REPIC Fachveranstaltung

ECOGEO
Commitment to the Environment

Ernesto Moeri

Bern, September 24th, 2013

Group structure

ECOGEO
Commitment to the Environment

~ 180 employees – Consolidated Revenues 2012: ~ USD 25 mi

GEOKLOCK

Environmental consulting, engineering and services

100%

ECOGEO

Environment and renewable energies

BIOLATINA

Energy from residual biomass

100%

BACHEMA

Laboratory for physical-chemical analysis of soil, water and air

60%

EKOS BRASIL

Biodiversity protection and sustainable development

ALGAE

Microalgae technology

35 %

Greenland, East Coast

ECOGEO
Commitment to the Environment

Greenland, 1975

ECOGEO
Commitment to the Environment

Mineral Exploration, Para - 1980

ECOGEO
Commitment to the Environment

Mineral Exploration, Amazon

ECOGEO
Commitment to the Environment

Semi-Arid Northeast, Paraiba

ECOGEO
Commitment to the Environment

Geotechnical Services, Paraiba 1984

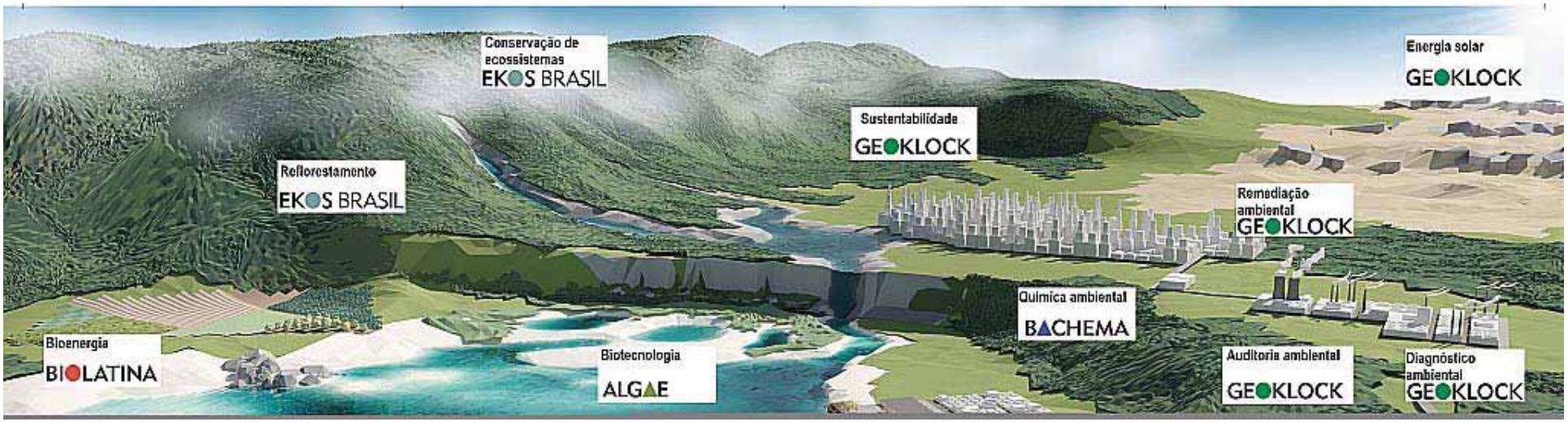
ECOGEO
Commitment to the Environment

Jeronimo, 2010

ECOGEO
Commitment to the Environment

Areas of Activity

ECOGEO
Commitment to the Environment



Clients

ECOGEO
Commitment to the Environment

ABB
Clariant
Bayer
Se é Bayer, é bom.
Rhodia
BOSCH
NOVARTIS
Nestlé
BASF
The Chemical Company
USIMINAS
PHILIPS
sense and simplicity
TOYOTA
TUPY
Electrolux
YAMANAGOLD
Votorantim
FIAT
MAGNETI MARELLI
VALE
Itaú
BR PETROBRAS
Citrovita
Votorantim
DUPONT
The miracles of science

Environmental Assessment and Remediation, 1990

ECOGEO
Commitment to the Environment

Amazon Rainforest

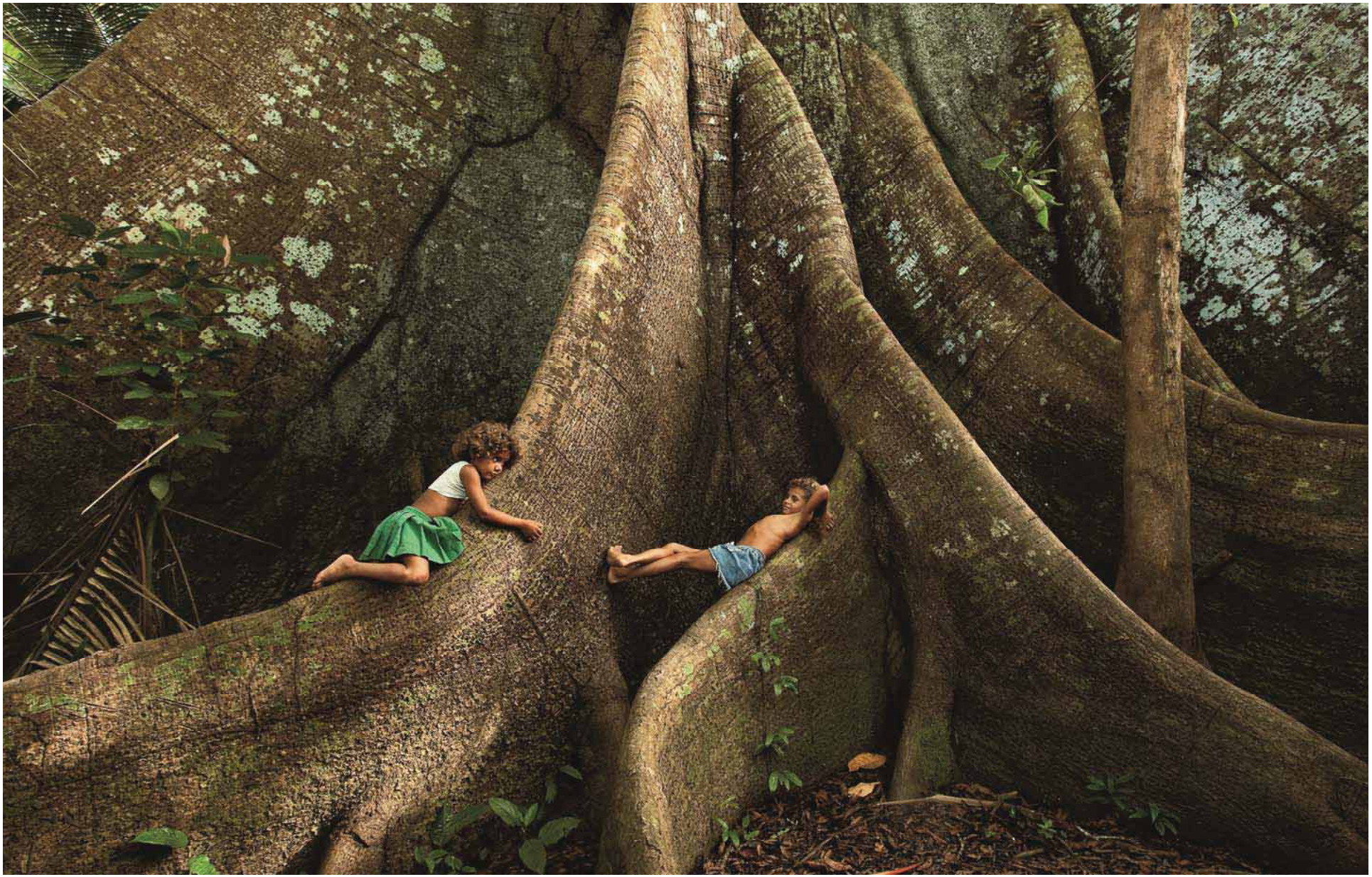
ECOGEO
Commitment to the Environment

Amazon Rainforest

ECOGEO
Commitment to the Environment

Amazon Rainforest

ECOGEO
Commitment to the Environment



Agribusiness, São Paulo State

ECOGEO
Commitment to the Environment

REPIC Experience

ECOGEO
Commitment to the Environment

Biogas Seminar São Paulo, September 21th, 2010

REPIC Experience

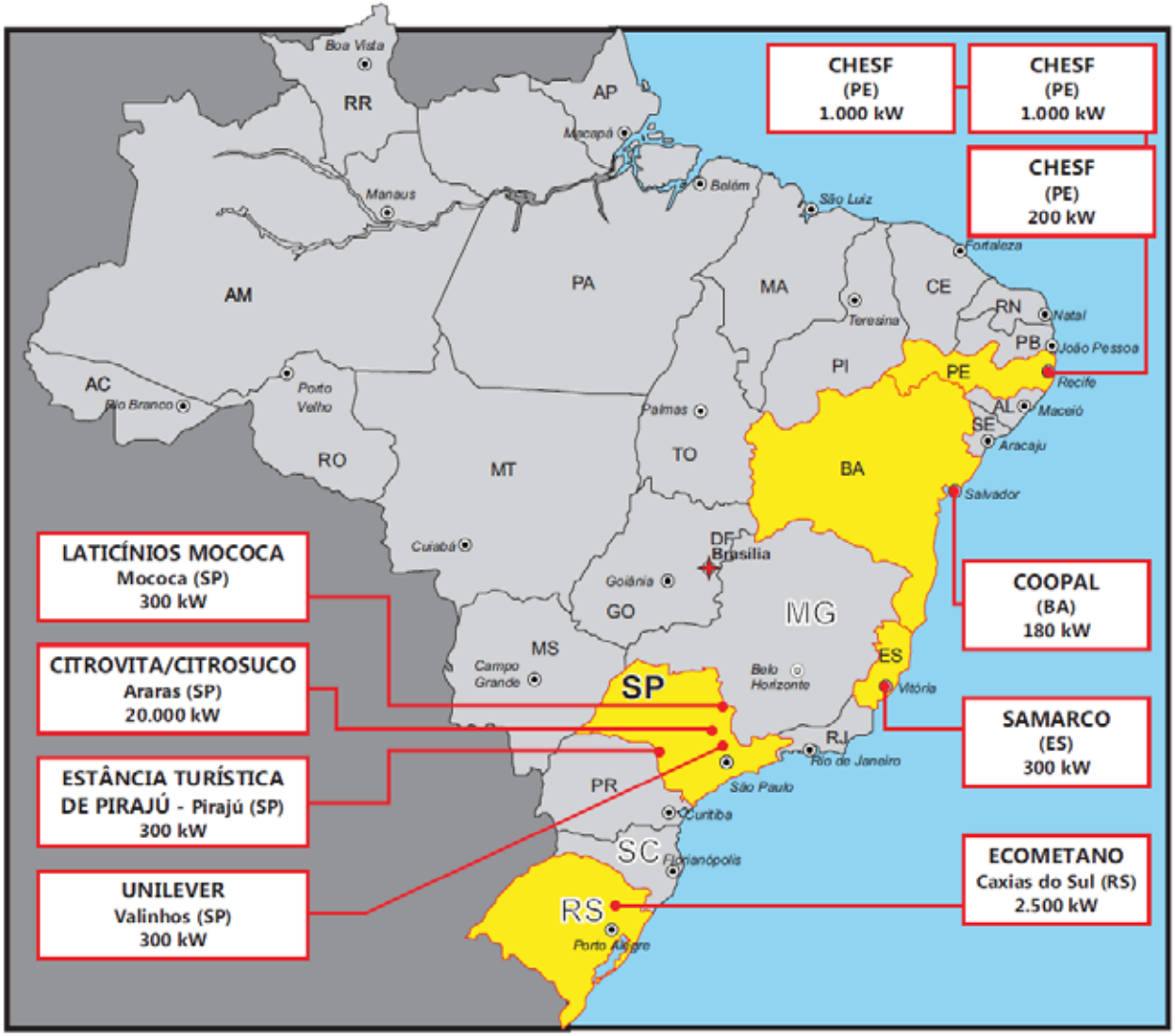
ECOGEO
Commitment to the Environment

Biogas Micro turbine 35m³/h – 60kWp *Fazenda São Paulo, Minas Gerais State – May, 2012*

REPIC Experience

ECOGEO
Commitment to the Environment

Projects in pipeline



BRAZIL 2050

The green and yellow energy future

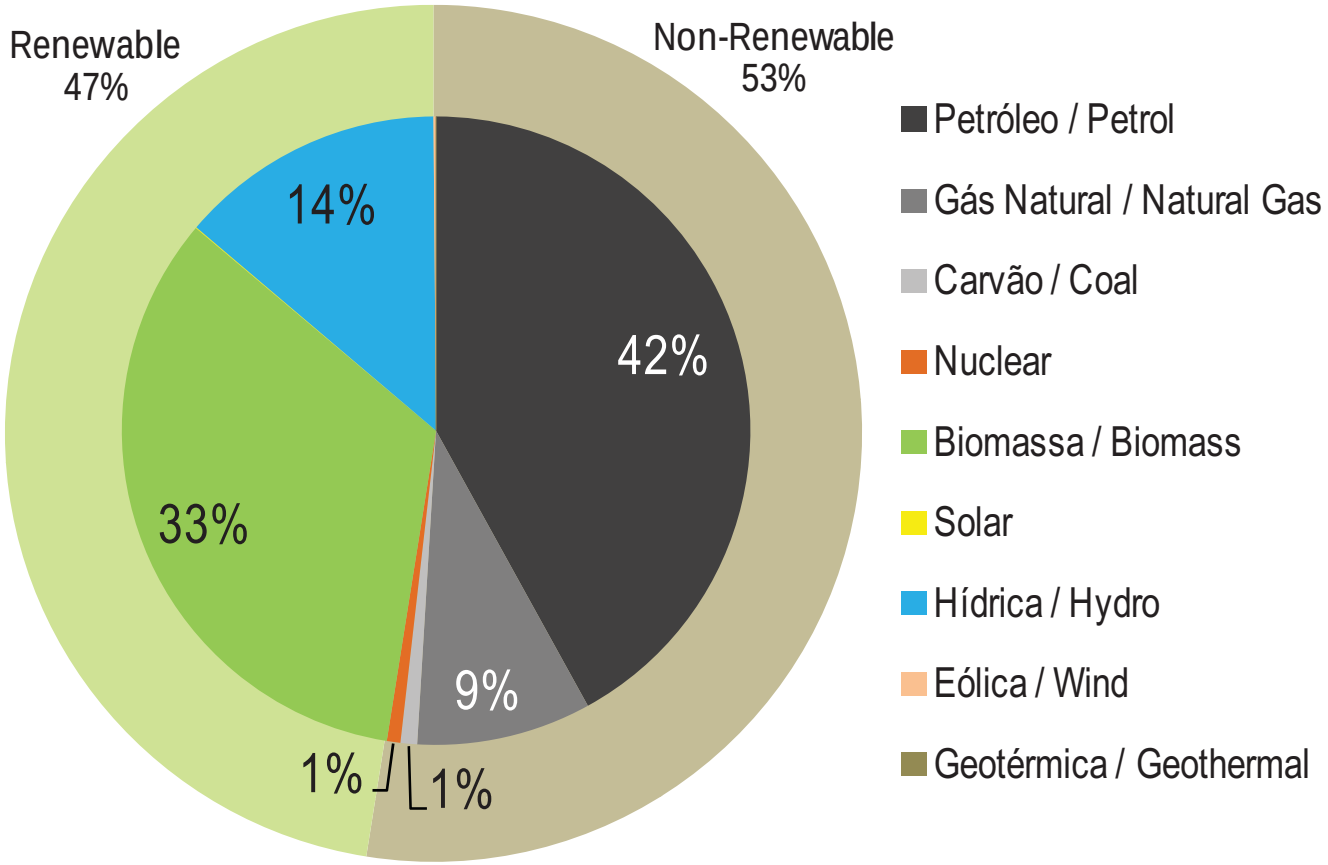
September, 2013

EKOS BRASIL

Current energy scenario

EKOS BRASIL
ECOGEO
Commitment to the Environment

Energy production 2010

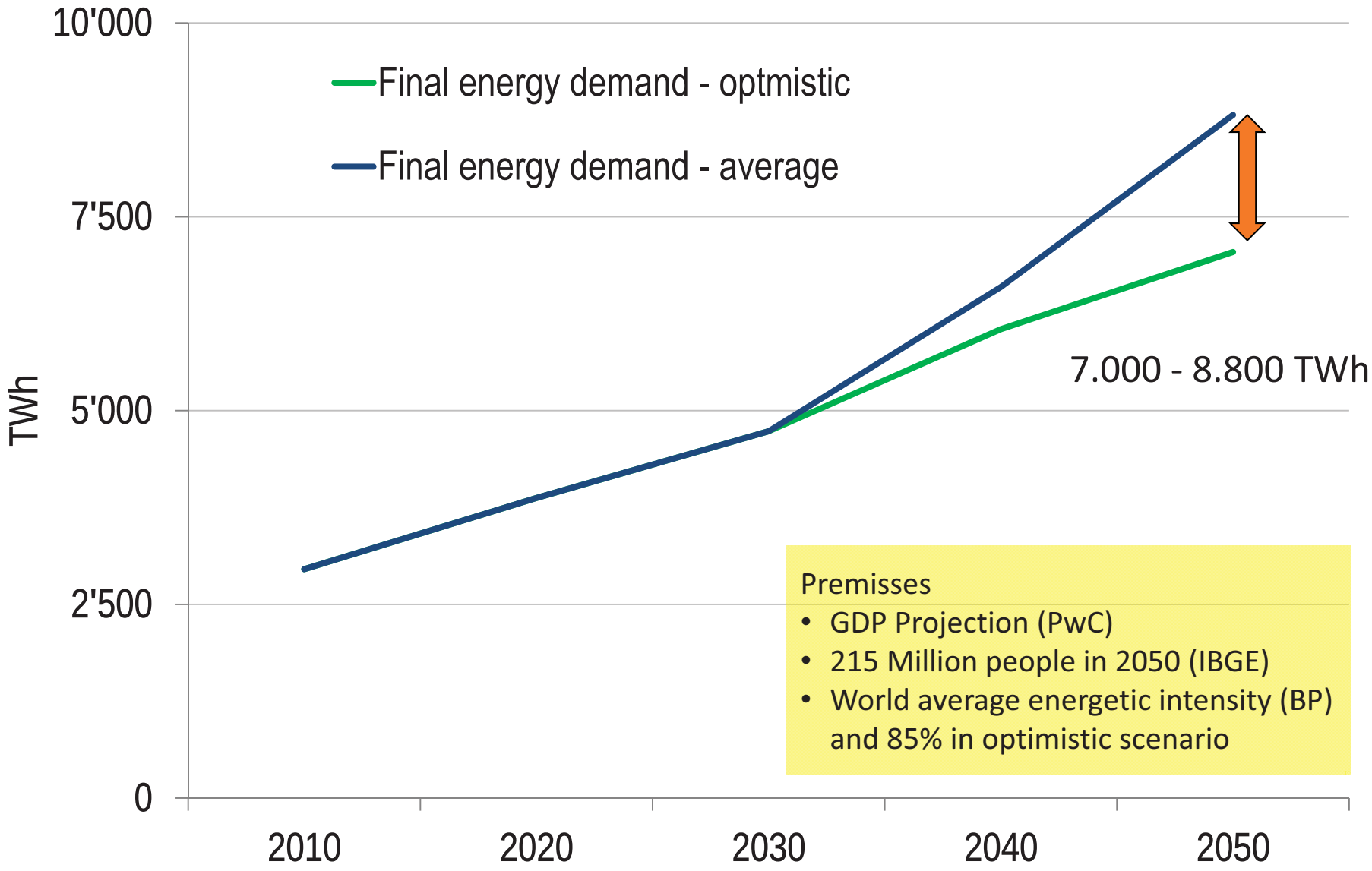


2012 energy demand: 2.950 TWh

Source: Ministério de Minas e Energia – MME, 2011 / 2013

Energy consumption 2050

EKOS BRASIL
ECOGEO
Commitment to the Environment



Premisses
- GDP Projection (PwC)
- 215 Million people in 2050 (IBGE)
- World average energetic intensity (BP) and 85% in optimistic scenario

Renewable Energy Potential

EKOS BRASIL
ECOGEO
Commitment to the Environment

theoretical potential

technical and ecological potential — consideration of technical and ecological restrictions

social potential — consideration of social restrictions and sensitive regions

economic potential — unsuitable sites and plants regarding economic efficiency and feasability

feasible potential — existing and prospective competitive utilisation

Renewable Energy Potential

EKOS BRASIL
ECOGEO
Commitment to the Environment

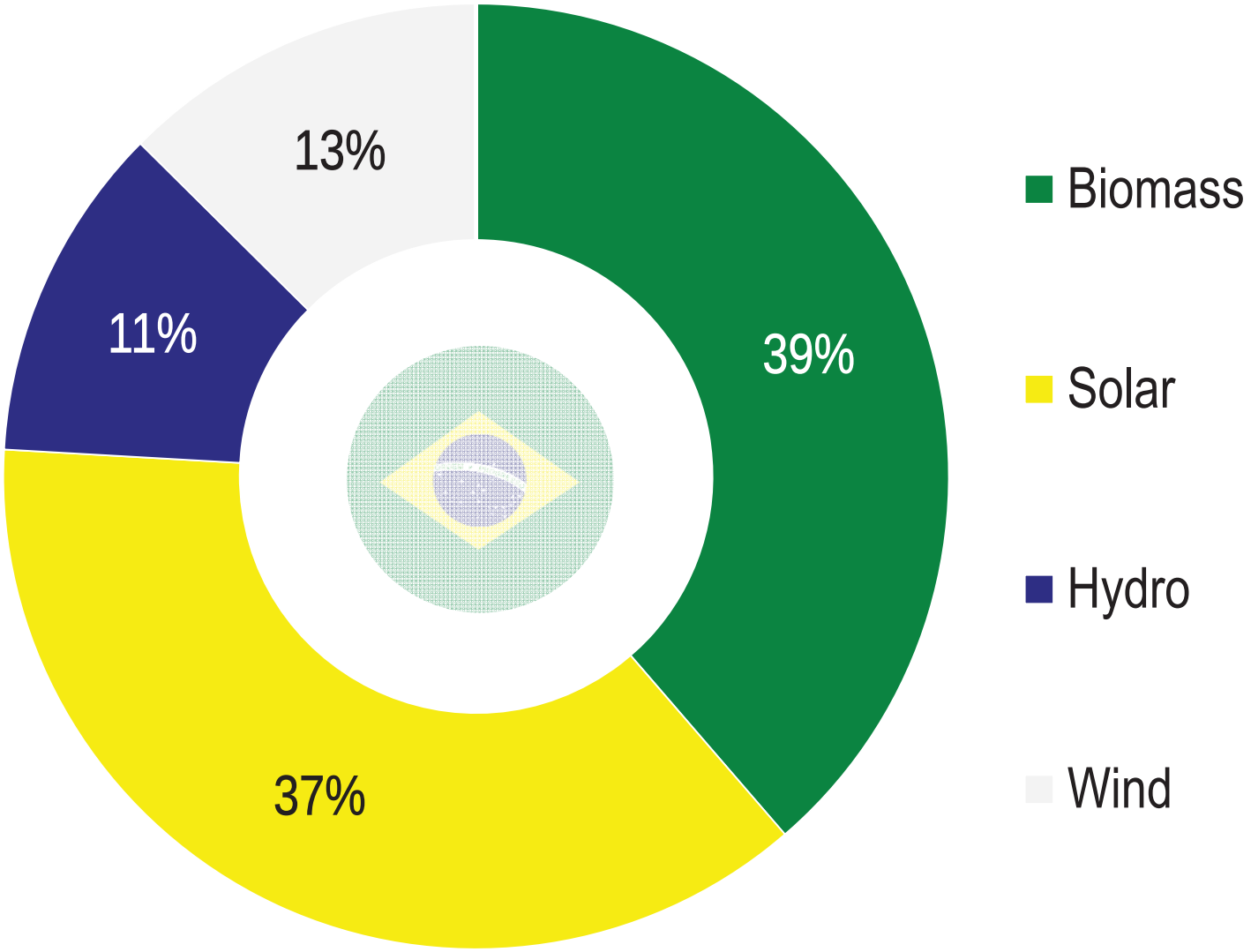
Energy Sources	Potential 2050 [TWh]
Biomass	5 000
Energetic Crops	*1 171*
Agriculture biomass residues	*2 006*
Agroindustrial biomass residues	*1 694*
Urban residues and sewage	*46*
Manure	*79*
Algae	*3*
Solar	5 220
Photovoltaic	*4 950*
Thermal	*270*
Hydro	1 157
Hidropower	*882*
Tides and Waves	*80*
Wind	1 388
Geothermal	1
Total	12 766

Available Energy Potential 2050	[TWh]
Biomass	3 213
Ethanol	532
Biodiesel	280
Biogas	146
Gasification	215
Incineration	1 718
Charcoal / Pellets	320
Biokerosene	3
Solar	3 084
PV integrated in buildings	1 080
Solar heat plant in buildings	480
PV open-field	1 524
Hydro	932
Small hydropower	92
Large hydropower	840
Tidal Power	0
Wind	1 040
Small wind park	260
Large wind park	780
Geothermal	0,8
Total	8 270

Renewable and Feasible Energy Potential

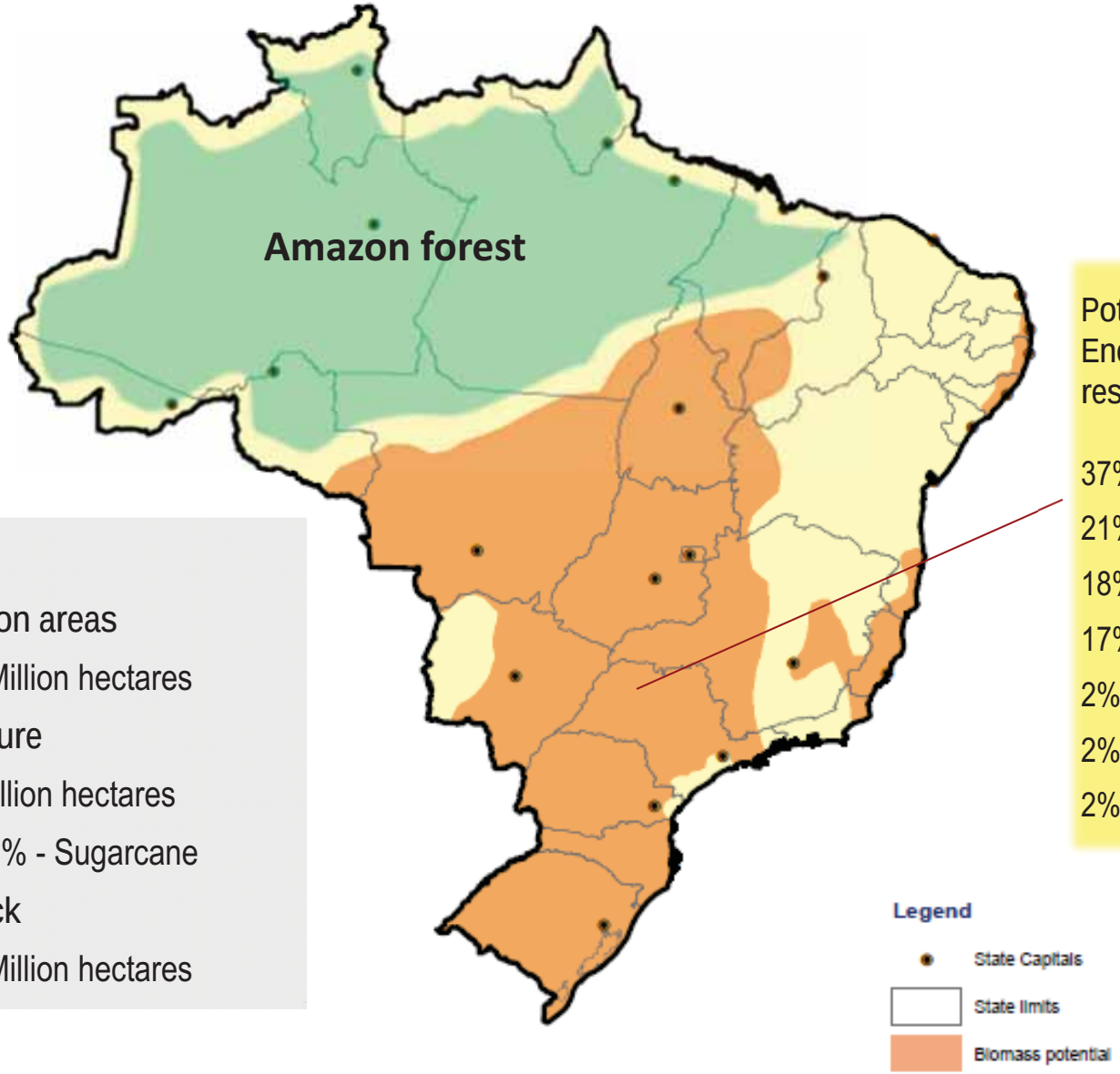
EKOS BRASIL
ECOGEO
Commitment to the Environment

Projection 2050



Biomass

EKOS BRASIL
ECOGEO
Commitment to the Environment



2010

Protection areas

- 405 Million hectares

Agriculture

- 66 Million hectares
  - 10% - Sugarcane

Livestock

- 210 Million hectares

Potential: 5.000 TWh (2050)
Energetic crops and biomass residues

37% Sugarcane

21% Soy, Jatropha

18% Corn

17% Firewood

2% Rice

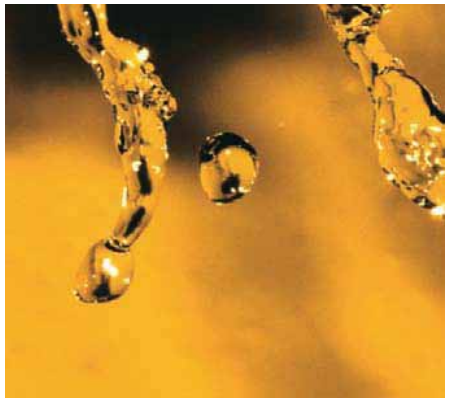
2% Manure

2% Municipal waste

Biomass

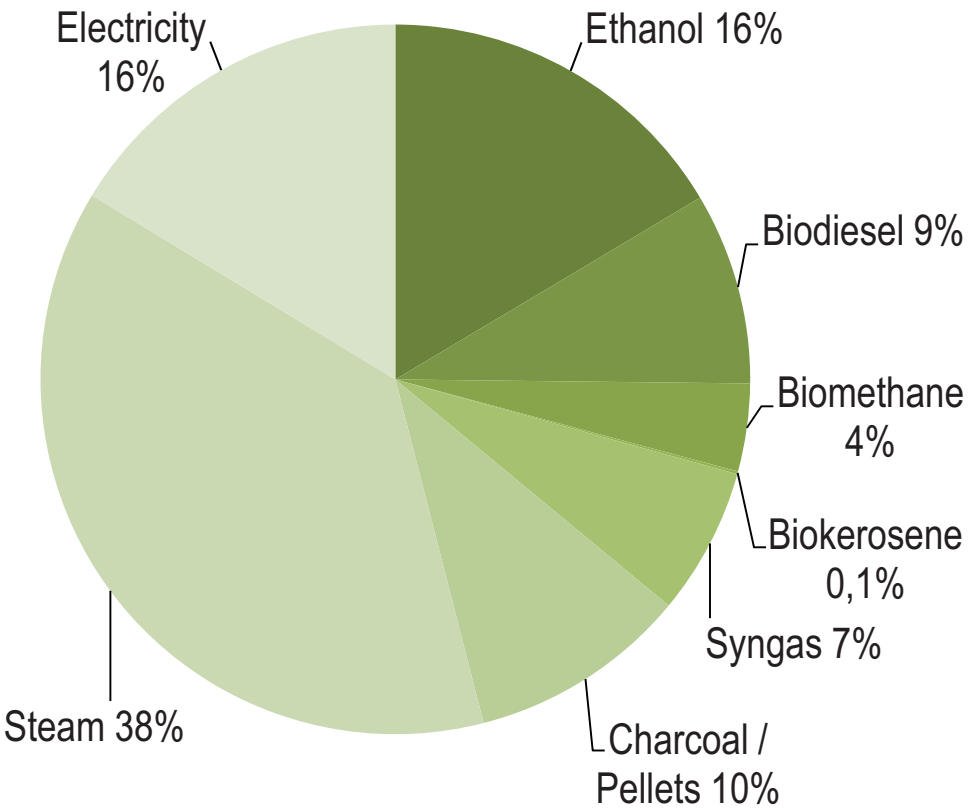
EKOS BRASIL
ECOGEO
Commitment to the Environment






Biomass Energy

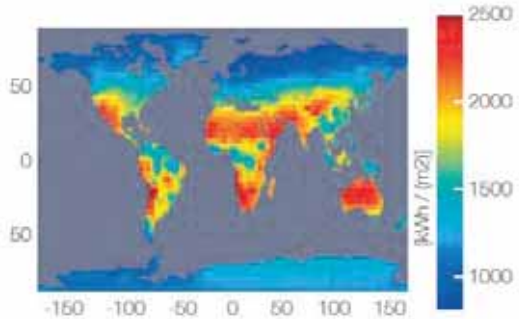
3.200 TWh em 2050



Solar Irradiation in Latin America

EKOS BRASIL
ECOGEO
Commitment to the Environment

The hot spots in the "Sunbelt" (Sonora desert, Atacama desert and Northeastern Brazil) offer Solar irradiation of > 2000 kWh/m²/year



source: Gregor Czisch, ISET, Kassel, Germany.

Global Irradiation

- > 2100 kWh/m²a
- 1700 - 2100
- 1350 - 1700
- 1050 - 1350
- < 1050

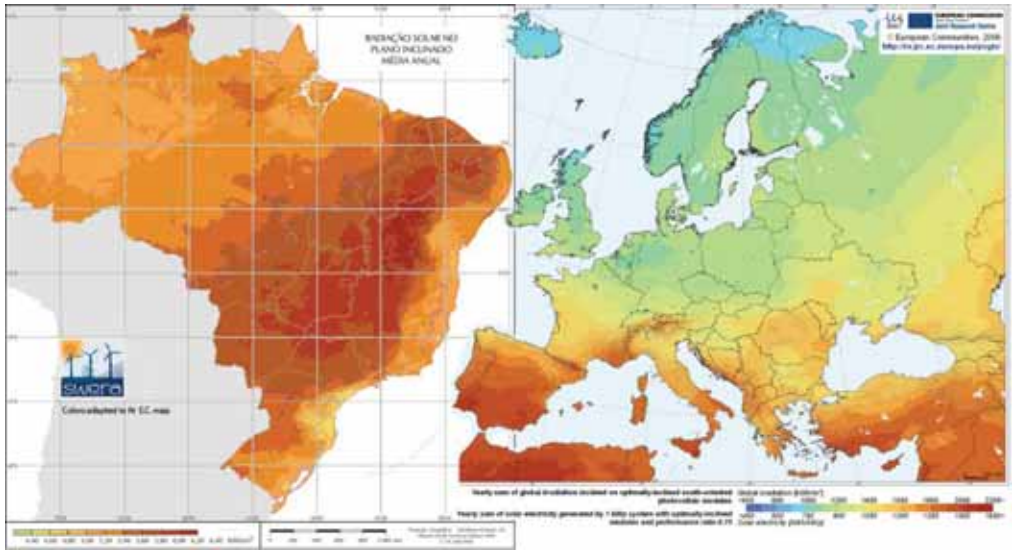
Data source:
Meteonorm 4.0
Meteotest, CH-3000 Bern

Cartography:
©2005
Energie-Atlas GmbH
CH-4142 Münchenstein

Source: World Bank, IMF, A.T. Kearney analysis

Brazil has a huge PV potential

EKOS BRASIL
ECOGEO
Commitment to the Environment



- The size of Brazil compares to the distance from the southernmost tip of Spain to the north cape
- The location with the lowest solar irradiation in Brazil has higher values than the best site in Germany while Germany, having 24 times less land mass, had an approx. 1000 times larger installed base of PV by the end of 2012

Brazil: <35 MWp PV installed by 12/2012

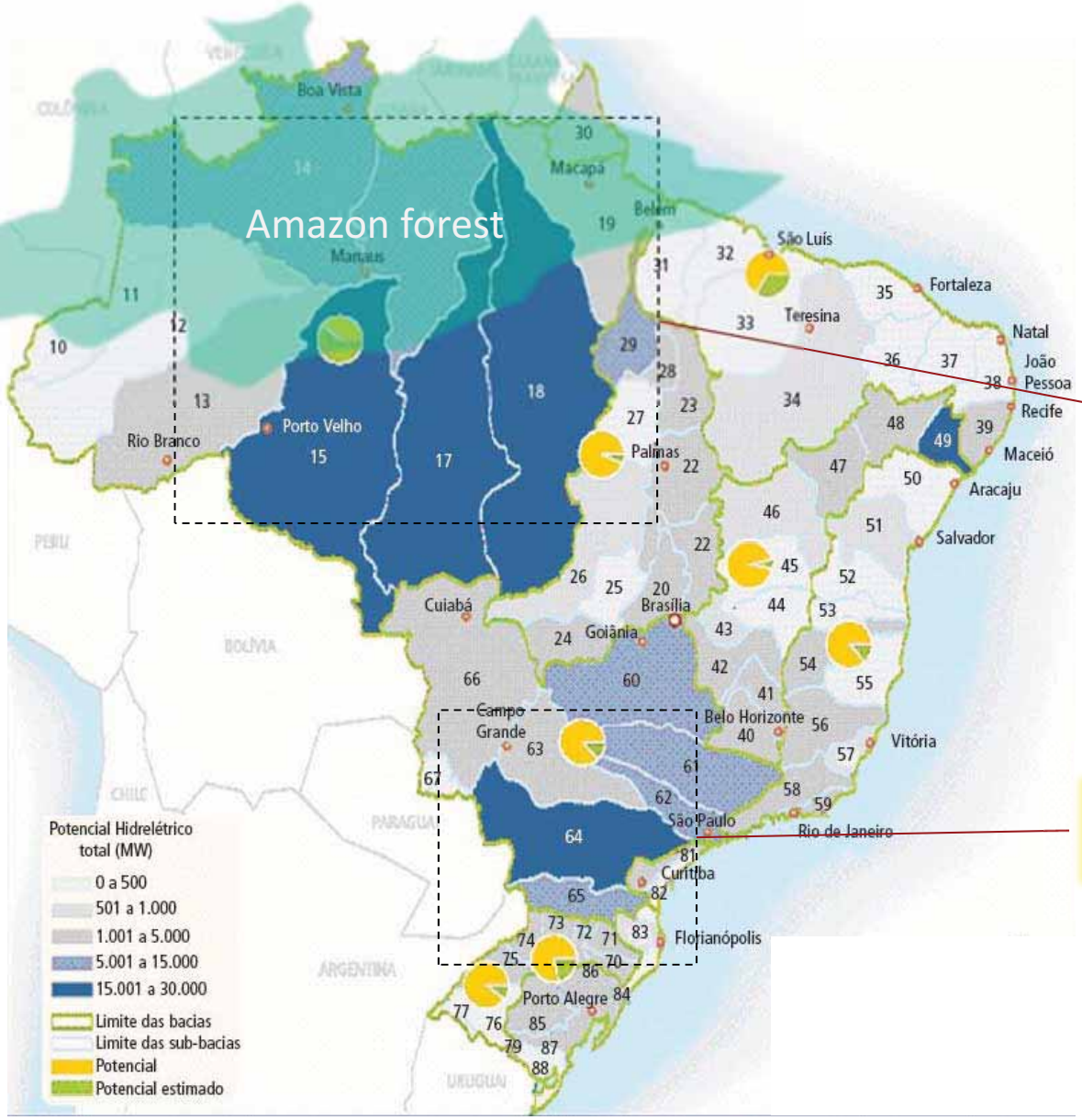
Germany:>30GWp PV installed by 12/2012

	Brazil	Germany
Number of citizens	184 million	82 million
Number of residential consumers	48,3 million	44 million
Total energy consumption	336 TWh/year	616 TWh/year
Total residential energy consumption	85 TWh/ year	140 TWh/ year
Energy prices for residencies	0,14 Euros/KWh	0,19 Euros/KWh
Max solar radiation per year	2226-2300 KWh/m2/year	1150-1200 KWh/m2/year
Min solar radiation per year	1642-1715 KWh/m2/year	900-950 KWh/m2/year

Sources: Aneel and BMU, 2007

Water

EKOS BRASIL
ECOGEO
Commitment to the Environment



Conservation areas:

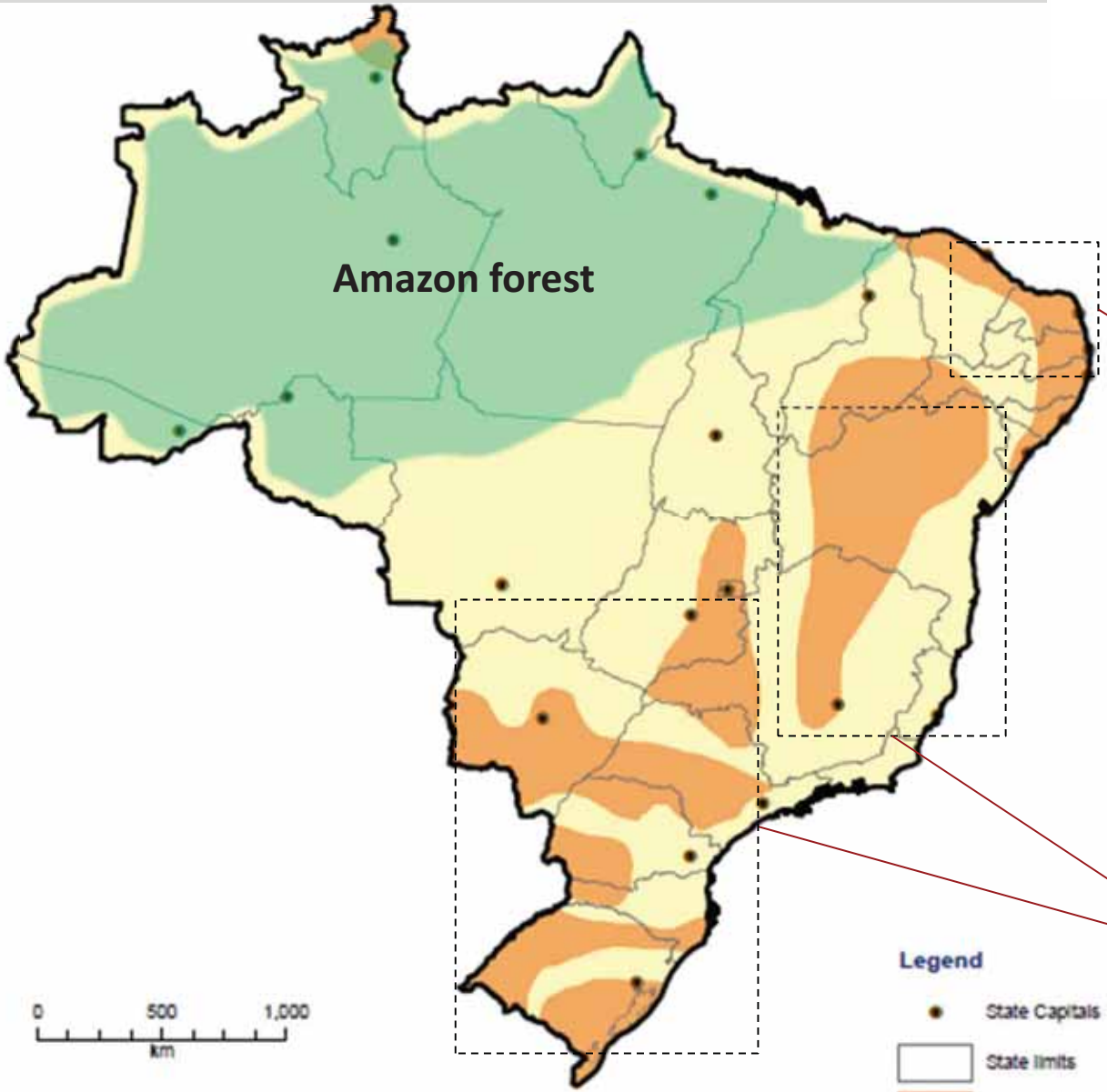
NOT CONSIDERED

Potential watersheds

Fonte: Plano Nacional de Energia 2030

Wind

EKOS BRASIL
ECOGEO
Commitment to the Environment



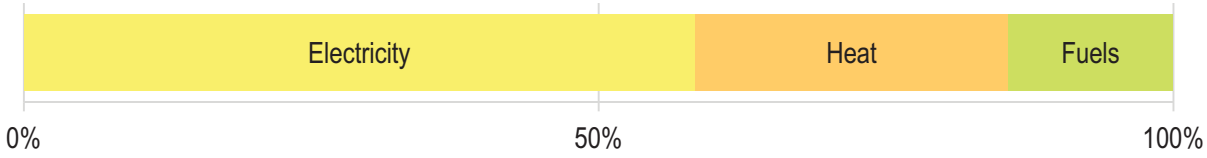
Existing wind parks, potential use in expansion

Potential areas to be explored

Conclusions

EKOS BRASIL
ECOGEO
Commitment to the Environment

- Brazil can supply 100% of its energetic demand with renewable sources by 2050
- Biomass and solar power: 75% of total energy
- Development of poor regions
- Storage and transmission strategy needed
- Future matrix based on electricity
- 1 Gigawatt CO2 energy emission reduction
- Investment opportunities



Biomass Case Study

ECOGEO
Commitment to the Environment

Biomethane Generation

Location: RS

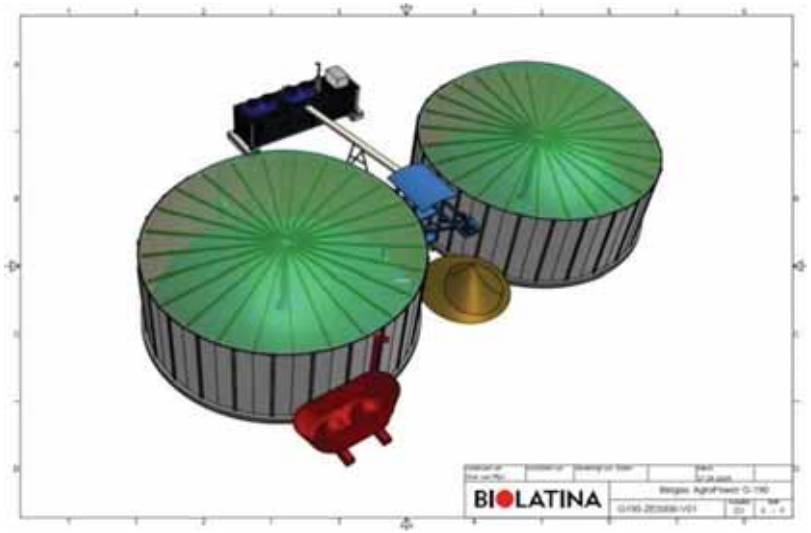
Installed capacity: 20.000 m³/day

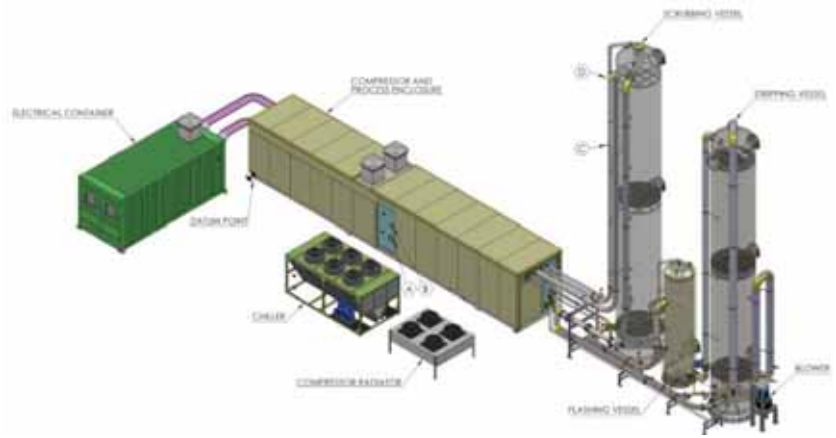
Raw material: 500 ton/day - Agriculture wastes

CAPEX: U$ 15.000.000

Biomethane cost: U$ 0,3 / m³

Estimated payback : 4.5 years





Biomass Case Study

ECOGEO
Commitment to the Environment

Bioenergy Generation

Location: SP

Installed capacity: 150 kW

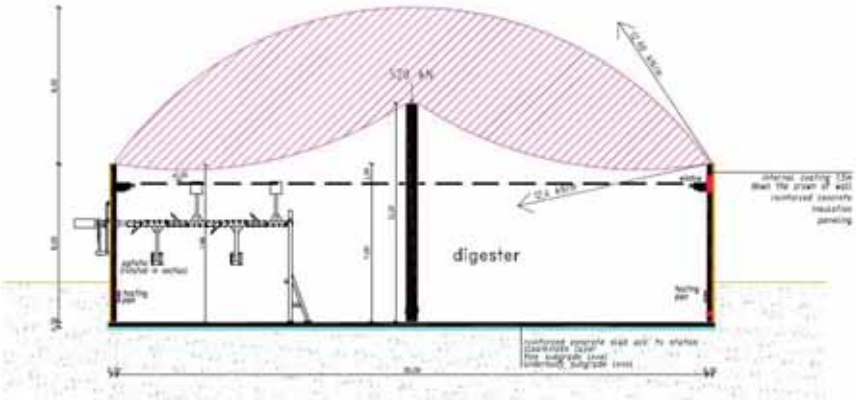
- Electric power: 1.000 people
- Fertilizer: 200 hectares

Raw material: 15 ton/day – Municipal organic wastes

CAPEX: U$ 1.000.000

Bioenergy cost: U$ 0,1 / kWh

Estimated payback : 3.5 years



Photovoltaic Case Study

ECOGEO
Commitment to the Environment

Solar PV Carport

Location: Maracanã – Rio de Janeiro – RJ

Parking capacity: 280 cars

PV modules: 2000 x 250Wattp

PV Installed capacity: 500kWp

Total PV Modules area: 3400m²

Sun irradiation at the site: 4.85 kWh/m2.dia

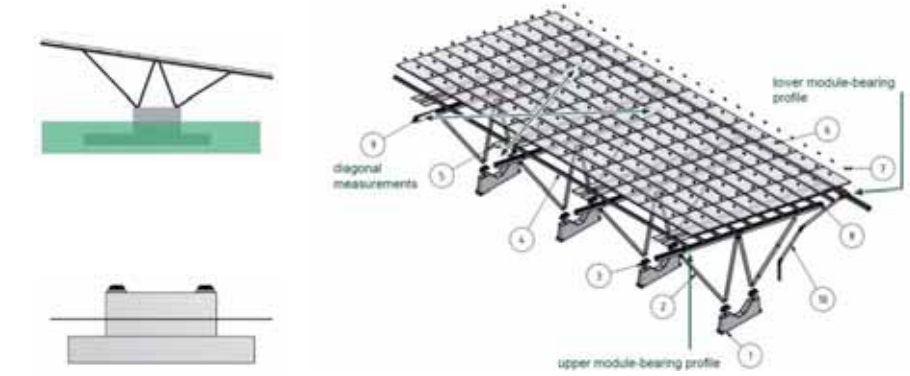
Annual energy yield: 885.125kWh

CAPEX: U$ 1.660.000

Actual energy cost at the site: U$ 0,17/ kWh

Levelized Cost of Energy : ~U$ 0,10/ kWh

Historical energy inflation: 7% per year



Photovoltaic Case Study

ECOGEO
Commitment to the Environment

Rooftop Solar PV - Sustainable Laboratory

Location: Bachema – São Paulo SP– SP

Anual average energy consumption: 168.000 kWh/m

PV modules: 400 x 250Wattp

PV Installed capacity: 100kWp

Total PV Modules area: 670m²

Sun irradiation at the site: 4.5 kWh/m2.dia

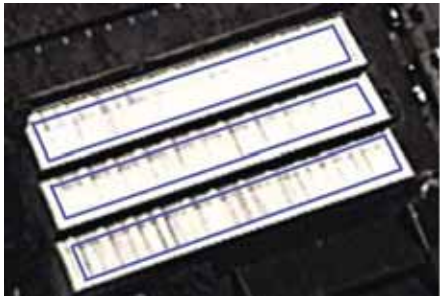
Annual energy yield: 152.400kWh

CAPEX: U$ 250.000 (Approx.)

Actual energy cost at the site: U$ 0,12/ kWh

Levelized Cost of Energy : ~U$ 0,8/ kWh

Historical energy inflation: 7% per year



Ekos Brasil Institute

www.ekosbrasil.org

ernesto.moeri@ecogeo.com.br

Fotos: Araquém Alcântara