

# AREVA NP

INAC 2017

October 23<sup>rd</sup> 2017

André Salgado – Brazil and South America

1

**AREVA NP business**

2

Nuclear: answering new electricity market challenges

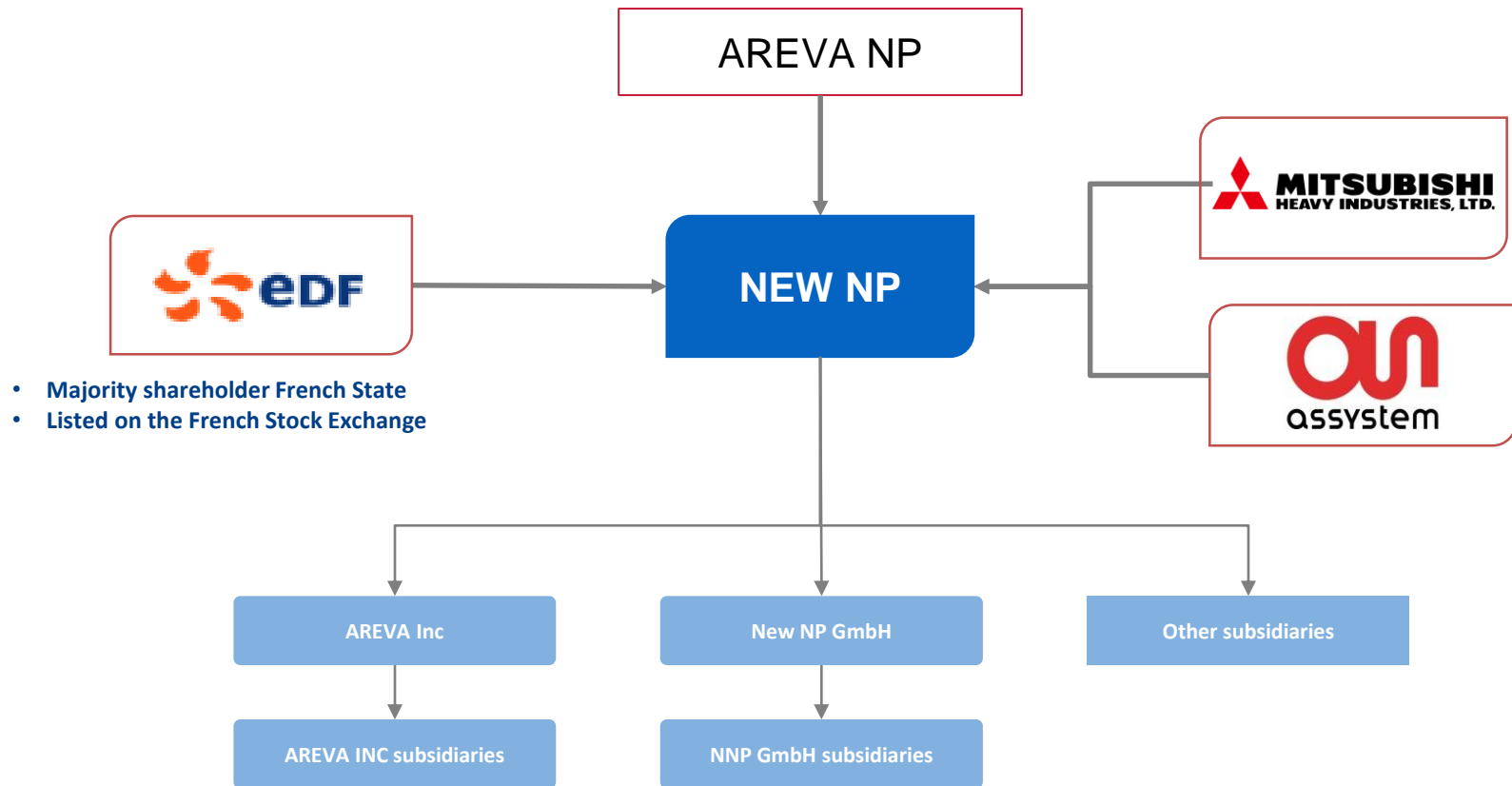
# From Areva Group to Areva NP



AREVA NP

# Target Shareholder structure New NP

Jan/2018



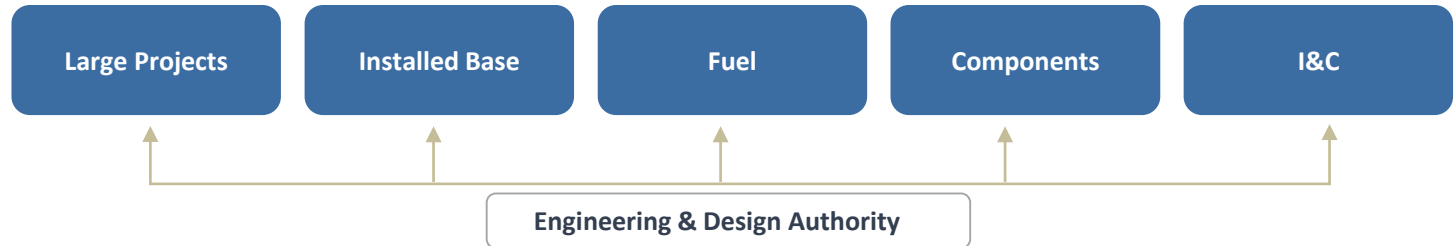
**New NP will be able to secure its long term development with the support of strategic shareholders whilst remaining an autonomous subsidiary**

AREVA NP

# AREVA NP

## Reference supplier in the nuclear sector

### Activities



- Annual revenue\* of ~ 3.1 bn€
- Sales Portfolio of 12 bn€
- ~ 14 000 employees worldwide
- > 58 locations
- A diversified portfolio of customers including worldwide leaders on the energy market
- Capability to provide services to all type of nuclear reactor technology



\*Sales revenue contributive to AREVA group - Dec 31, 2016

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# AREVA NP Worldwide presence



### OEM NSSS DESIGNER AND MANUFACTURER

#### ■ Consolidate our position as OEM NSSS designer & manufacturer

##### In-service nuclear fleet

- Propose innovative technologies and solutions (fuel, I&C, services)

##### New builds

- Adapt the offer to serve all potential markets



To satisfy customers and partners

**VISION**

**High-performing people and technologies  
for safe and competitive nuclear plants worldwide**

**VALUES**





### SCOPE

Designer and supplier of Nuclear Steam Supply System and nuclear equipment, services and fuel for high levels of safety and performance



Offer innovative solutions and value-adding technologies that help our customers achieve their safety, commercial and societal objectives



Set the standard in terms of commercial and operational excellence, both in manufacturing and in project execution, and ensure a high level of safety



Ensure the professional skills of our employees and uphold their engagement in a demanding and fulfilling work environment

# AREVA NP activities

## BUSINESS UNITS



### Engineering & Design Authority

Development, design and licensing of NSSS and associated services



### Large Projects

Management and execution of nuclear reactor New Build projects



### Installed Base

Maintenance, engineering services for existing nuclear fleets and fleets under construction



### Fuel

Development, design, licensing and fabrication of fuel assemblies and core components for PWR, BWR reactors, and research reactors. Development of zirconium products



### Components

Design and manufacture of heavy and mobile components for nuclear islands



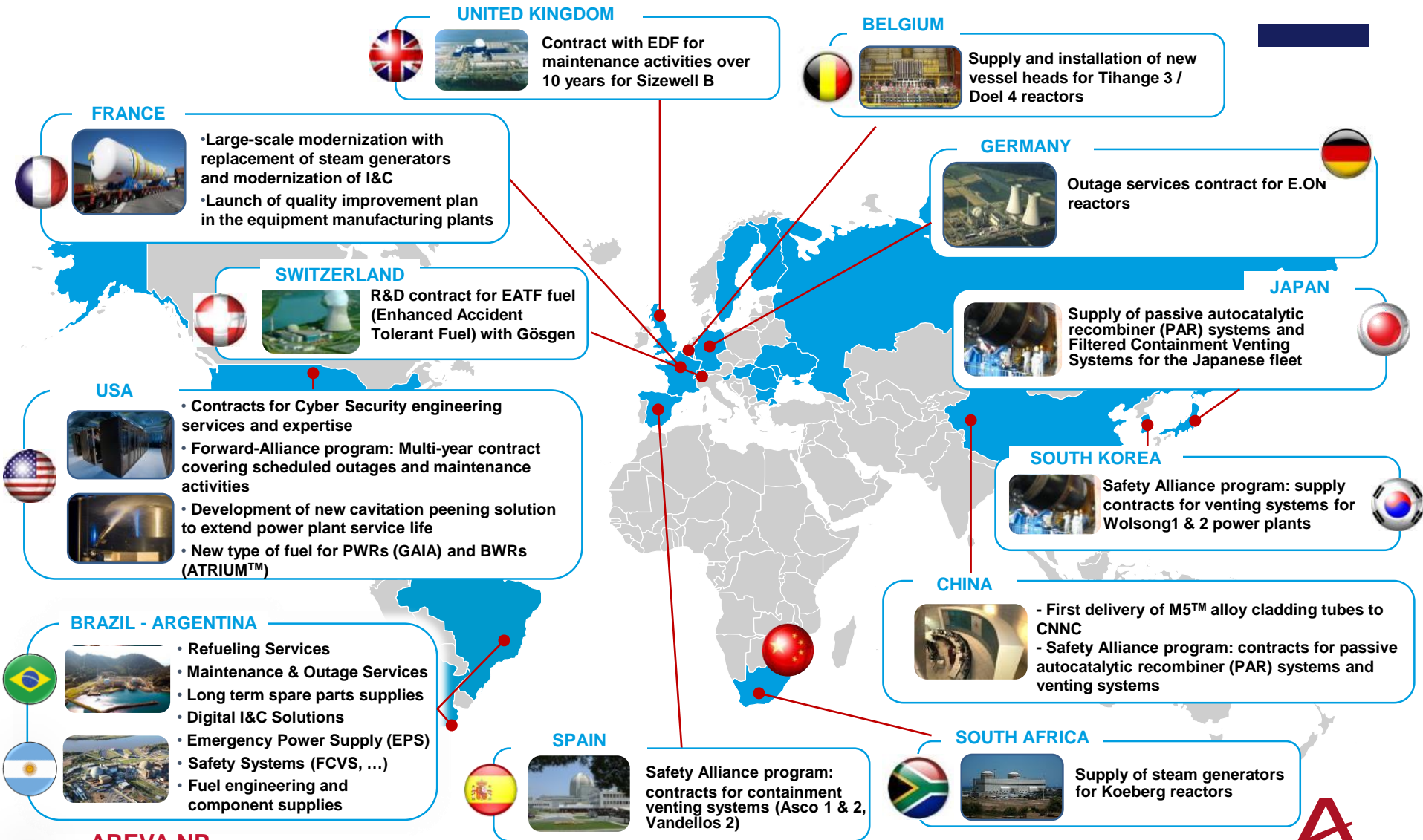
### Instrumentation & Control (I&C)

Design and fabrication of safety I&C systems for the nuclear steam supply system

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# AREVA NP in 2015-2016

## In-service NPPs



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# AREVA NP in 2015-2016

## New builds

### UK

Hinkley Point C: signature of the contracts for the construction of 2 EPR reactors, led by EDF.

### FINLAND

Olkiluoto 3: on-site delivery of operational I&C TXP cabinets, completion of their on-site testing, and start of commissioning tests on reactor

### FRANCE

Flamanville 3: introducing RPV internals into the reactor building, delivery of the reactor vessel head to the site and completion of mechanical assembly work on the reactor coolant system

### TURKEY

ATMEA1: completion of the detailed generic Basic Design

### BRAZIL

Angra 3: equipment supply, engineering services, I&C.

### CHINA

- Taishan 1: cold-run tests with RPV closed and then open successfully carried out
- Taishan 2: introduction of all steam generators into the reactor building and completion of primary loop welding work

### INDIA

Jaitapur: contract with NPCIL for basic design studies for an EPR

# AREVA NP in Latin America

## Strong history and partnerships

### AREVA NP IN LATIN AMERICA

- **A 40 years presence in South America;**
  - ❑ Commercial Office in Rio de Janeiro ;
  - ❑ Operational presence on sites: Atucha and Angra.
- **OEM for ANGRA 2, ANGRA 3, ATUCHA 1 & 2;**
- **Angra 3 : Engineering and Equipment Supply**

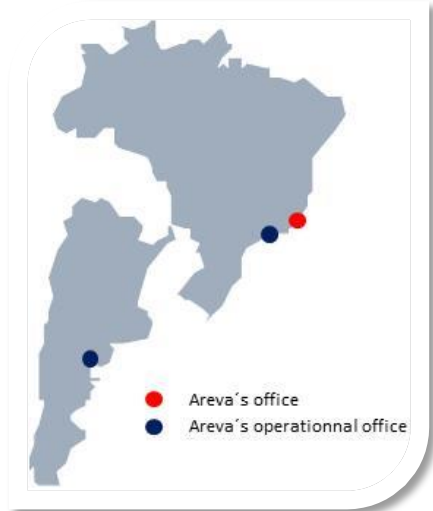
### INSTALLED BASE AND I&C

- **Support to the construction and commissioning of the NPPS;**
- **Services expertise for all types of reactors all along;**
  - ❑ ANGRA 1 & 2, Atucha 1&2, Embalse, :
    - *Specialized engineering;*
    - *Maintenance expertise;*
    - *Outage services.*

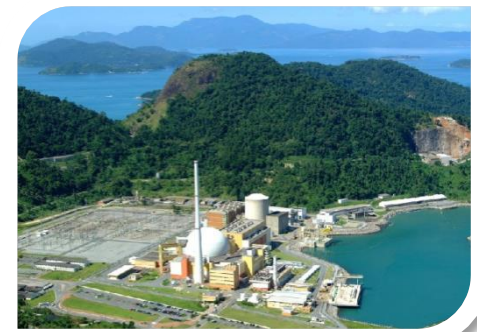
### FUEL

- **Components supply**
- **Manufacturing support**
- **Design of Angra 2 fuel in collaboration with INB.**

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Areva's offices in LATAM



Angra plant

# AREVA NP

## Involvement in Angra 3 Project Present Industrial scheme and role

ELETRONUCLEAR Overall Project Management and Supervisory Site Management					
	Design	Supplies	Civil Works	Erection	Commissioning <small>Delegation of personnel</small>
Overall Plant					
NSSS incl. Safety I&C					
Nuclear Island					
Turboset					
Conventional Island					
Civil Part					
Electrical Part					
Operational I&C					

<sup>1</sup> Erection Supervision by **AREVA NP** AREVA

<sup>2</sup> Erection Supervision by Siemens AG

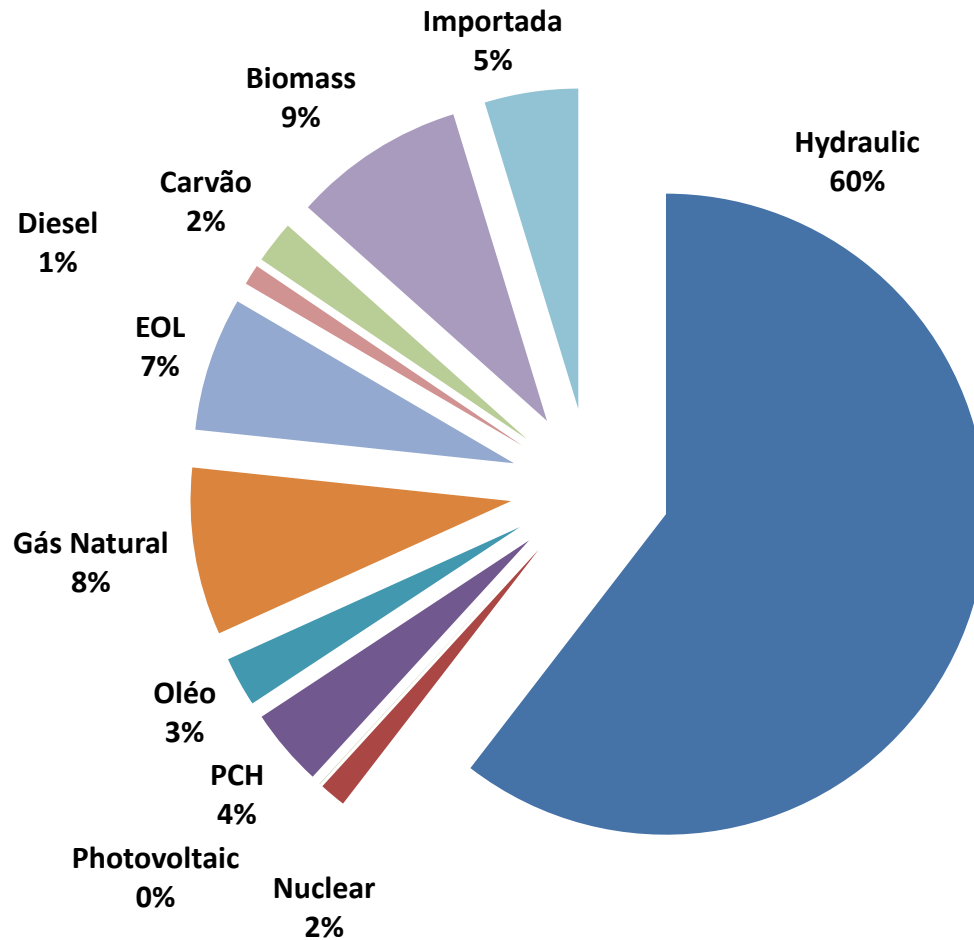
Siemens AG as subcontractor of AREVA

Brazilian Main Erection Company

**1** AREVA NP business

**2** Nuclear: answering new electricity market challenges

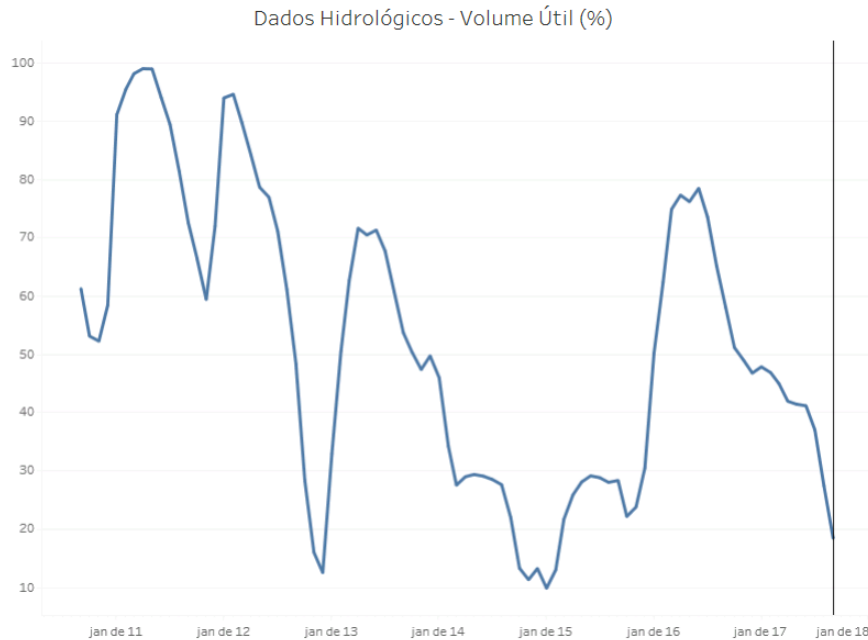
# 2016: Energy Mix: Installed Capacity



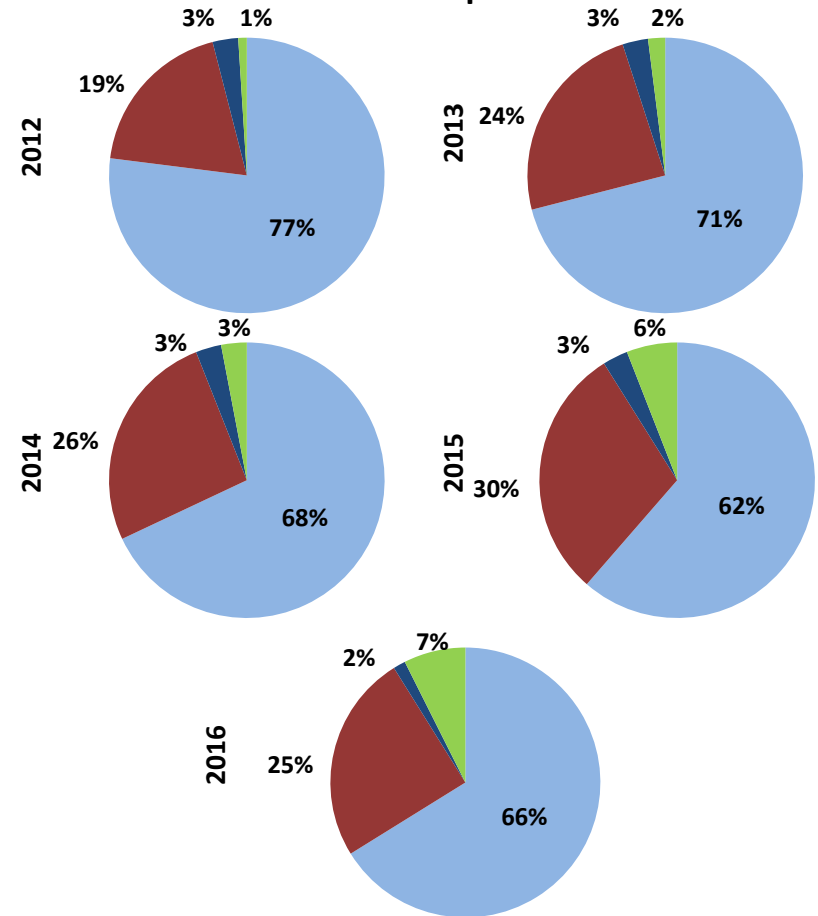


# Brazil: Hydro to Thermal Transition

Brazil Storage Capacity (%) – Since 2008



Brazil's Electricity Generation (MWh) Mix:  
Growth of fossil and expensive Thermal

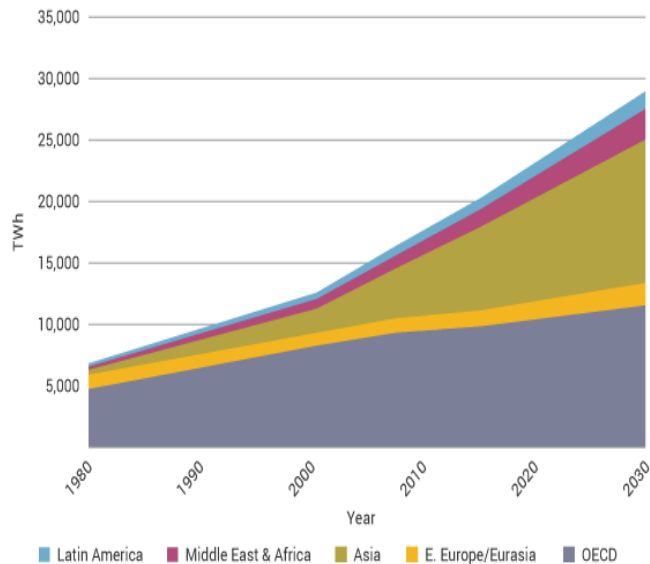


■ Hydro ■ Thermal ■ Nuclear ■ Renewables

# Electricity Market: a challenge

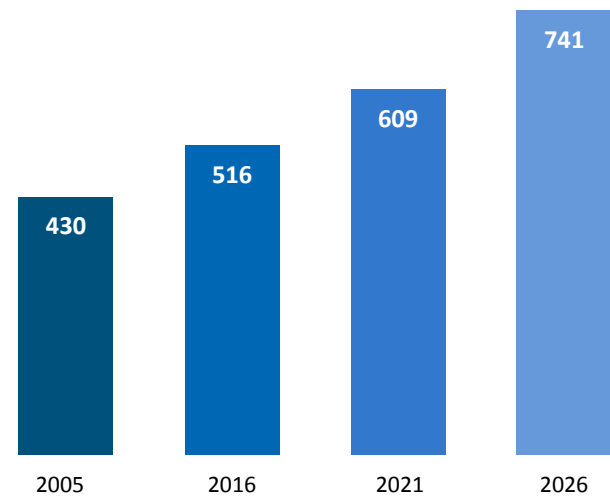


### World's electricity consumption forecasts by region



Source: OECD/IEA World Energy Outlook 2009 - Reference Scenario

### Brazil's electricity demand forecasts



Source: PDE 2026 - MME / EPE



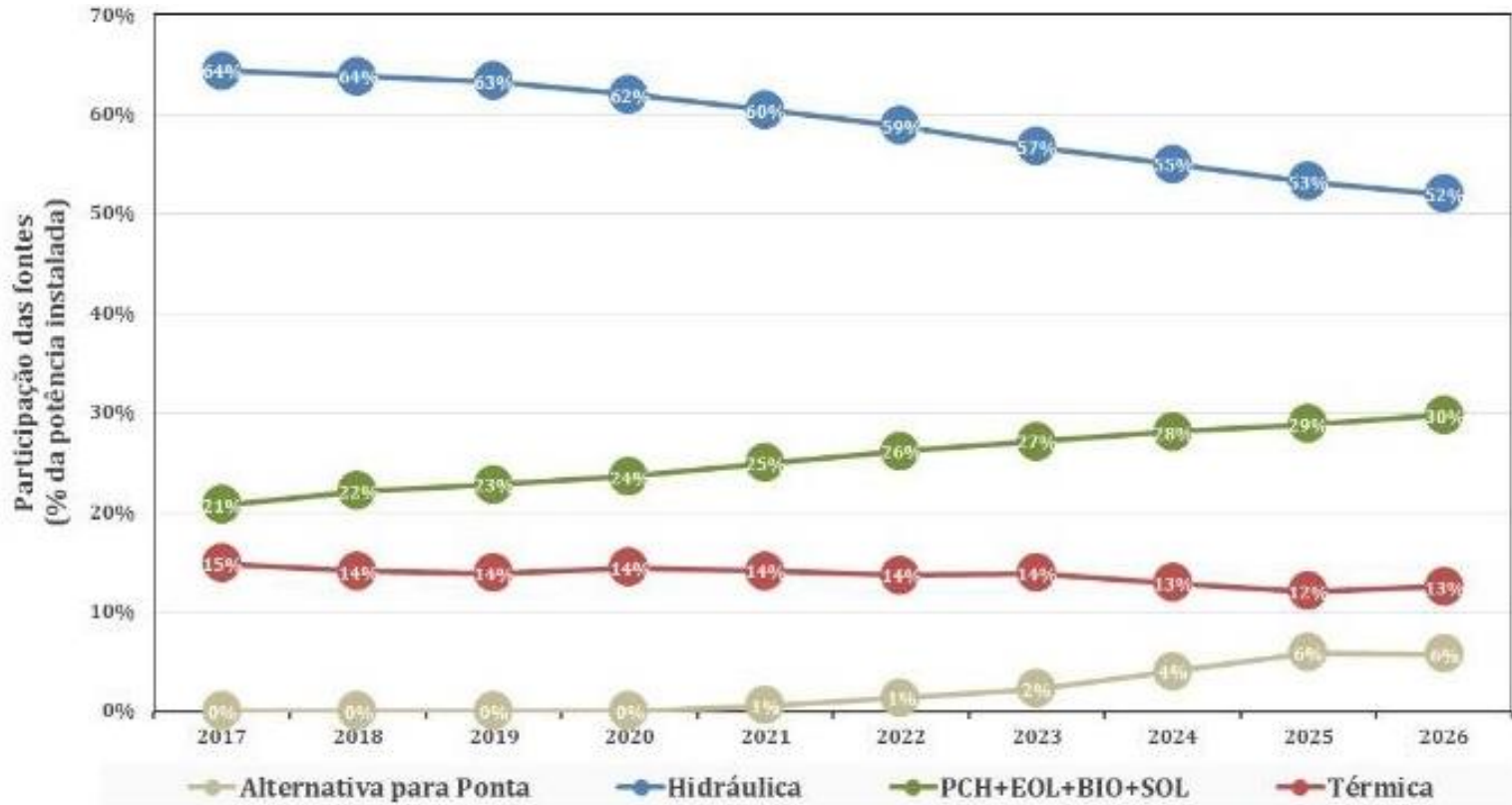
**Brazil's electricity consumption will grow 44% until 2026, according PDE. Additional 65 MW capacity in 10 years !**

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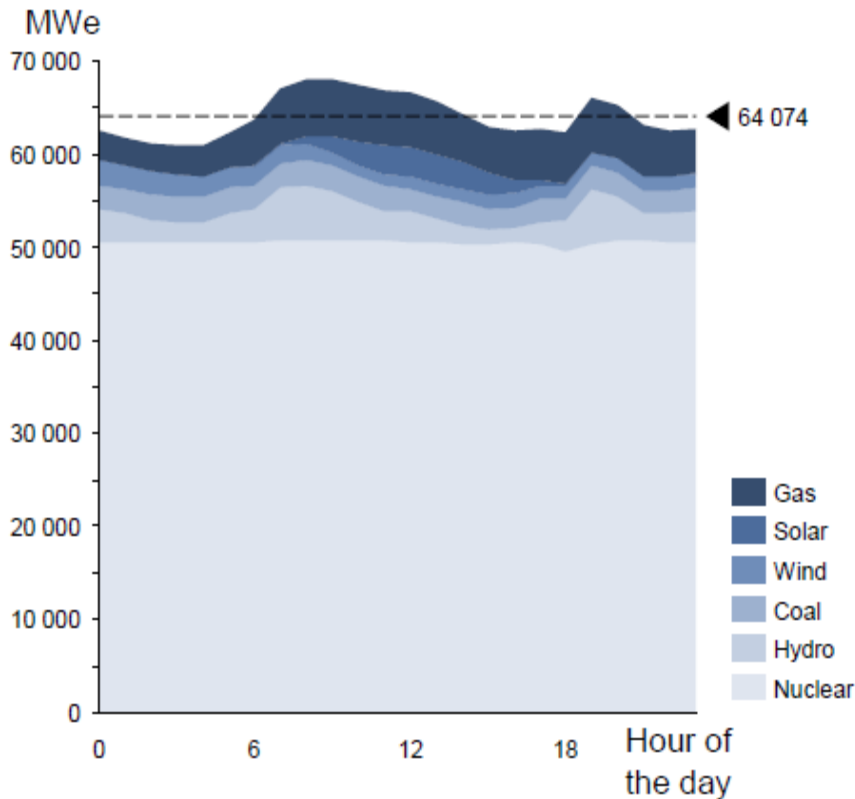
# Participations of the Production Sources in the Energy Mix Evolutions



Source: PDE 2026

# Nuclear power allows security of the grid by covering baseload needs

## Typical daily electricity production in France

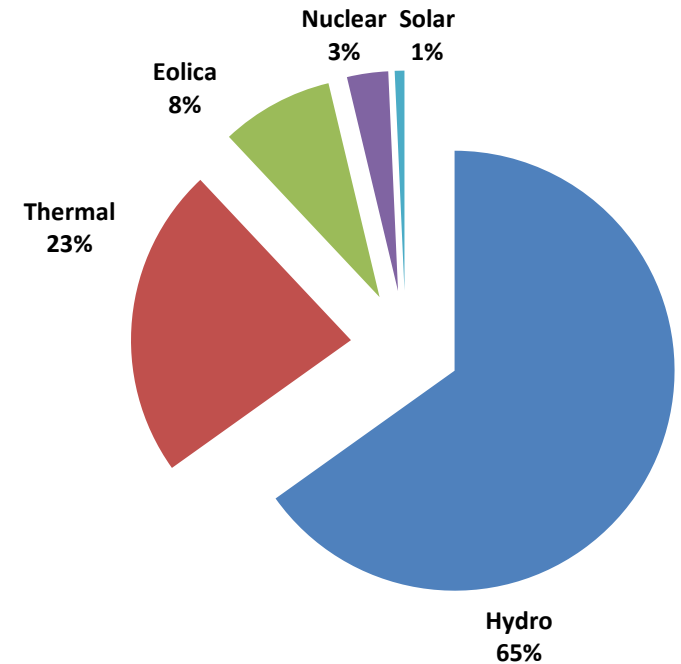
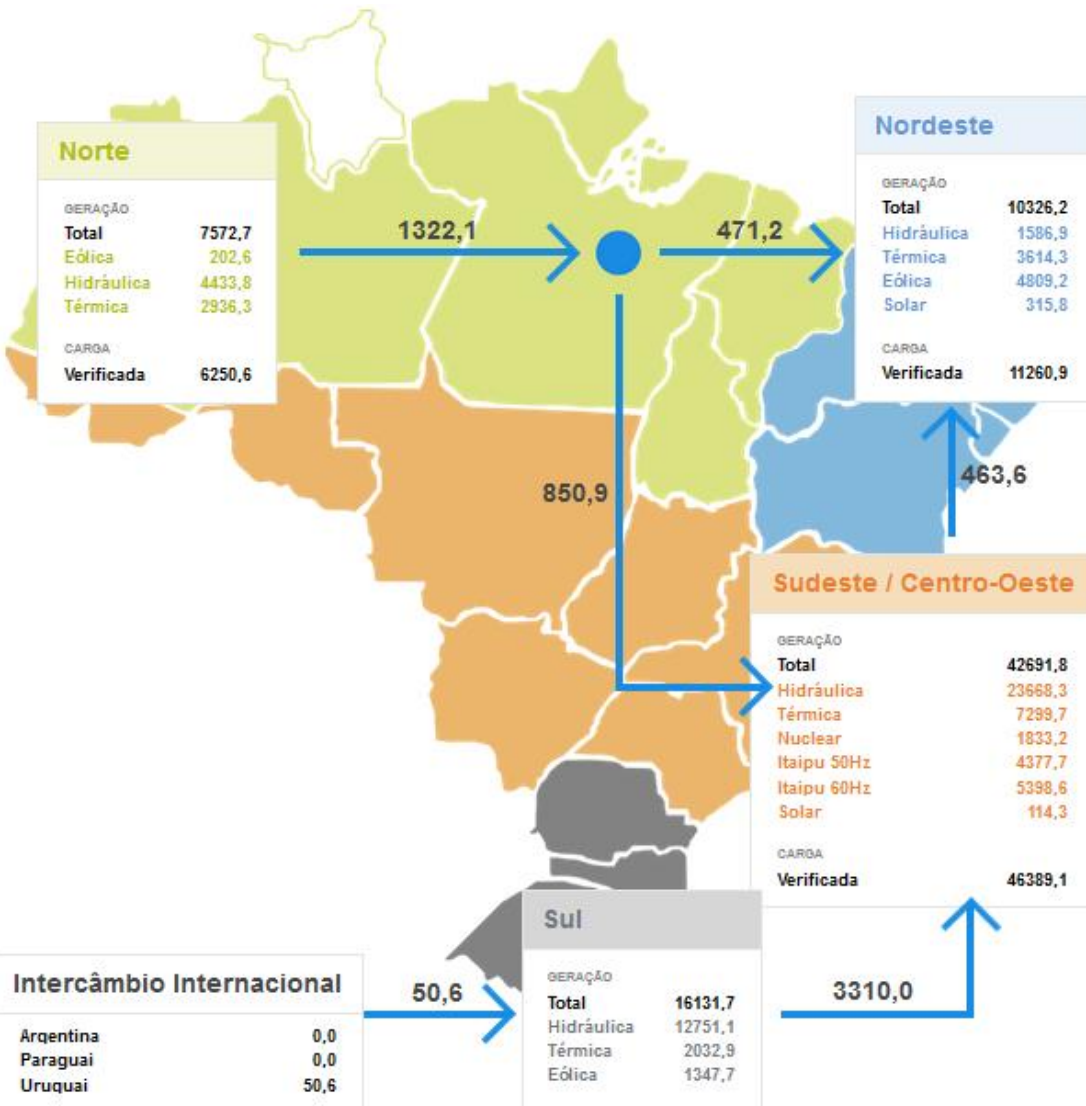


## Key facts

- Nuclear energy provides stable and predictable electricity production, on a large scale
- Nuclear capacities allow to cover baseload needs
  - Nuclear energy does not depend upon regular fuel supply or climate conditions, and has an excellent plant availability factor
  - Once reloaded, a nuclear plant can run non stop up to 24 months before outage for reload
  - Modern nuclear power plants have short outage durations

# 2017: Energy Mix

Energy Generation as of 19/10/2017



Source: ONS

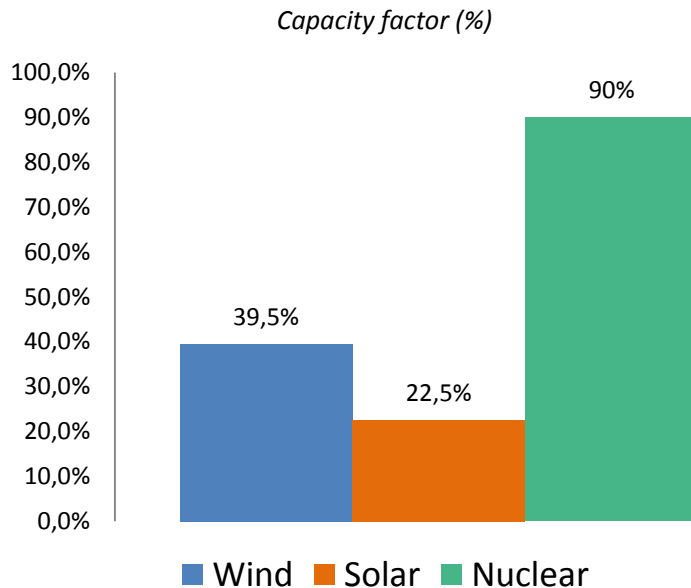
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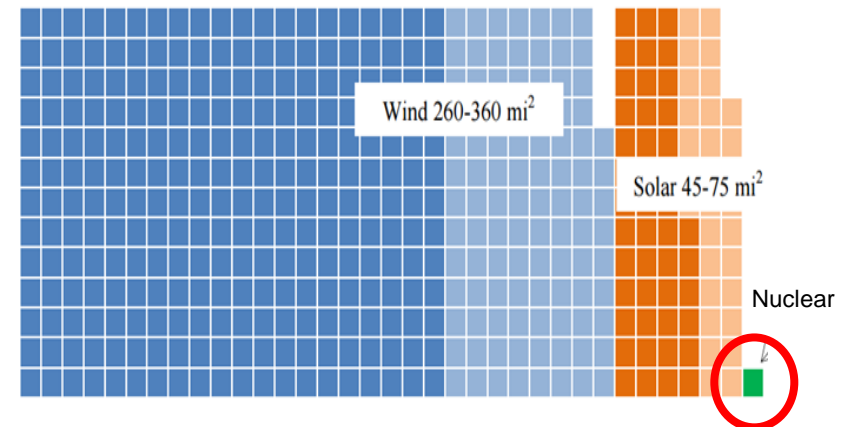
# Nuclear a sustainable and...

...Effective energy



...for low land use

The graph summarizes the approximate land required by wind and solar technologies to match the electricity produced annually by a 1.000-MW nuclear plant



Source: NEI Data

- In opposition to other renewable energy sources, **nuclear does not depend on weather** and register a **much higher capacity factor** that could compensate hydropower seasonality in Brazil;
- Compared to Solar and Wind, nuclear technologies use very few land and **can be installed next to consumption centers**.

# ... Environmentally Friendly

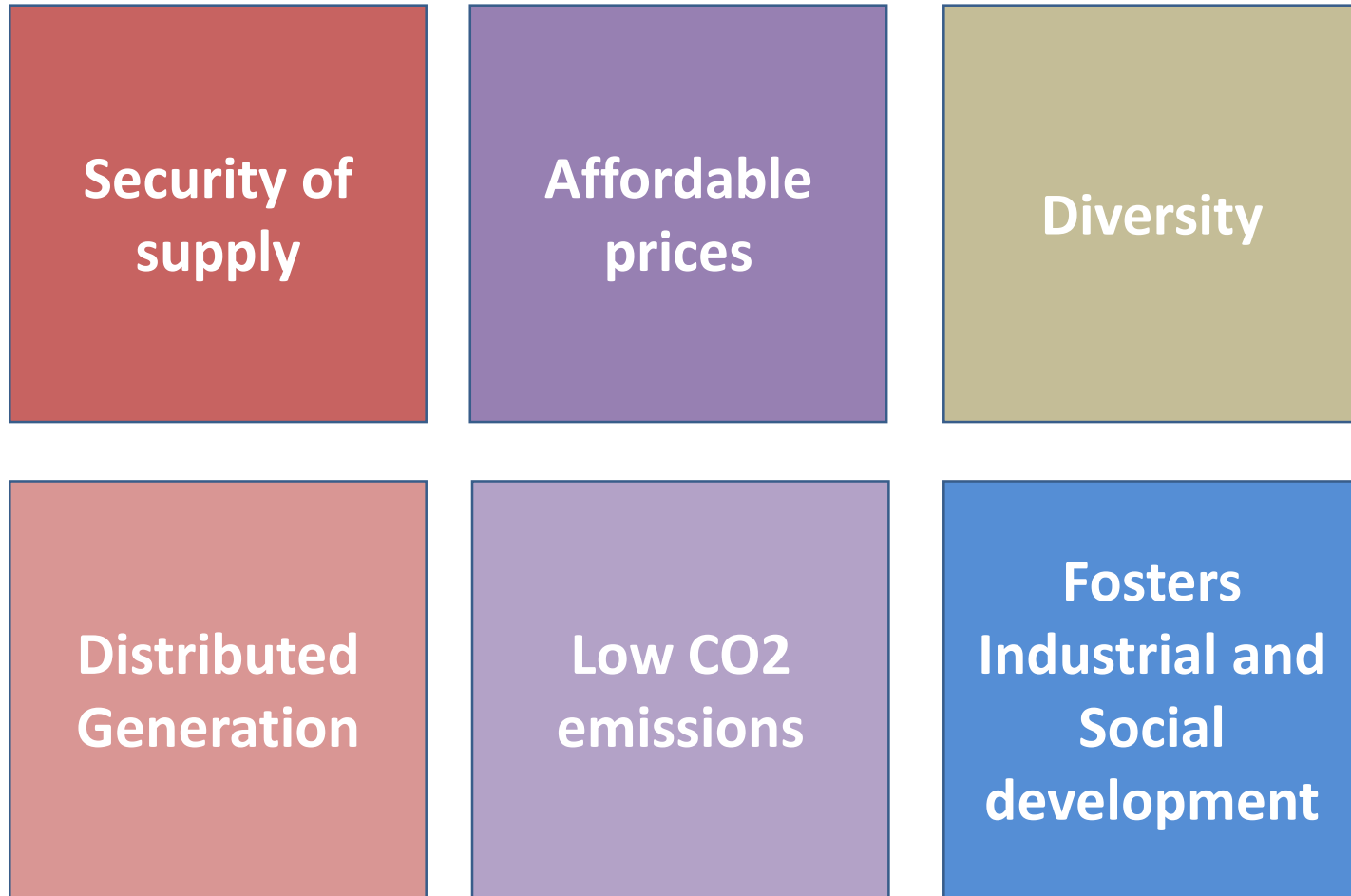


- **COP 21 agreement**  
Limit increases in global average temperature to 2°C until 2100
- **Brazil Engagement**  
43% reduction in 2030 vs 2005



- **More than an environmental necessity, controlling CO2 emissions will also be an economic one with the implementation of the CO2 tax regulation**

# Global and Local challenges for the electricity sector







Thank you for your attention!

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