The role of renewable energy to promote the French energy transition and address climate change

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Thematic session III: Renewable Energy for Global Sustainability

Summary

A brief presentation of ADEME

A public Agency under the joint authority of the French Ministries for Ecology, Sustainable Development, Energy / Higher Education and Research

ADEME's objective: be the point of reference and privileged partner for central and local authorities, professionals and the general public

4 ways of action:

✓Acquiring knowledge and develop solutions for the future (R&D and demonstration programs, roadmaps)

✓Providing expertise (Advise public authorities, Provide studies, tools & guides, Help for decision making)

✓Convincing and mobilizing (communication campaigns, advice to citizens, notably through Energy information centers, Information and training of professionals

✓Financial support for project development (notably : renewable heat fund, waste fund, Polluted sites)

ADEME Key Figures

1000 employees

3 headquarters

26 local offices (17 as from 2016)

budget : 590 M€ per year (excluding PIA)

Environment & Energy Management

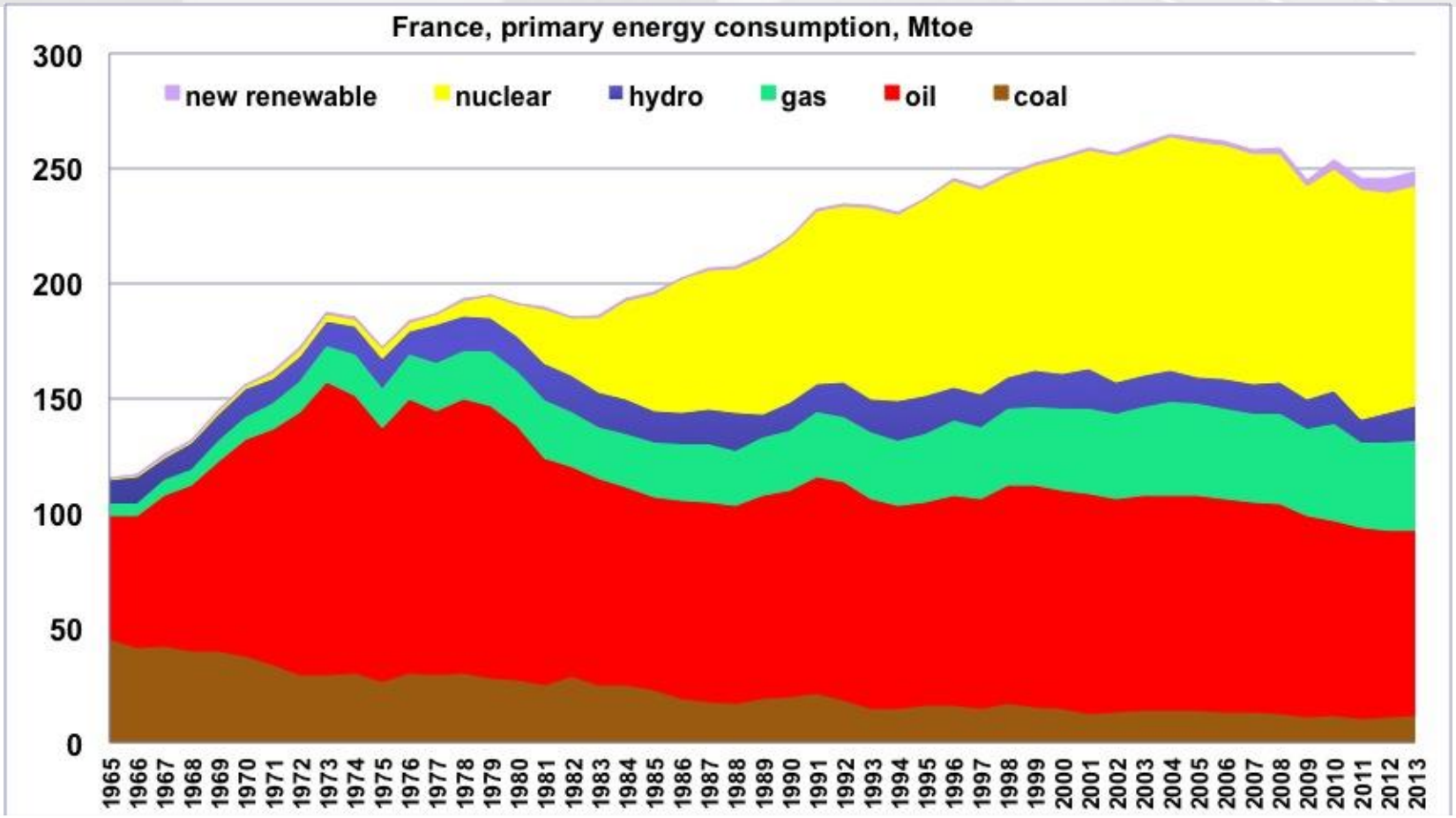
The new law in France for Energy Transition and Green Growth

After a large debate among stakeholders in 2013, a new law has been adopted by Government mid 2014 and adopted by the Parliament in August 2015.

Main objectives to comply with factor 4 in 2050 :

- Reducing GHG emissions by 40% in 2030.
- Reducing energy demand by 50% to 2050 (-20% to 2030).
- Increasing the share of renewable energy from 13,4% (2012) to 32% in 2030 and 40% of electricity mix.
- Reducing the share of nuclear in electricity mix from 75% to 50% in 2025.
- Reducing the share of fossil energy in energy mix by 30% in 2030.

Primary French energy consumption by energy source



Primary energy consumption in France is dominated by oil and nuclear power and significant hydro electric power. Coal and natural gas are secondary in the energy mix.

ADEME Energy Transition scenarii (2030-2050)

- Identification of a potential pathway for energy transition in France
- Two time horizons : 2030 and 2050
- 2 main targets: energy consumption management and development of renewable energy resources

	2030	2050
Energy demand	- 20%	- 50%
GHG	- 40%	- 75%
Renewable energies	35% of energy mix	55% of energy mix

French Policy for Energy Transition : ADEME's vision

Energy and climate ADEME scenarios:

• In 2050: Factor 4, divide CO2 emissions by 4 compared to 1990

•Residential buildings:

In 2030: 26% decrease of final energy consumption
In 2050: 52% decrease

•Urban planning:

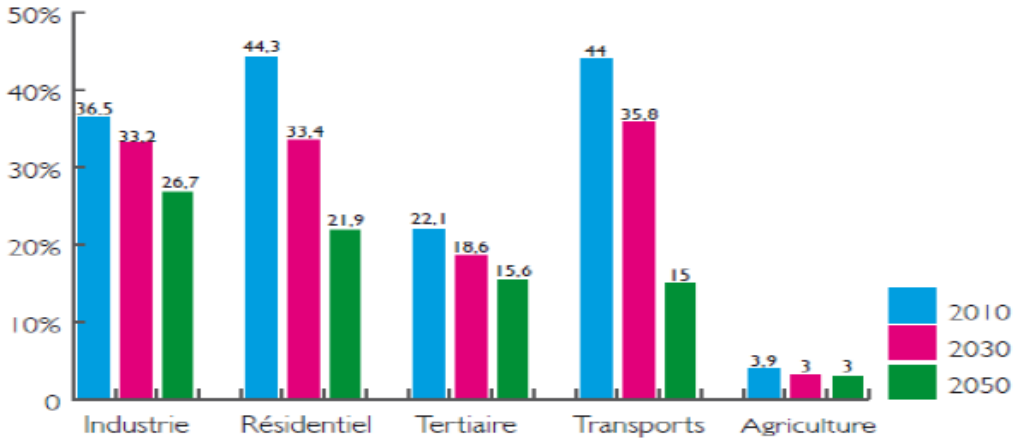
Share of multi-family new buildings increases (from 42% in 2010 to 50% in 2030)

•Transport :

In 2030 : 18.6% decrease of energy consumption

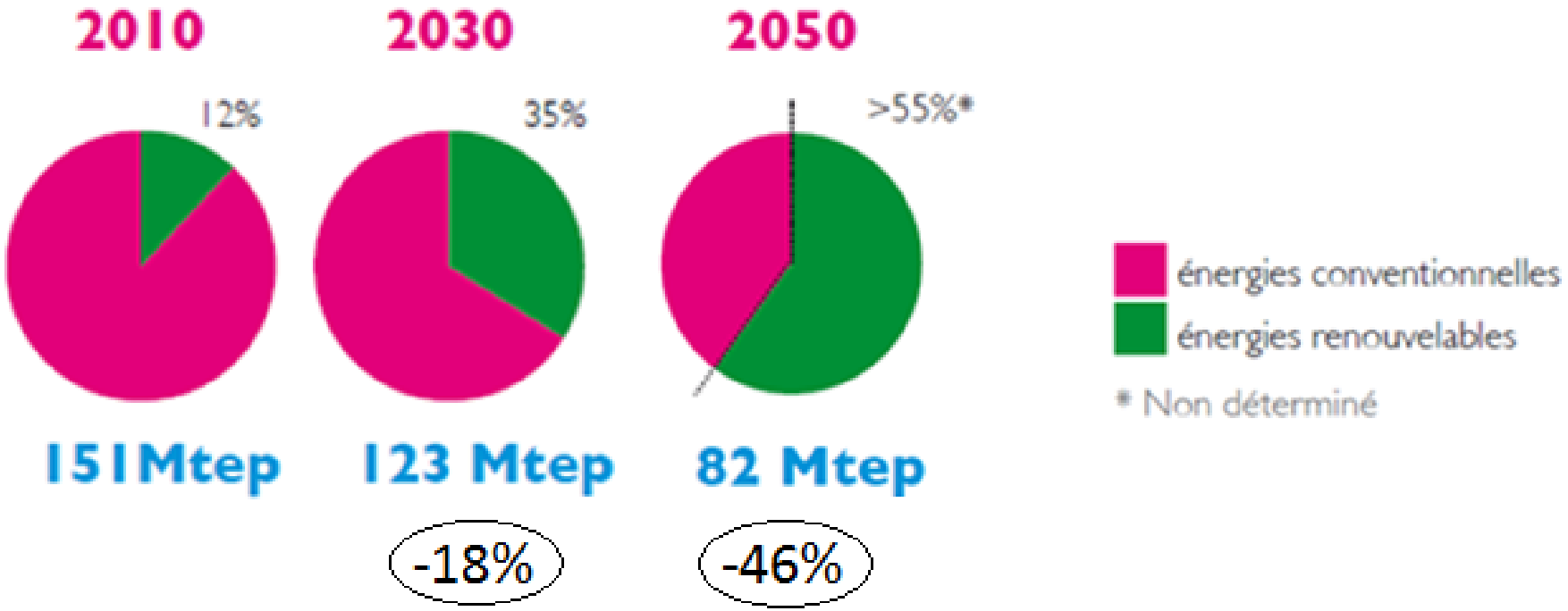
In 2050 : 66% decrease

Urban mobility in 2050 : 30% shared vehicles, 25% collective transport, 15% bicycle



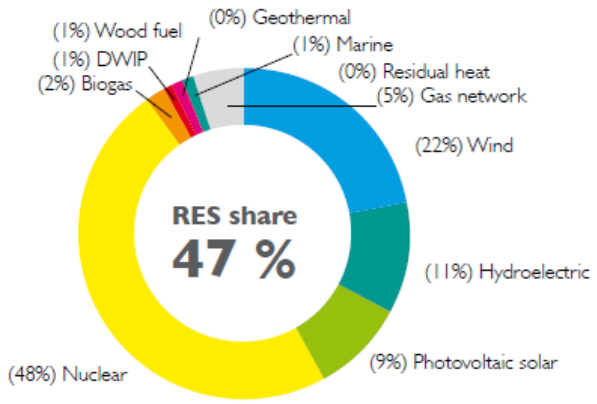
ADEME Scenarii / Renewable energies

Renewable energies would increase by 35% in 2030 and 55% in 2050

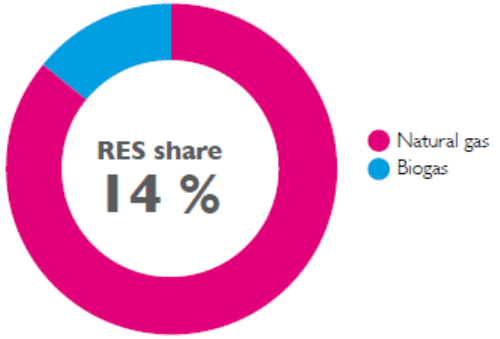


Proportion of Renewable energy sources in each network in 2030

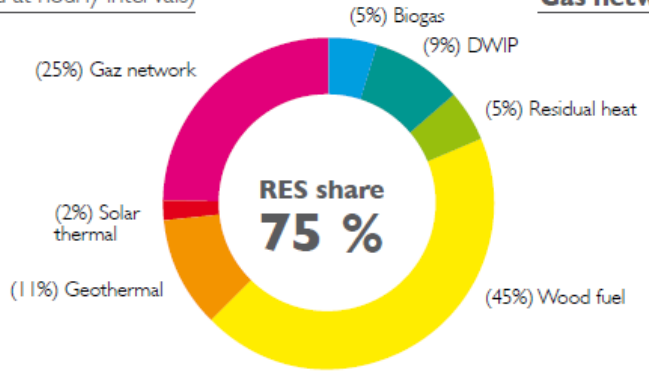
PRIMARY ENERGY SOURCES IN 2030 (MTOE)



Electricity mix (Balanced at hourly intervals)

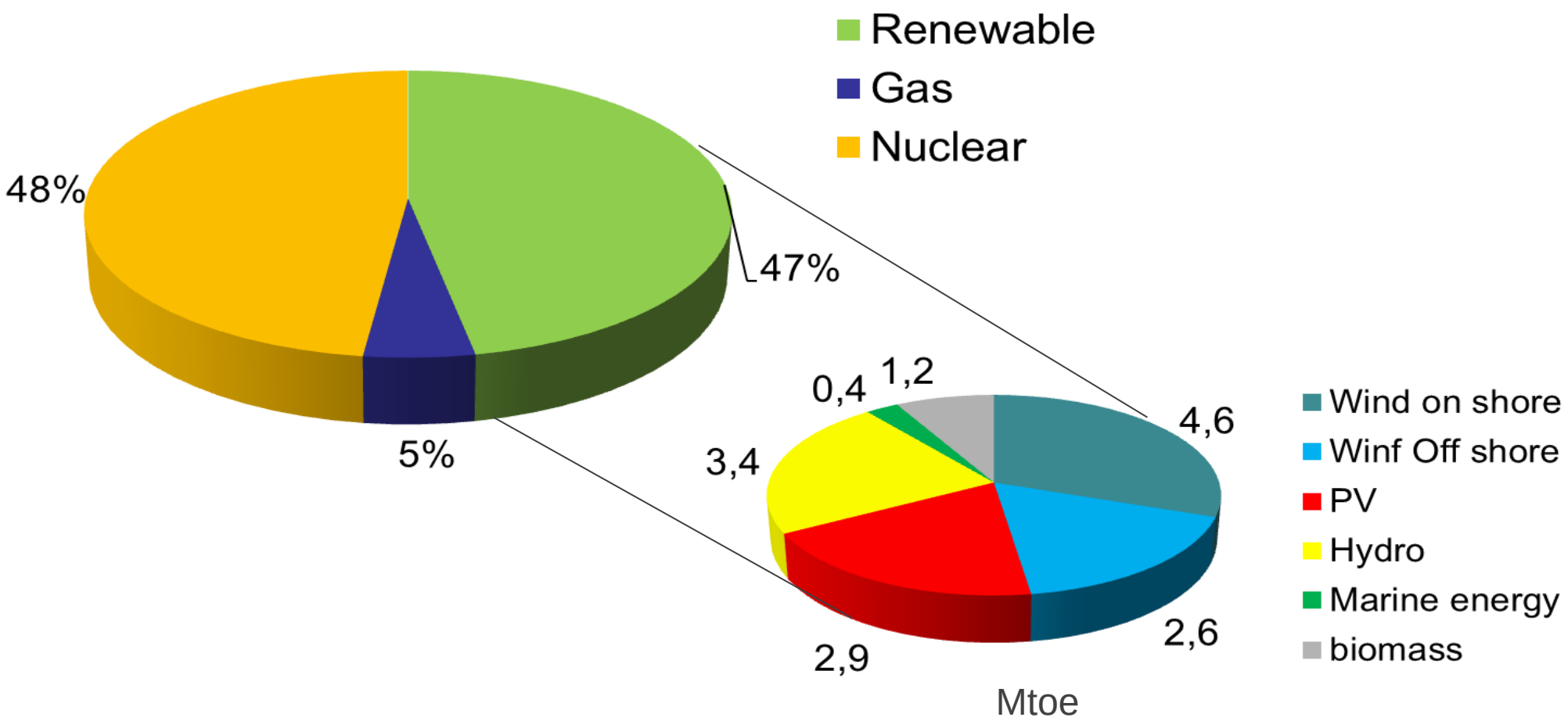


Gas network mix



District heating mix

ADEME scenario / Electricity mix in 2030



Renewable energy deployment perspectives in 2030-2050

WIND ENERGY

On shore wind : 1.5 GW/year ➡ 34 GW in 2030 (2050 potential 40 GW)

Off shore wind ➡ 12 GW in 2030 (2000 anchored turbines of 6 MW) (2050 potential : 30 GW anchored and floating)

SOLAR ENERGY

Decentralized PV (dwellings roofs) : 400 MW/year ➡ 8 GW in 2030

Centralized PV (industrial & commercial roofs, ground power plants) 25 GW in 2030

2050 potential estimated at 65 GW (with new technologies)

MARINE ENERGIES

Tidal and current energy ➡ 1 GW in 2030 (2050 potential : 3 GW)

Waves energy ➡ 200 MW in 2030 (2050 potential : 10 GW)

+ Thermal ocean energy…(overseas)

BIOMASS

Wood and solid biomass for combustion : 5.9 ➡ 18 Mtoe in 2030 (2050 potential : 21 Mtoe)

Biogas ➡ 6 Mtoe in 2030

- Biofuels : 2.2 ➡ 4.2 Mtoe in 2030 (2050 potential : 4.4 Mtoe, limited by available superficies)

Examples of innovations

Green innovation funding: Investments for the Future Program

A fund for green energy technologies innovation set up by Government and managed by ADEME from 2010

2 main priorities:

- **Energy and ecological transition demonstrators : 2 130 M€**
  - ✓ Renewable energy and biobased chemistry
  - ✓ Smart grids
  - ✓ Circular economy
- **Vehicules and Tranports of the future: 1 150 M€**

More than 250 successful projects so far

Main characteristics:

- Co-investing in demonstrators projects and industrial experimentations proposed by companies (trigger effect = 3), public and private risk sharing
- Sharing innovation risk with companies for energy, environment, economic development and employment stakes
- Creating opportunities for international cooperation

Wind energy : Project VERTIWIND

Vertical Axis Floating Wind Turbine

- Depth : > 50 m
- Height : 90 m
- Capacity : 2 MW

Total Cost	17.6 M€
ADEME Subsidies	7.5 M€
Project Duration	4 years
Current Status	Test (Pool)

Pilote Group

Technip

energies nouvelles

NENUPHAR

ifp Innovation Energy Environment

BUREAU VERITAS

CONVERTEAM THE POWER CONVERSION COMPANY

SEAL engineering

océanide

ARTS ET MÉTIERS ParisTech

ISITV

Pôle Mer PACA

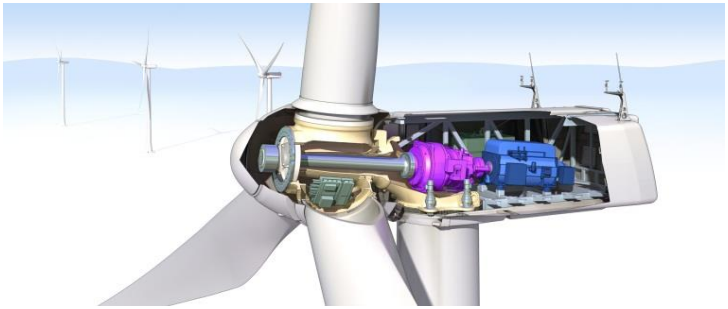
capenergies

Wind energy: Alstom OFFSHORE FRANCE

Large wind machine

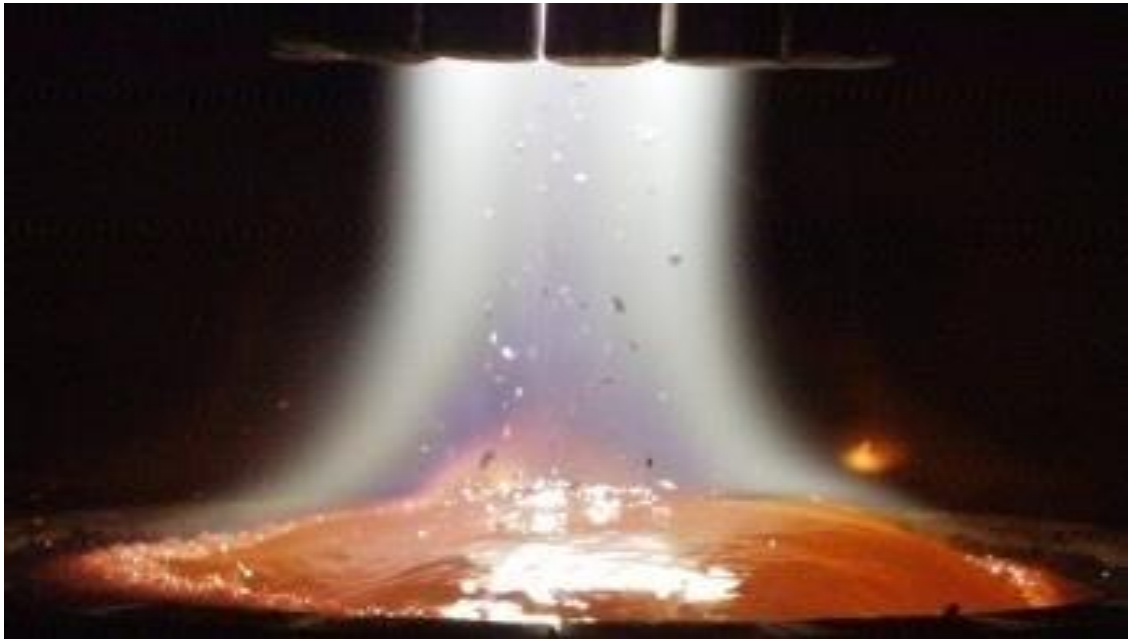
Objective : Industrialization of highly efficient wind generators

- Contribution to 2020 France objective of REN share in energy mix
- Construction of a French offshore wind industry, know-how, employment (creation of 7 000 directs and indirect jobs)
- Deployment of a new machine : Haliade 150 (6MW, pales 150 m diameter, nacelle at 100m)
- Disruptive technologies adapted at offshore (direct drive, generator with permanent magnets..)



Company	ALSTOM RENEWABLE
Total budget	Confidential
Place	Saint Nazaire & Cherbourg
State of implementation	Plant inauguration in December 2014

Solar PV : ISOPEM (Silicium manufacturing)



Total Budget	45,8 M€
PIA subsidy	9,3 M€
Duration	5 years
Industrial objectives	Production of purified metallurgic silicium Pilot production of 100 tons en 2014 (10 MW) and 800 tons in 2016 (80 MW) Cost objective 20 €/ kg Si
Localization	Rhône-Alpes

cea ines INSTITUT NATIONAL DE L'ENERGIE SOLAIRE

FerroPem Groupe FerroAtlántica

Photosil Industries

SIMaP

ADEME cnrs

Smart Grids: example of the GREENLYS project

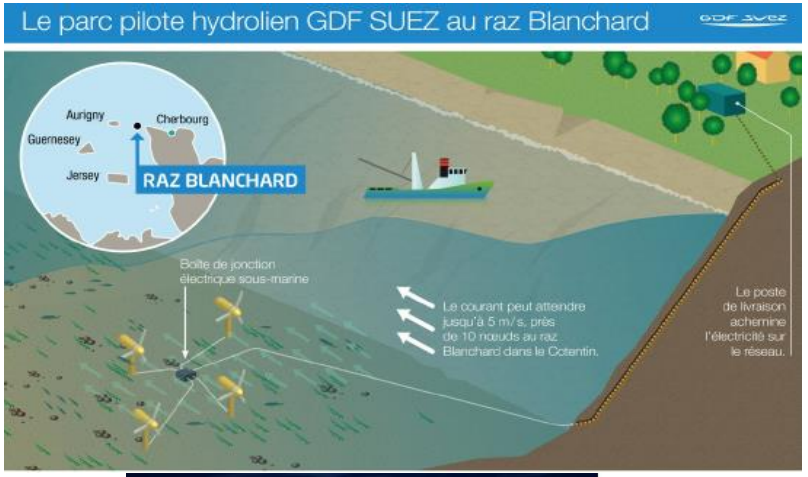
Objectives :
- Test and deploy innovative solutions for the electric system (decentralized electricity generation, smart meters, management of distribution grids, new load-shifting and DSM offers and energy management solutions for customers) ;
- Define a value chain for customers, distribution grid 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%

Tidal Energy Pilot Farms : last step before commercial deployment

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

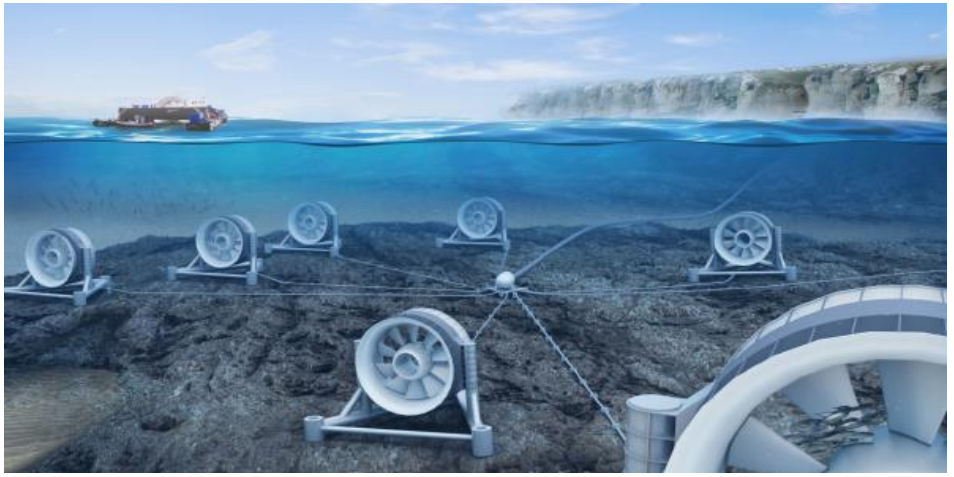
GDF SUEZ ALSTOM

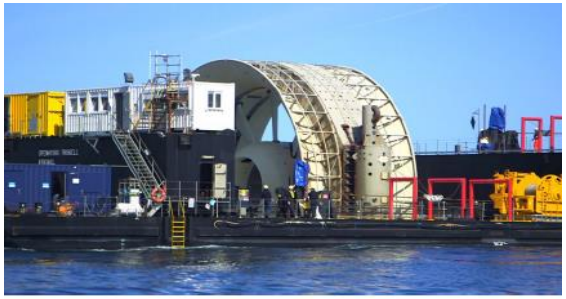


Hydrolienne OCEADE 18 - 1.4 MW

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

Conclusion

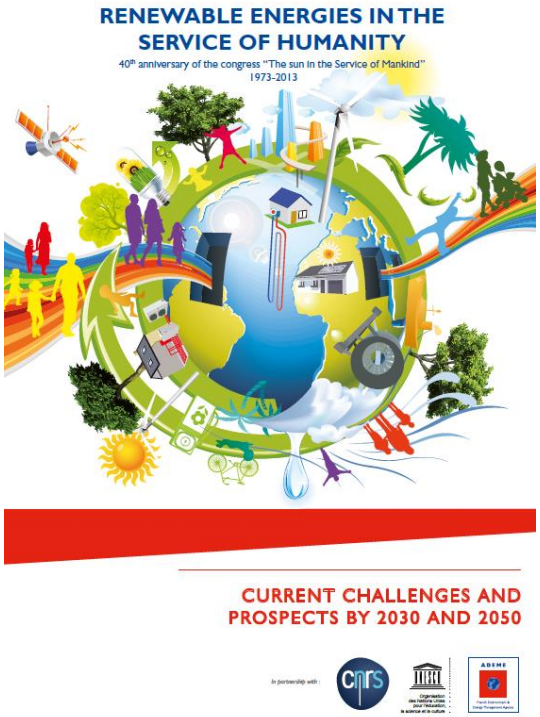
Importance of innovation to achieve energy transition and adressing climate change : not only technological innovation but also organisationnal, methodological, cultural…

Need for strengthening cooperation / exchanges of best practices at the international level:

- October 2013 : UNESCO CNRS ADEME congress organised for the 40th anniversary of the congress “The sun in the Service of Mankind” (1973-2013)

- July 2015 : International scientific conference "Our common future under climate change" at the UNESCO headquarters in Paris ; organisation by ADEME of a session on “Innovative Technologies to Mitigate Climate Change: Priorities Among Countries”

December 2015 – COP21 in Paris: opportunities to share and showcase the actions of the public and private players to fight climate change



Thank you for your attention!

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