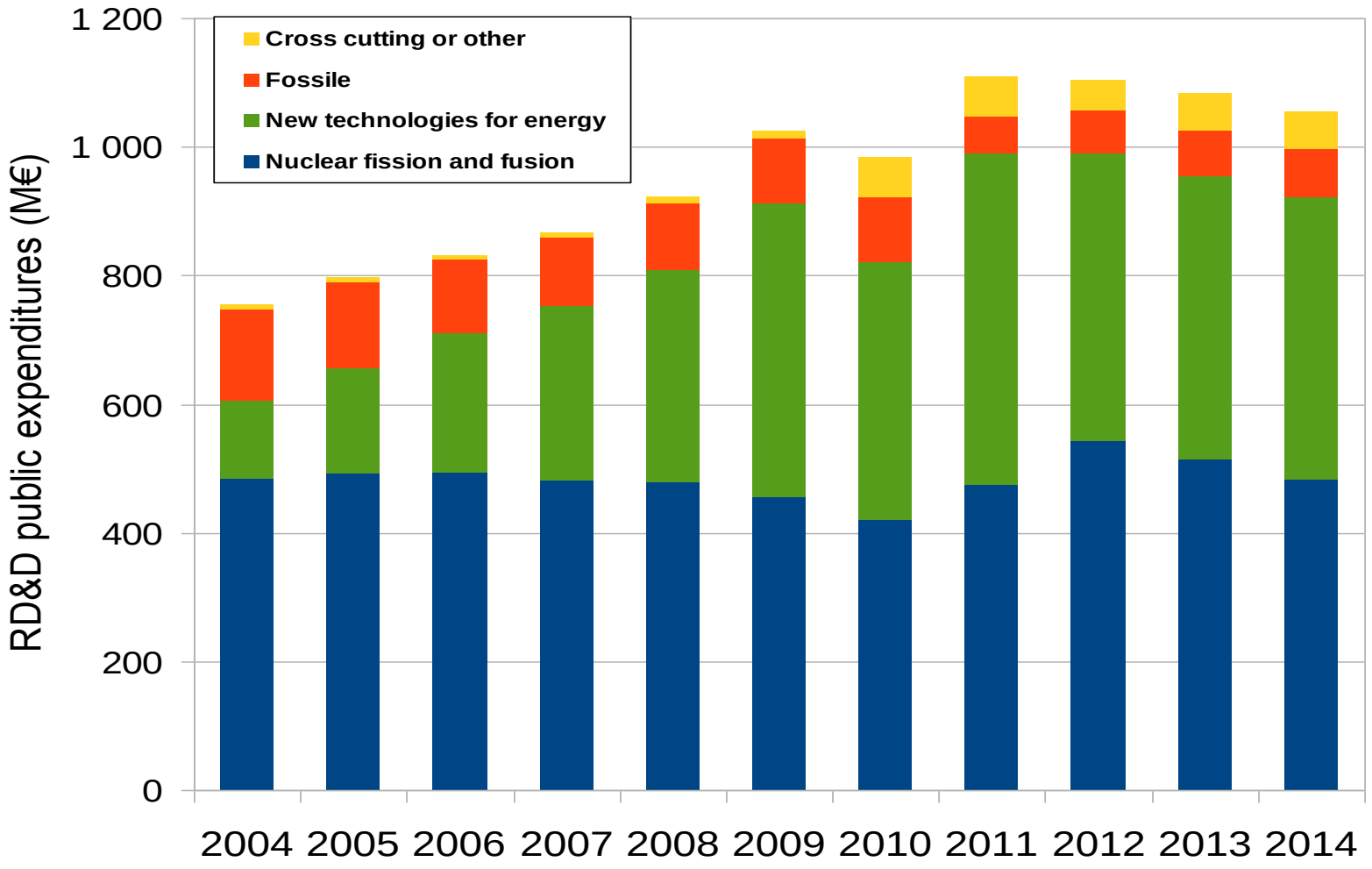
The national energy research strategy

- **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

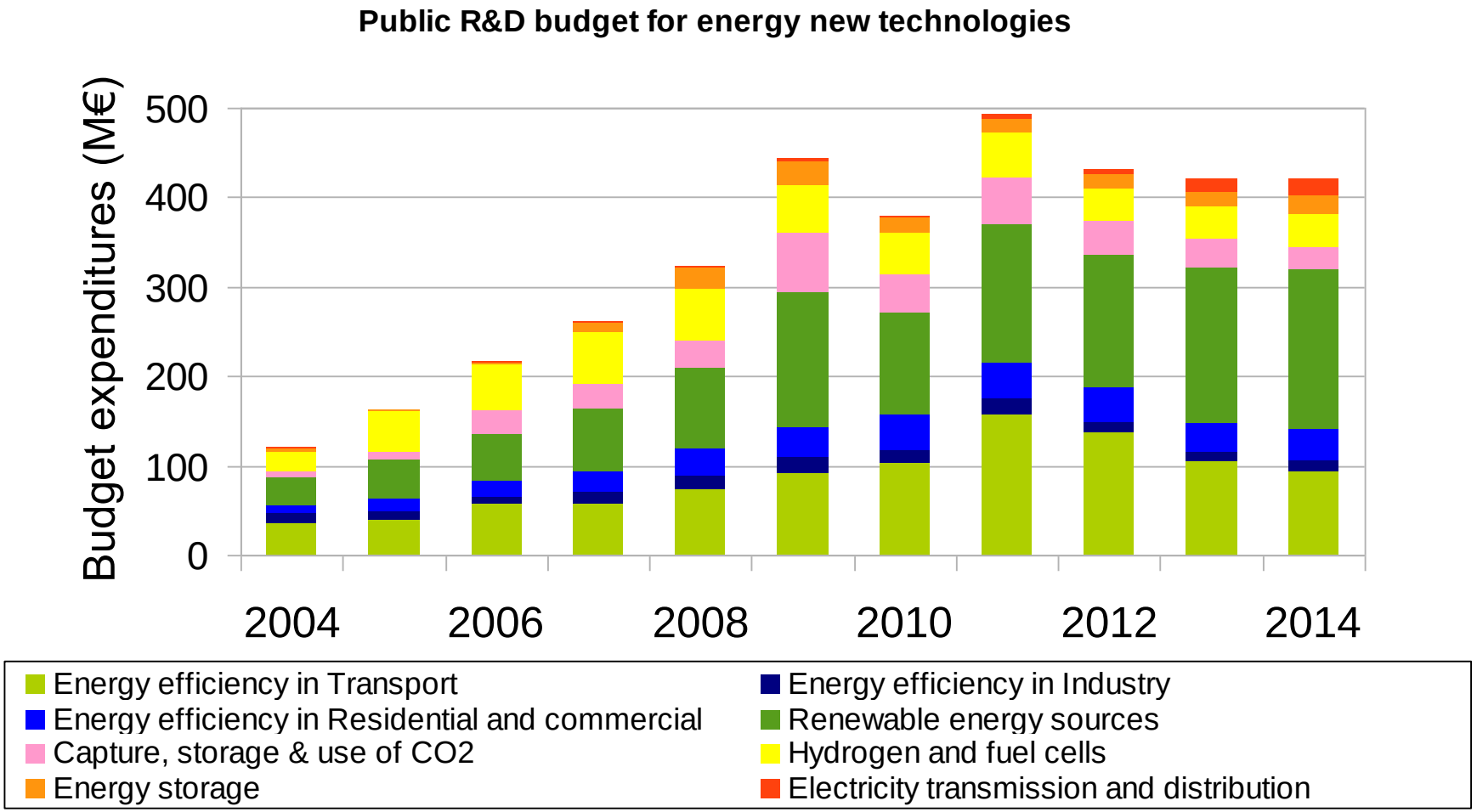
Energy public R&D budget



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

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

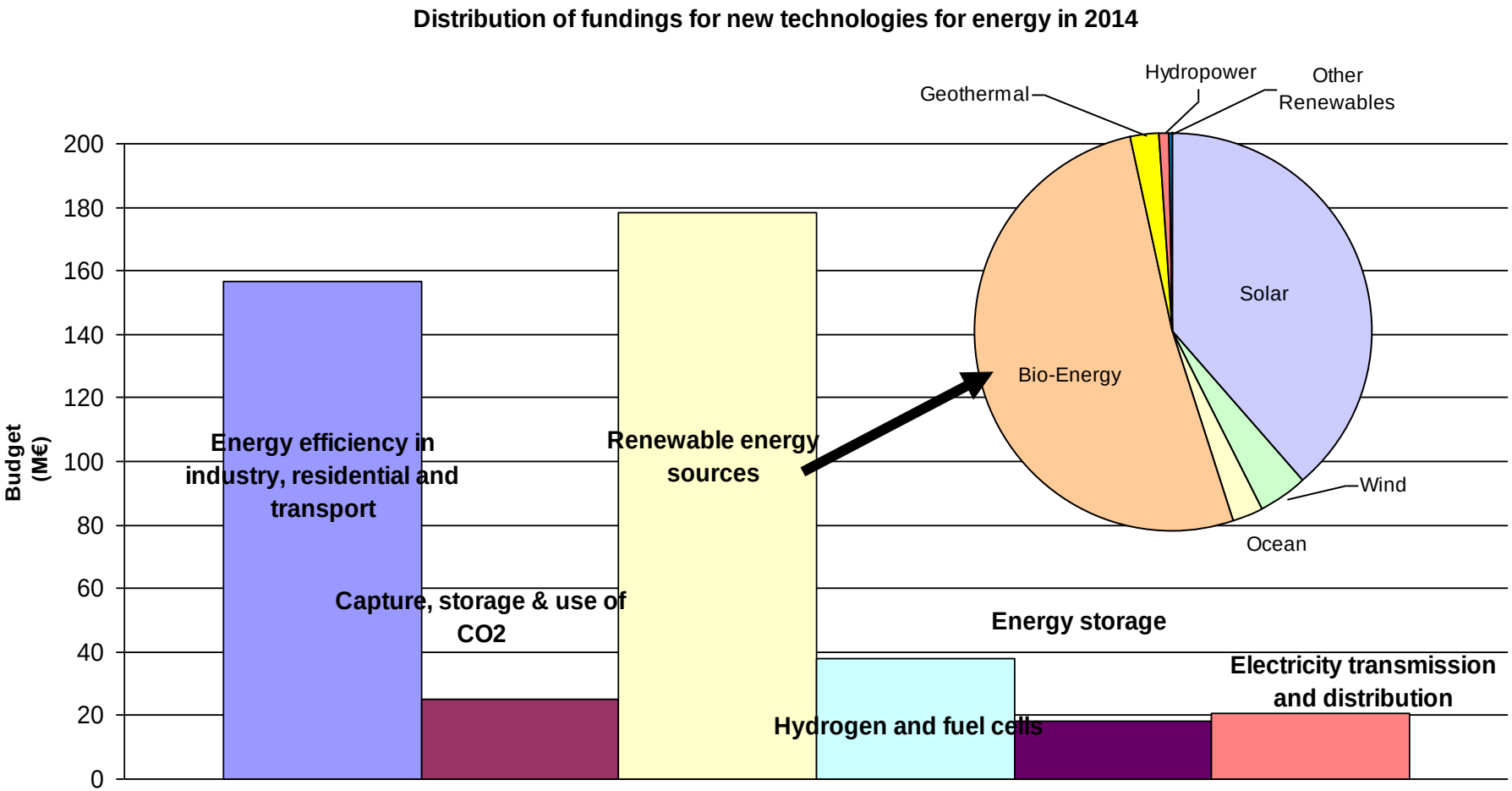
Energy public R&D budget



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

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

Energy public R&D budget



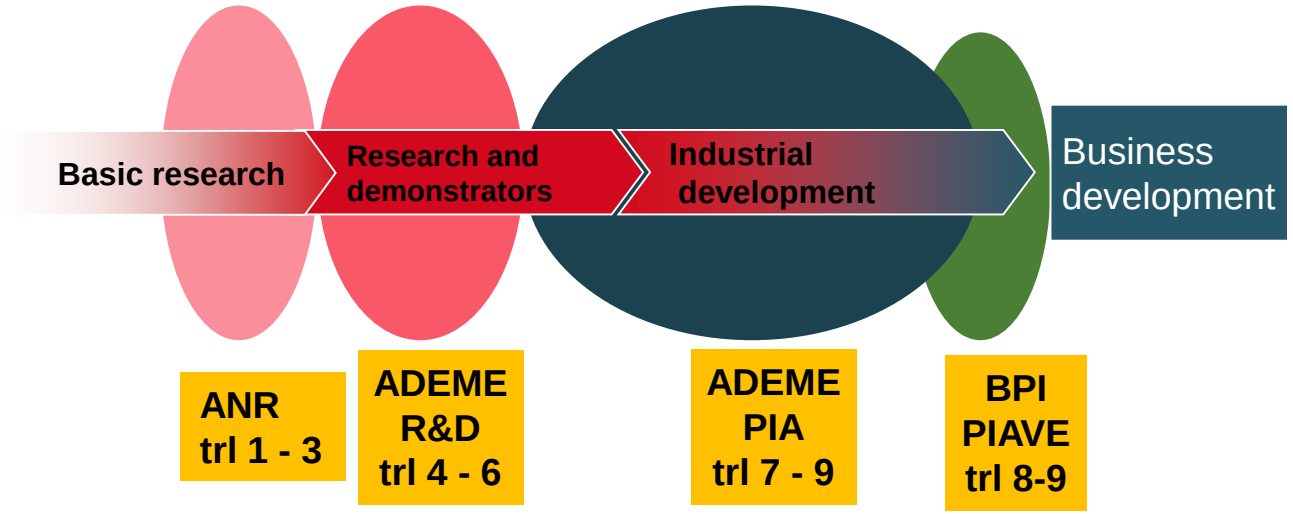
The ecosystem for low carbon RDI :

Public support

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

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

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

The "Programme d'Investissements d'Avenir" (PIA)

"Excellence, Innovation Cooperation".

- **Supporting the whole chain of innovation**
  - To share risks with companies and research organisms developping 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

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

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

Energy transition in the PIA

- **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

Examples of actions and project from PIA:

ANR actions

Ademe actions

- **TRLs ≤ 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 ressources
    - 2. Energy
    - 3. Industrial renewal
    - 4. Health
    - 5. Food safety and demographic challenge
    - 6. Mobility and sustainable cities
    - 7. ICT
    - 8. Innovative and Inclusive Sociéties
    - 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

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

Ademe

ADEME
Agence de l'Environnement et de la Maîtrise de l'Energie

Key figures from PIA 2011 – 2016

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

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

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)

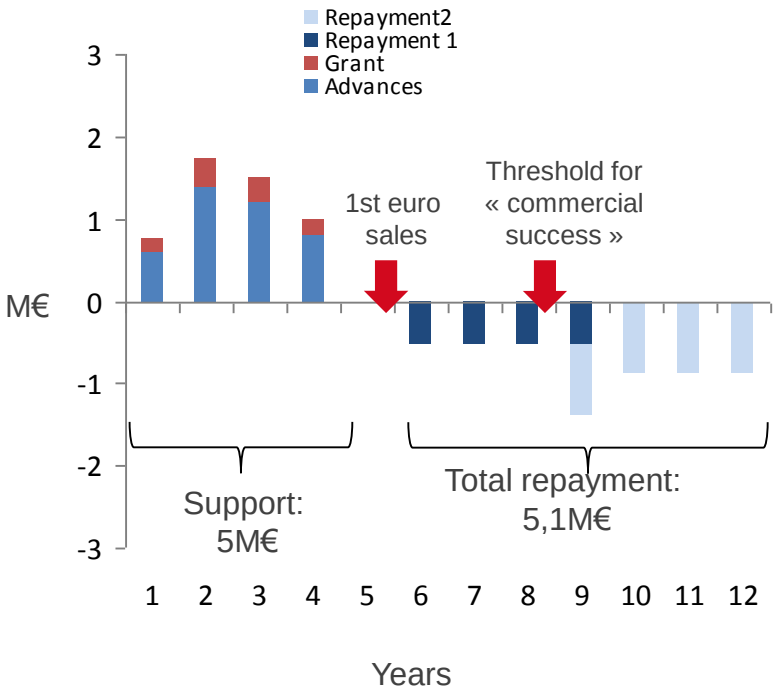
➢Dedicated to SBCs (13 CFP since 2015): grants only, maximum aid 200 k€

- 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)

Example of a typical Ademe funding operation

- 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

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

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

ECM

Partenaires

THERMOCOMPACT

cea

ines

SAFRAN

Herakles

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

Example of project GREENLYS

Smart grid Program

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.

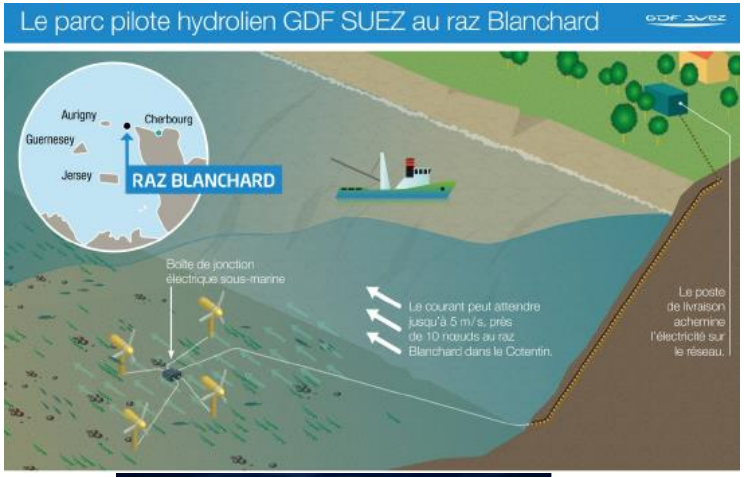
Total Budget	**36,8 M€**
PIA subsidy	**9,3 M€**
Type of demonstrator	▪ Urban ▪ 1000 residential customers ▪ 40 tertiary sites
Localization	**Lyon & Grenoble**
Duration	**4 years**
State of implementation	**100%**

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

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€

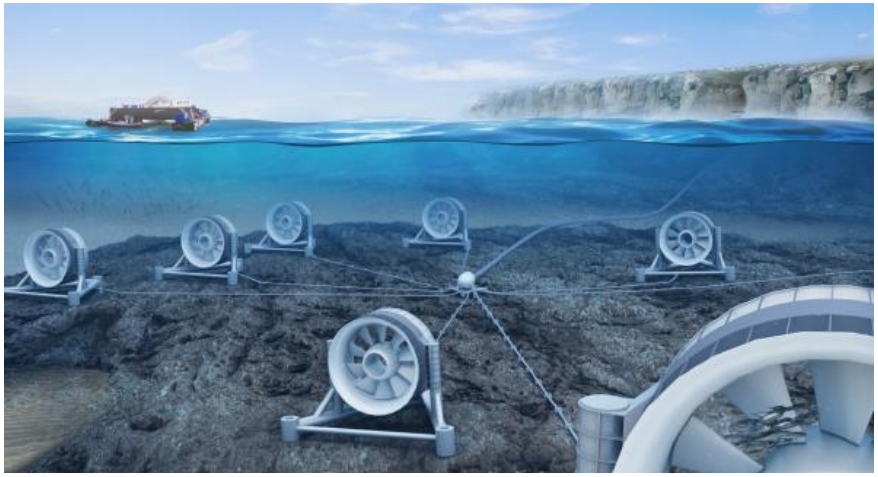
GDF SUEZ ALSTOM

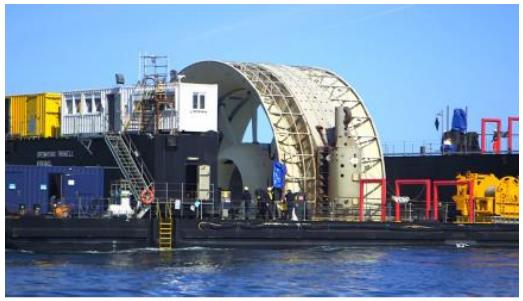


Hydrolienne OCEADE 18 - 1.4 MW

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

EDF energies nouvelles DCNS

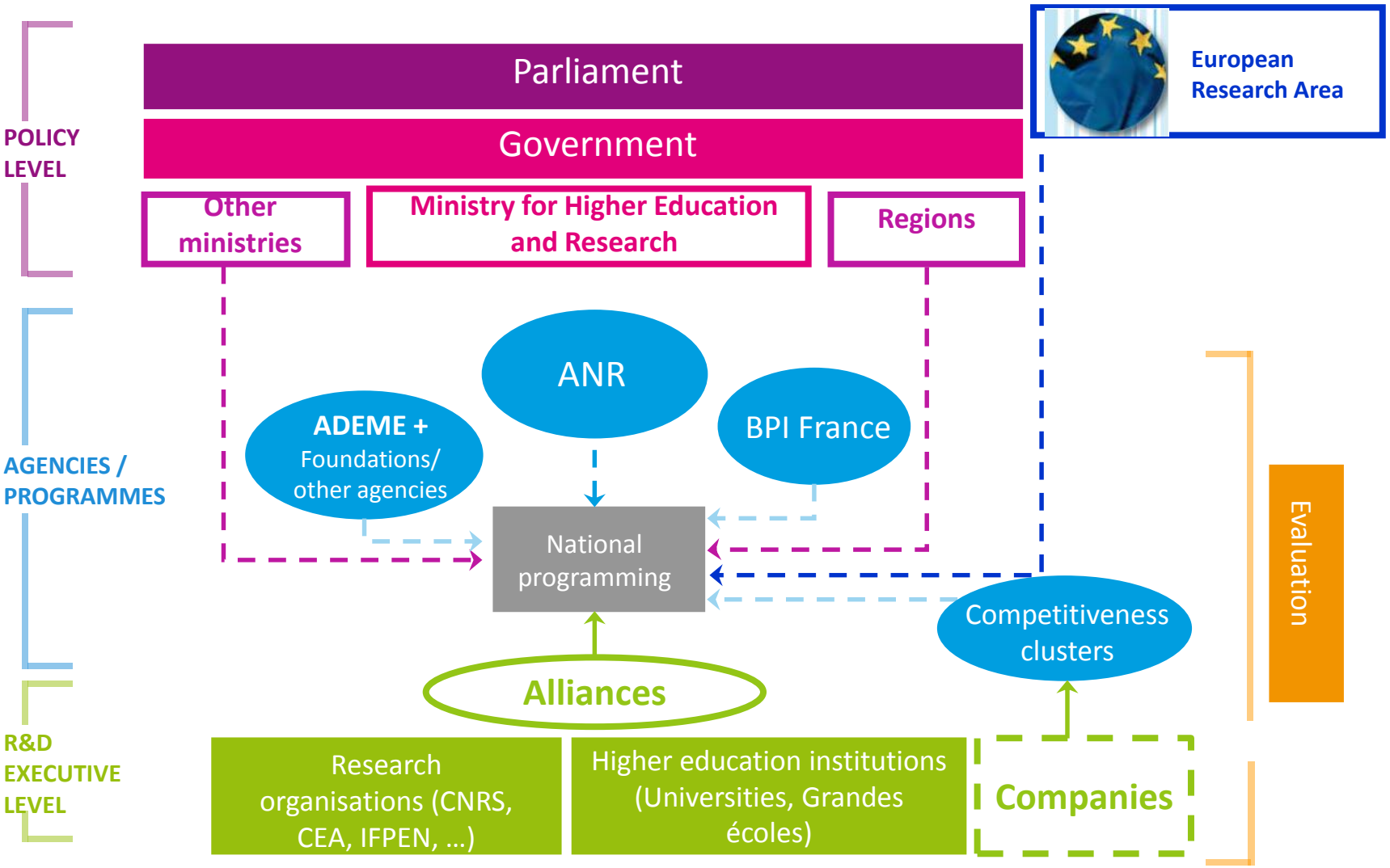




Hydrolienne Open Hydro sur la barge d'installation

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

France general RDI system



LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

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**

LA TRANSITION ÉNERGÉTIQUE pour la CROISSANCE VERTE

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

Institutes of the energy transition

- **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/