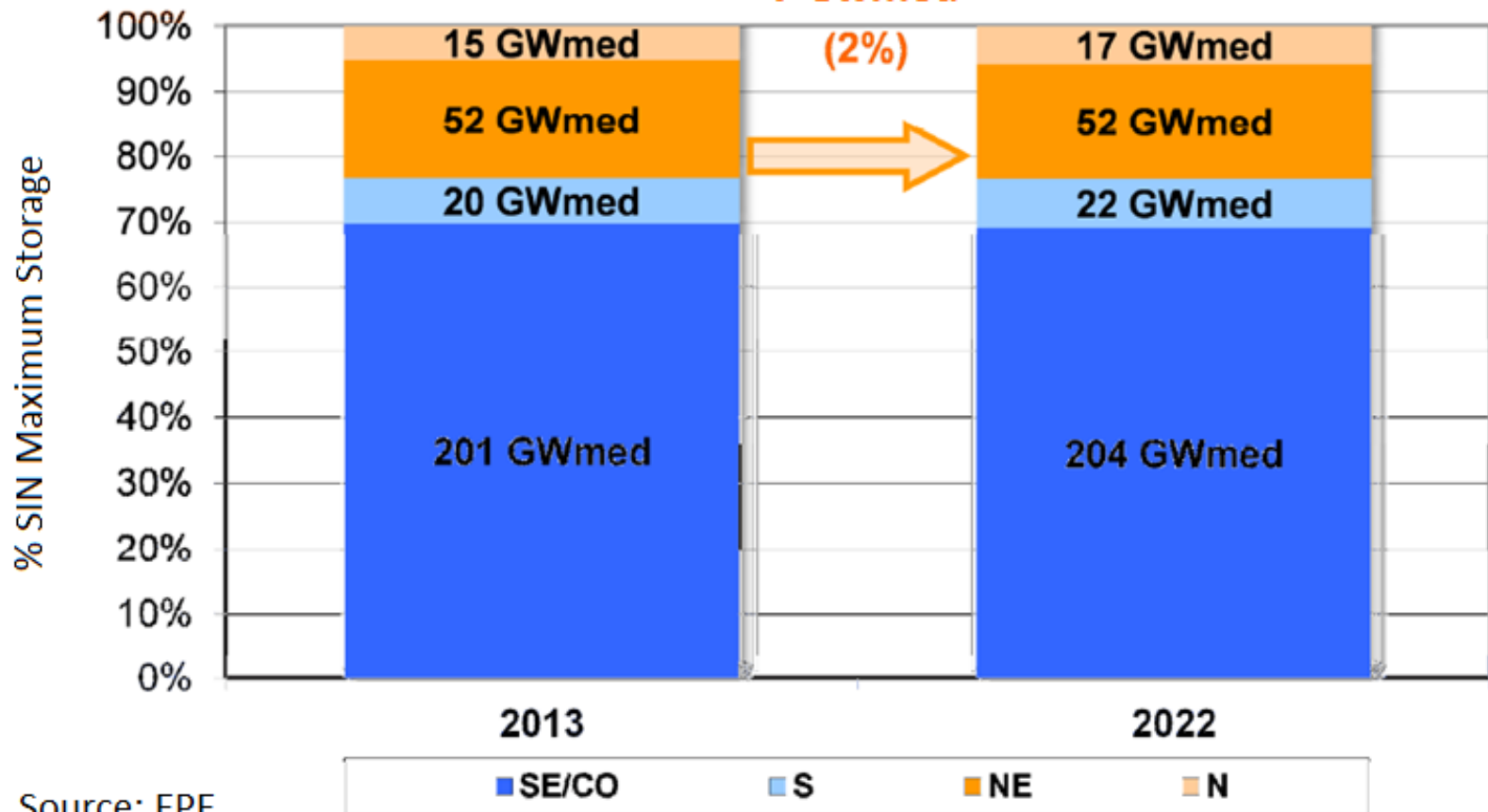


# Some Ideas about the Construction Phases of New Nuclear Power Plants in Brazil

Eng. Carlos Henrique Mariz

# Hydro Storage

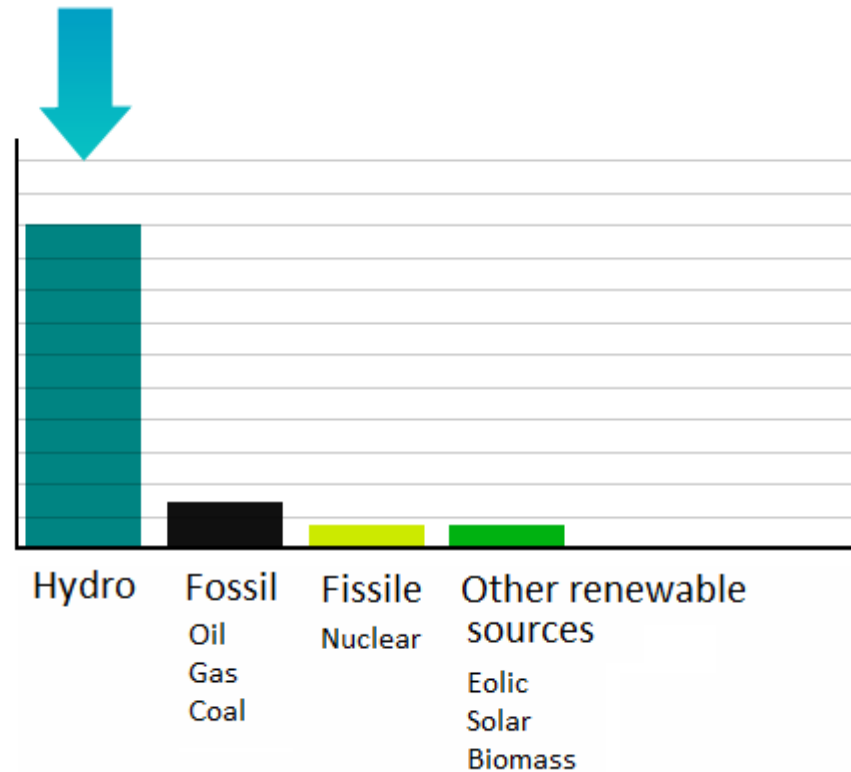
Increase 2013 to 2022  
7 Gwmed



Source: EPE

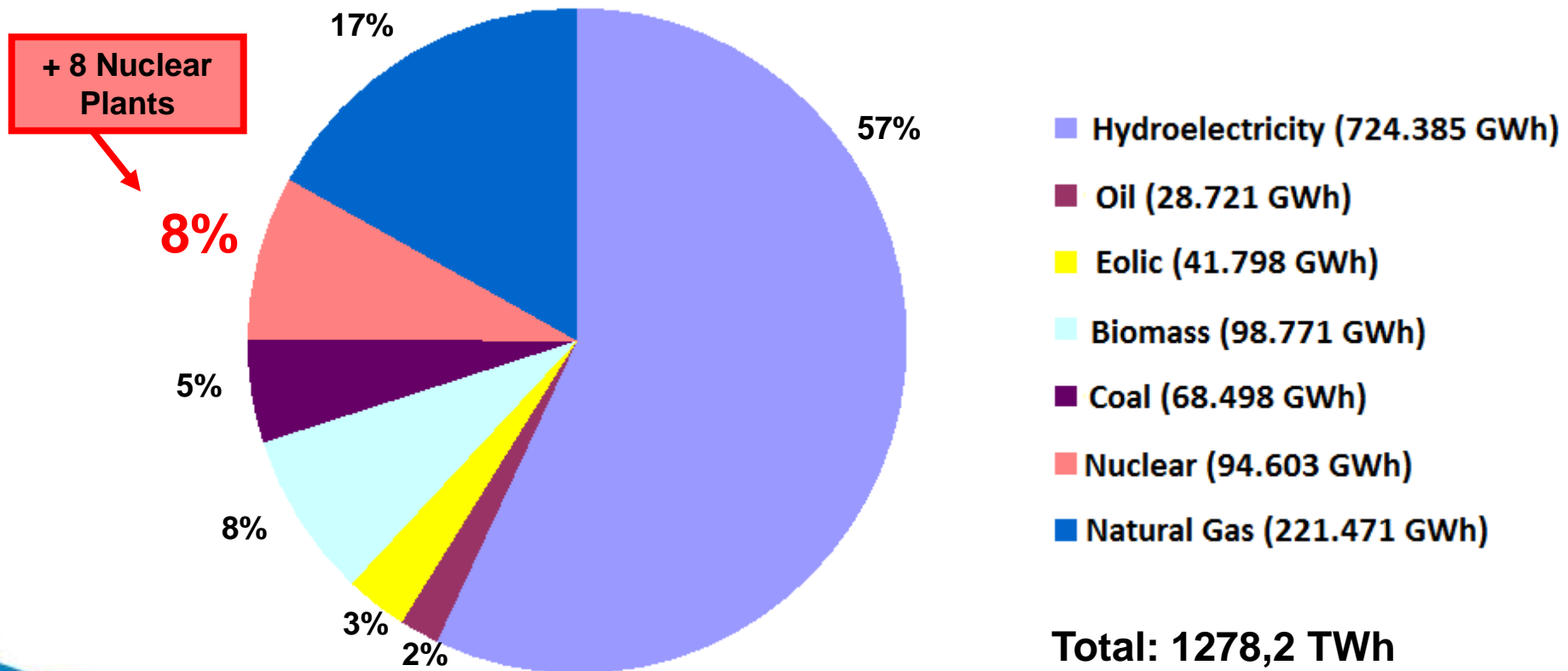
# Generation Expansion

- The expansion must be based in the the mixture of **Natural Gas** (depending on the amount and cost of Pre-Salt), **Coal** (depending on the feasibility of CCS and clean coal) and **Nuclear**.
- Renewable sources (**biomass, eolic, solar**) and the expansion of **energetic efficiency** programs will be an important complement.



# Sceneries for Brazilian Electric Energy Matrix – Year 2040

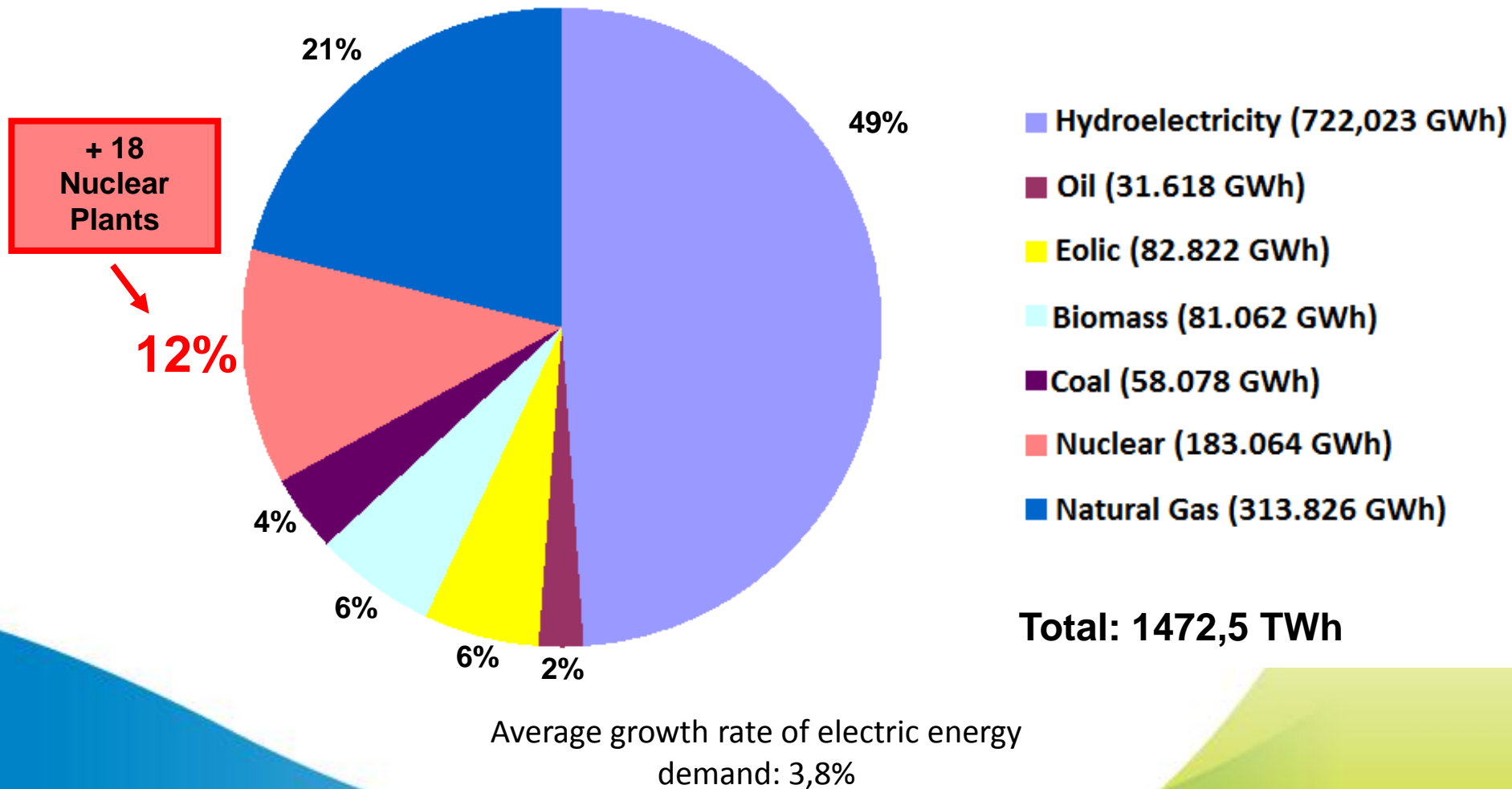
Market Control



Average growth rate of electric energy demand: 3,1%

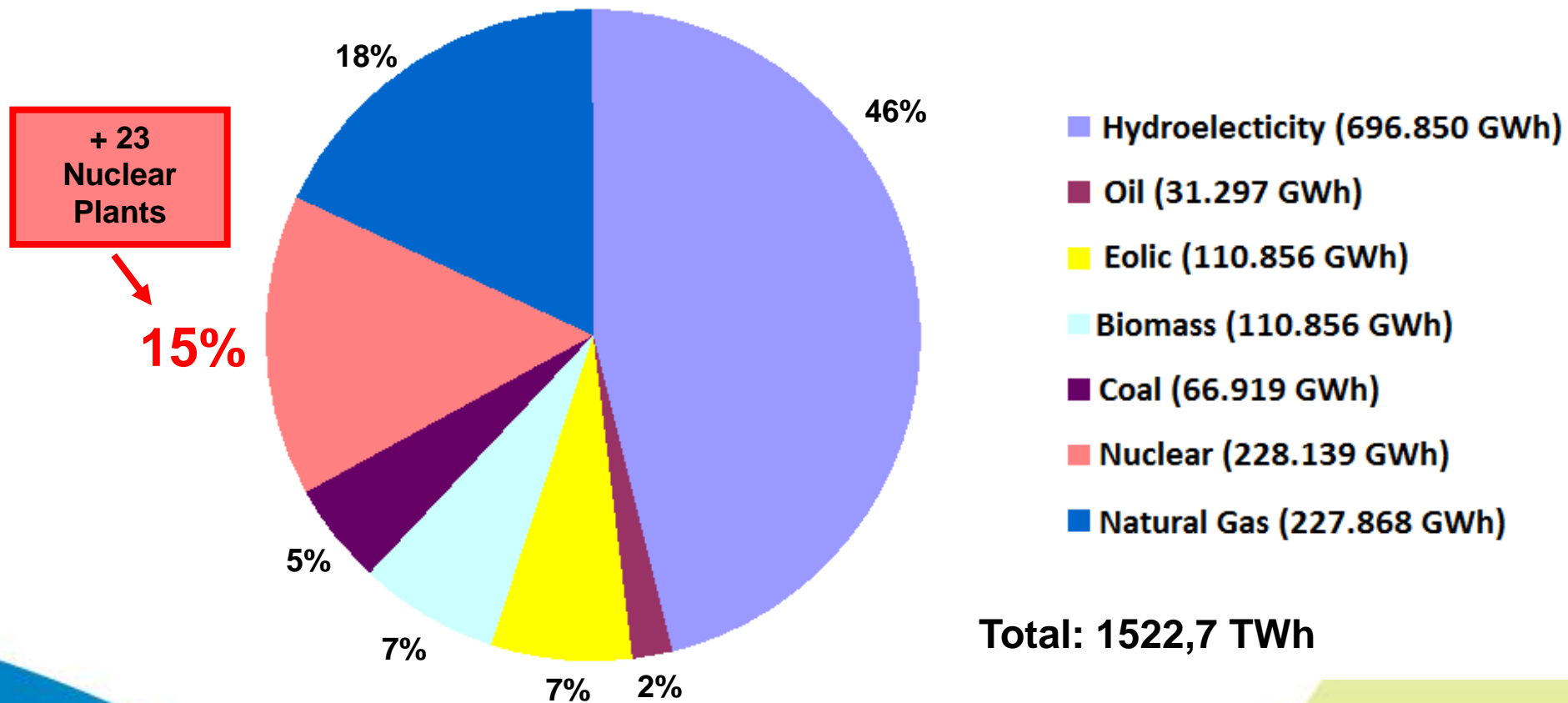
# Sceneries for Brazilian Electric Energy Matrix – Year 2040

*Economic Rationality*



# Sceneries for Brazilian Electric Energy Matrix – Year 2040

*Institucional Advance*






Average growth rate of electric energy demand: 3,9%

# New Nuclear Power Plants Construction Program

2014  2040

Scenery 1  1 PLANT EVERY TWO 2 YEARS  + 8

Scenery 2  1 PLANT EVERY YEAR  2038  + 18  
2 PLANTS/YEAR

Scenery 3  3 PLANTS EVERY 2 YEARS  + 23 + 1

| Item | Description   | Year 2012 | Year 2013 | Year 2014 | Year 2015 | Year 2016 | Year 2017 | Year 2018 | Year 2019 | Year 2020 | Year 2021 | Year 2022 |
|------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1    | Selection and Purchase of the Site                        | █         |           |           |           |           |           |           |           |           |           |           |
| 2    | Environmental and Nuclear Licensing of the Site (initial) |           | █         |           |           |           |           |           |           |           |           |           |
| 3    | Nuclear Licensing for the Operation                       |           |           |           |           | █         |           |           |           |           |           |           |
| 4    | EPC Contract / Manufacturing of heavy compounds           |           |           |           | █         |           |           |           |           |           |           |           |
| 5    | Construction and Assembly                                 |           |           |           |           | █         |           |           |           |           |           |           |



**Eletrobras**

Eletronuclear

# **An Idea of the Construction of New Nuclear Power Plants in Brazil**



# Phase 1: (2014/2015)

Having a technical/political decision of  
medium and long turn.

Indication in the **PDE** (Decennial Program of Generation)

## Two new unities

Northeast

Southeast

## Program Dimension – PNE

Northeast

Southeast

South

**Structuring the program of human resources  
formation and communication with the public**

## Phase 2: (2014/2015)

Continue the studies to make sure the pre-selected areas are really excellent. There are viewed areas in the northeast, southeast and south.

These studies will lead to the EIA/RIMA, and to the environmental (IBAMA) and nuclear (CNEN) licenses concerning the site(s).

## Phase 3: (2014)

**Establish criteria for technology selection and** implement them, determining technology, which can be more than one, and should be aiming to compose the best primary/secondary set.

**The objective is to obtain the technological set that result in the lower entrepreneurial risk possible (best scope, deadline and budget control).**

Due to the possibility of building (at long turn) a significant number of plants, we might choose one or two technologies, to best serve geopolitical interests, control risks of systematic failures and ally to a bigger number of global partners.

# Phase 3: (2014) - Continued

## Important Points:

1. A Plant which is safe and reliable;
2. can withhold a cast core with no liberations, in case of accidents;
3. is simple to acquire, build, operate and maintain;
4. can be licensed;
5. has the smallest capex;
6. has the best financing conditions.

## Phase 4: (2014)

**Formation of capital structure**, possibly combining state and private capital, this way reducing the individual risk for each owner.

As the new hydroelectric plants now in construction, for instance, or other models.

A bit more than half of the 430 nuclear plants in the world belong to private capital.

## Phase 5: (2015)

**Contract the technology(ies), the number of plants and start the manufacture of items at long turn.**

## Phase 6: (2015)

**Start nuclear licensing for installation and operation.**

Generation III+

## Phase 7: (2016/2017)

**Mobilize resources and implement construction site(s),** including the improvement of the associated infrastructure.

Start planning and introduce the first actions of regional socioeconomic development related to the venture(s).



## Phase 8: (2016)

**Start specialized work force formation** for the construction, maintenance and operation of the venues.

**Each power plant** needs around 3000 direct employees, 2000 indirect employees and 4000 induced in the construction. And 1000 direct, 500 indirect and 1500 induced in the operation.

# Phase 9: (2017/2022)

*Build, test and turn on the Power Plant*

Five years constitute a realistic deadline, bearing in mind that the extension of the construction deadline is the major cause of budget control loss.



# Thank you!

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