

Hydroelectric Dam Development in the Amazon: National and international context



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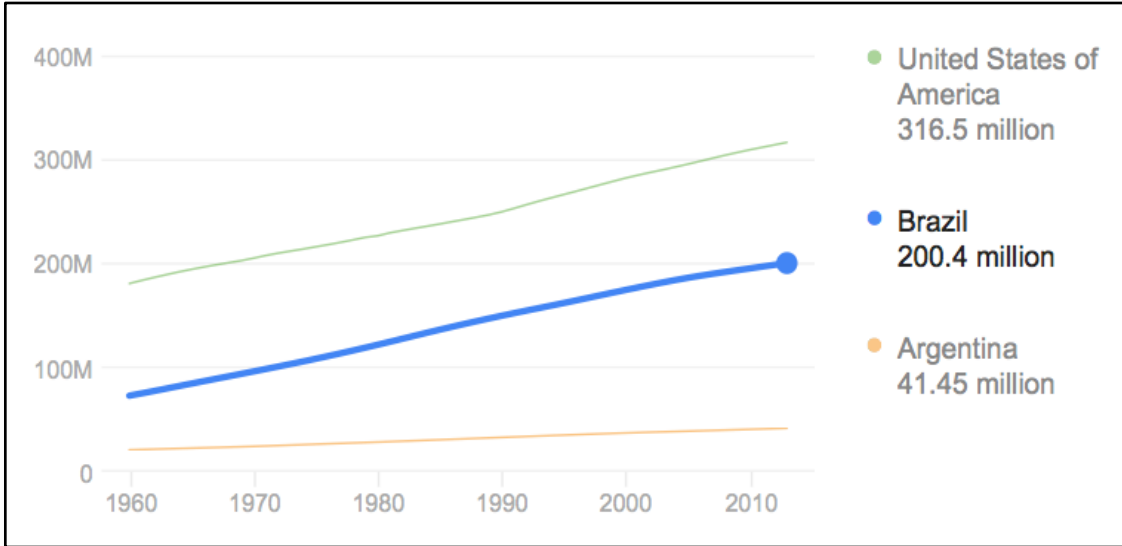
Outline

- **The Basics:** Population, Economy, Energy
- **The Plan:** Damming the Amazon
- **The Framework:** Environmental Licensing
- **Discussion**

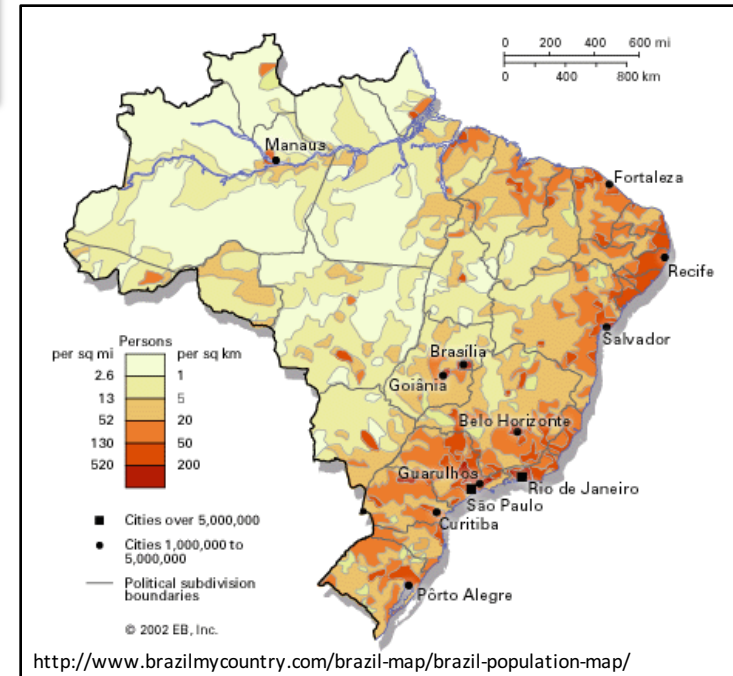


The Basics: Population

Sources : World Bank, United States Census Bureau



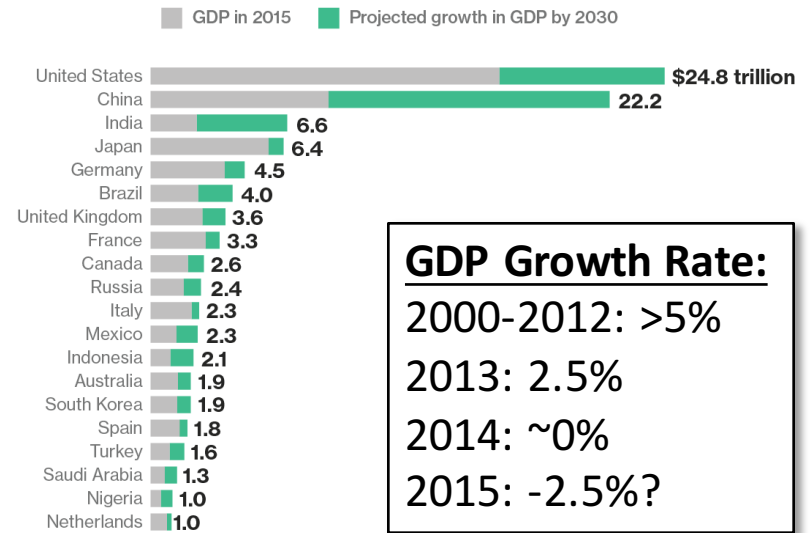
- >200 million people
- 85.7% urban population (2015)
- Uneven geographic distribution



The Basics: Economy

- One of largest world economies (8th → 6th by 2030)
- Service (67%), Industrial (27.5%), Agriculture (5.5%)

World's 20 Largest Economies in 2030

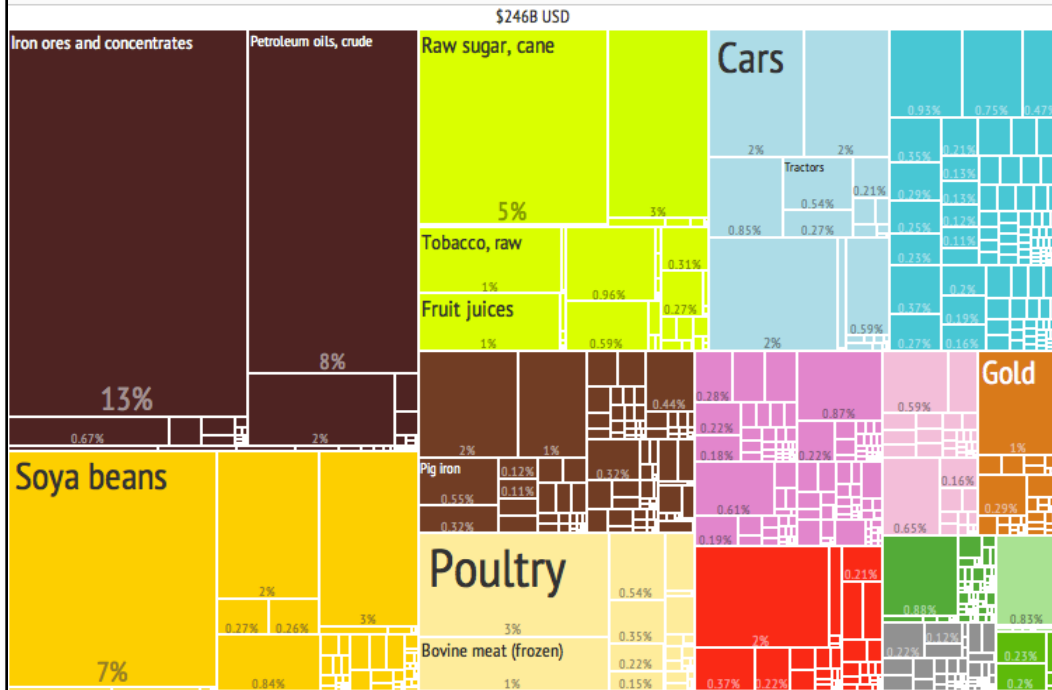


GDP Growth Rate:

2000-2012: >5%
 2013: 2.5%
 2014: ~0%
 2015: -2.5%?

Data: USDA; Figure: http://assets.bwbx.io/images/iPn8SIWm3_pY/v2/-1x-1.png

What did Brazil export in 2012?



https://commons.wikimedia.org/wiki/File:2012_Brazil_Products_Export_Treemap.png#/media/File:2012_Brazil_Products_Export_Treemap.png

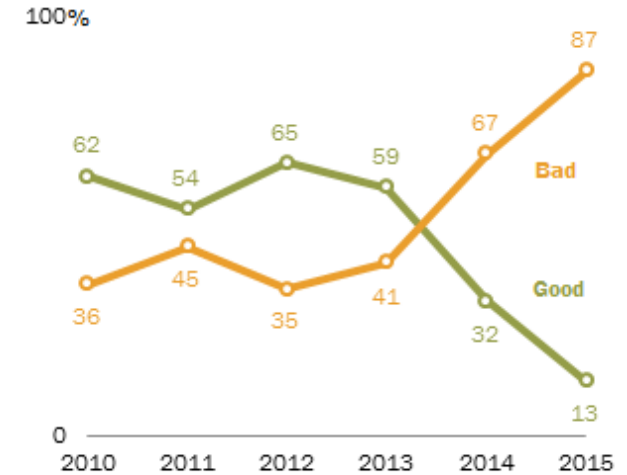
The Basics: Economy

- Economic darling or pariah?



Rapid Decline in Brazilians' Assessment of Economy

Current economic situation in Brazil is ...



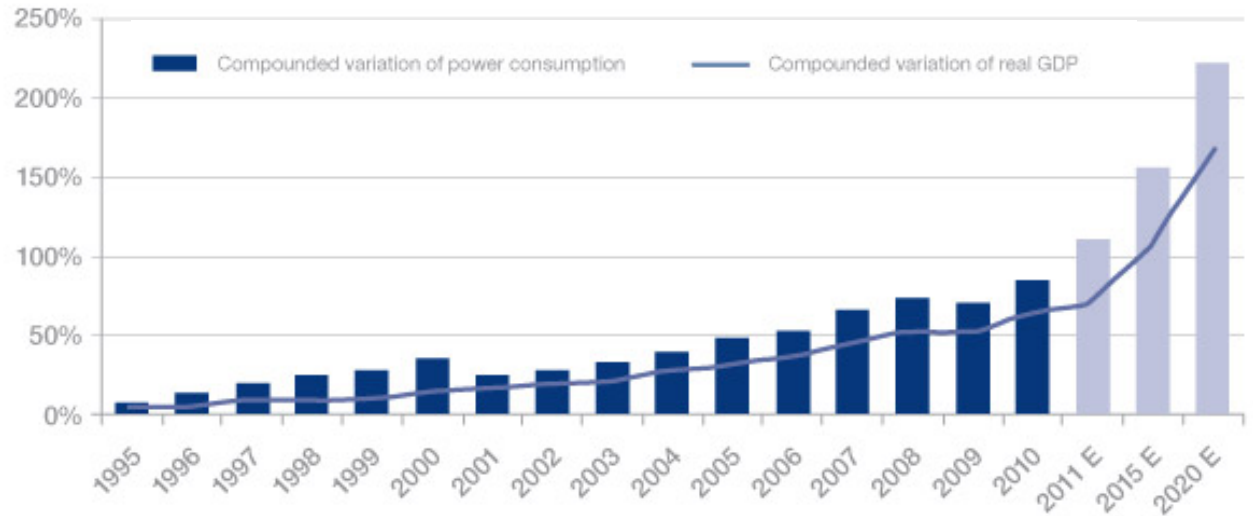
Source: Spring 2015 Global Attitudes survey.
PEW RESEARCH CENTER



http://www.pulsamerica.co.uk/wp-content/uploads/2014/02/basta_corrupção.jpg

The Basics: Energy

- Energy-Economy Link (aka “Duh”)
- Crise do apagão (blackouts): 2001, 2002, 2005, 2007, 2009, 2015...



Blackout in Brazil

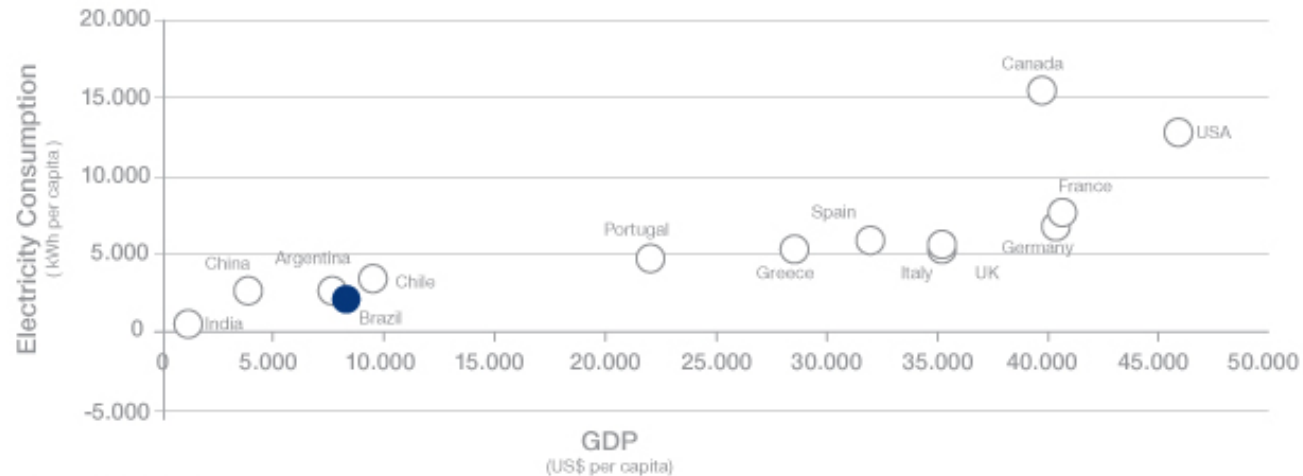
A widespread power outage Tuesday affected more than 60 million people in Brazil and Paraguay after transmission problems at a hydroelectric dam.

Area most affected by blackout



SOURCE: ESRI

AP

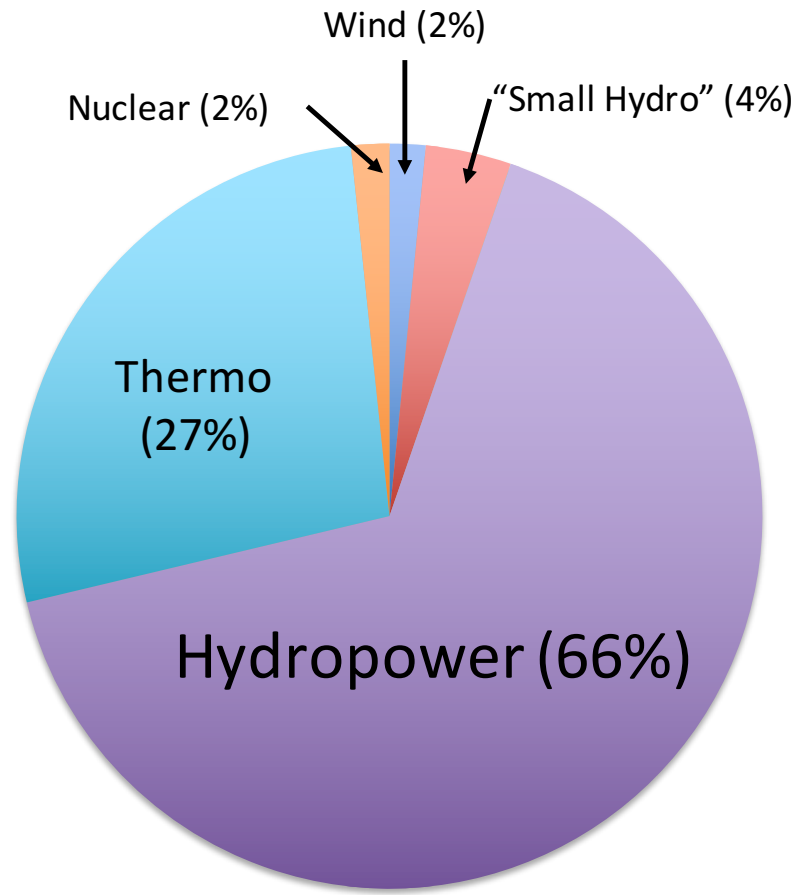
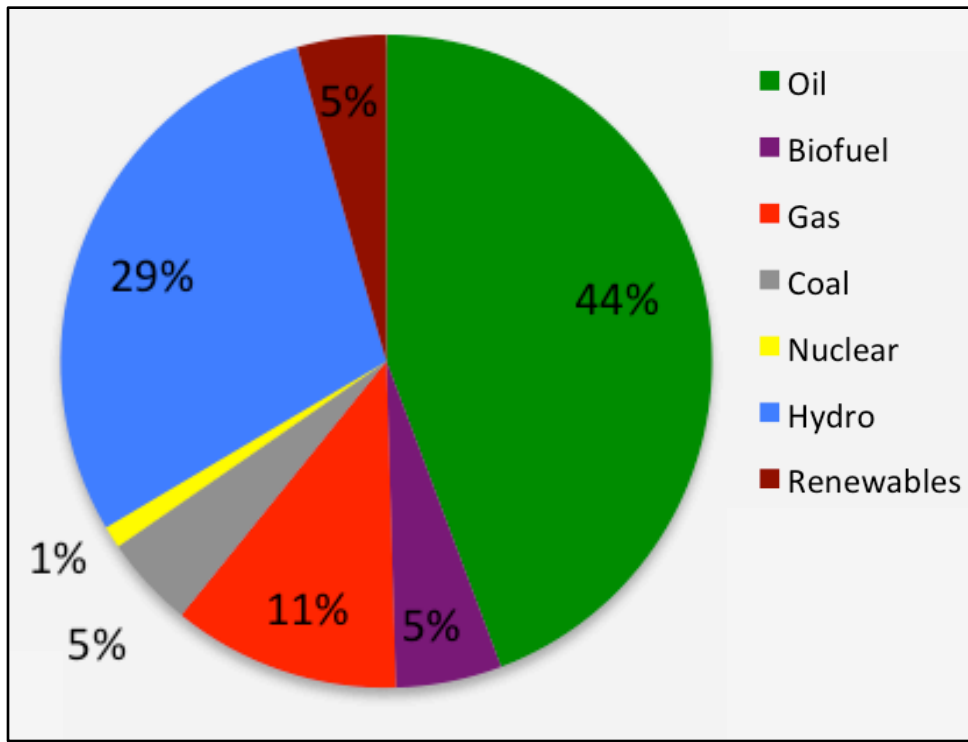


Data: World Bank, IPEADData, and PDE 2020;

Figures: <http://brazilenergy.com.br/en/quem-somos/perfil-do-setor/>

The Basics: Energy

- **Caution:** “Energy Consumption” vs. “Electricity Generation”



http://www.euanmearns.com/wp-content/uploads/2014/07/brazil_consumption_pie2.png

F. Prado, 2013; Data from ANEEL

The Basics: Energy

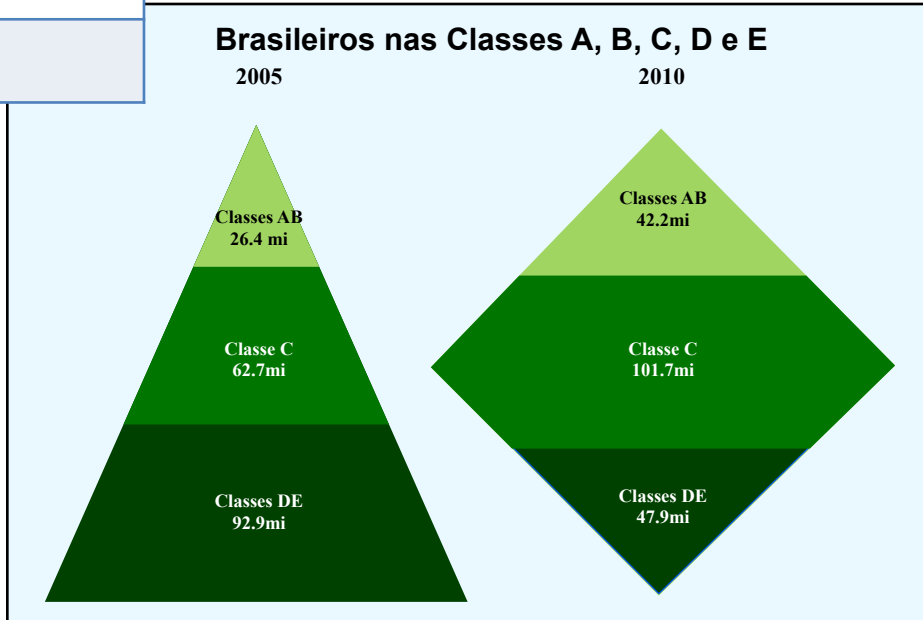
- **Caution:** Projected vs. Actual Demand

Brazilian Energy Planning Enterprise Plan (2012-2021)

Year	Consumption (TWh)	GDP (US\$ trillion)
2012	514*	2.253*
2016	619	4,7**
2021	774	6,0**

← 4-5% annual growth forecasts in electricity consumption and GDP

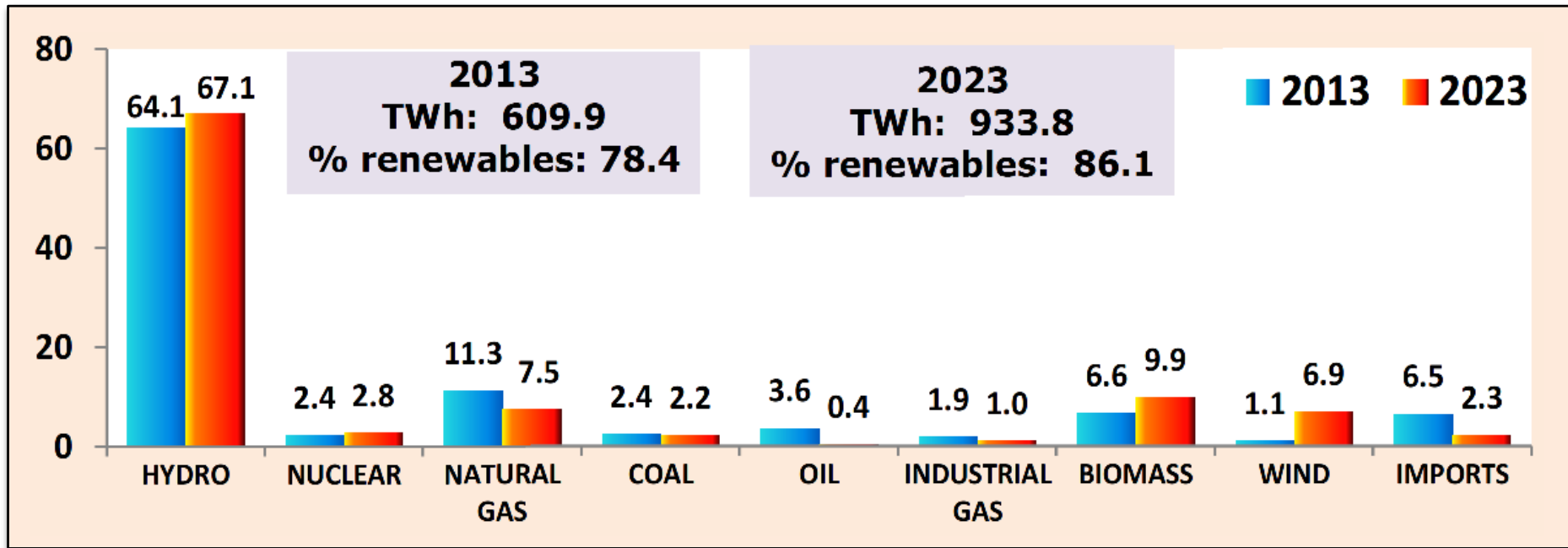
*verified
**forecast



The Basics: Energy

- Caution: Projected vs. Actual Demand

Brazilian Energy Planning Enterprise Plan (2013-2023)*



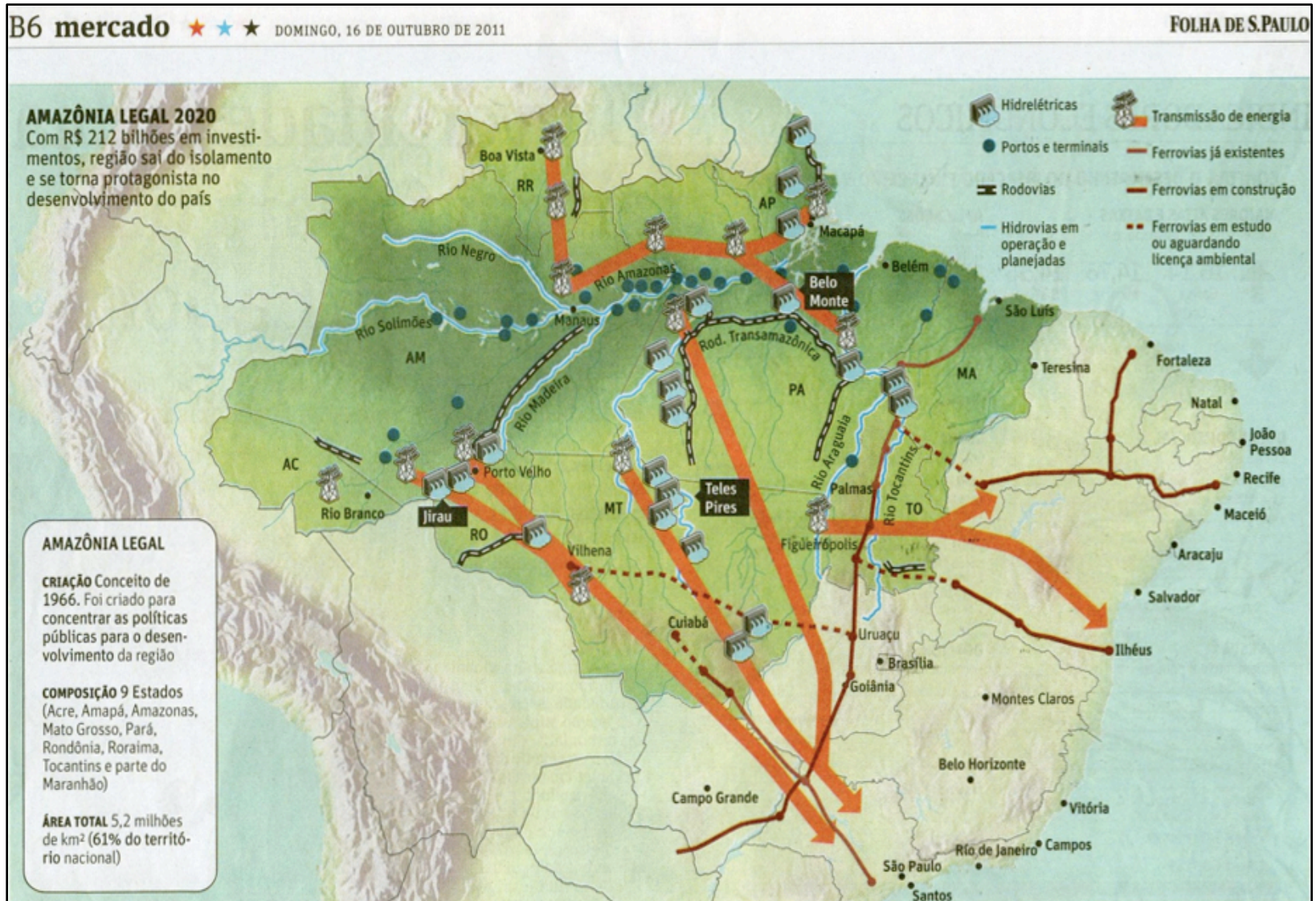
*<http://www.epe.gov.br/Estudos/Paginas/Plano%20Decenal%20de%20Energia%20-%20PDE/MMEcolocaPlanoDecenal.aspx>

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The Plan(s): Take-home Message



The Plan(s): Dams as of 2002

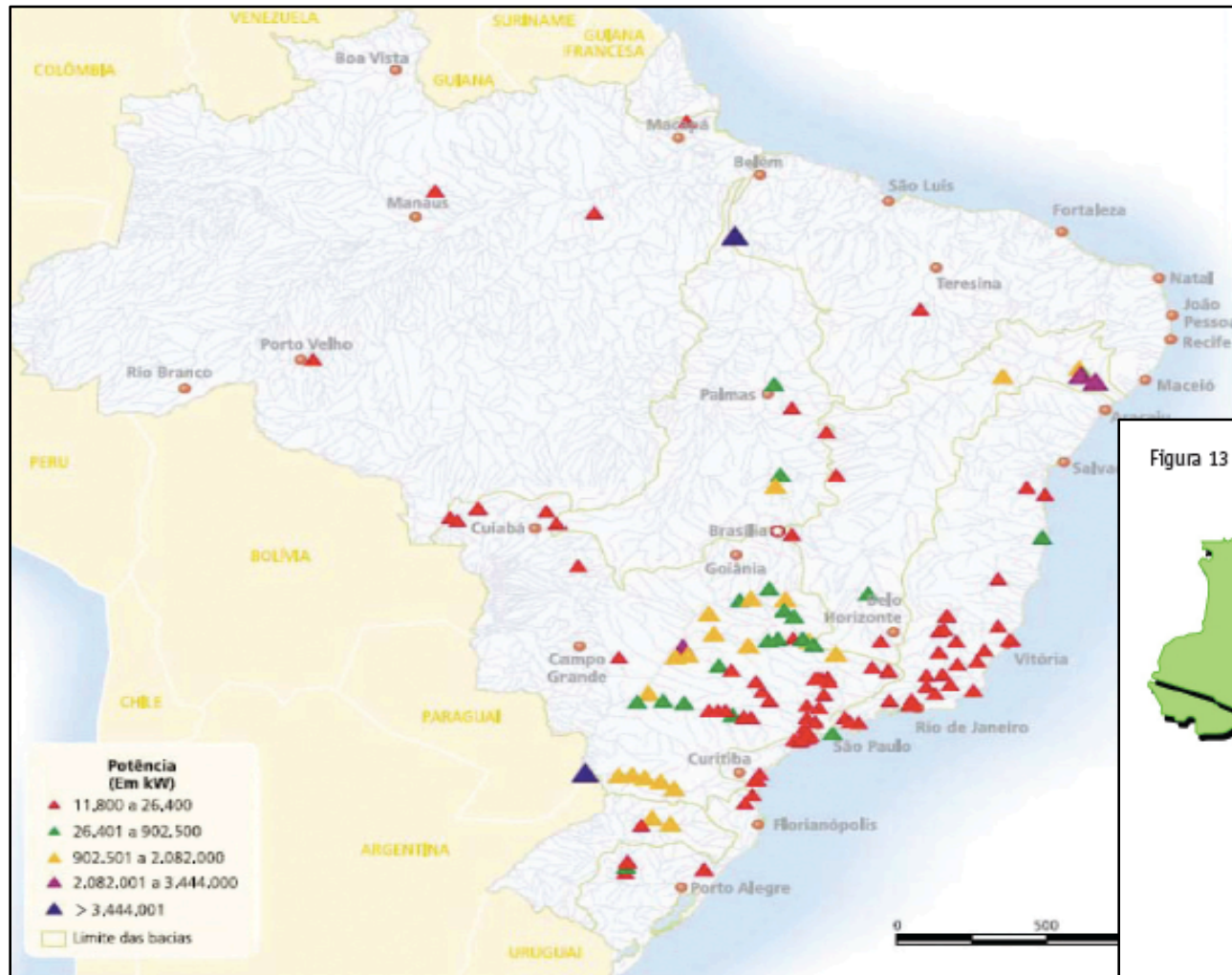


Figura 13 – Distribuição geográfica do potencial hidrelétrico a aproveitar



Source: PNE2030

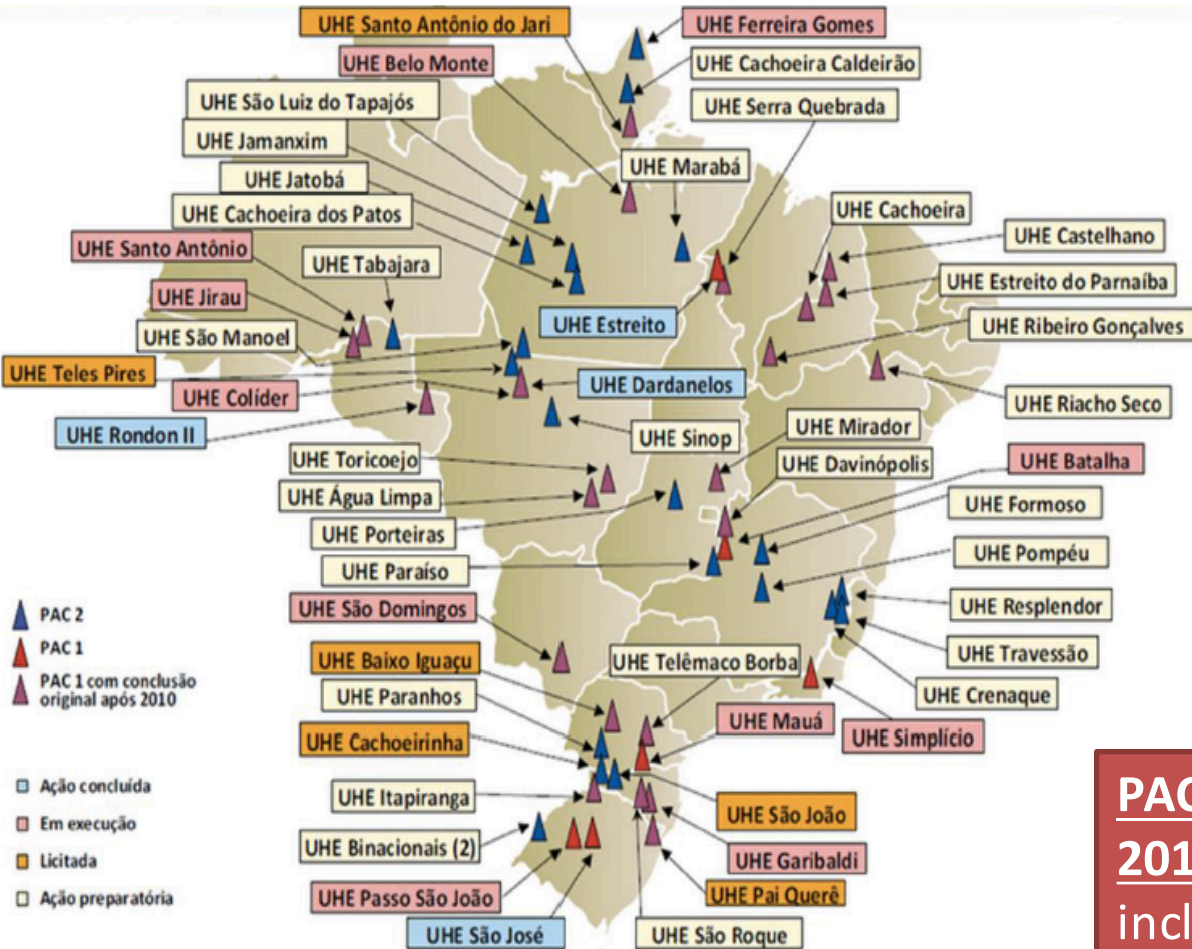
The Plan(s): PAC1 and PAC2

Programa de Aceleração do Crescimento (2007 - ??)

PAC1: US\$ 346 B
PAC2: US\$ 526 B

UHE: Usina Hidroelétrica
(HE Power Station > 30 MW)
PCH: Pequena central
hidrelétrica (3-30 MW)

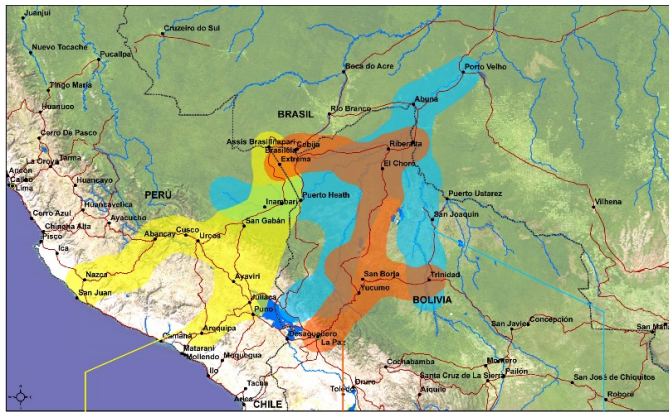
PAC2: 76 dam projects in Brasil
2011 Plan for Energy Expansion:
includes projects in Peru, Bolivia,
Guiana and Peru...



The Plan(s): IIRSA



Initiative for the Integration of the Regional Infrastructure of South America



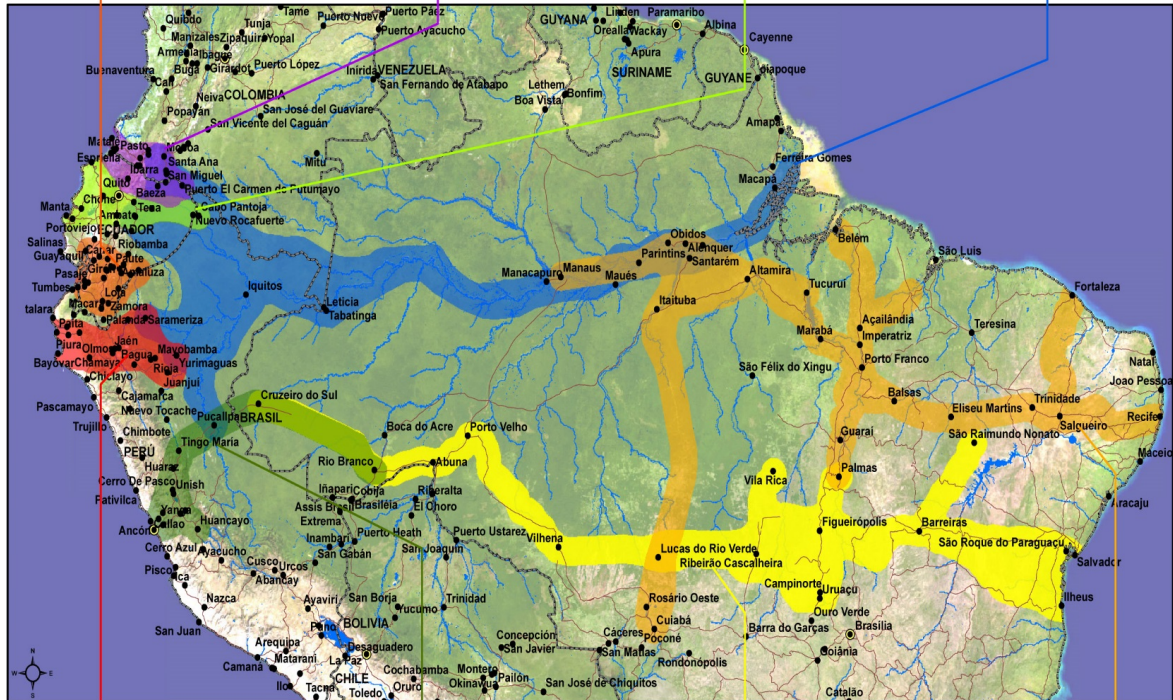
Group 1: CORRIDOR PORTO VELHO - RIO BRANCO - ASSIS - PUERTO MALDONADO - CUSCO / JULIACA - PORTS IN THE PACIFIC
 Group 2: RIO BRANCO - COBIJA - RIBERALTA - YUCUMBO - LA PAZ CORRIDOR
 Group 3: MADEIRA - MADRE DE DIOS - BENI RIVER CORRIDOR

Group 7: ACCESS TO THE MORONA - MARAÑÓN - AMAZON WATERWAY

Group 1: ACCESS TO THE PUTUMAYO WATERWAY

Group 2: ACCESS TO THE NAPO WATERWAY

Group 6: AMAZON WATERWAY NETWORK



Group 3: ACCESS TO THE HUALLAGA - MARAÑÓN WATERWAY

Group 4: ACCESS TO THE UCAYALI WATERWAY

Group 8: PORTO VELHO - SOUTHERN NORTHEASTERN BRAZIL RAIL CONNECTION

Group 5: CONNECTION BETWEEN THE AMAZON BASIN AND NORTHERN NORTHEASTERN BRAZIL

- 177 HE plants built or in construction
- 241 dams planned
- 220 sites inventoried
- **As many as 638 hydroelectric dams**
- 20,000 km of waterways

The Plan(s): IIRSA

The rapid pace of planned development, spatial scale of impact, and potential for detrimental and irreversible loss of globally important ecosystems services, *make this impending **hydrologic** transformation unprecedented* (e.g., Fearnside, 2014).



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“A Brief Explanation about Environmental Licenses in Brazil”

(Florencio and Malpass, YEAR?)

<http://www.acs.org/content/dam/acsorg/greenchemistry/news/environmental-licenses-in-brazil.pdf>

Environmental Licensing – The Good

- Instituted by Programa Nacional do Meio Ambiente, through the Conselho Nacional do Meio Ambiente resolution (1986)
- Included in the Federal Constitution (1988)
- Amended by environmental laws and regulatory instruments at the national, state and local levels
- **SOME** participation and democracy: public hearings and lawsuits
- “Science” used to set up and ratify standards, procedures and mitigation mechanisms



(Eraldo Peres/Associated Press)



Taira Kayapo (Kayapo Leader) and Aloysio Guapindaia (FUNAI Director) at a public hearing in Brasilia

Environmental Licensing – The Bad

Structural

- Complex system of (often contradictory) laws (e.g., Santos, 2007)
- Sophisticated legal system; poor understanding & enforcement
- Poor information-sharing: agencies, developers & affected peoples
- Dam building consortium chooses who develops the EIA!

Scientific

- Minimal baseline (and post-implementation) data
- Cost and benefit analysis as tool for decision making
- Framing research towards project approval (Zhourri, 2010)

Social

- Poor political participation; activism viewed as empty participation for lack of “scientific content”
- Lack of clarity about SOCIAL component of EIA
- Plans not tailored to the impacted communities

Environmental Licensing – The Ugly

Markets | Wed Oct 7, 2015 11:10am EDT

Related: STOCKS, REGULATORY NEWS, M&A, MARKETS

Eletrobras' corruption probe zeroes in on Brazilian dams

SAO PAULO | BY CAROLINE STAUFFER



Oct 7 A commission hired by Brazil's state-run energy utility Eletrobras to probe possible violations of U.S. and Brazilian anti-corruption laws involving the company is studying three Amazonian dam projects and a nuclear power plant, two sources familiar with the investigation said.

They said the commission is investigating possible bribery in two \$5 billion dam projects on the Madeira river, Santo Antonio and Jirau, as well as the massive Belo Monte dam and the Angra 3 nuclear power plant that prosecutors have already linked to a huge corruption scandal.



<https://intercontinentalcry.org/documentary-exposes-corruption-behind-megadams-in-sarawak-malaysia-27890/>

Environmental Licensing – The EIA/RIMA

Estudo de Impacto Ambiental (EIA): Environmental Impact Assessment
Relatórios de Impactos Ambientais (RIMA): Env. Impact Report
Plano Básico Ambiental (PBA): Basic Environmental Plan

- **Preliminary License (LP)** – deployment/planning phase; does not authorize the installation, but APPROVES environmental feasibility and authorizes its location and design technology
- **Installation License (LI)** – authorizes start of the work; valid for up to 6 yrs.
- **Operating License (LO)** – authorizes start of operation; subject to inspection to verify that all requirements and technical details of the approved project were developed

PLANNING

BUILDING/MITIGATING

MONITORING

EIA/RIMA → LP

PBA → LI

PBA Review → LO

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- **Discussion:** Pros and Cons of Hydro in the Amazon



Mario Tama/Getty Images