Adapted from The Economist

Brasil's new energy policies, new deals in competition and the mega-hydrocarbon fields

La nouvelle politique énergétique du Brésil, nouvelles donnes de la concurrence et méga-gisements hydrocarbures

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Adapted from The Economist

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RÉSUMÉ

La nouvelle politique énergétique du Brésil mise en place par le gouvernement de Dilma Roussell.

Les facteurs nouveaux impactant la concurrence relative entre énergies (gaz naturel, charbon, nucléaire, ...) dans la production de l’électricité.

Les méga-gisements d’hydrocarbures découverts au large des côtes du Brésil qui sont sur le point de bouleverser la stratégie énergétique du géant sud-américain.

Un éclairage brésilien en répondant aux questions que soulève la croissance énergétique très spécifique d'un des "BRICS".

Brazil in the general context

Brésil dans le contexte général

Adapted from The Economist

- It’s not yet a Chichen Hop
- But the economy is no longer spinning in a virtuous circle
- Fragmented political coalitions may damage the fiscal discipline and raised past economic ghosts such as inflation

- Ce n'est pas encore du petit saut du poulet
- Mais l'économie ne file plus dans un cercle vertueux
- Coalitions politiques fragmentées peuvent endommager la discipline fiscale et faire sortir des fantômes économiques du passés, tels que l'inflation

- Is Brazil about to stop flying?
  - High dependence of commodities exports
  - Growing dependence on Asia (China) economical dynamics
  - Large uncertainties regarding the future domestic economic prospect

- Est-ce que le Brésil va cesser de voler?
  - Haute dépendance d'exportations de *commodities*
  - Dépendance croissante vers la dynamique économique en Asie (Chine)
  - Grandes incertitudes concernant la future perspective de l’économie domestique

- Brazil's renaissance comes laden with long-term burdens:
  - The dreadful legacy of poverty and inequality
  - Social inclusion fostered by low-interest credit and booming consumption
  - Low focus on education, technology and growing productivity

- La renaissance du Brésil vient chargé avec des fardeaux à long terme :
  - L'héritage épouvantable de pauvreté et inégalité
  - Inclusion sociale stimulée par des crédits à bas-intérêt et consommation éclatante
  - Basse attention sur éducation, technologie et productivité

- The state's resistance to reform:
  - Taxes are too high and complicated
  - Social security, labor law and bureaucracy are ruinously costly
  - Heavy and wrong state presence strangle private initiatives
  - Corruption scandals paralyze government

- La résistance de l'état à réformer :
  - Les impôts sont trop hauts et compliqués
  - La sécurité sociale, la loi du travail et la bureaucratie sont ruineusement chères
  - La présence de l'état est lourde et mal placée et étrangle des initiatives privées
  - Les scandales de la corruption paralysent le gouvernement

- The burdens of large sport events:
  - Losing the focus by the government and society
  - Questionable investment priorities
  - More corruption on the scene
  - More public debt with low capacity to pay off
  - Long-term pressures on macroeconomics

- Les fardeaux de grands événements sportifs :
  - Perte des priorités par le gouvernement et la société
  - Priorités d'investissement contestables
  - Plus de corruption sur la scène
  - Plus de dette publique avec basse capacité de rapporter
  - Pressions à long terme sur la macro-économie

The growing importance of oil in Brazil

L'importance croissante du pétrole au Brésil

Adapted from The Economist

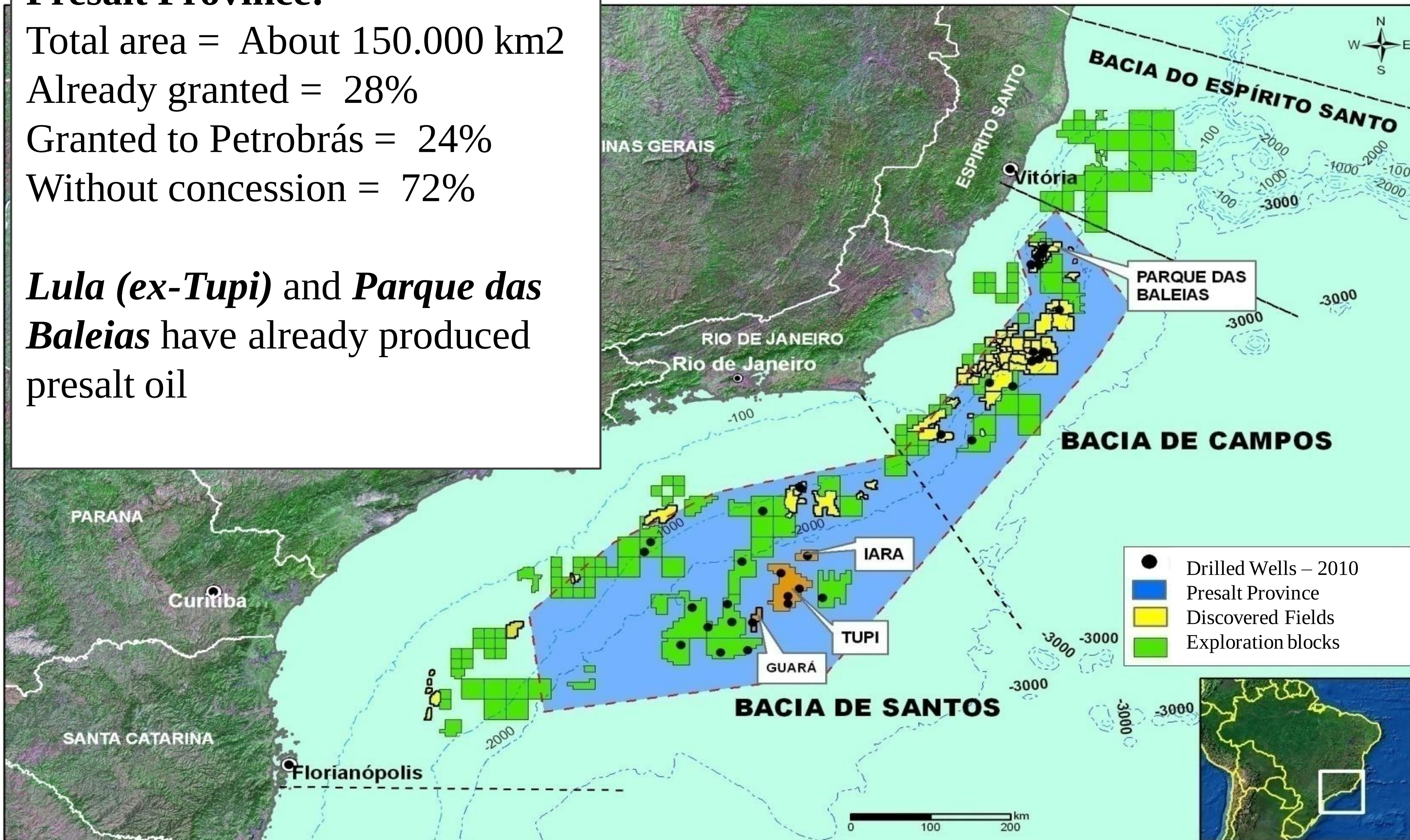
- Oil is increasingly an essential economic asset for Brazil
- But also a danger for the national competitiveness
- A poisoned chalice to finance
- Oil - Between good sense and euphoria

- Pétrole est de plus en plus un atout économique essentiel pour le Brésil
- Mais aussi un danger pour la compétitivité nationale
- Un calice empoisonné à financer
- Pétrole - Entre le bon sens et l’euphorie

What is the Presalt?

Presalt Province:
Total area = About 150.000 km2
Already granted = 28%
Granted to Petrobrás = 24%
Without concession = 72%

Lula (ex-Tupi) and ***Parque das Baleias*** have already produced presalt oil

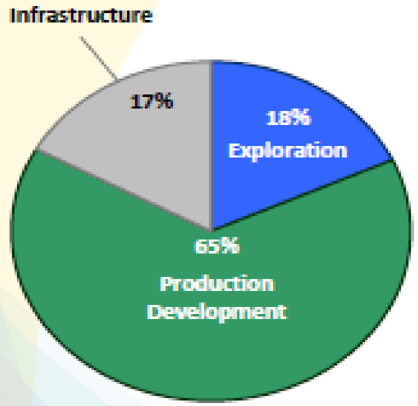


What is the Presalt?
INVESTMENT PERSPECTIVES

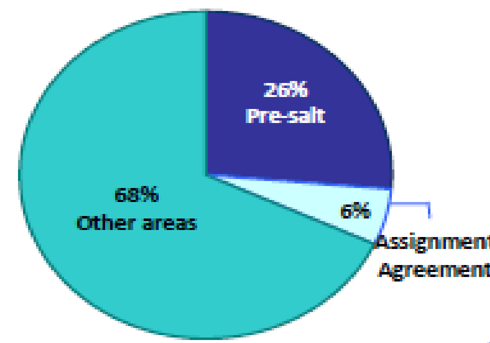
TOTAL E&P INVESTMENTS IN BRAZIL– 2011-15 BUSINESS PLAN

E&P investments in Brazil: US$117.7 bn

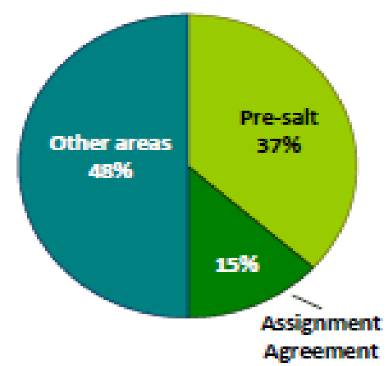
Pre-Salt	**Post-Salt**
US$ 53.4 billion	US$ 64.3 billion



Exploration



Production Development



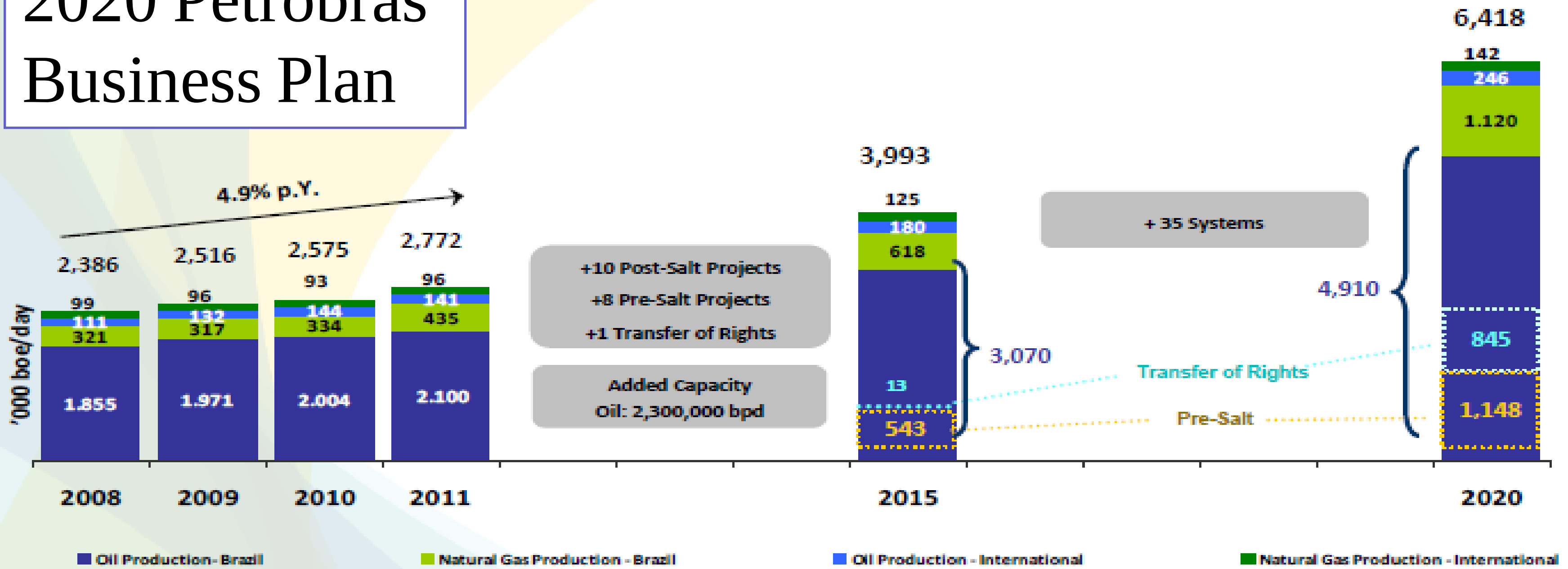
- Annual investments of more than US$ 4 billion in exploration;
- Investments of US$ 12.4 billion in the assignment agreement areas in 2011-15
- In the BP 2010-2014, the forcasted investment for the Pre-Salt was of US$33 billion

Note: Pre-salt includes Basins in Santos, Campos and Espírito Santo

What is the Presalt?
PRODUCTION PERSPECTIVES

OIL, LNG AND NATURAL GAS PRODUCTION – BRAZIL AND INTERNATIONAL

2020 Petrobras Business Plan



- Accomplishment of 30 EWTs from 2011 to 2015: 13 in the Pre-Salt, 7 in the transfer of rights area and 10 in the post-salt;
- Pre-Salt participation in the total production will enhance from the current 2% to 18% in 2015 and 40.5% in 2020.

2020 PETROBRAS STRATEGIC PLAN

Note: Does not include Non-Consolidated International Production.

PETROBRAS

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What are the Challenges?
THE NG CHALLENGE

THE NATURAL GAS CHALLENGE

What is the Presalt?
PRODUCTION PERSPECTIVES

2020 Petrobras Business Plan (in Average Annual Growth Rates)

Production Perspectives (Brazil e international) (in Million bbd)				
	2008 – 2011	**2011 - 2015**	**2015 - 2020**	**2011 - 2020**
Oil in Brazil	4,2%	10,0%	9,8%	9,9%
Presalt		91,9%	16,2%	45,2%
Onerous Concession			130,5%	
Oil International	8,3%	6,3%	6,4%	6,4%
Oil - total	**4,5%**	**9,7%**	**9,7%**	**9,7%**
NG in Brazil	10,7%	9,2%	12,6%	11,1%
NG International	-1,0%	6,8%	2,6%	4,4%
NG - total	**8,1%**	**8,8%**	**11,2%**	**10,1%**
Total	**5,1%**	**9,6%**	**10,0%**	**9,8%**

What are the Challenges?
THE NG CHALLENGE

Brazil NG market evolution (in Average Annual Growth Rates)

2000 a 2004		2005 a 2009		Vitality loss in % between the two periods	
Filipinas	160%	Peru	23%	Filipinas	-159%
Singapura	39%	China	17%	Singapura	-29%
Peru	26%	Singapura	10%	Chile	-28%
Brasil	19%	Suécia	10%	Brasil	-17%
Espanha	13%	Índia	10%	Azerbaijão	-15%
China	13%	EAU	9%	Hungria	-12%
Paquistão	13%			Portugal	-12%
		Brasil (34º)	1%	Espanha	-11%

Who may have the interest to resume NG market vitality in Brazil?
In which conditions?

What are the Challenges?
THE NG CHALLENGE

2020 Petrobras Business Plan – MARKET PERSPECTIVE

- Domestic NG production increasingly not delivered to the national market
- 2020 > 30% of Total prodution
- **Where?** ... Exports, Injection or Flaring?

- Aggressive consumption scenarios in power generation, fertilizers and oil refining
- Poorer consumption scenarios for other NG uses - NG deficits forecasted by 2015

What are the Challenges?
THE NG CHALLENGE

2020 Petrobras Business Plan – MARKET PERSPECTIVE (in Average Annual Growth Rates)

- If NG demands in power, fertilizers and refining do not materialize => Huge NG oversupply
- Unsustainable NG overproduction requires alternative consumption strategies in other uses

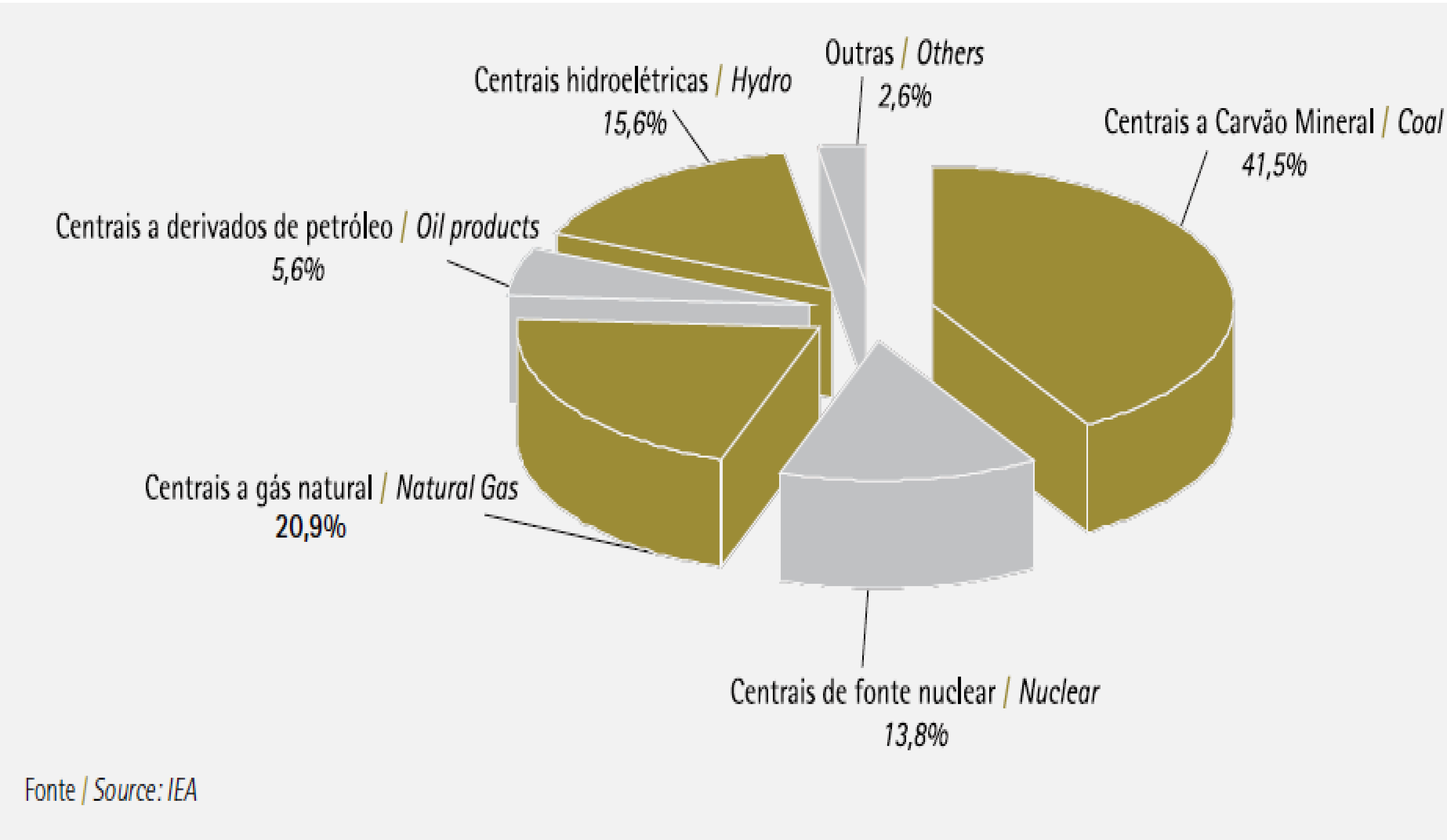
- IS BRAZIL'S ENERGY POLICIES PREPARED FOR THAT?

What are the Challenges?
THE POWER CHALLENGE

THE POWER
CHALLENGE

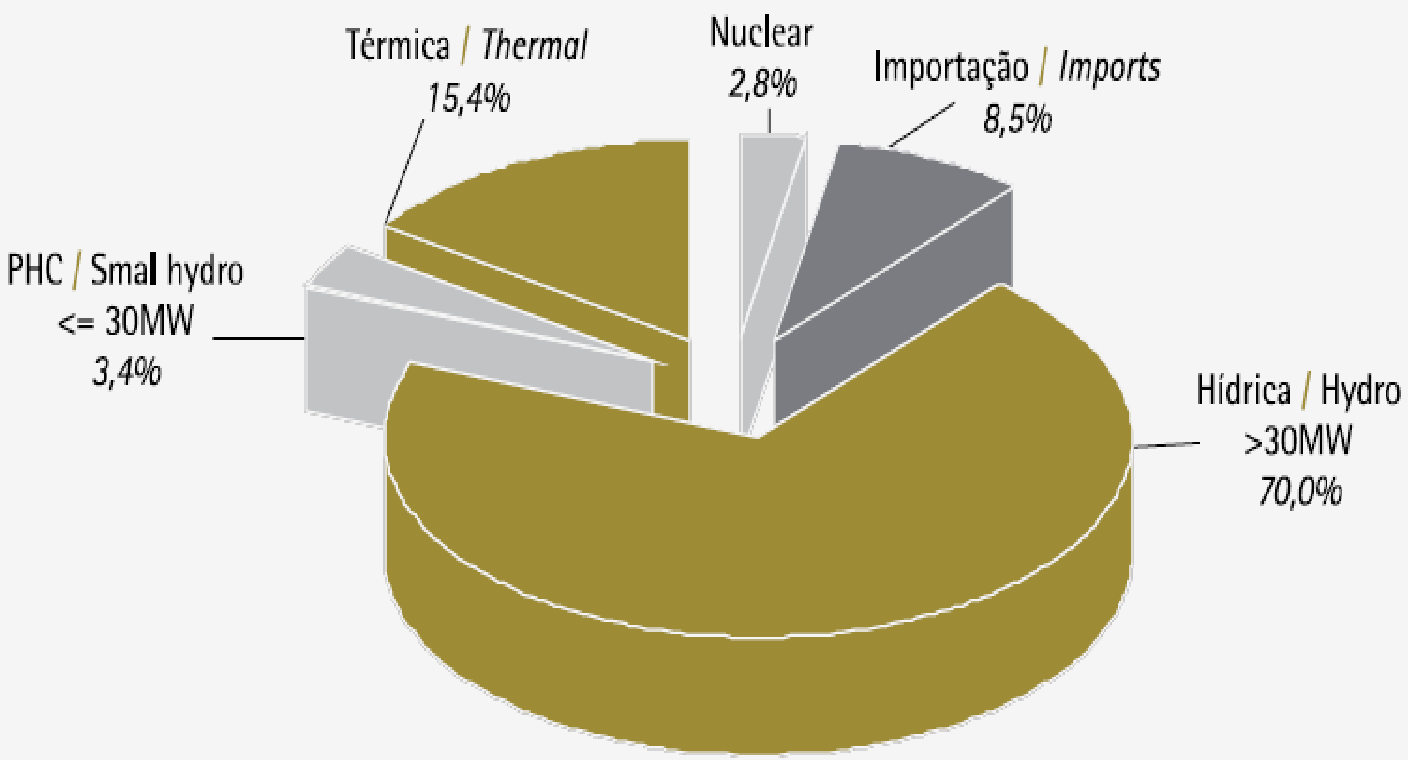
What are the Challenges?
THE POWER CHALLENGE

POWER GENERATION IN THE WORLD BY SOURCE OF ENERGY:



What are the Challenges?
THE POWER CHALLENGE

POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY:



Notas / *Notes:*

1 Inclui centrais elétricas autoprodutoras. / *1 Includes self-producers power plants.*

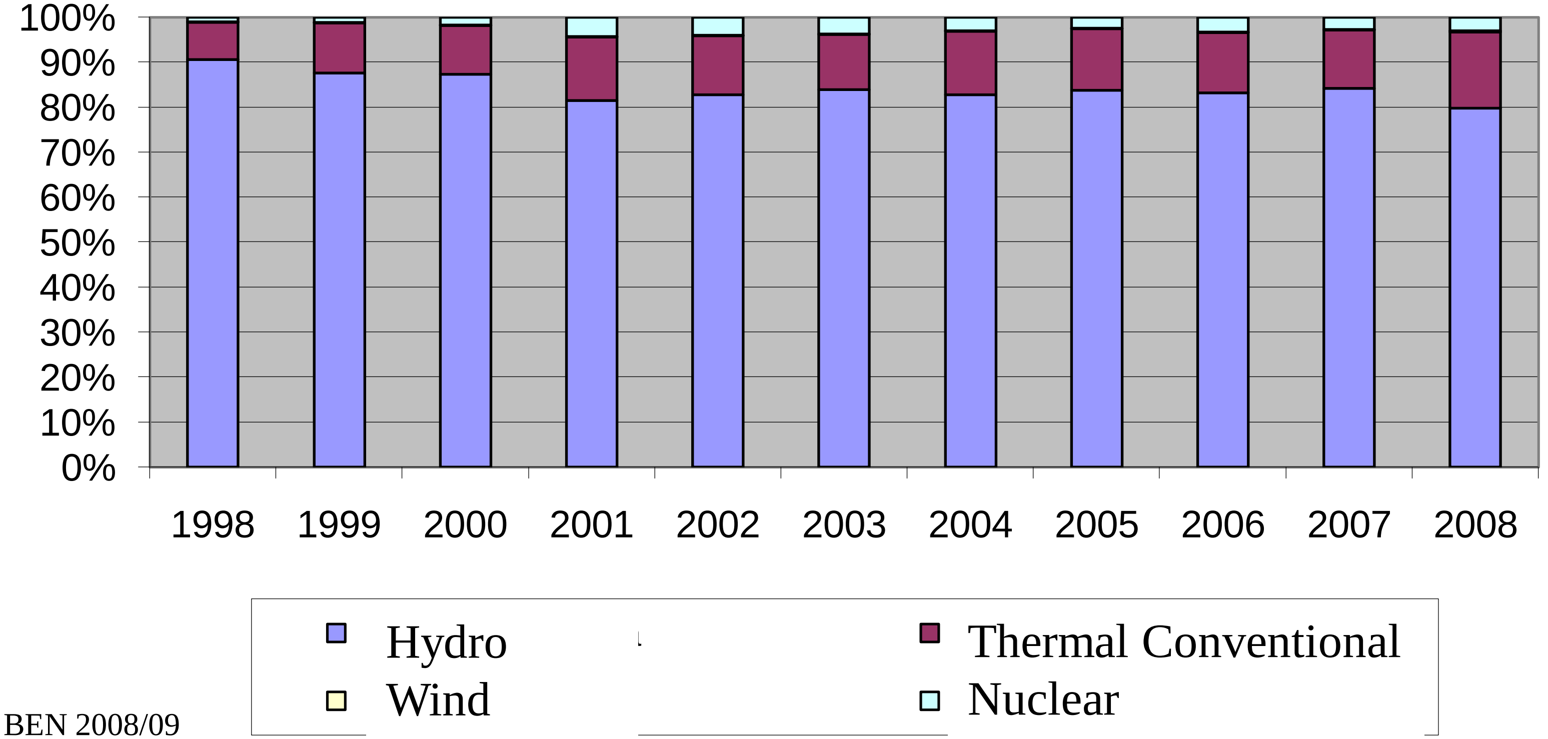
2 Centrais hidroelétricas são aquelas com potência superior a 30 MW. / *2 Hydroelectric plants are those with power higher than 30 MW.*

3 Pequenas centrais hidroelétricas são aquelas com potência igual ou inferior a 30 MW. / *3 Small hydroelectric plants are those with power equal or lower than 30 MW.*

4 A importação inclui a parcela paraguaia de Itaipu. / *4 Imports includes the Paraguayan electricity from Itaipu.*

What are the Challenges?
THE POWER CHALLENGE

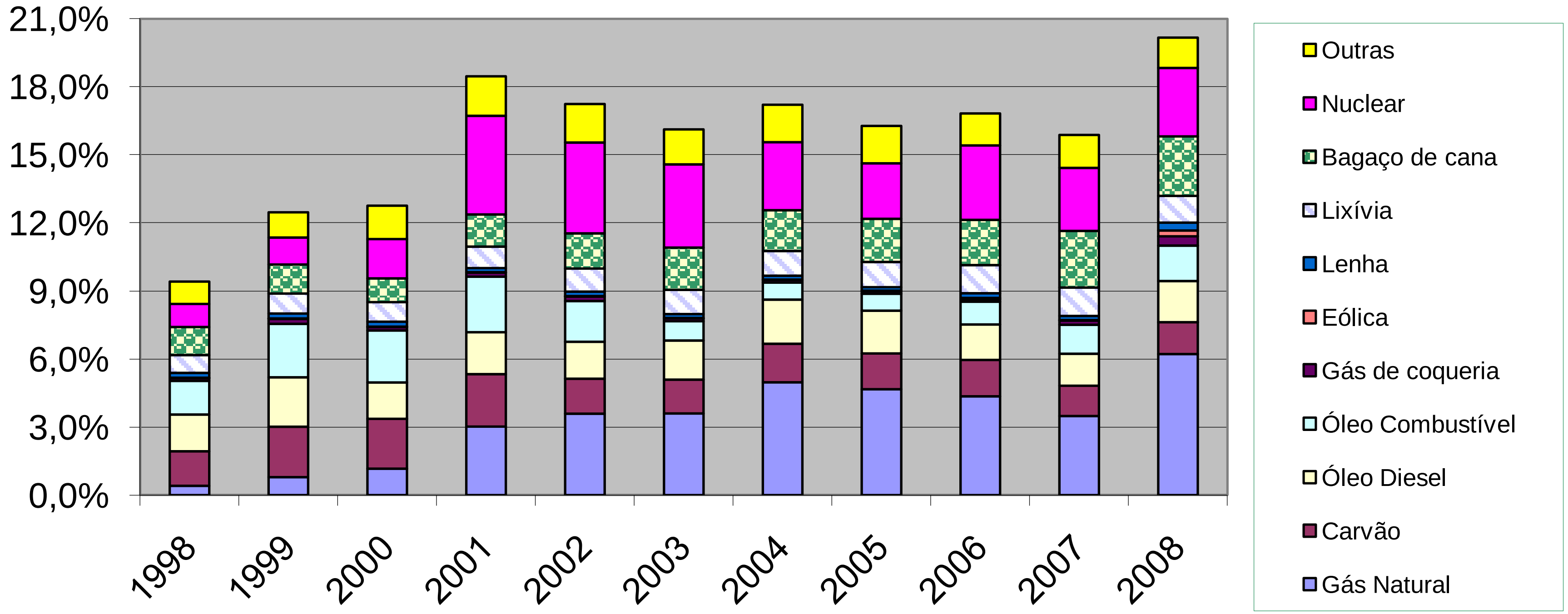
POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY
SWINGING AVAILABILITY OF WATER:



Fonte: BEN 2008/09

What are the Challenges?
THE POWER CHALLENGE

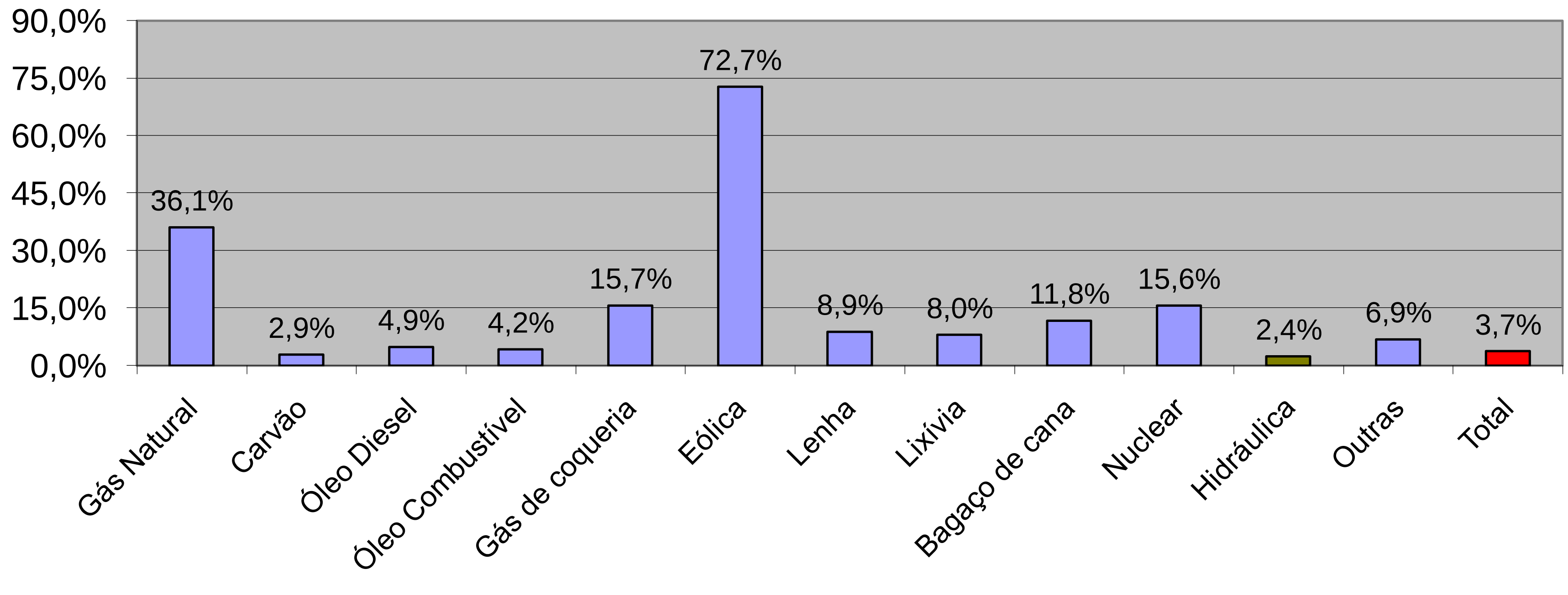
POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY DIVERSIFICATION BEYOND THE WATER:



Fonte: BEN 2008/09

What are the Challenges?
THE POWER CHALLENGE

POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY DIVERSIFICATION BEYOND THE WATER:



Fonte: BEN 2008/09

What are the Challenges?
THE POWER CHALLENGE

POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY
DIVERSIFICATION BEYOND THE WATER
AVERAGE ANNUAL CAPACITY FACTOR BY SOURCE:

2007		2008	
Fator de Capacidade Total	**50,5%**	**Fator de Capacidade Total**	**50,8%**
Hídrica	55,5%	Hídrica	53,9%
Térmica	31,1%	Térmica	38,4%
Eólica	4,5%	Eólica	32,5%
Nuclear	70,2%	Nuclear	79,5%
Fator de Capacidade das CESP	**50,3%**	**Fator de Capacidade das CESP**	**51,0%**
Hídrica	55,7%	Hídrica	54,3%
Térmicas	20,6%	Térmicas	31,8%
Eólica	4,5%	Eólica	32,7%
Nuclear	70,2%	Nuclear	79,5%
Fator de Capacidade de Autoprodutores	**52,2%**	**Fator de Capacidade de Autoprodutores**	**49,6%**
Hídrica	51,9%	Hídrica	46,6%
Térmica	52,4%	Térmica	51,1%
Eólica	0,0%	Eólica	0,0%

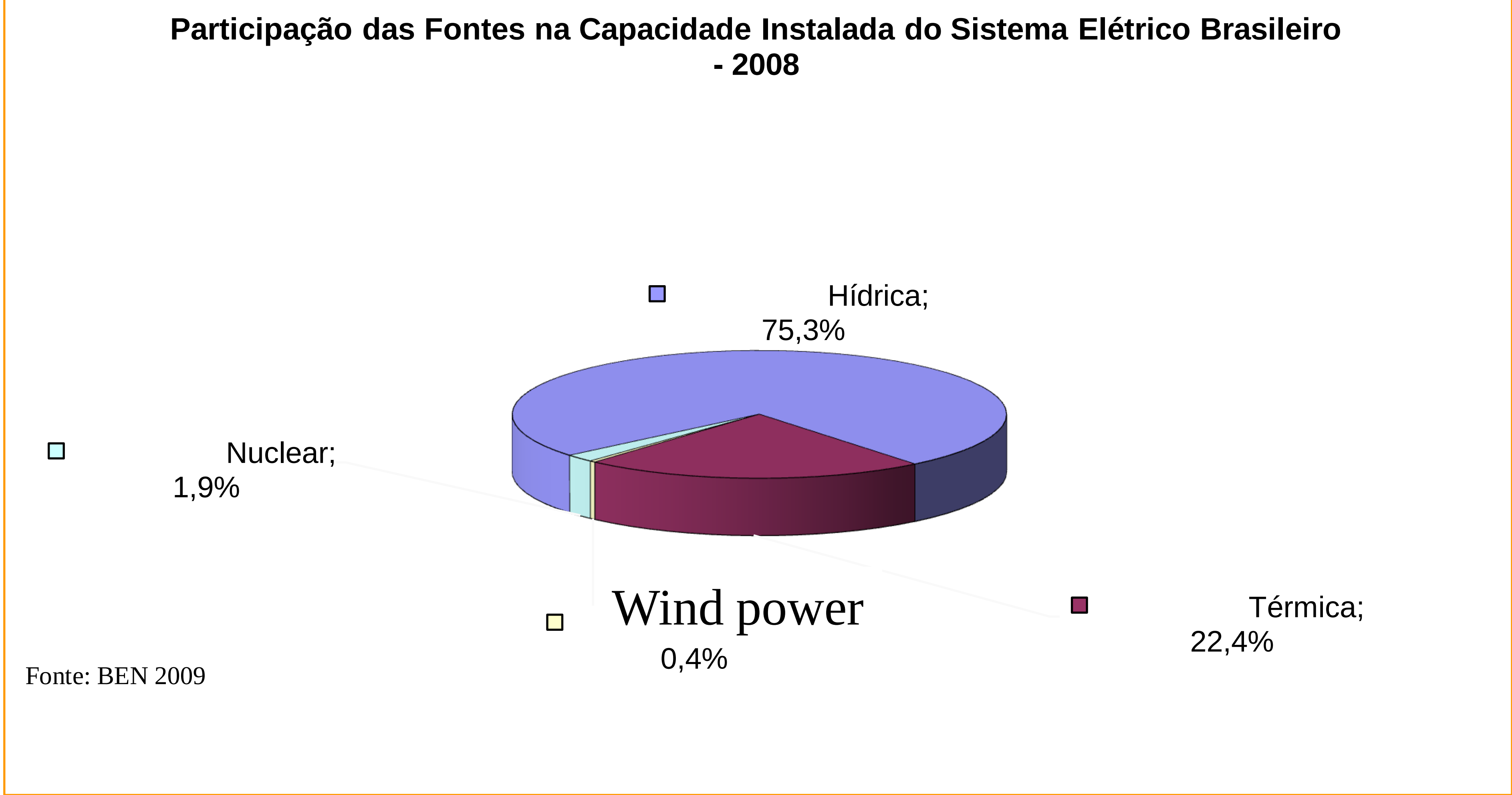
Fonte: BEN 2008/09

THE POWER CHALLENGE

MOST RECENT ACHIEVEMENTS

What are the Challenges?
THE POWER CHALLENGE

POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY
THE RAISING OF WIND POWER:



Fonte: BEN 2009

What are the Challenges?
THE POWER CHALLENGE

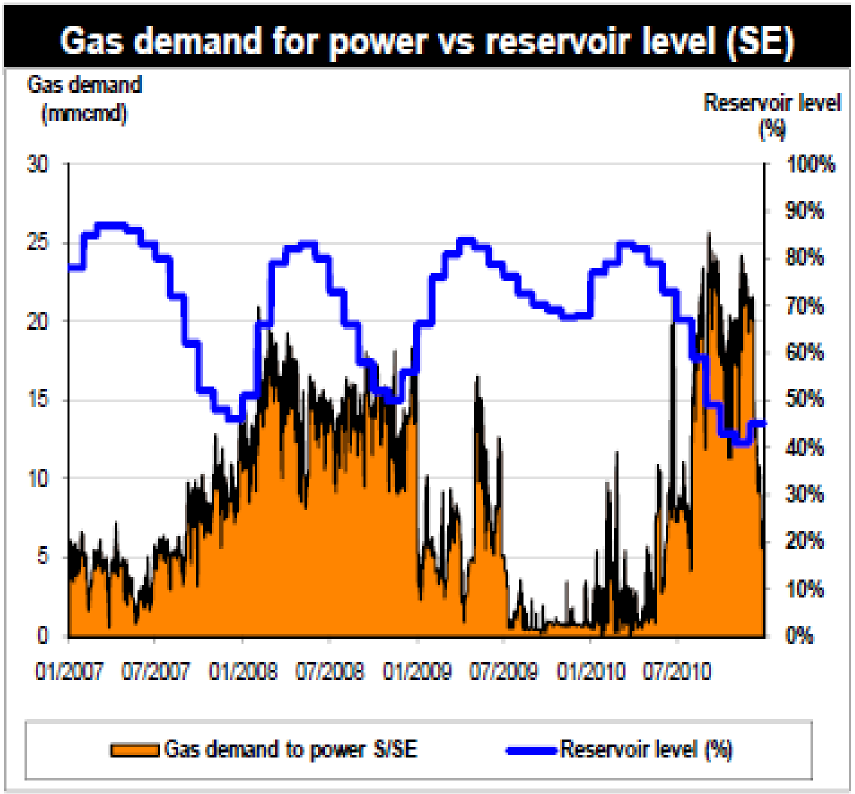
POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY
QUESTIONS FOR THE FUTURE:

- Last power auctions mainly won by Amazon large hydro, wind and very flexible gas-fired power

- Is this model sustainable regarding an eventual NG oversupply offshore (associated gas)?

What are the Challenges?
THE NG CHALLENGE

POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY QUESTIONS FOR THE FUTURE:



- Large swings in power demand dependent upon hydrology
- High volatility of power market is a challenge for gas producers
- Potential exports during periods of low power demand
- Pre-salt players are assessing LNG projects

What are the Challenges?
THE POWER CHALLENGE

POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY
QUESTIONS FOR THE FUTURE:

- How to understand the competitiveness between different power sources?

- COAL x NUCLEAR x NATURAL GAS
  - WORLD x BRAZIL

- IN BRAZIL: WHO BEST FIT INTO A STRONGLY RENEWABLE WORLD

What are the Challenges?
THE POWER CHALLENGE

POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY
QUESTIONS FOR THE FUTURE:

- What is the meaning of competitiveness by the way?
  - Lower total cost X Lower CAPEX?
  - Higher flexibility?
  - Best allocation of natural resources?

What are the Challenges?
THE POWER CHALLENGE

POWER GENERATION IN BRAZIL BY SOURCE OF ENERGY
QUESTIONS FOR THE FUTURE:

- What if NG is not competitive for power generation?

  - The role of Petrobras in the game?
  - How electricity demand may change with the development of other NG uses?