

Workshop on Equitable Access to Basic Services: Insights for Latin America

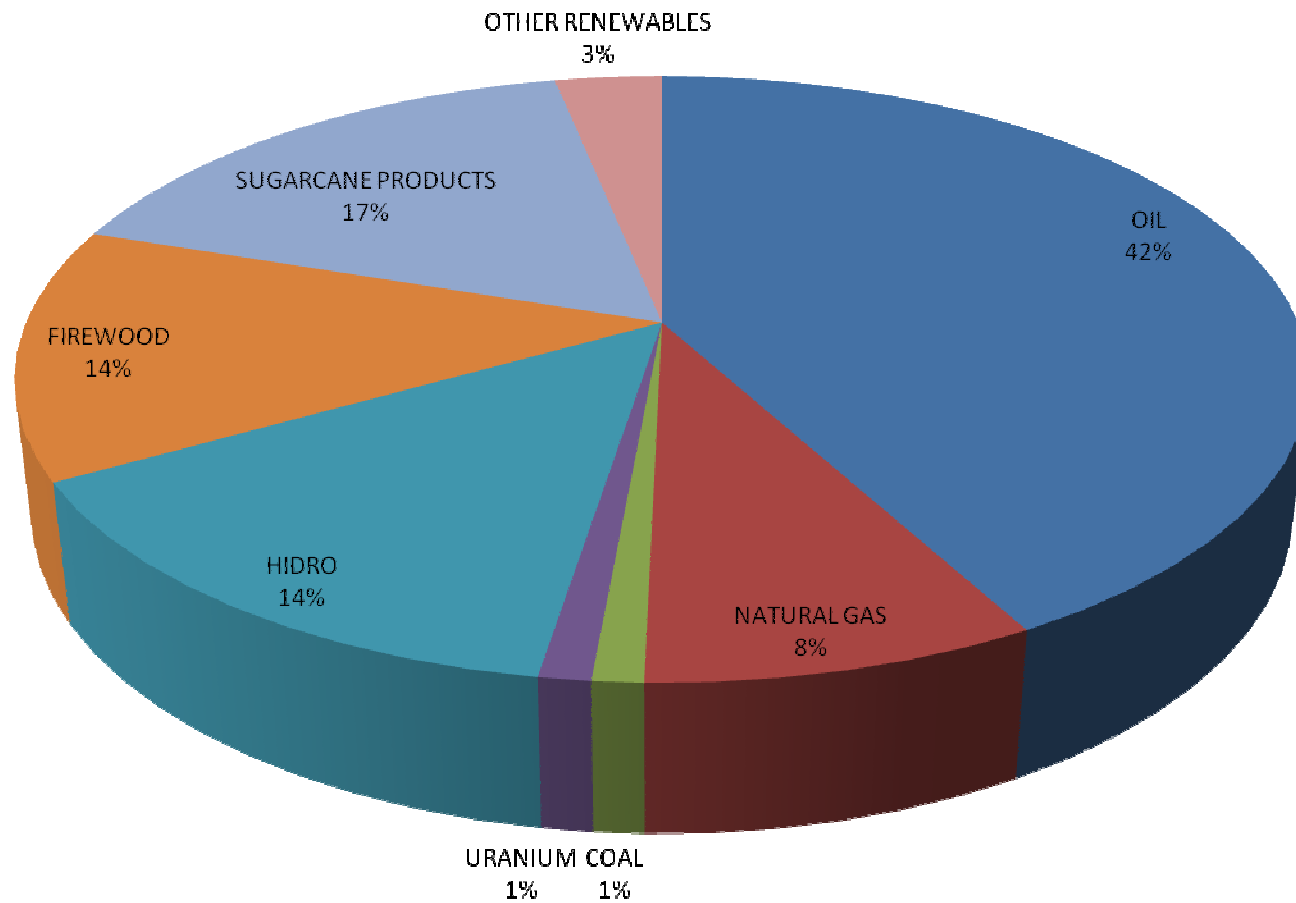


Energy Access in Brazil

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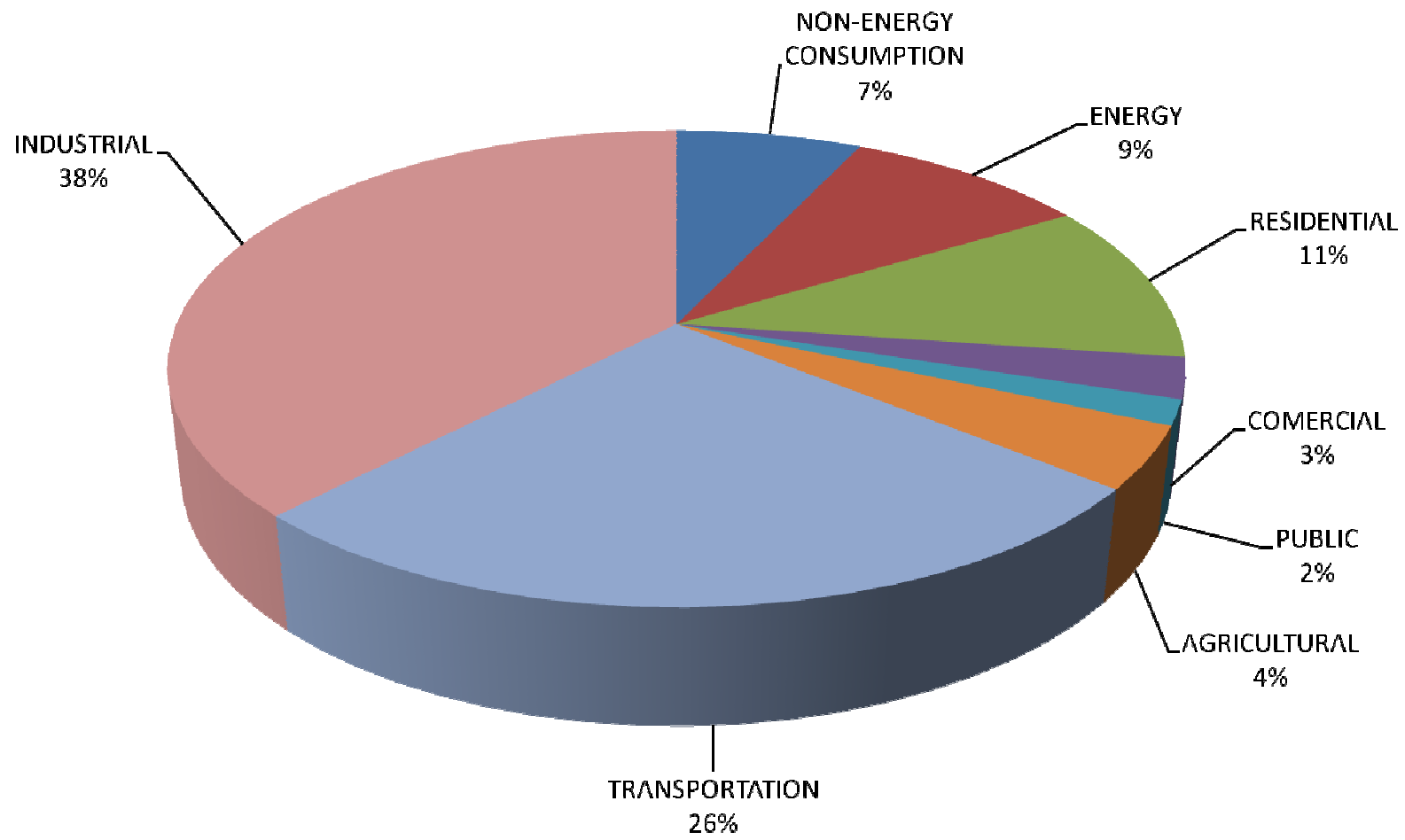
December 5th, 2008

Brazilian Primary Energy Supply (2006)



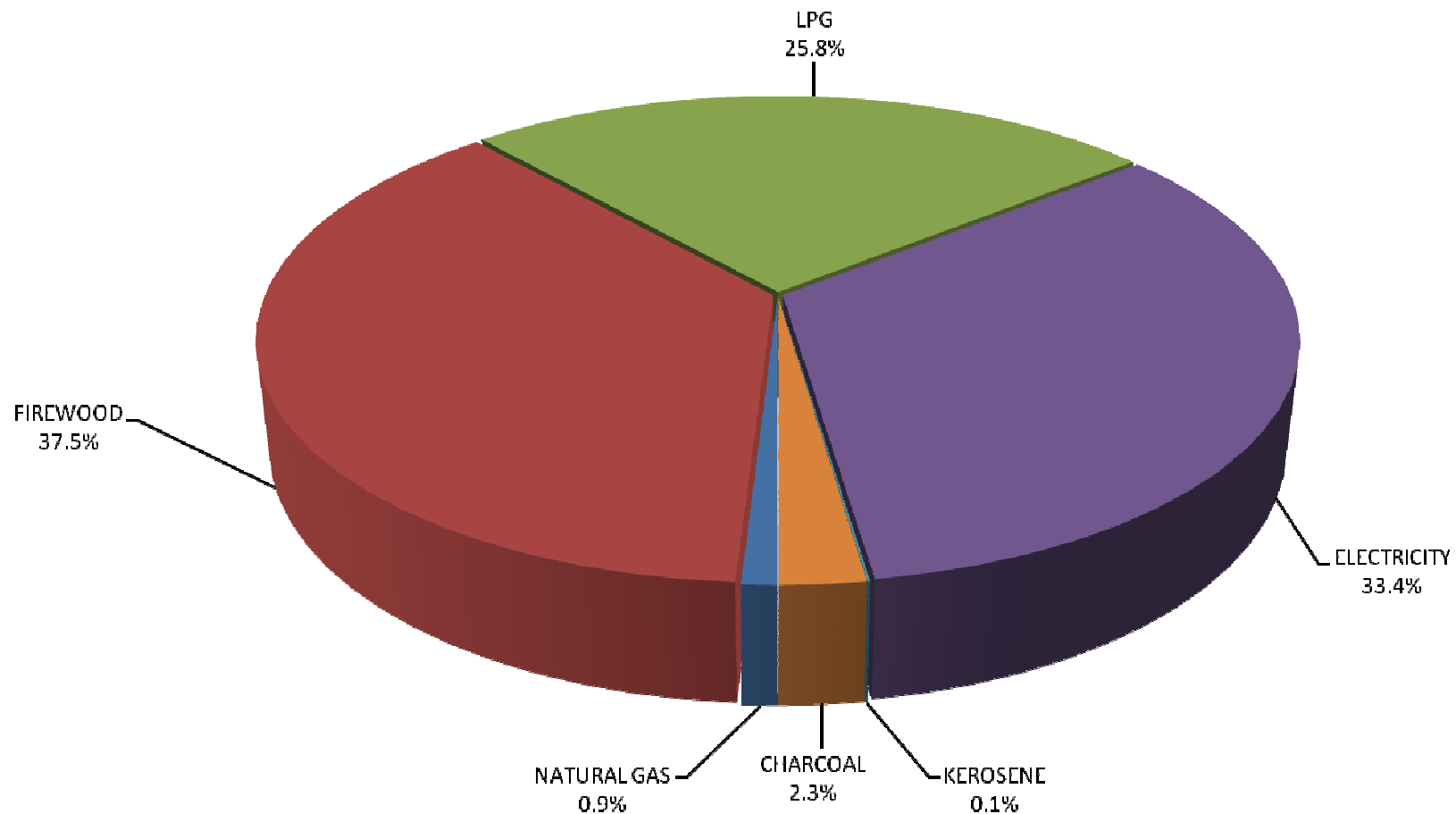
Source: MME, 2007

Brazilian Energy Consumption by Sector (2006)



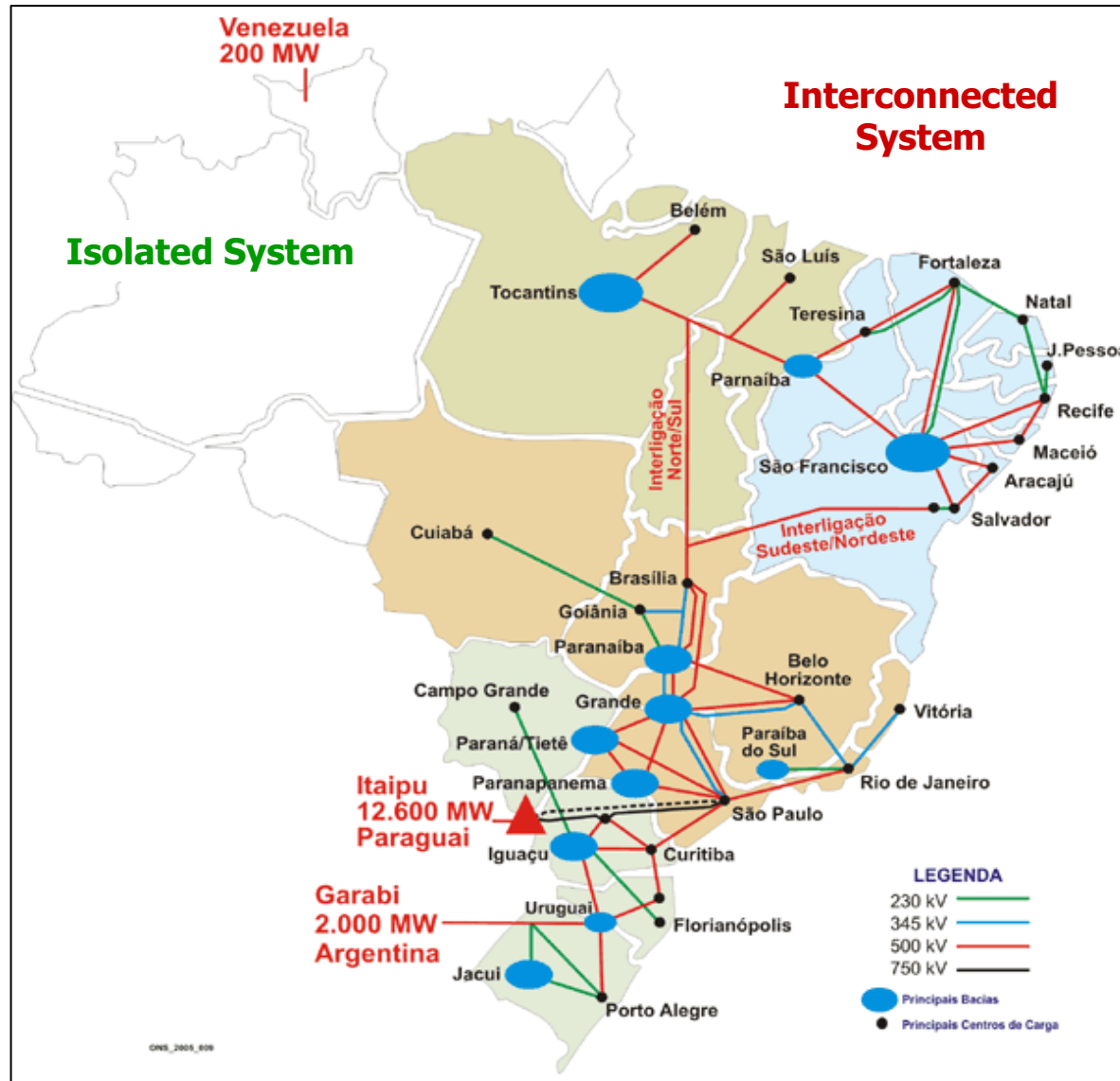
Source: MME, 2007

Brazilian Residential Sector Energy Supply by Source (2006)



Source: MME, 2007

Brazilian Electric System



Introduction

- There are presently near 1,000 power plants supplying electricity for isolated cities and villages in the Amazon using diesel oil. Almost 700 units have an installed power capacity below 500 kW.
- In particular, there was a lack of incentives and obligations to implement rural electrification programs, as well as to improve supply to low-income consumers and to sustain existing off-grid projects.

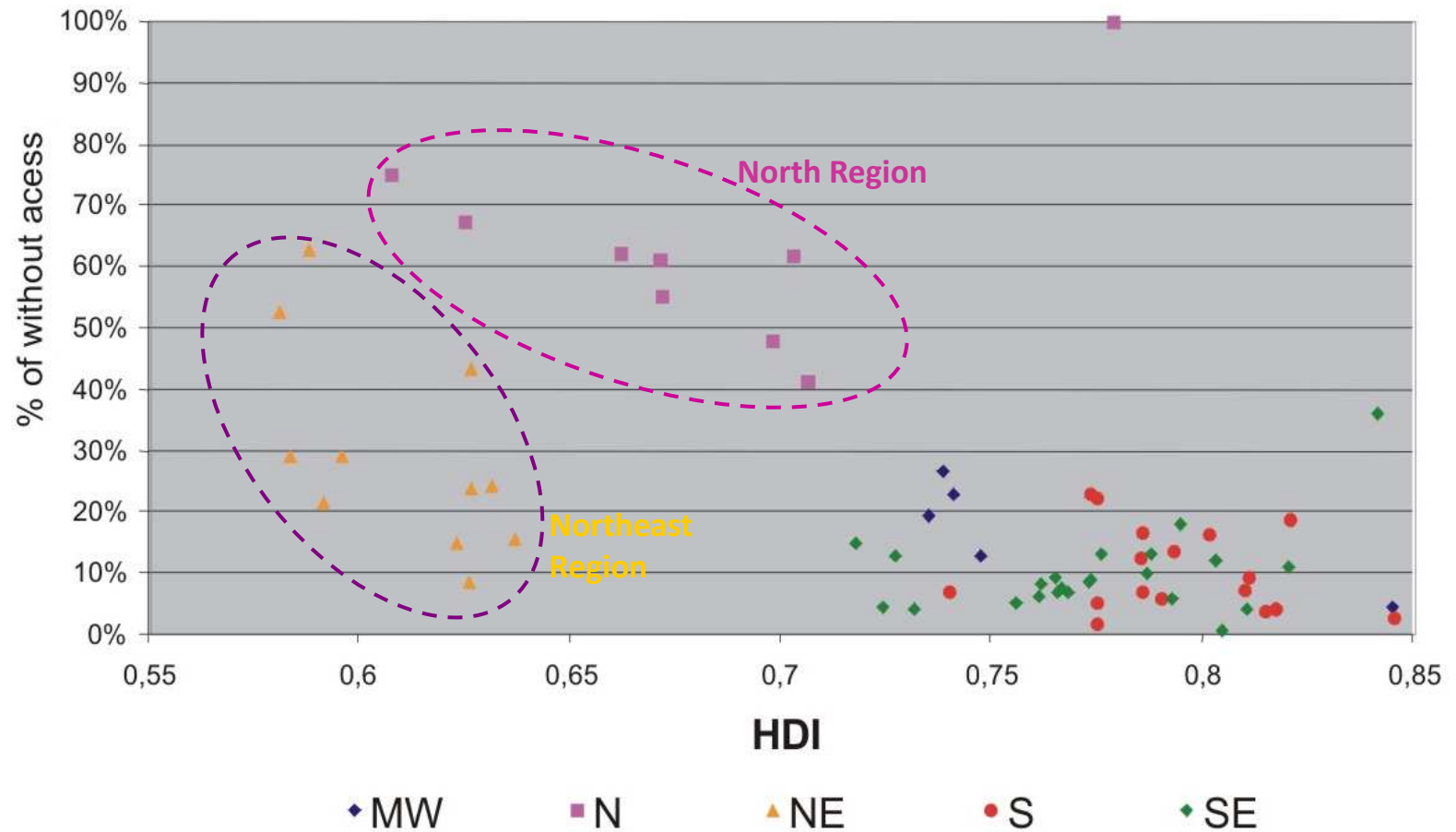
Permanent private residences and permanent population in urban and rural areas (in millions), 2000



| | Permanent private households | | | Permanent population | | |
|---------------------------|------------------------------|-------|-------|----------------------|--------|-------|
| | Total | Urban | Rural | Total | Urban | Rural |
| Total | 44.78 | 37.37 | 7.41 | 168.45 | 136.98 | 31.47 |
| With electric lighting | 42.33 | 37.04 | 5.29 | 157.46 | 135.74 | 21.72 |
| Without electric lighting | 2.45 | 0.33 | 2.12 | 10.99 | 1.24 | 9.75 |
| Electrification level (%) | 94.5 | 99 | 71 | 93 | 99 | 69 |

Source: IBGE, 2001

Access Level at Brazilian regions versus HDI



Source: IBGE, 2001

Energy access in Brazil – an overview

- The electricity supply plays an **important role** in the increase of life standards:
 - it allows high quality lighting, clean water, health care, communications
 - a frequently mentioned figure for a minimum consumption level is 600 kWh per household per year (or 50 kWh per household per month).
- The electrification of such **small remote communities** using conventional supply presents significant barriers:
 - high costs of the transmission lines
 - transportation of diesel oil
 - very low profit of the community residents.

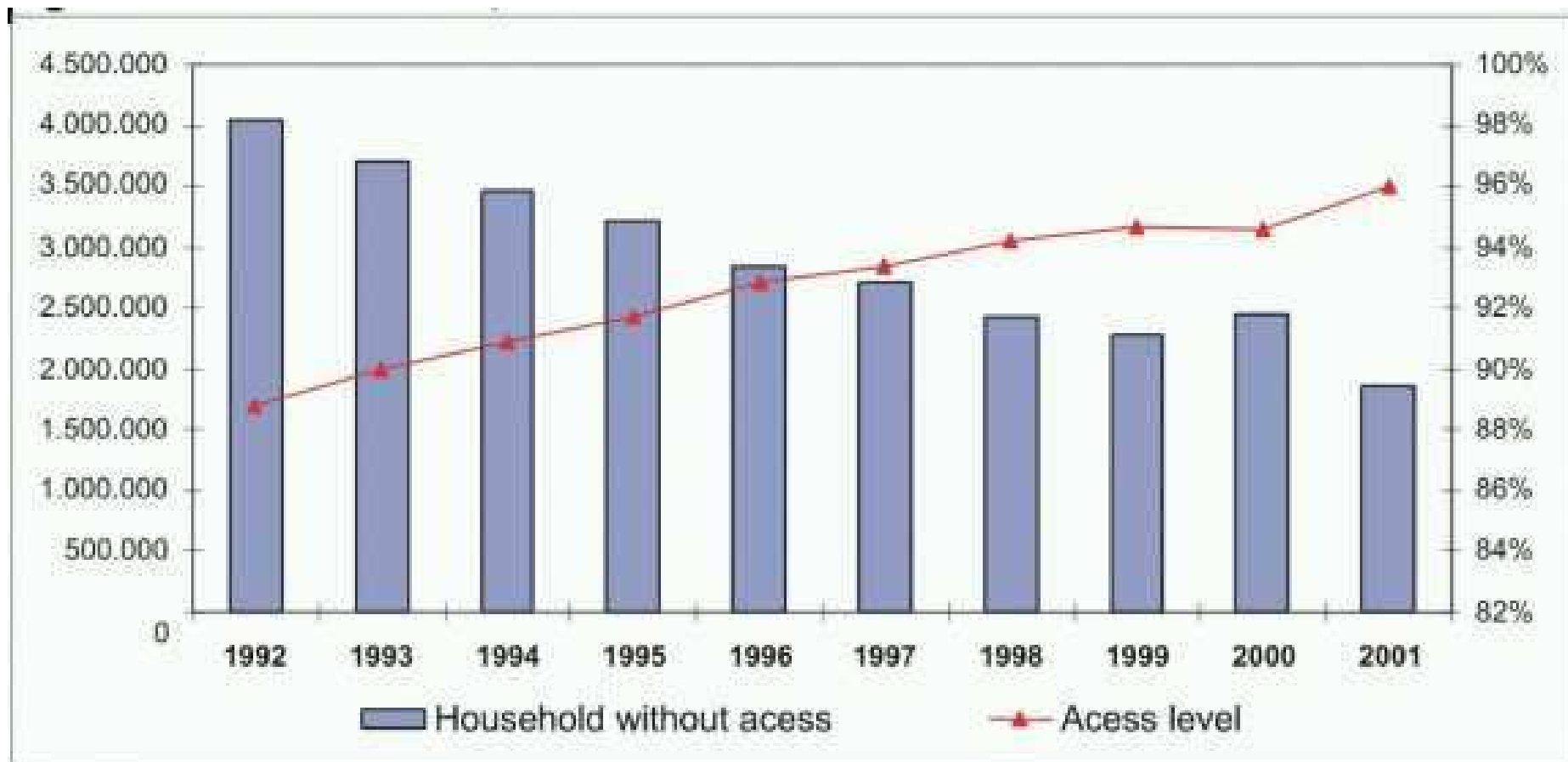
Energy access in 1991 and 2002 in households at urban and rural areas



| Energy access in | coverage (%) 1991 | | | coverage (%) 2002 | | |
|------------------|-------------------|-------------|-------------|-------------------|-------------|-------------|
| | Urban | Rural | Total | Urban | Rural | Total |
| ACRE | 95.0 | 13.0 | 70.0 | 98.5 | 32.6 | 80.4 |
| AMAZONAS | 96.0 | 16.0 | 79.0 | 97.8 | 27.2 | 85.4 |
| AMAPÁ | 94.0 | 42.0 | 89.0 | 99.3 | 52.0 | 95.6 |
| PARÁ | 91.0 | 37.0 | 71.0 | 97.6 | 39.0 | 82.2 |
| RONDÔNIA | 90.0 | 20.0 | 68.0 | 98.5 | 58.8 | 85.7 |
| RORAIMA | 97.0 | 30.0 | 82.0 | 98.9 | 42.4 | 88.6 |
| TOCANTINS | 81.0 | 14.0 | 64.0 | 95.2 | 37.9 | 82.4 |
| NORTHERN REGION | 92.0 | 54.0 | 75.0 | 97.6 | 40.3 | 83.9 |
| BRAZIL | 97.0 | 49.0 | 87.0 | 98.8 | 73.2 | 94.8 |

Source: IBGE, 1992; MME, 2003

Access evolution 1992-2001



Source: IBGE (Census and Pnad)

LPG Program



- **Distribution network** all over the country. **Reduction on firewood consumption**
 - Accessible by 98 % of all Brazilian households and 93 % of rural households [Census, 2002].
- From **1950 through 2001** the Brazilian federal government regulated **LPG final prices to consumers** → subsidies equalized prices throughout the whole country.
- By **2000**, around **US\$ 100 million** was being spent annually to subsidize LPG in Brazil.
- In **January 2002 subsidies were removed** → international prices of the product transferred to the consumer.
- **2002**: Law 10453/02 created a program named **Auxílio-Gas** (literally “gas assistance”), which would transfer to low-income families subsidies for **residential LPG**.
- Subsidies nowadays are included in “Bolsa Família”, but the previous policy appears to be more adequate to stimulate LPG consumption since it reached all LPG consumers.

Existing rural electrification programs in Brazil

Programmes

- ***Luz no Campo (Light in the Countryside)***
 - largest rural electrification program implemented in Brazil. Since 1999:
 - 2,235,025 kVA installed
 - 560,000 families
 - 2.8 million people
- ***PRODEEM (Program for Energy Development in Municipalities)***
 - the main government sponsored off-grid electrification program.
 - 1996-1999: 3 MW in PV installed to 3,050 villages, 604,000 people benefited
 - 2000: 1050 Solar home systems, 104,000 people benefited
 - 2001: 1086 SHS, 3,000 community systems
- ***Luz para Todos (Light for Everyone) - Oct, 2003***
 - energy access to 12 million inhabitants up to 2008
 - investment required: R\$ 7 billion, being 5.3 billion from the Federal Government and R\$ 1.7 billion from State Governments and utilities (Bolsa Familia = 11 million households = 0.8% of GDP = 23 billion R\$)

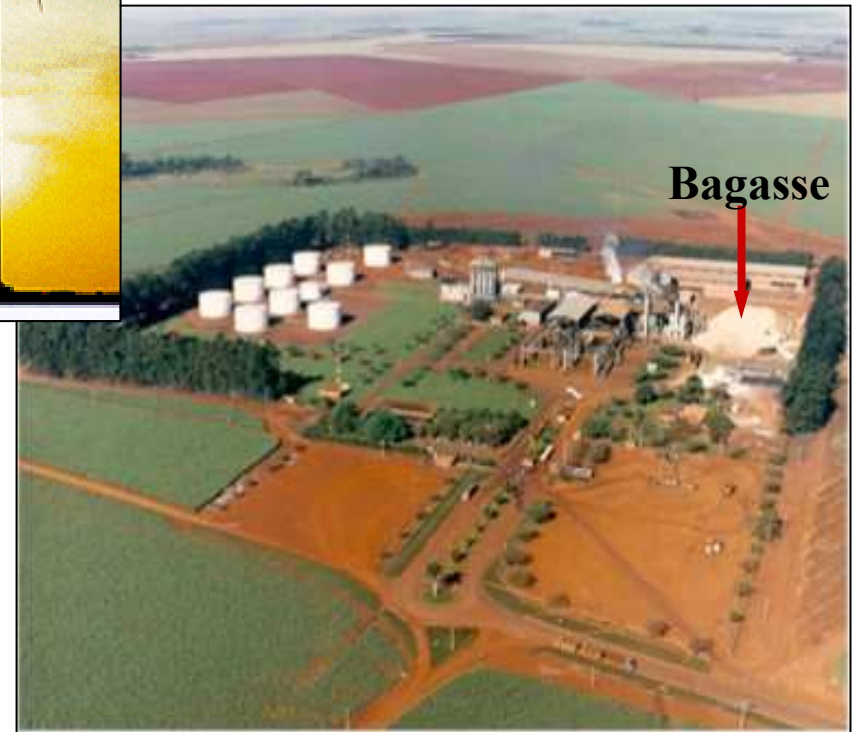
- Law 10438, in April 2002:
 - provisions for reduction of the tariffs to low-income consumers;
 - the establishment of targets for concessionaires
 - to permit holders to provide full coverage
 - the creation of a national fund, the Energy Development Account (*CDE - Conta de Desenvolvimento Energético*)
 - to promote universal access and use innovative sources of energy.

Renewable energy technologies to expand energy access

Renewable energies

- PV energy – very small scale in remote villages (but incentivate further grid expansion)
- Biomass energy
 - Remote villages (straight vegetable oils; biomass residues)
 - Interlinked system – sugarcane bagasse origin cogeneration
- Small hydropower plants
- Wind power

Renewable energies



Barriers against the use of renewable energy technologies in off-grid power systems

- There are **not** significant **technical** barriers to the use of RE in the isolated system → it is just necessary to adapt the technologies already in use.
- Lack of skilled people → difficulties in O&M
- Small electricity demand – development of economic activities
- Investors consider it a high risk investment

Conclusions

- **Rural electrification** through grid connections, in general, is not **economically feasible**; **energy supply** in these cases must be **decentralized**; and this is an excellent opportunity for the introduction of renewable energy, as discussed above.
- **institutional models** are needed to **assure sustainability of off-grid** solutions;
- it must be assured the **permanence of RGR, and CDE funds** with a preference to renewable electricity sources;
- **incentives** must be created to stimulate concessionaires and permissionaires to **diversify their supply alternatives**, through the optimization of the use of available resources in the country, such as the **PROINFA Program**;
- **community participation in electricity management** is fundamental, mainly in rural and remote areas, to reduce O&M costs;
- the **social and economic benefits must be maximized to rural/remote communities**, through the implementation of local sustainable activities.



Thanks!
Obrigada!

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