Rivers of the Amazon: Can They be Used on a Sustainable Basis as a Source of Renewable Hydropower?

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Presentation Outline

- Answer to the Question;
- Hydropower Development in the Amazon – *Outlook*;
- Santo Antonio Hydropower Project;
- Conclusions and Recommendations.

1. Answer to the Question



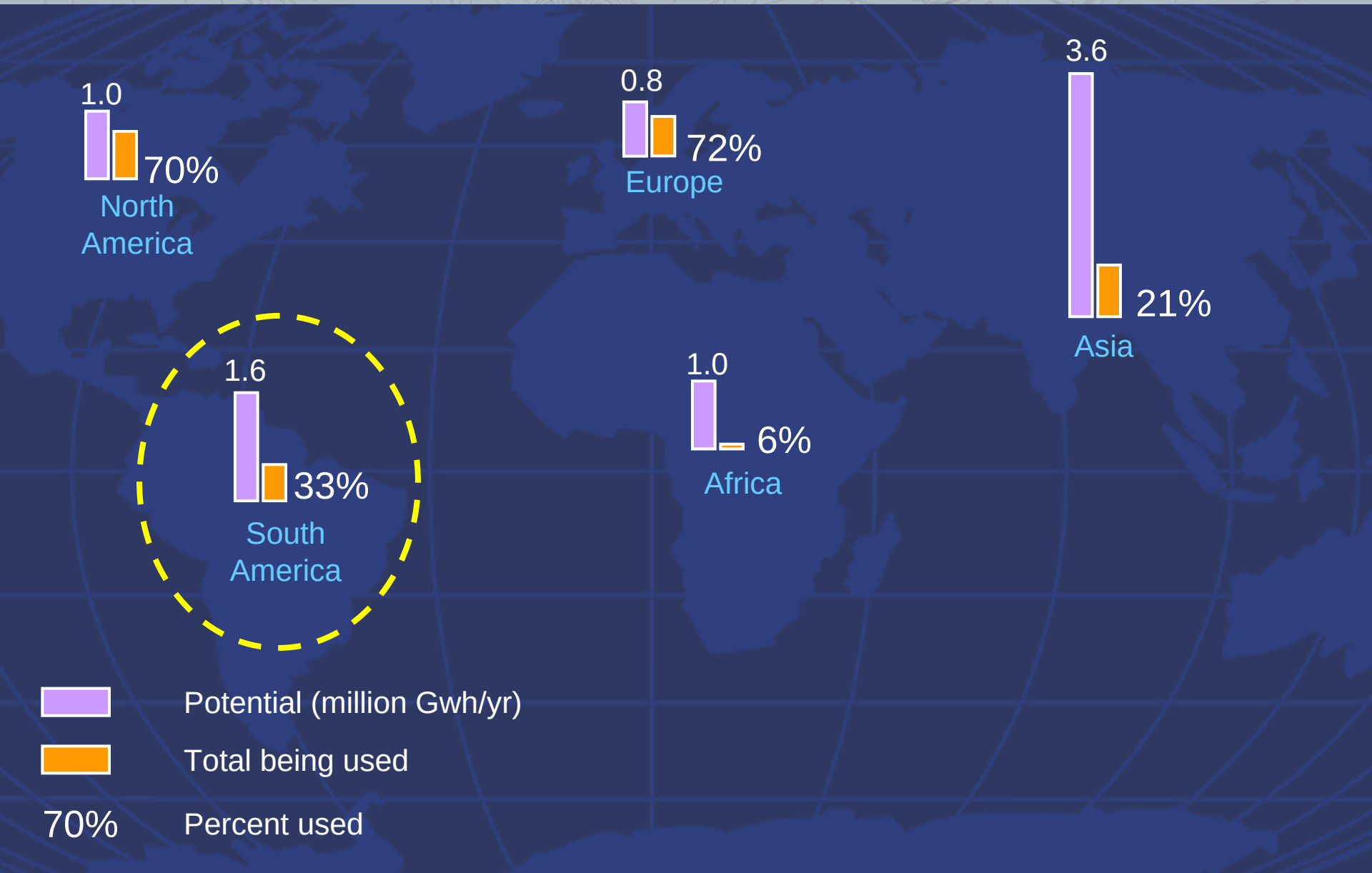

Answer to the Question

We must be able to develop sustainable hydropower in the Amazon:

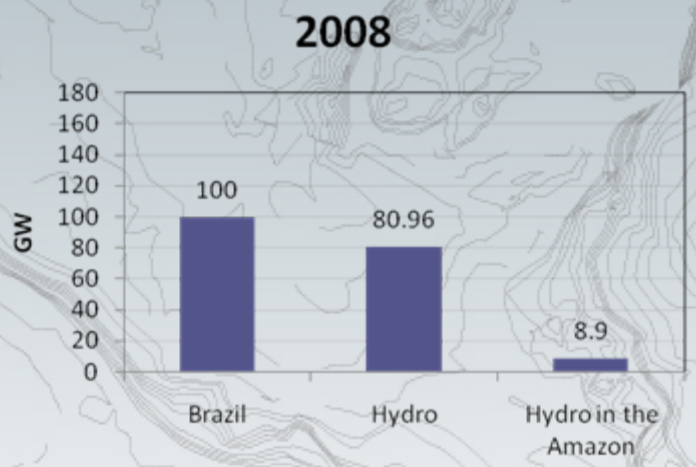
- Growing energy demand in the region;
- Hydropower – clean and renewable source of energy – fight climate change;
- Hydropower potential in the Amazon basin;
- Lower cost of expansion (scale) compared with other renewable sources;
- Hydropower contributes to local / regional development and can bring about environmental gains;

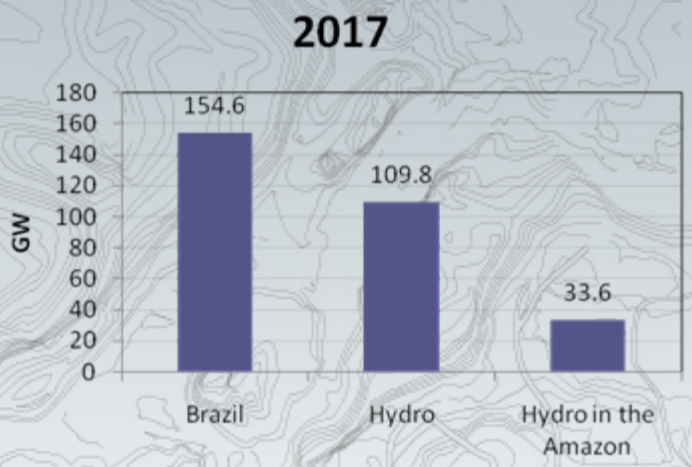
2. An Outlook on Hydropower Development in the Amazon

Hydropower Potential Worldwide



Brazil´s Energy Expansion Plan 2008 -2017

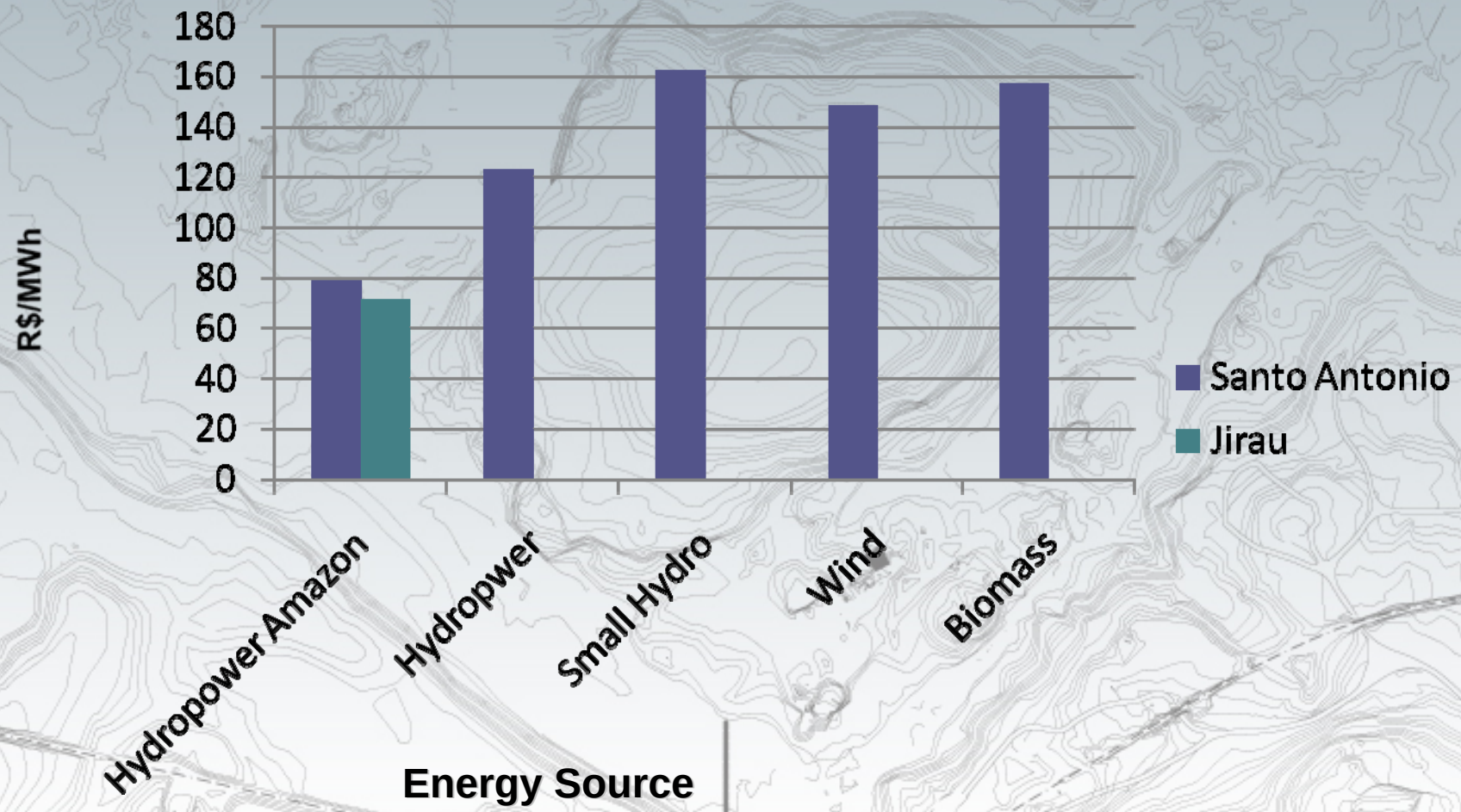




Planned Expansion of 55 GW with 29 GW (53%) from Hydropower

Hydropower growth of 29 GW with 25 GW (86%) in the Amazon

Highly Competitive Tariffs



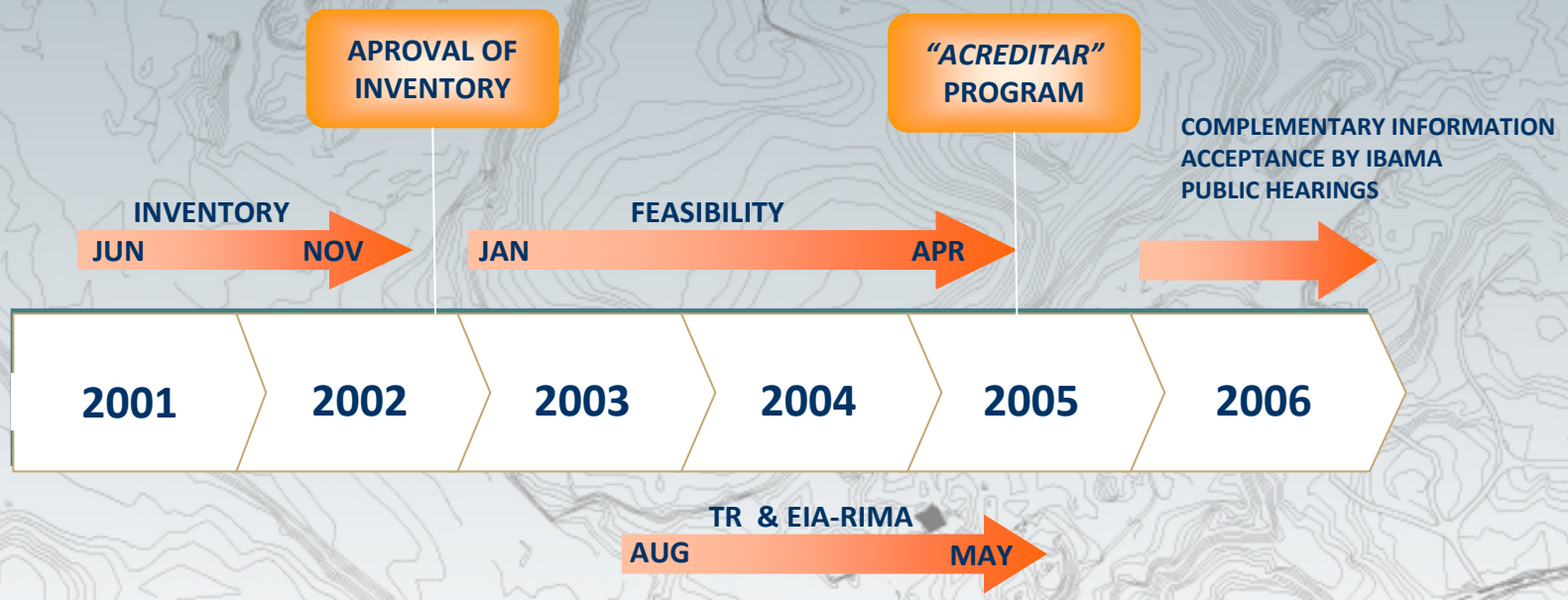
3. Santo Antonio Hydropower Project

Institutional Arrangement

Santo Antonio S.A is the specific purpose corporation (SPC) responsible for the hydroelectric plant concession – partners include: Furnas Centrais Elétricas, CEMIG, Santander, Banif, Odebrecht and Andrade Gutierres – SAESA is the Project Owner – they will operate the hydropower project and supply energy to the Brazilian grid

Construtora Norberto Odebrecht is the leader of construction consortium

Timeline - UHE Santo Antônio



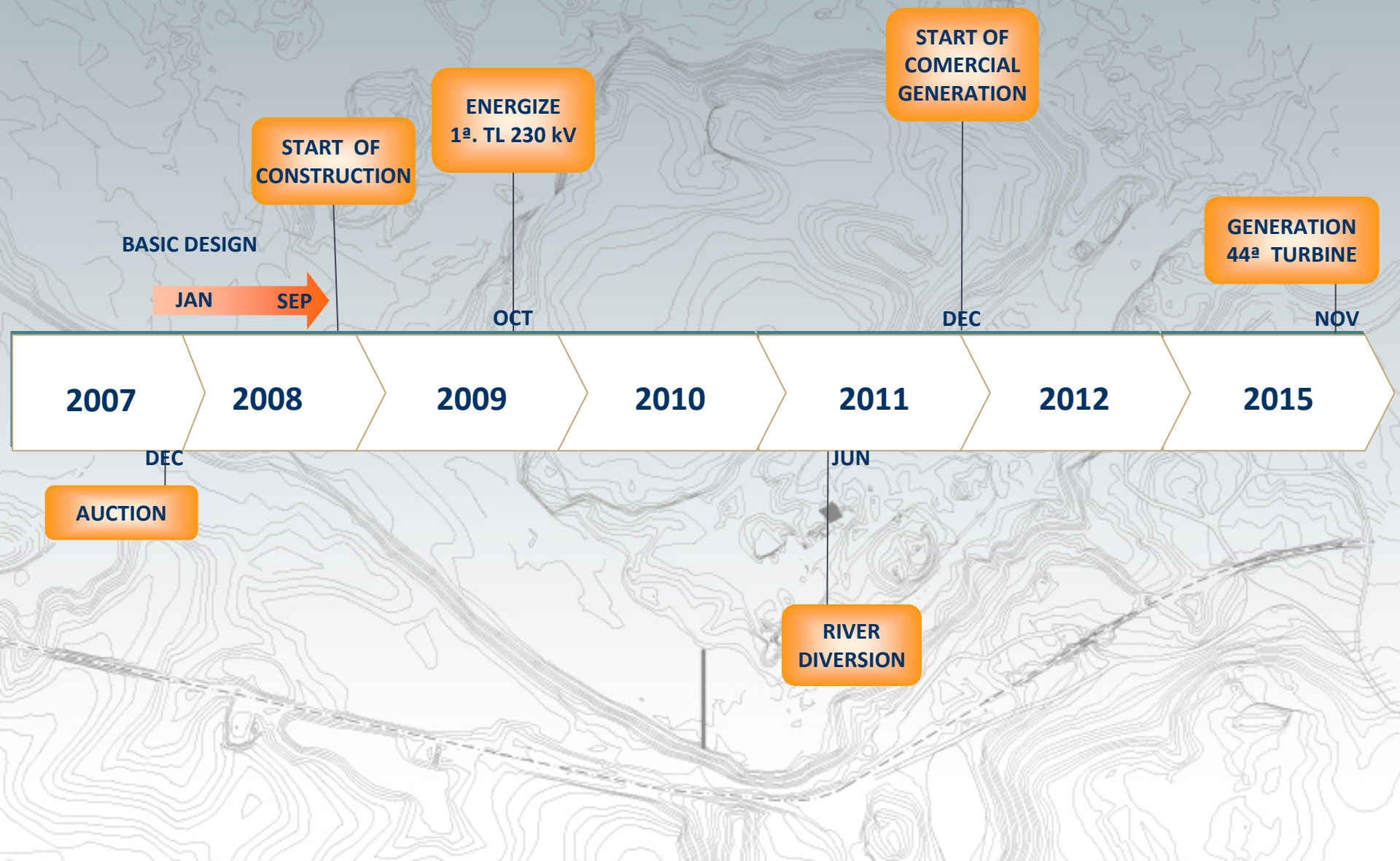
FURNAS

ODEBRECHT

Investment

R$ 200.000.000,00

Timeline - UHE Santo Antônio



SITE LOCATION

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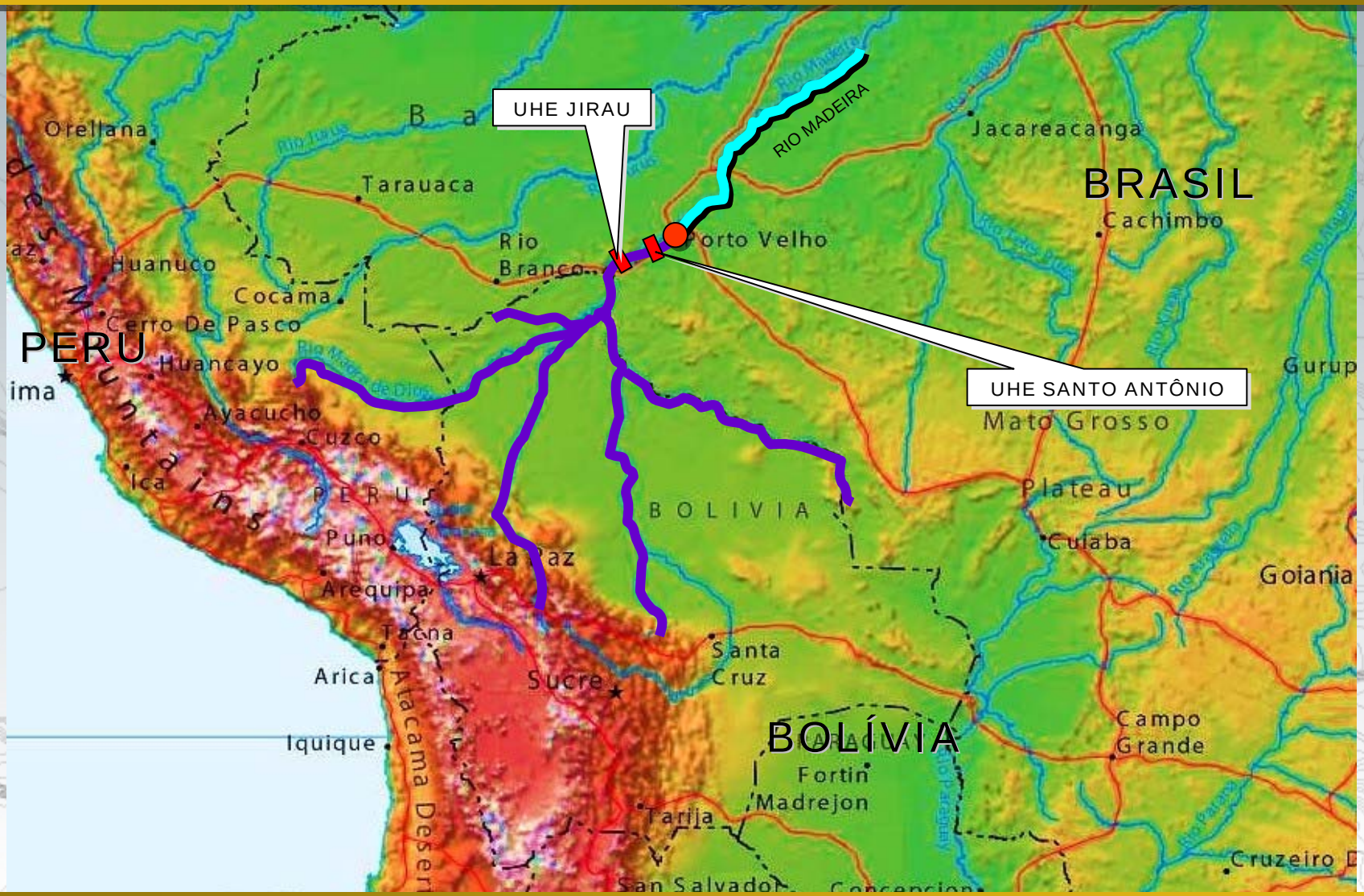

Complexity - Uncontrolled Frontier Expansion

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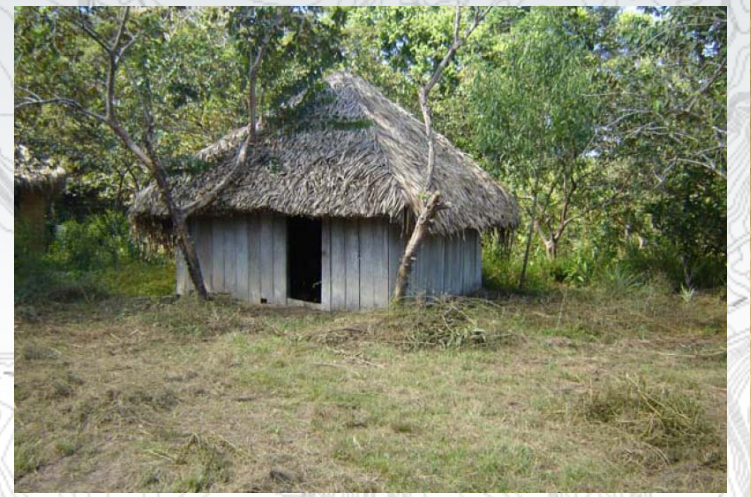


Unique Project Preparation

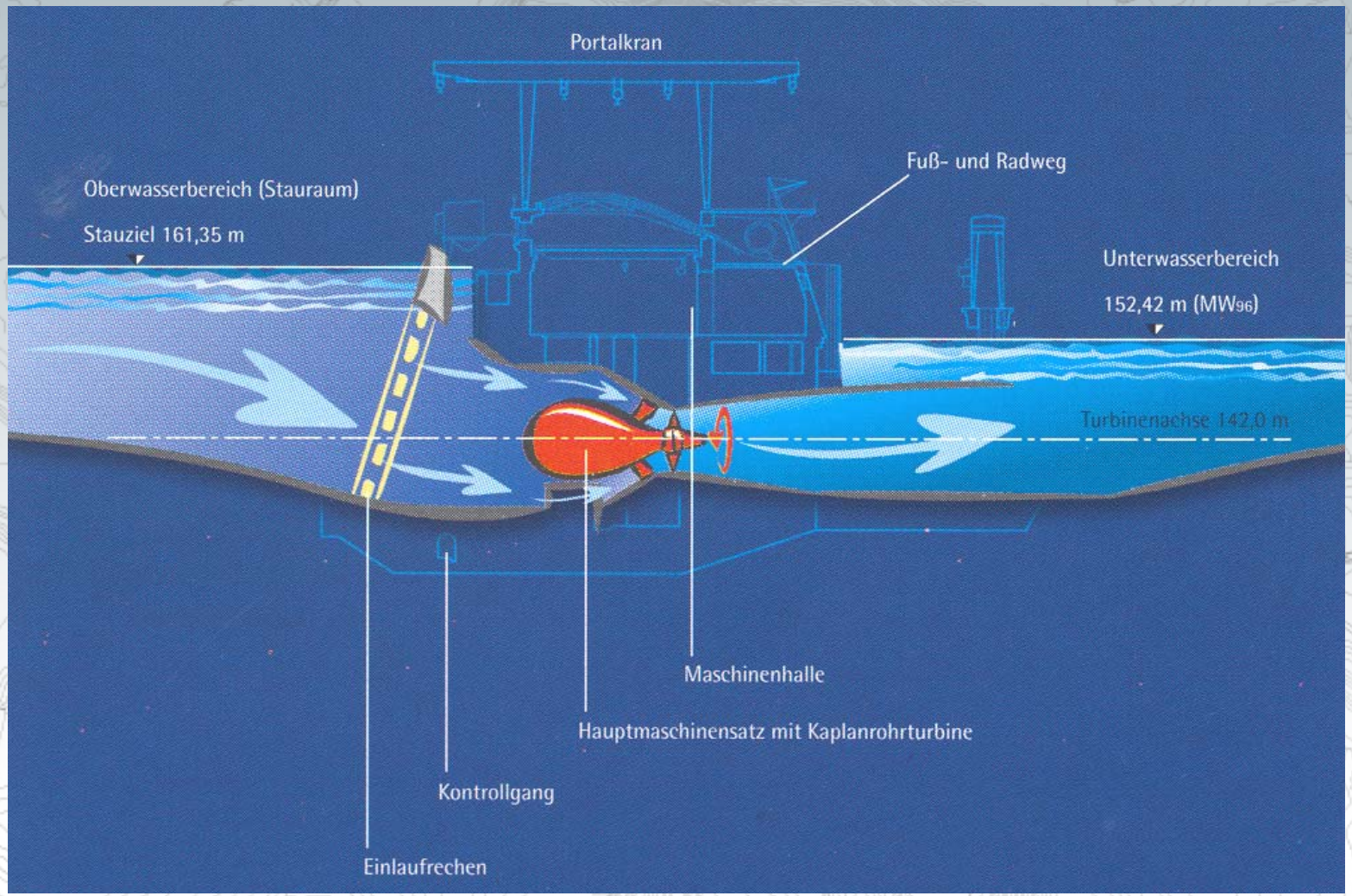
- TOR for the EIA was developed following a public meeting organized by proponents;
- Preparatory meetings for public hearings – over 60 meetings involving all affected communities;
- Registered inventories of properties and assets;
- Signed agreement with the MP (*Ministério Público*) to monitor project implementation;

Unique Project Preparation

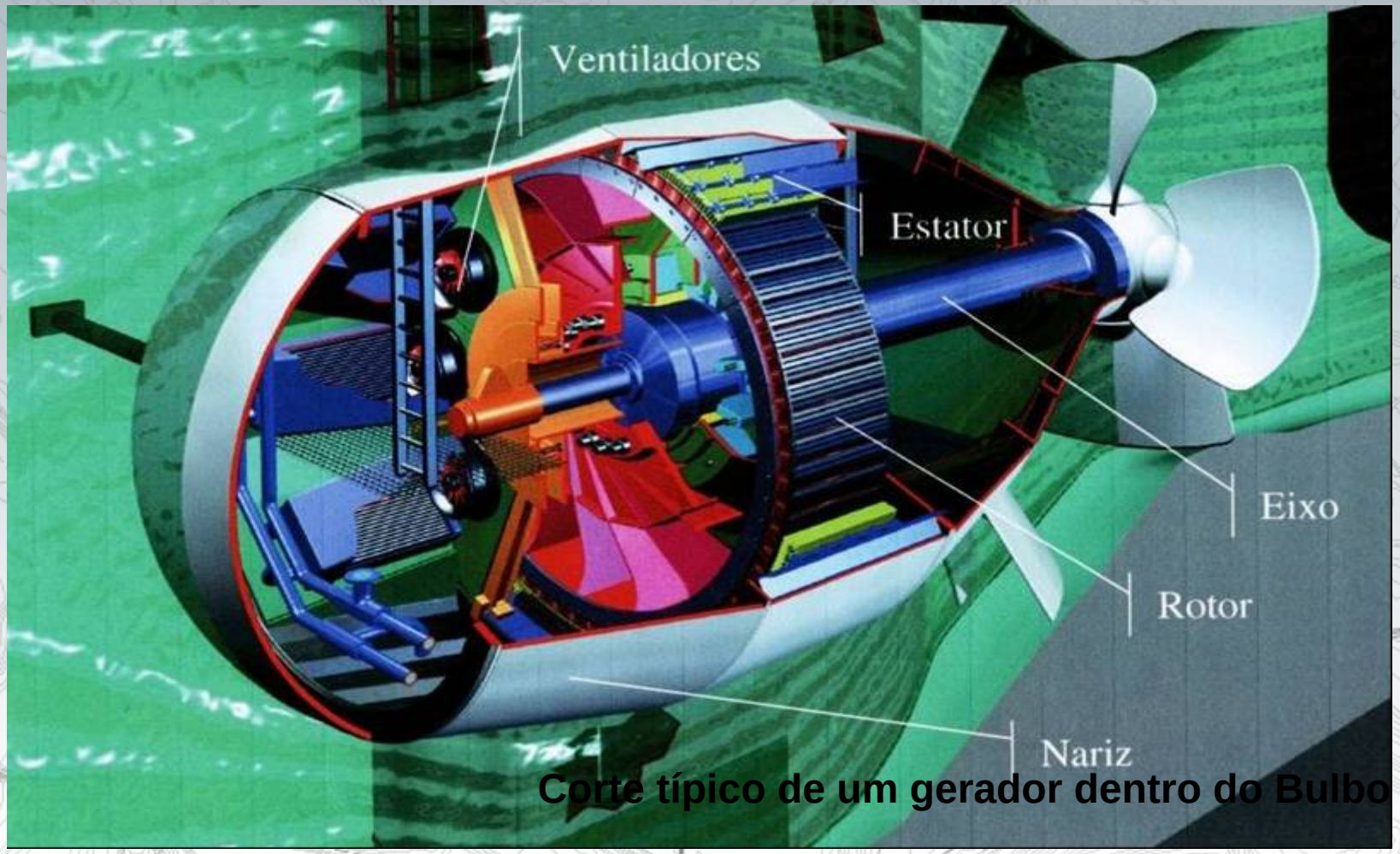
- Four public hearings in different locations;
- Effective (respectful) interaction with the Karitianas and Karipunas indigenous groups;
- Strategic environmental assessment study;
- Assessment of work force in Porto Velho - basis for the development of the Acreditar program;

Technology & Engineering

Run of the River Project
Bulb Turbines Technology

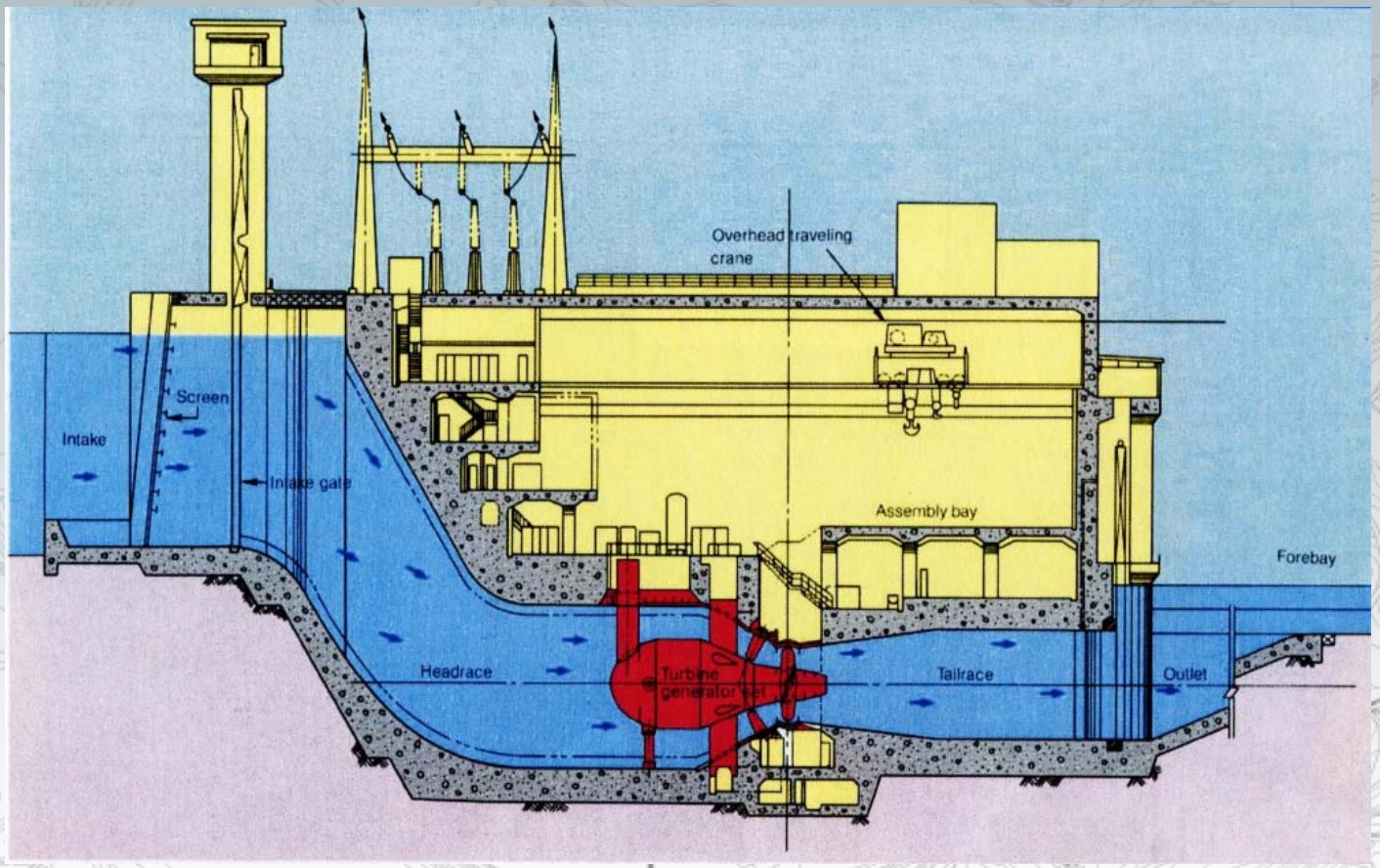


Bulb Turbine

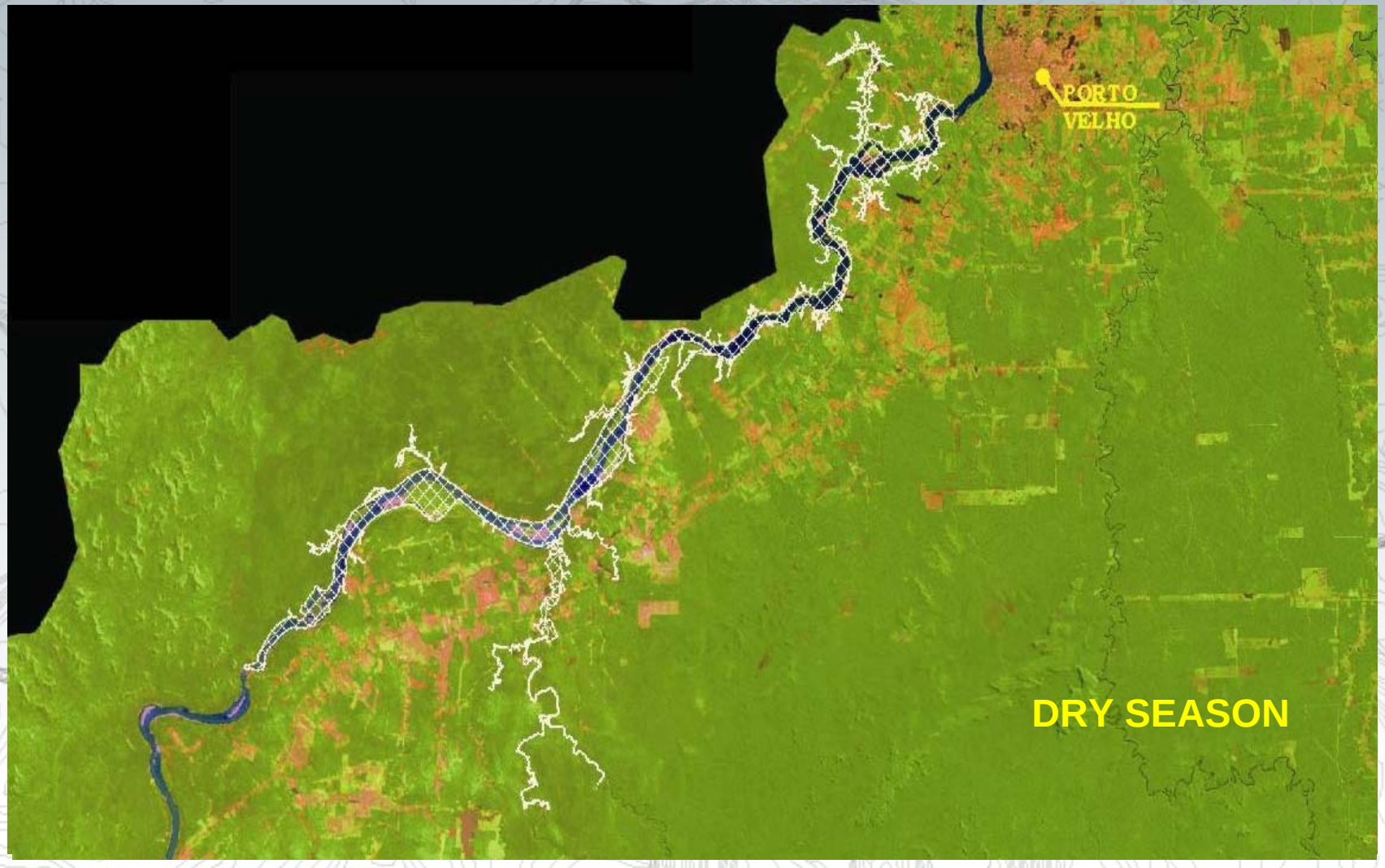


Corte típico de um gerador dentro do Bulbo

Bulb Turbine



Santo Antonio Reservoir

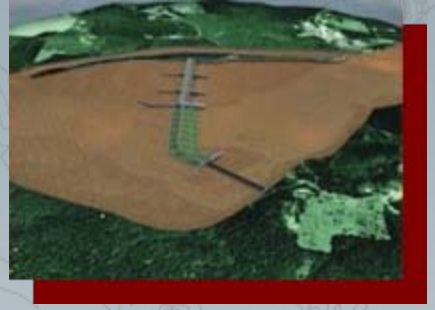


Environmental Efficiency Indicators

HYDROPOWER PLANTS IN THE AMAZON	RESERVOIR AREA (km^2)	GENERATION CAPACITY (MW)	RESERVOIR AREA / GENERATION CAPACITY (km^2 / MW)
BALBINA	2.360	250	9,44
SAMUEL	584	217	2,69
MANSO	387	210	1,84
TUCURUÍ 1ª PHASE 2ª PHASE	2.414	4.000	0,61
		8.000	0,30
SANTO ANTÔNIO	271	3.150	0,09
	110 (*)		0,03
JIRAU	258	3.300	0,08
	140 (*)		0,04


STP 2
N
AM-4
CANAL DE FUGA
TA/CF UN. 21 A 32
TA/CF UN. 09 A 20
AM-3
INTERCEPTOR DE TRONCOS E FLUTUANTES (ME)
AM-2
RIO MADEIRA
CANAL DE RESTUIÇÃO
VERTEDOURO PRINCIPAL
CANAL DE APROXIMAÇÃO
FLUXO
BARRAGEM DE GRAVIDADE
AM-6
FLUXO
TA/CF UN. 33 A 44
AM-5
BARRAGEM DE GRAVIDADE
VERTEDOURO COMPLEMENTAR
TA/CF UN. 01 A 08
CANAL DE FUGA
AM-1
BARRAGEM DE TERRA MD
MD-7
Usina Hidrelétrica Santo Antônio

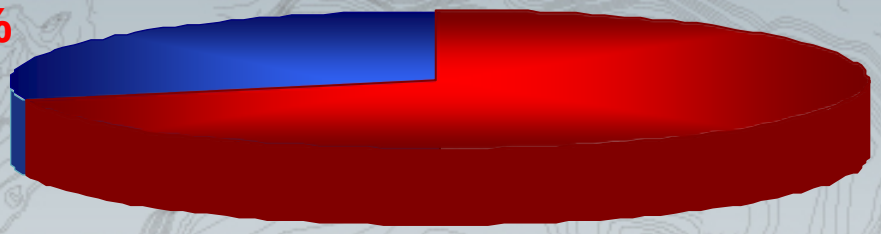
“Sharing Benefits”
Professional Capacity Building



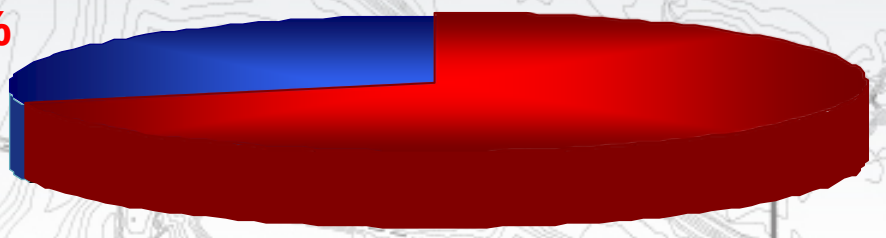
PROGRAMA DE QUALIFICAÇÃO PROFISSIONAL CONTINUADA

ACREDITAR

Scenario in Jan/2006



Today´s Goal



January 2010

82% Local
18% Imported

Selection of Candidates

- Basic Evaluation
- Medical / Health Evaluation
- Psychological Evaluation

Training Site

20 salas - Campus II - Porto Velho/RO

Theoretical Training

Simulator

Training Facility

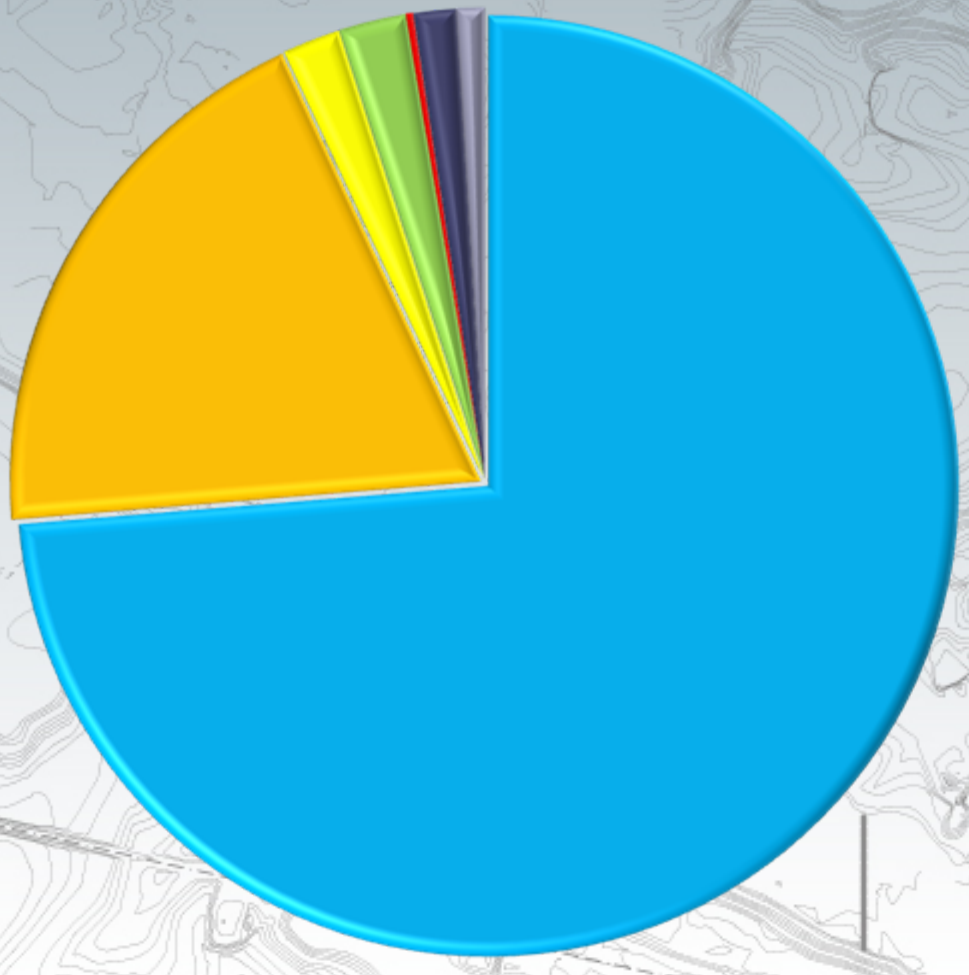
Practical Training

Practical Training


ACREDITAR
CERTIFICADO

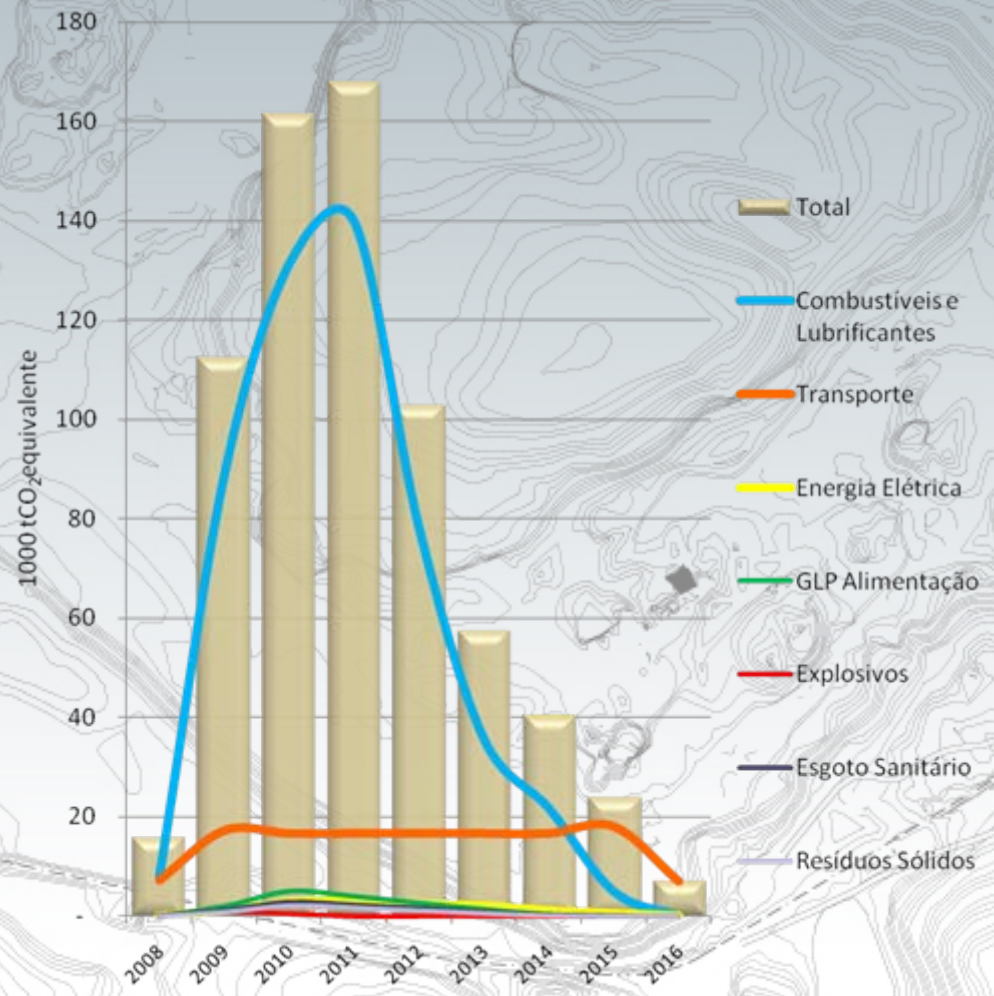
GHG Emissions Estimate

Estimation of GHG Emissions

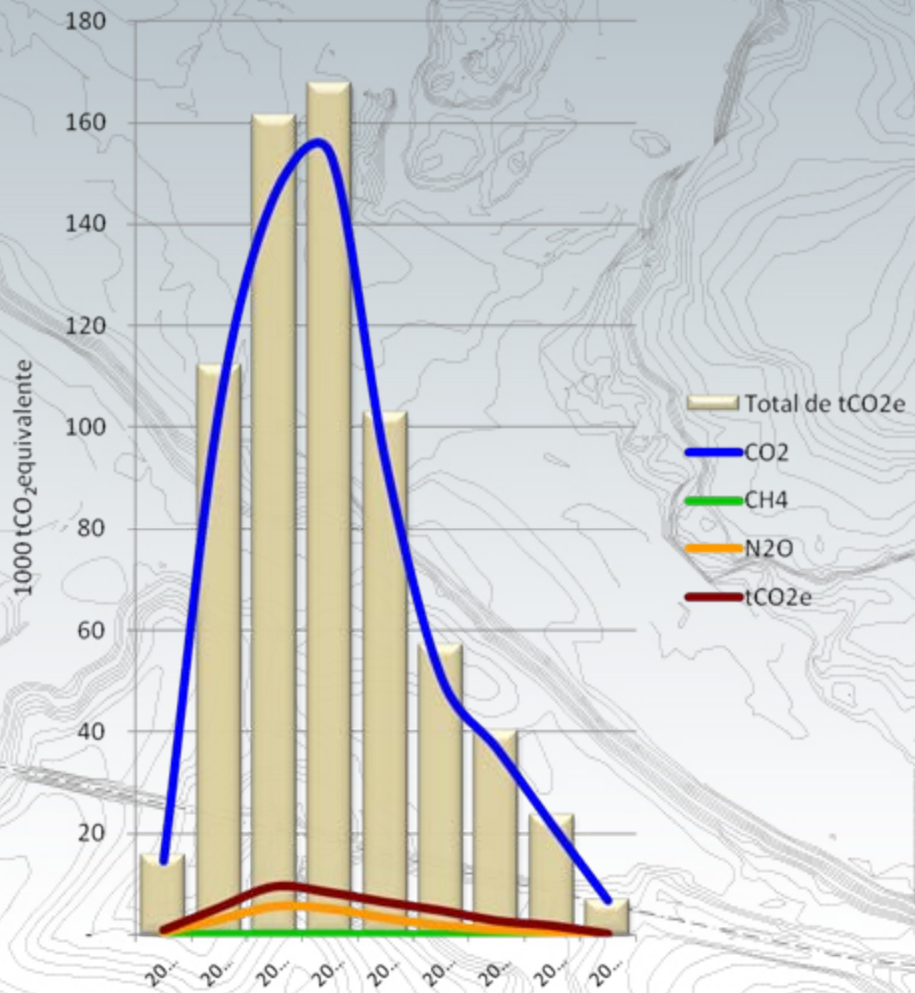


Combustíveis e Lubrificantes	508.178 tCO_2e	75%
Transporte	133.512 tCO_2e	18%
Energia Elétrica	13.651 tCO_2e	2%
GLP Alimentação	16.002 tCO_2e	2%
Explosivos	1.651 tCO_2e	0%
Esgoto Sanitário	9.929 tCO_2e	1%
Resíduos Sólidos	6.597 tCO_2e	1%
Total	**689.521 tCO_2e**	**100%**

Estimation of GHG Emissions During Construction

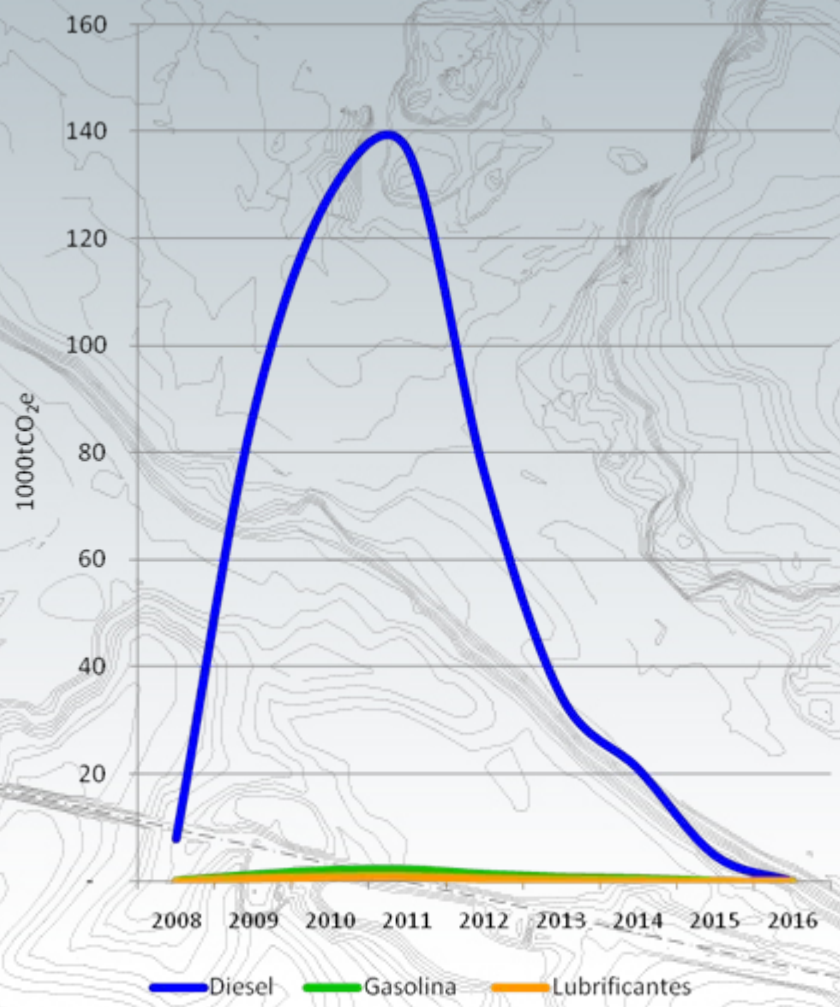


Emissions per type of GHG in tCO2e



Volume de GHG emitted tCO_2e	
CO_2	626.950
CH_4	951
N_2O	20.834
Estimated tCO_2e	40.786
Total tCO_2e	**689.521**

GHG Emissions from Fuels and Lubricants

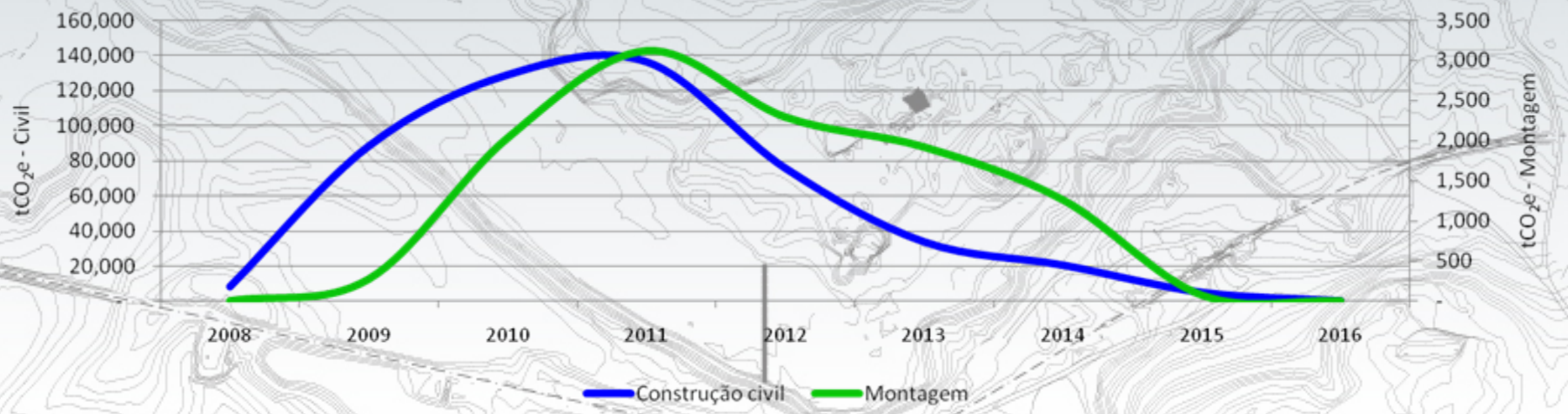


	tCO_2e	%
Diesel	496.758	98%
Gasoline	8.355	2%
Lubricants	3.066	1%
Total	**508.178**	**100%**

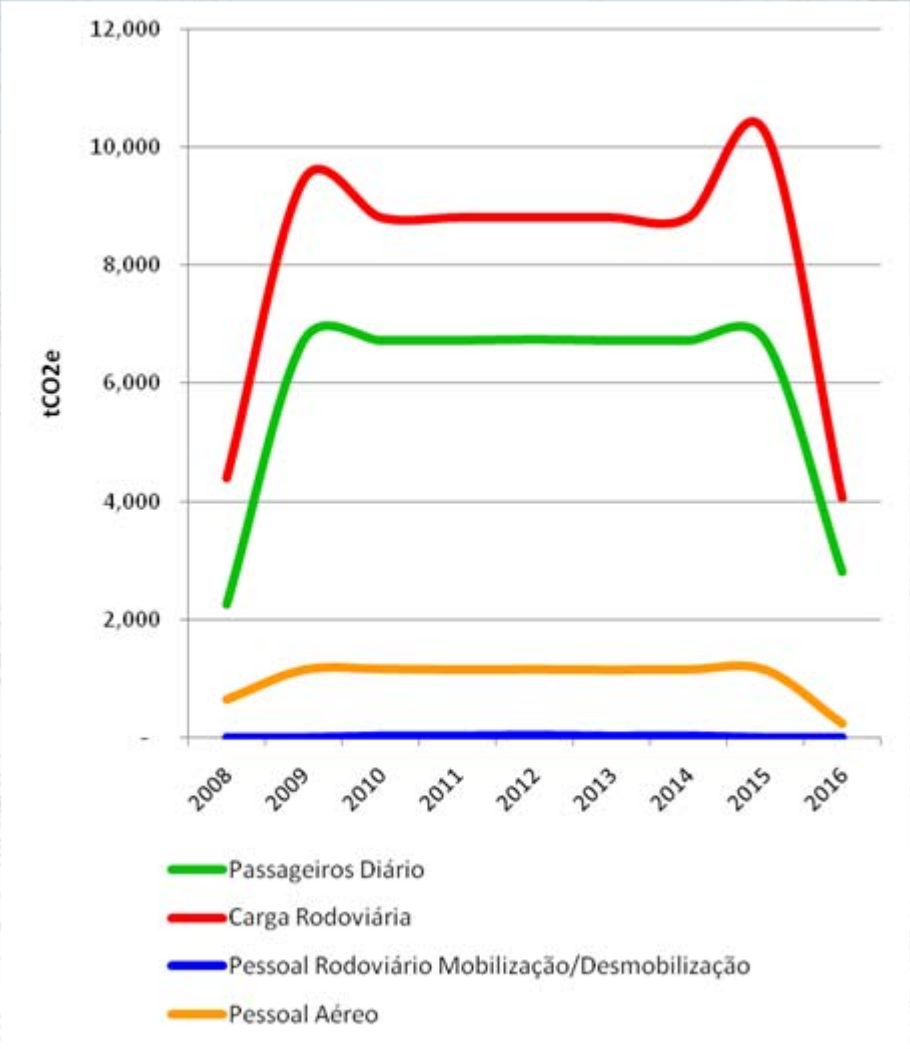
GHG Emissions from Fuels and Lubricants

GHG Emissions from the use of fuels and lubricants

	tCO_2e	%
Civil Construction	497.183	98%
Assembly	10.995	2%
Total	**508.178**	**100%**



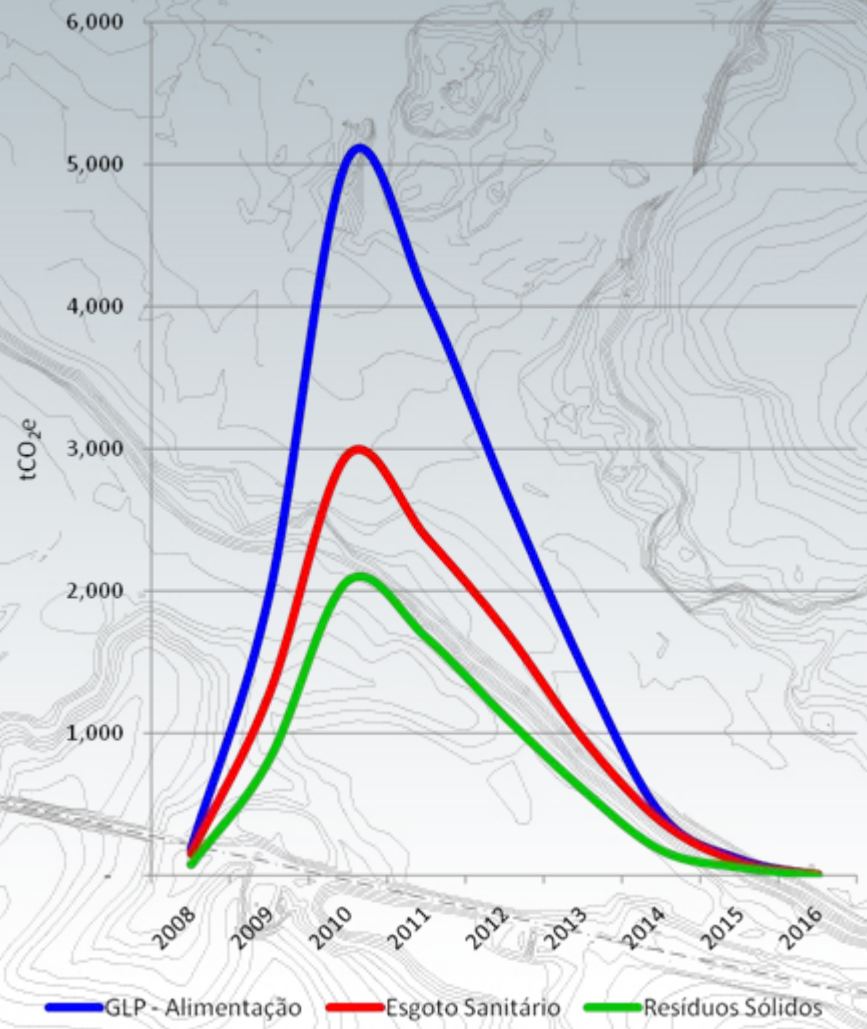
GHG Emissions from Transportation



GHG Emissions from transport of people and supplies/materials

	tCO2e	%
Daily Passengers	52.168	39%
Materials - Roads	72.210	54%
People - Roads	177	0%
Air Travel	8.957	7%
Total	**133.512**	**100%**

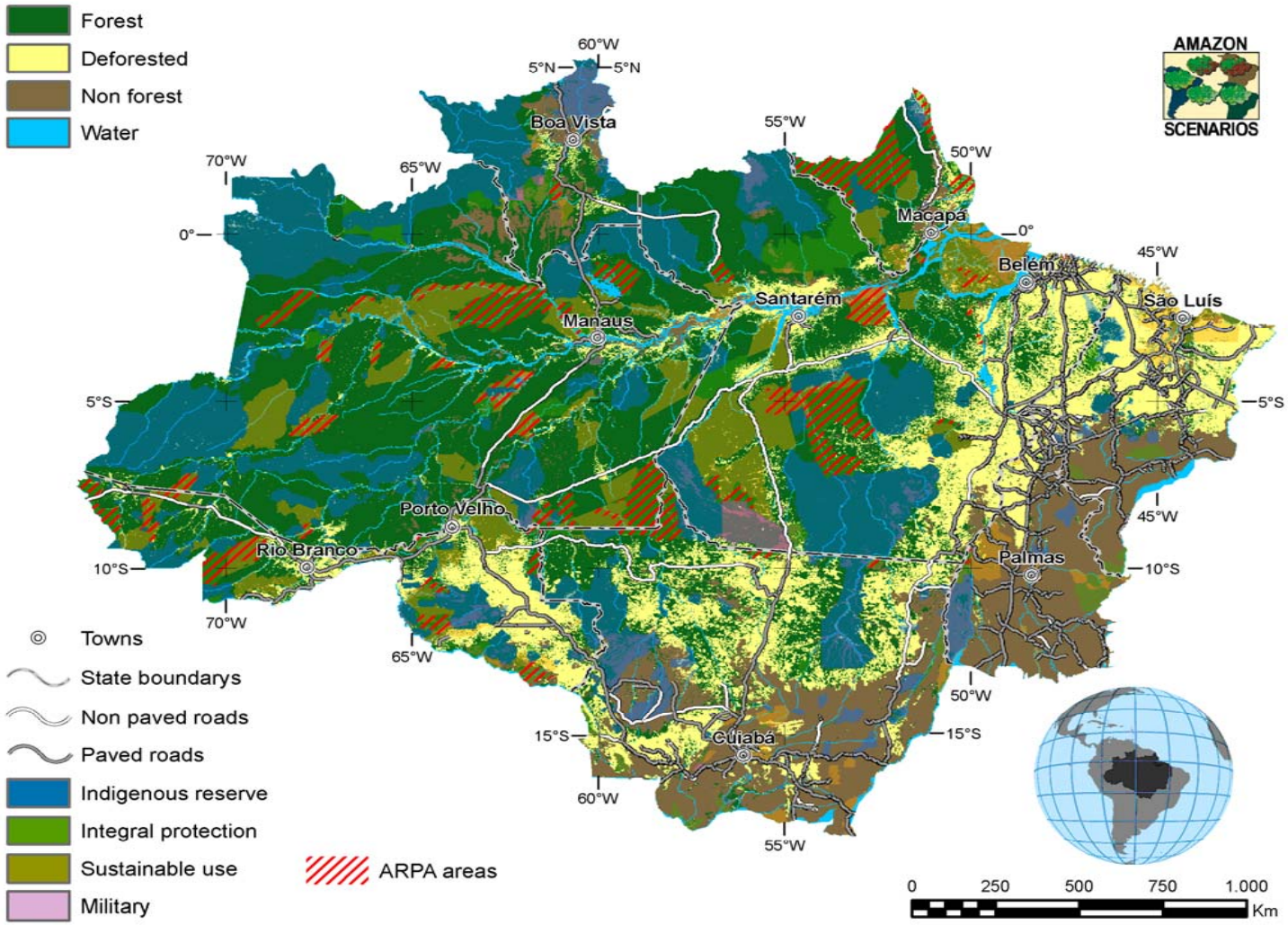
GHG Emissions from other Sources



GHG Emissions from other sources

	tCO_2e	%
GLP - Cooking	16.002	3%
Sewage	9.929	2%
Solid Waste	6.597	1%
Total	**32.529**	**6%**

Protected Areas under ARPA



312 thousand km²

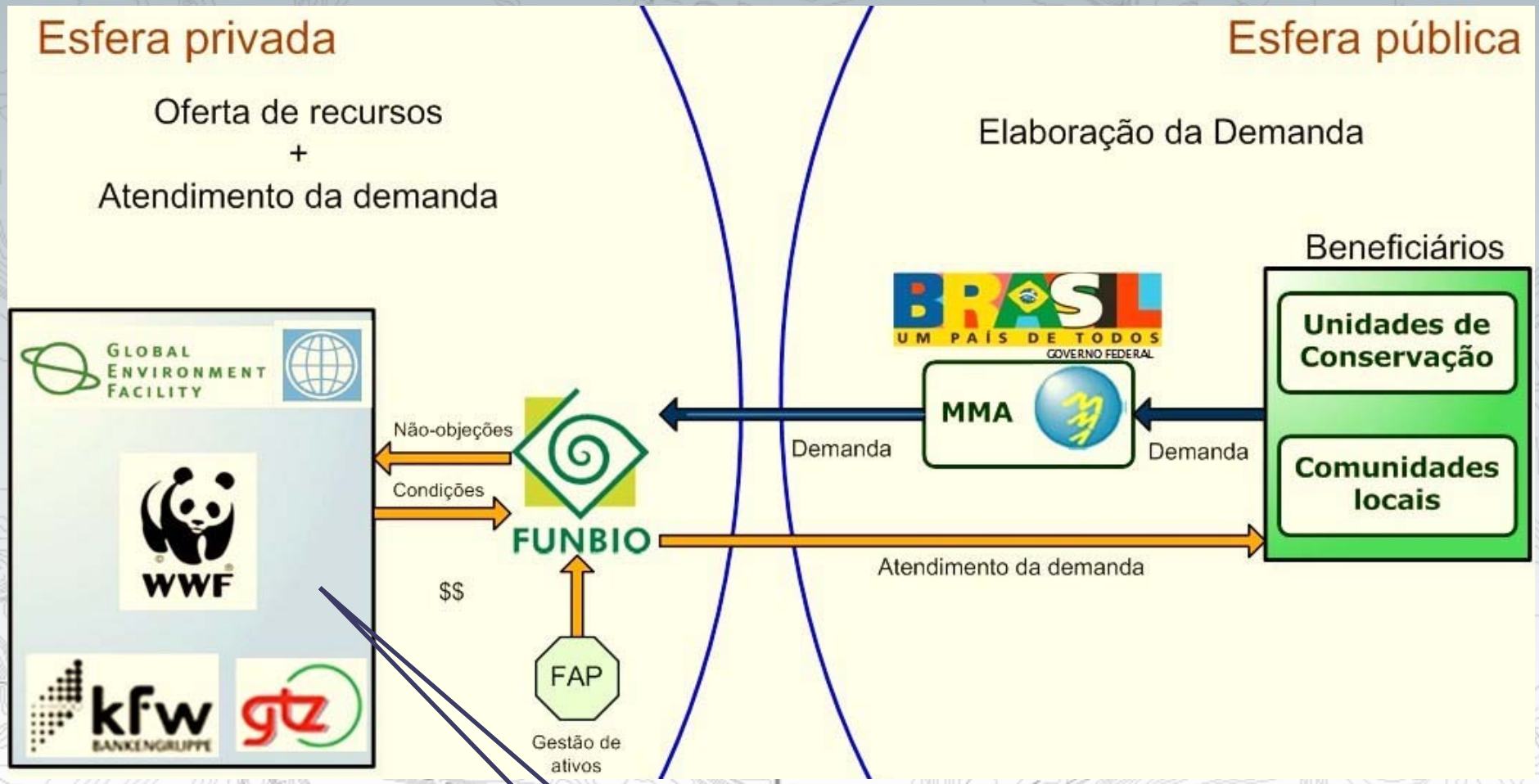
19% of Amazon Protected Areas

WWF

UFMG UNIVERSIDADE FEDERAL DE MINAS GERAIS

IPAM - INSTITUTO DE PESQUISA AMBIENTAL DA AMAZÔNIA

ARPA´S Model
"Public Private Partnership"



MESA
Madeira Energia S.A.

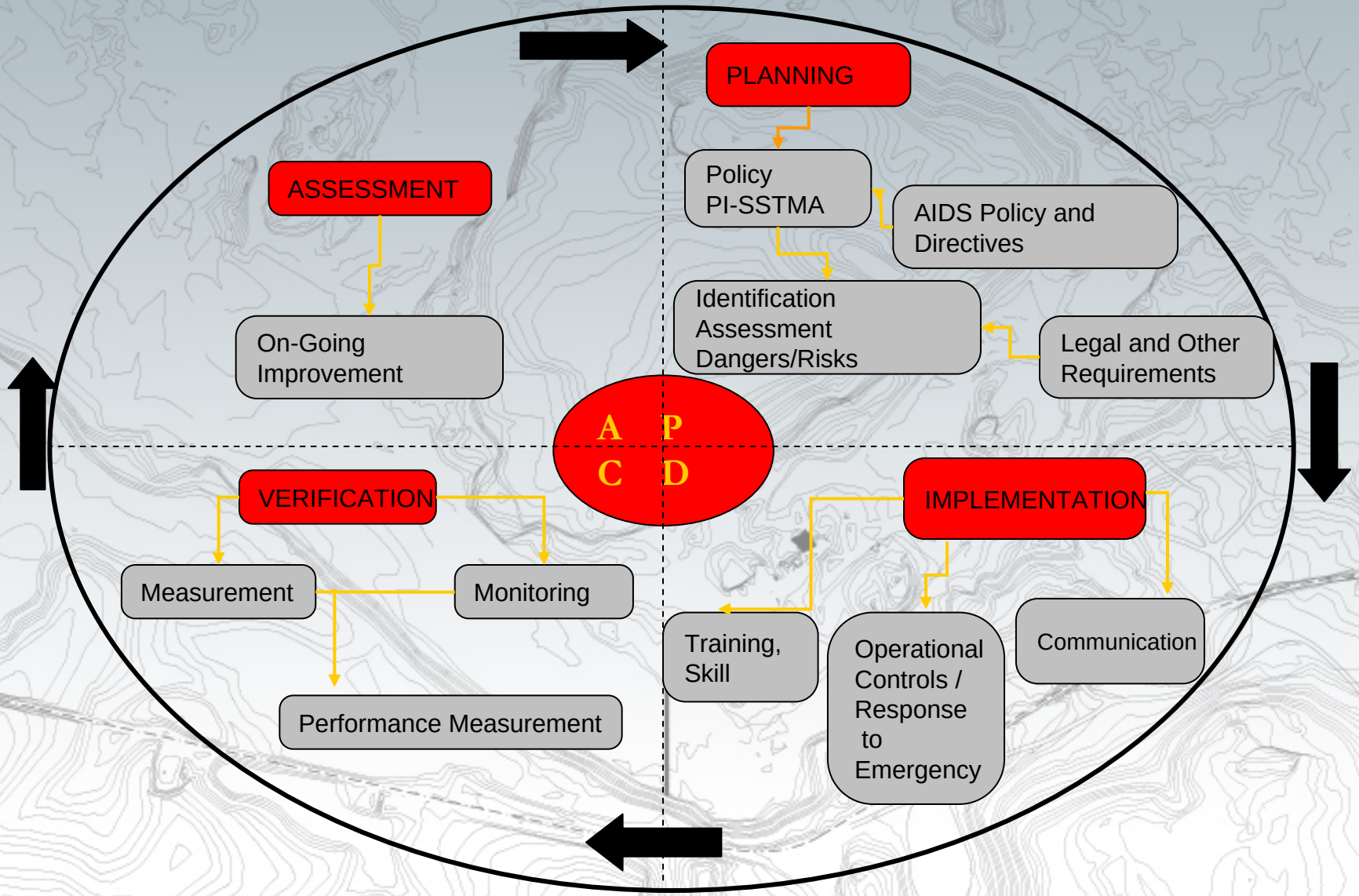
Fish Passage

Conclusions and Recommendations

Tips on "Roadway to Success"

- Planning – holistic approaches;
- Relevance to regional as well as national growth / development;
- Learn from past experiences;
- Anticipate risks and major challenges;
- Sharing of benefits with local populations;
- Partnerships with local institutions, social groups, NGOs, and local governments;
- Long term view on project cycle;
- Transparency;
- Effective communication;
- State of the art science and technology;
- Promote effective environmental gains.

EHS MANEGEMENT AND THE PROJECT CYCLE



Essential Role for Governments

- Licensing discussions should be brought to a <u>higher</u> level – strategies, plans and programs as oppose to individual projects;
- Establish boundaries (minimum limits) but provide <u>incentives</u> for better performer (e.g. sustainability requirements in public procurement, matching grants, public recognition; etc.);
- Implement reforms necessary to promote the implementation of innovative ideas and arrangements;
- Enforcement – the effective enforcement of rules and regulations is an essential role of Governments;
- Leveled playing field – *clear rules of the game*.

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Thank You

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