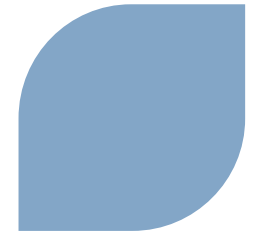




# AREVA TOWARDS THE WORLD NUCLEAR MARKET

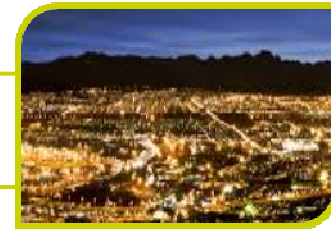
Frédéric LELIEVRE  
AREVA Vice Chief Commercial Officer

International Nuclear Atlantic Conference – INAC 2013  
November 25<sup>th</sup> 2013



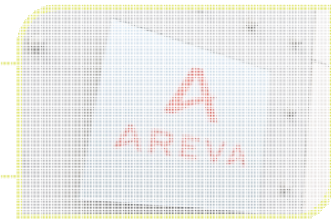
**1**

## Energy Market Fundamentals



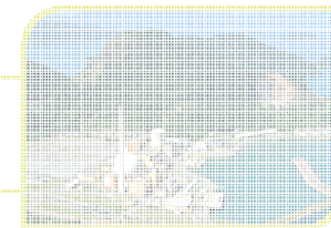
**2**

## AREVA Group at a Glance



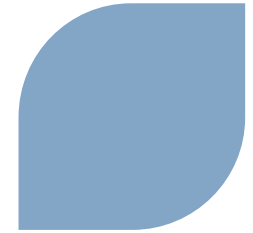
**3**

## AREVA in South America



# AREVA Group

## Nuclear & Renewable strategy



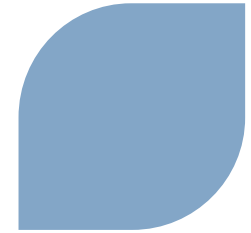
The development of Nuclear and Renewable energies is necessary

- **Demand Growth:** doubling of energy demand by 2050
- **Reduction of CO<sub>2</sub> emissions:** objective to reduce greenhouse gas emissions by 50% by 2050
- **Security of Energy Supply:** depletion of fossil resources and geopolitical uncertainties
- **Economic Competitiveness:** need for energy sources with stable and predictable cost



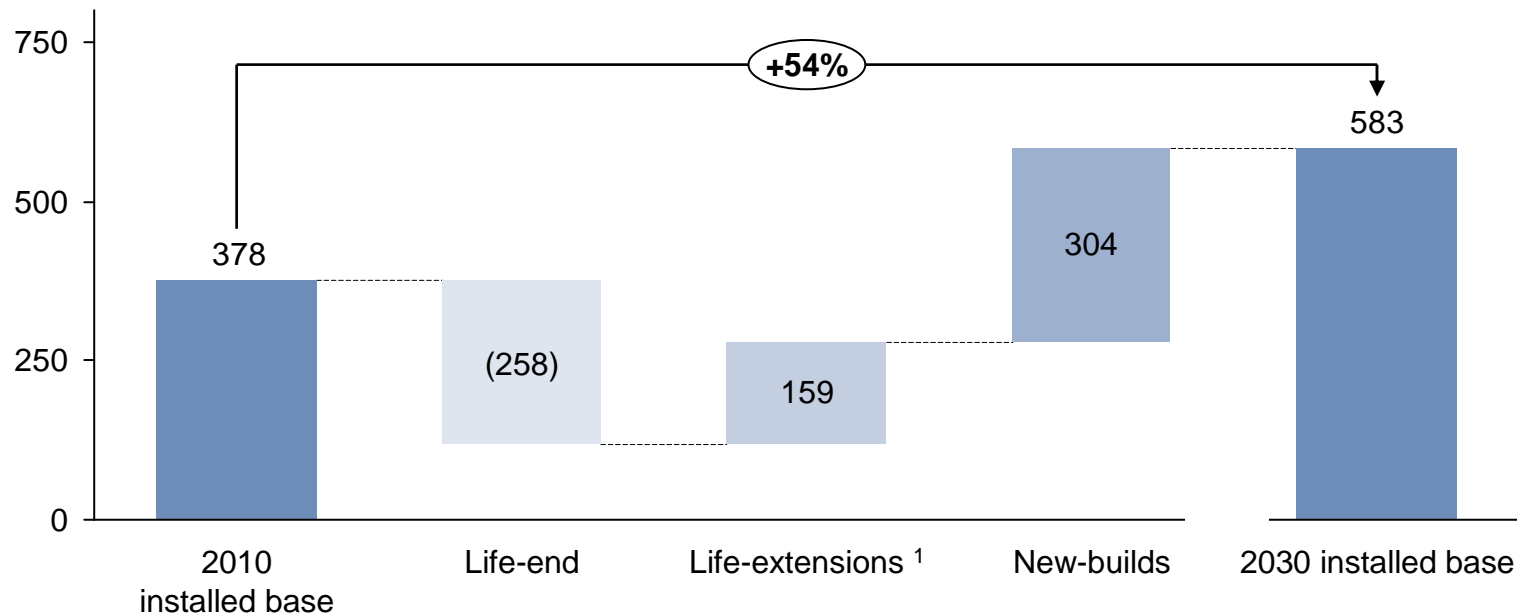
**AREVA's strategy is to consolidate its nuclear power leadership & become a reference player in the Renewable Energies industry**

# Global nuclear capacity is projected to increase by 54% by 2030



## AREVA forecast of 2010-2030 evolution of the global nuclear installed base

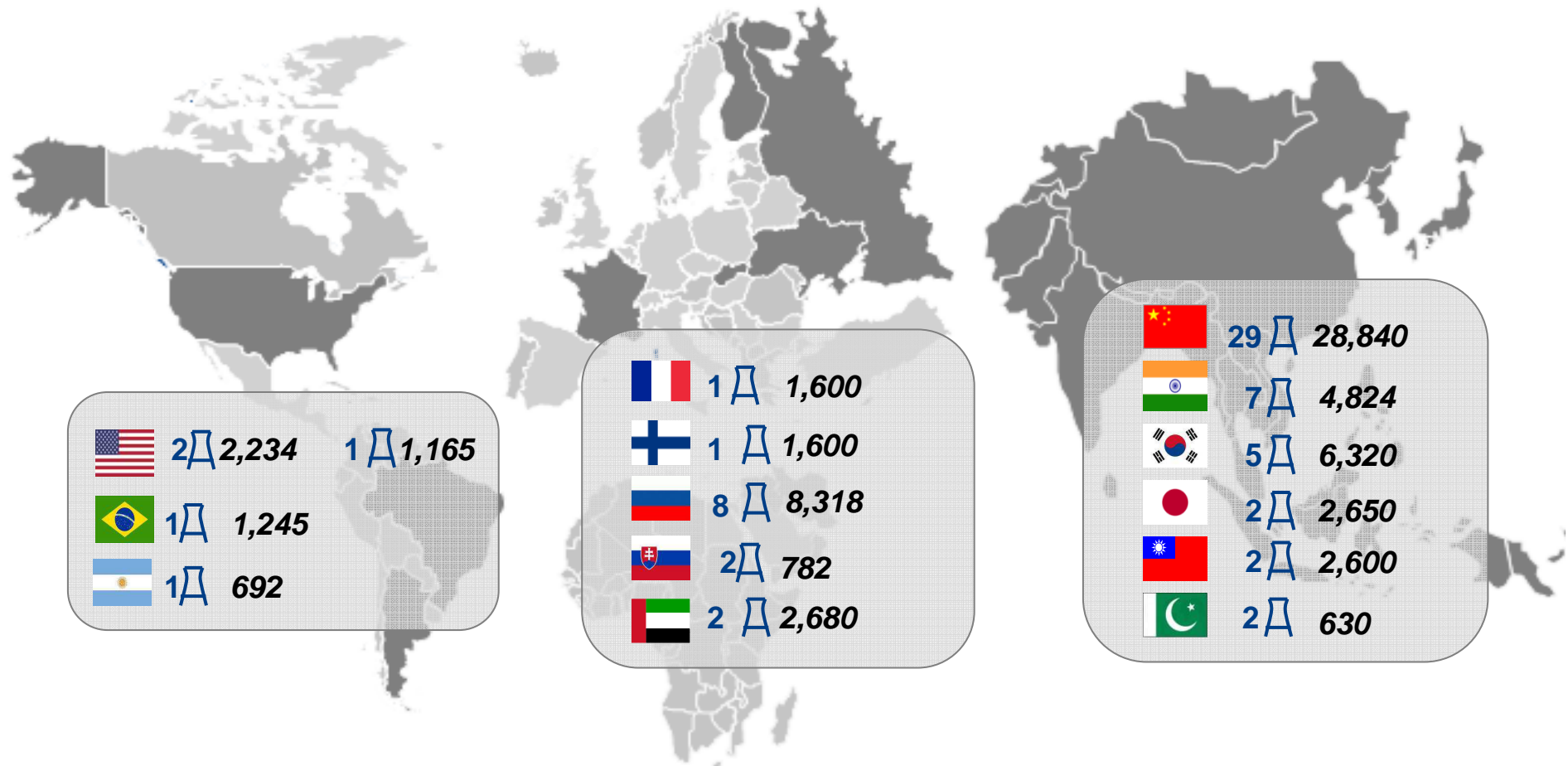
(Net output, GW)



1. Including power uprates

# Post Fukushima : Most countries have confirmed the importance of nuclear in their energy mix

Nuclear Power Plants under construction throughout the World (Mwe)

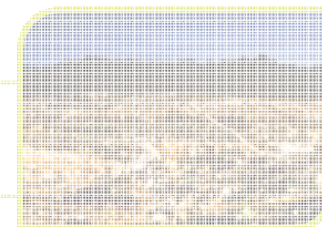


 New NPPs/under completion 66 GWe



1

Energy Market



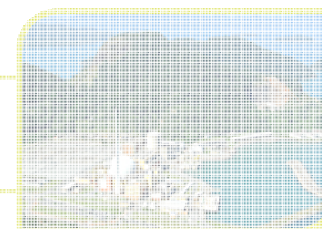
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**AREVA Group at a Glance**



3

AREVA in South America



# AREVA SUPPLIES SOLUTIONS FOR POWER GENERATION WITH LESS CARBON

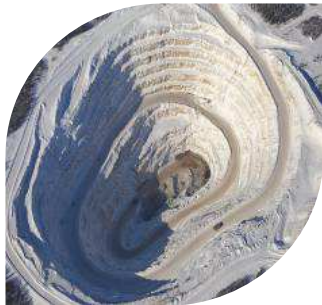
## ► World leader in nuclear power

- A unique integrated model, from uranium mining to reactor design and related services to used nuclear fuel recycling

## ► A major player in renewable energies

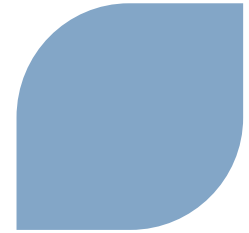
- A portfolio of diversified operations: offshore wind, concentrated solar power, bioenergies, hydrogen and energy storage

**Nuclear & Renewables:**  
contributing synergistically  
to a reliable, economical  
and low-carbon energy mix





# AREVA GROUP 2012 KEY FIGURES



- **€9.342Bn** in Annual Revenues
- **€45.4Bn** in Backlog
- **4.8%** of revenues in R&D spending
- **>8,000** Active Patents held
- **51** Manufacturing Sites in **5** continents

- **47,000** Employees Including:
  - **900** Specialty Experts
  - **2,700** Scientists & Researchers
  - **6,500** world's largest nuclear in-house EPC team

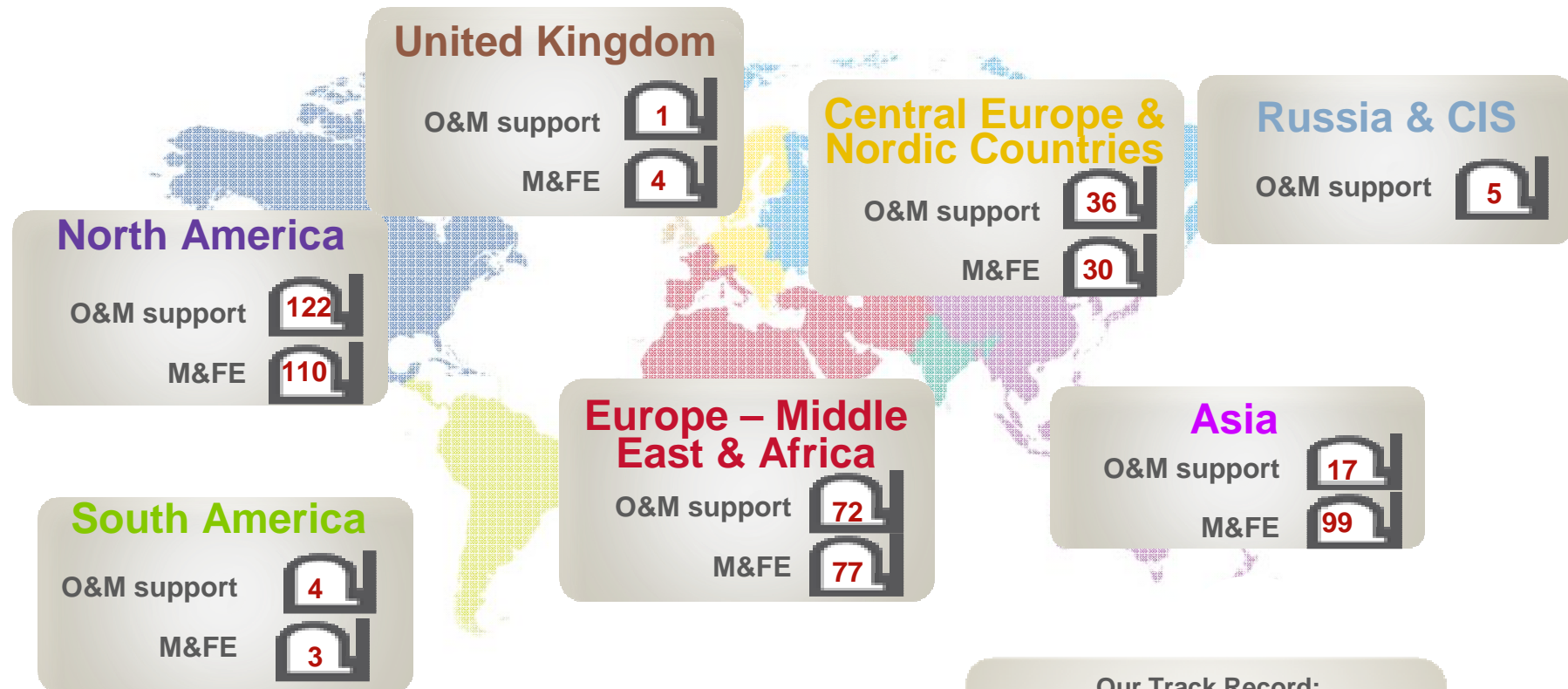
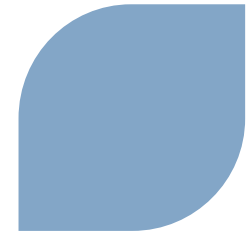
- **98 reactors built**, 30% of worldwide installed nuclear capacity
- **4** reactors under construction
- **360+ reactors** served around the world



# AREVA Group Across the Globe



# World's leader in nuclear energy



**360/440 reactors served by AREVA in the World**





**AREVA**  
Safety Alliance

# AREVA's Safety Alliance

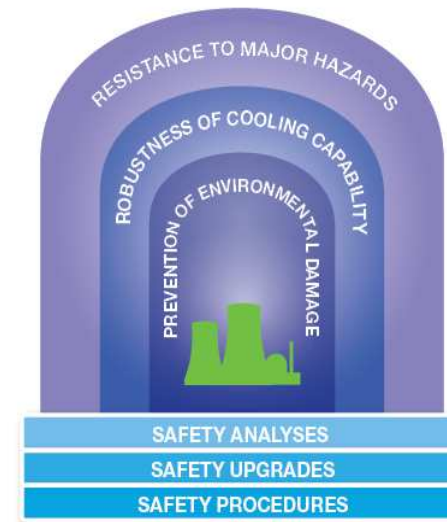
► Engaging with utilities to help them meet ever-increasing safety requirements

- ◆ Safety analyses
- ◆ Safety upgrades
- ◆ Safety procedures



► A safety framework structured around three imperatives:

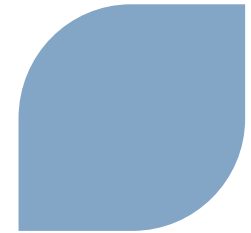
- ◆ Resistance to Major Hazards
- ◆ Robustness of Cooling Capability
- ◆ Prevention of Environmental Damage





**AREVA**  
Safety Alliance

## Safety Alliance: a continuing success



### Commercial achievements in H1 2013

- **Brazil:** H2 PAR -Catalytic Recombiners will equip Angra2
- **Japan:** Hitachi-GE Nuclear Energy, Ltd. and AREVA sign an agreement to improve nuclear plant safety by supplying filtered containment venting systems (FCVS)
- **United States:** AREVA and PEICO form an alliance to operate regional emergency response centers
- **China:** AREVA signs a contract with China Nuclear Power Engineering Co., Ltd and Jiangsu Nuclear Power Corporation (JNPC) to supply backup diesel generators for units 3 and 4 of the Tianwan power plant
- **Czech Republic:** AREVA is awarded a contract to supply hydrogen recombiners to the four reactors of the Dukovany nuclear power plant

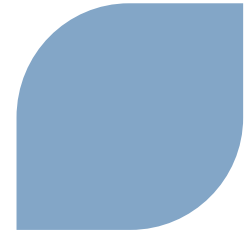


**More than 100 projects in 19 countries for around 50 power companies, representing €290 million in orders since the start of the program**



**AREVA**  
Forward Alliance

# Forward Alliance: the launch of a new program



## Helping utilities extend the operation of their reactors

- Providing personalized assistance to our customers to ensure the long-term operating safety of their nuclear fleets in accordance with international regulations
- Three priorities:
  - Support provided during the license renewal process recommended by the IAEA
  - Assistance for safety reviews of major components
  - Products and solutions meeting project requirements
- Offering integrated solutions based on AREVA's "aging management" activities
- Forward Alliance catalog: more than 25 products, services and solutions for extended operations

# Continued achievements

## Mining

### Mongolia



- Agreement signed on October 26<sup>th</sup> to develop uranium mines.
- Creation of AREVA Mines LCC with the participation of Mitsubishi Corporation.

>> World's second largest uranium producer. (9.760 t produced in 2012)

## Front-End

### Georges Besse II

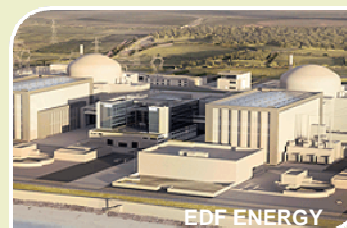


- Production of North unit from GBII
- 2016: Full production 7.5 MSWUs

>> Key player in the enrichment market.

## Reactors & Services

### Hinkley Point



- Agreements signed on October 21<sup>st</sup> for the construction of 2 EPR reactors in UK.
- Decisive step for the EPR technology.

>> AREVA's high nuclear safety standards rewarded.

## Back-End

### MOX



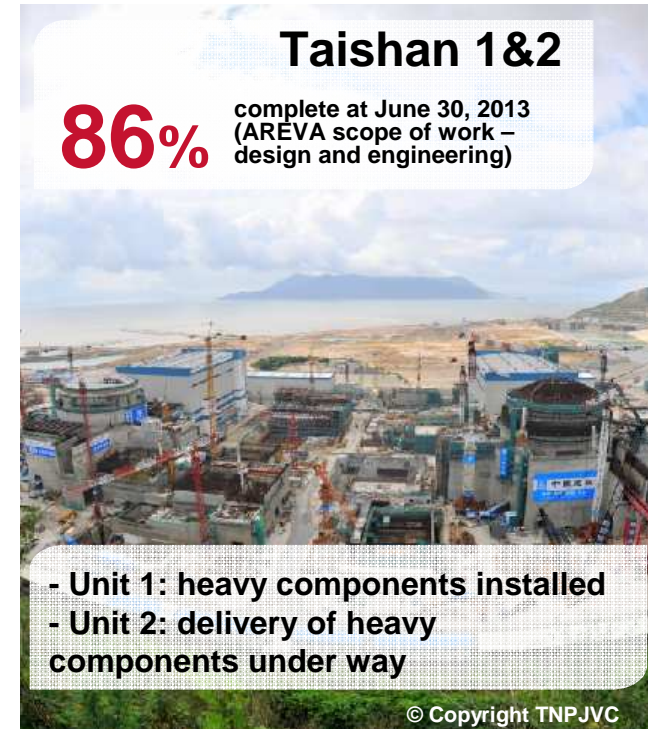
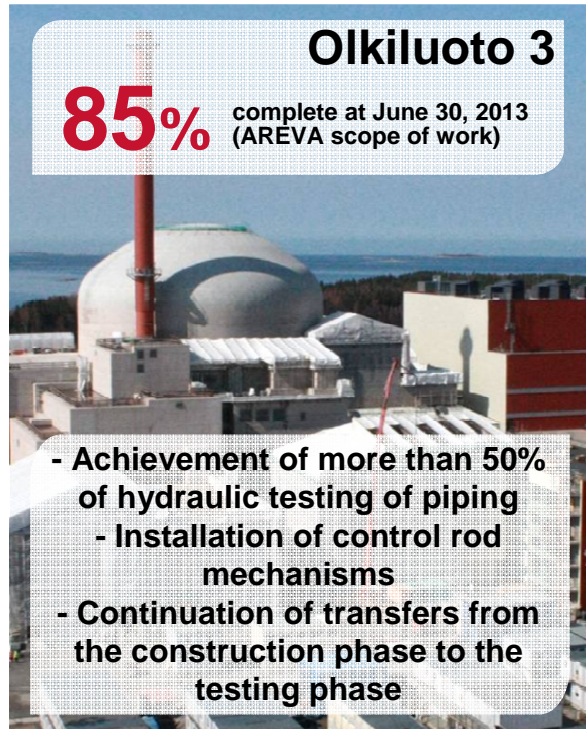
- April 18<sup>th</sup>: First shipment of MOX fuel to Japan since Fukushima
- First MOX fabrication for Borselle (NL) reactor
- April 25<sup>th</sup> : LOI for the delivery of a treatment and recycling plant in China.

>> Unique experience in fuel treatment and recycling.



# Gen III+ reactors: unequaled cumulative experience

## Major construction progress during the half-year period...



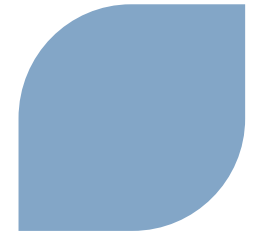
## ... and in the new builds market

**May:** start of exclusive negotiations with Turkey for the construction of 4 ATMEA1 reactors

\* Percentage of completion including last amendment, although not yet in backlog

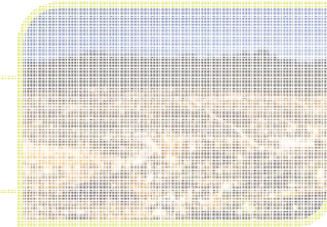
International Nuclear Atlantic Conference – INAC 2013 - Recife 25/11/2013





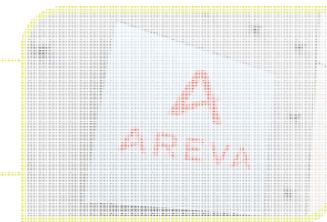
1

Energy Market



2

AREVA Positionning

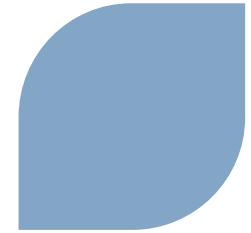


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**AREVA in South America**

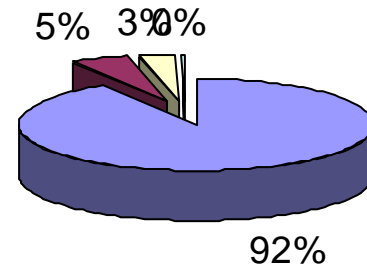


# Brazil's highly relying on hydro



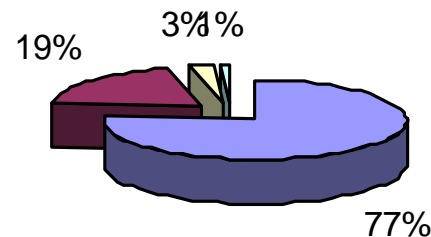
**2011**

Installed Capacity: 117GW  
Generation: 430 TWh  
CO2 emissions: 70kg/MWh



**2012**

Installed Capacity: 121GW  
Generation: 498TWh  
CO2 emissions: 82kg/MWh



**CO2 emissions increased by 17%**

■ Hydro ■ Thermal ■ Nuclear ■ Renewables

Ref : EPE- BEN 2013

## ► The Brazilian Nuclear Electricity Program to diversify the baseload:

- ◆ ANGRA1- PWR 640 MW
- ◆ ANGRA2- PWR 1350 MW
- ◆ ANGRA3- PWR 1405 MW- 2018
- ◆ N1, N2, N3 and N4 by 2030
- ◆ Mining and Nuclear Fuel thanks to INB development - Enough U for 60 years and for all NPPs
- ◆ CNEN as Safety Authority



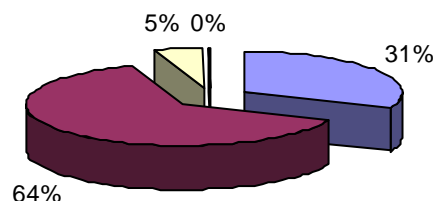
**Balance to be found between electricity demand growth and nuclear share in the energy mix**

# Argentina high dependence on gas



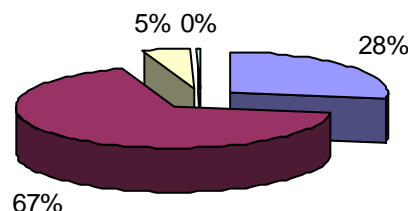
**2011**

Installed Capacity: 28 GW  
Generation: 125 TWh



**2012**

Installed Capacity: 30 GW  
Generation: 131 TWh



■ Hydro ■ Thermal ■ Nuclear ■ Renewables

Ref : CNEA 2013

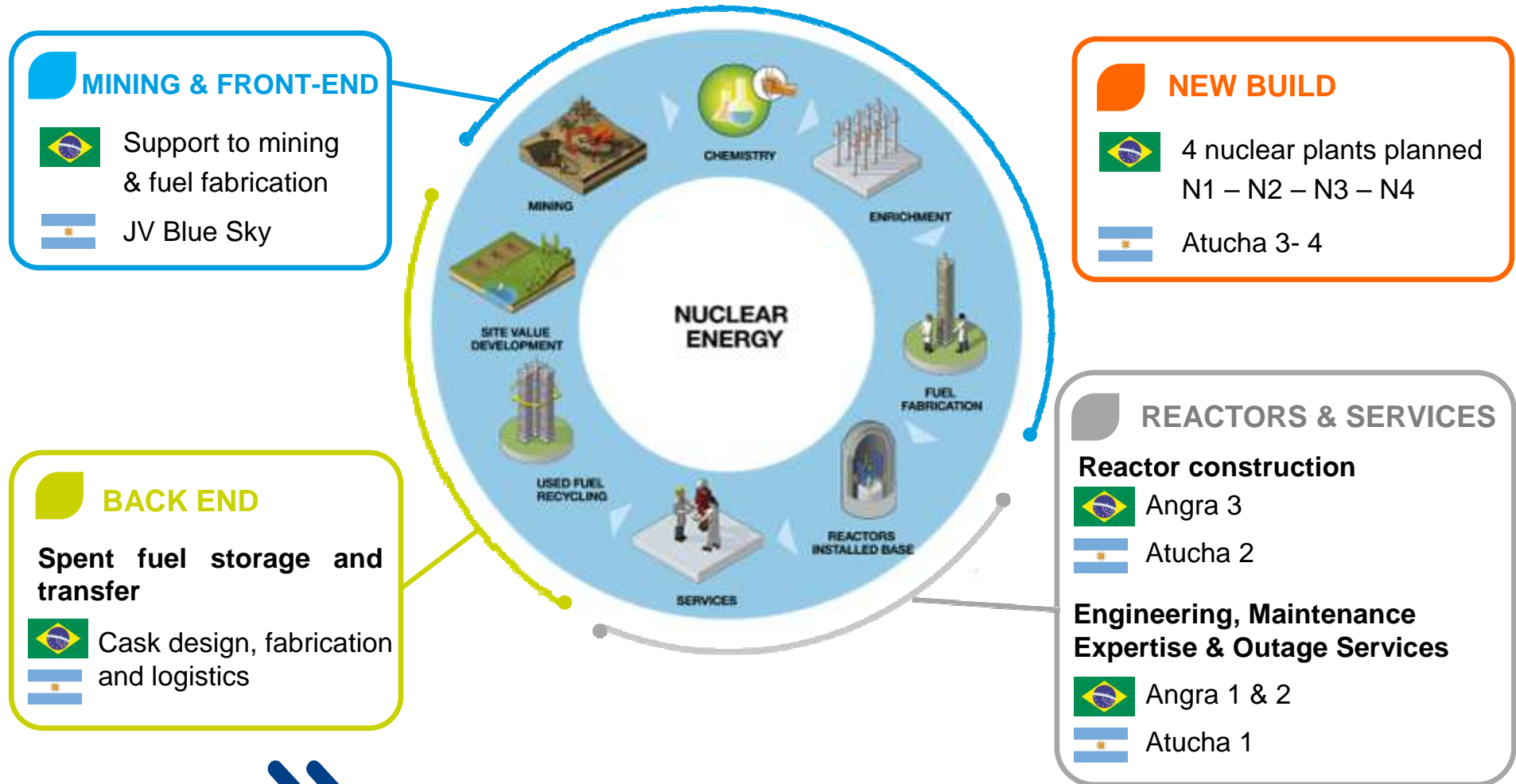
## ► The Argentinean Nuclear Electricity Program to reduce the dependence on gas:

- ◆ EMBALSE- PHWR 640 MW
- ◆ ATUCHA1- PHWR 350 MW
- ◆ ATUCHA2- PHWR 750 MW- 2014
- ◆ ATUCHA3 and 4 ? Bid in 2014
- ◆ Mining and Nuclear Fuel thanks to CNEA and CONUAR development
- ◆ ARN as Safety Authority



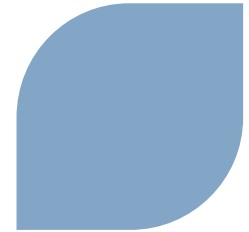
**Implement a medium and long term energy plan with a balanced participation of hydro, nuclear and renewable energies.**

# Bring AREVA experience to support Brazil & Argentina nuclear growth



**More than 20 years of presence**

# Angra 3: A significant path forward for Brazilian nuclear capacities



- ▶ Meeting the client situation : a 25 years project that has been postponed
- ▶ A specific integrated approach
  - ◆ Evaluate an existing design and bring evolution to meet the last safety standards
  - ◆ Bringing technical assistance: coordination, design review, training, supervision and commissioning
- ▶ Implement innovation in an existing Design : digital I&C, upgraded safety through additional devices



**ANGRA 3: innovative approach to help nuclear program restart in Brazil**



**Luc Oursel**  
**Chief Executive Officer**

**“AREVA is proud to have been selected to complete the construction of the third Brazilian nuclear reactor and to continue its collaboration with Eletrobras Eletronuclear that began with the supply of reactor services to the Angra 1 and 2 reactors.**

**The completion of Angra 3 confirms Brazil’s engagement in an ambitious nuclear program and illustrates the relevance of this energy source as a solution for sustainable economic development.”**





 **Obrigado!**



# Backlog: nearly 5 years of sales revenue

