EPRG & CEEPR European Energy Policy Conference

Universalization of electricity supply

"Universal access to electricity: models, challenges, and opportunities"

Carlos Sallé

Director of Regulation

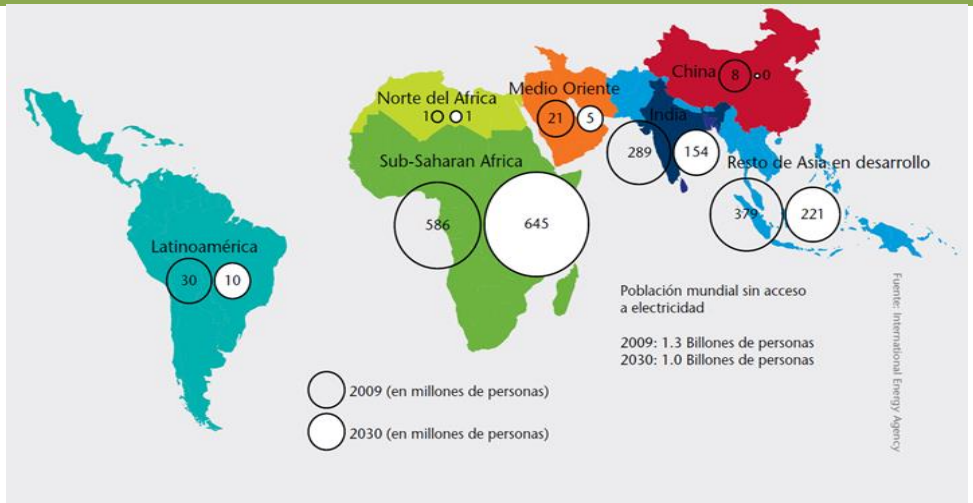
Madrid, Spain

July 3rd 2014

IBERDROLA

The challenge: supplying energy access for all

More than 1.300 million people have no access to electricity and 2.600 million do not have clean cooking facilities



Challenge: provide quality energy supply to developing countries

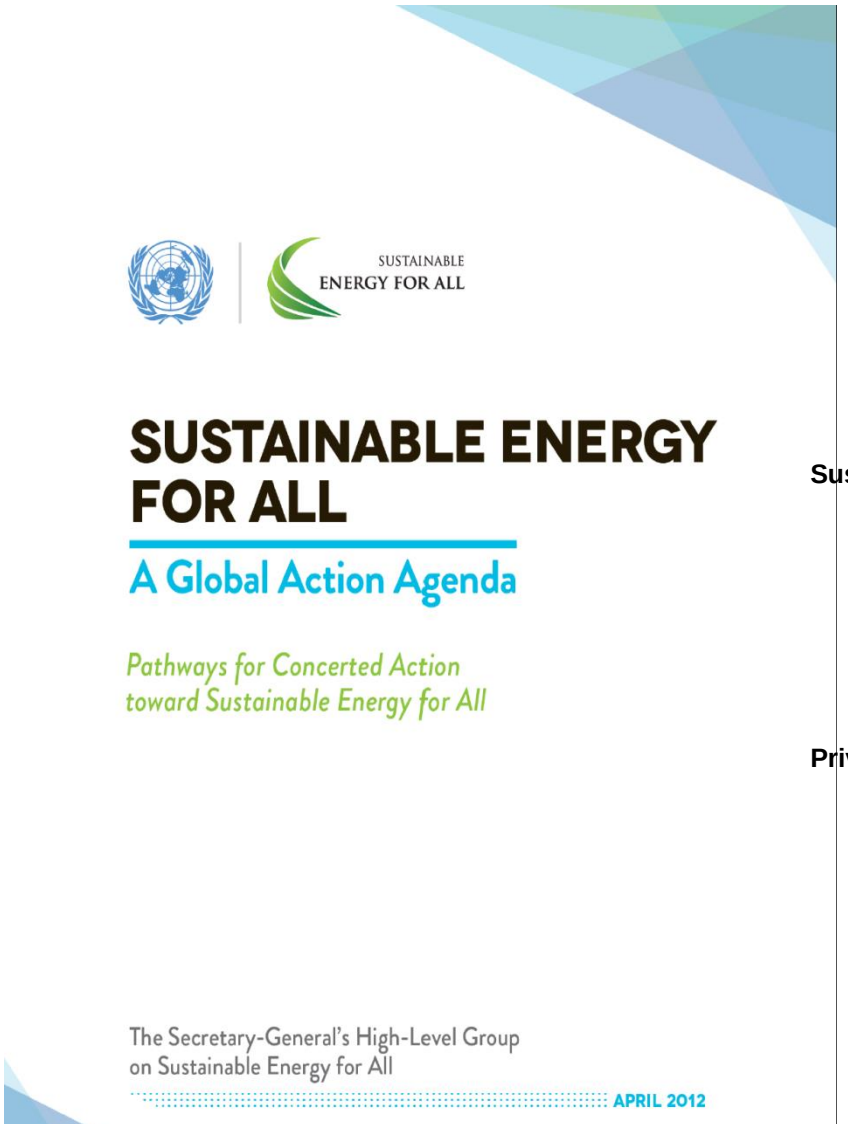
a) Minimum service (three lamps and one phone charger)?

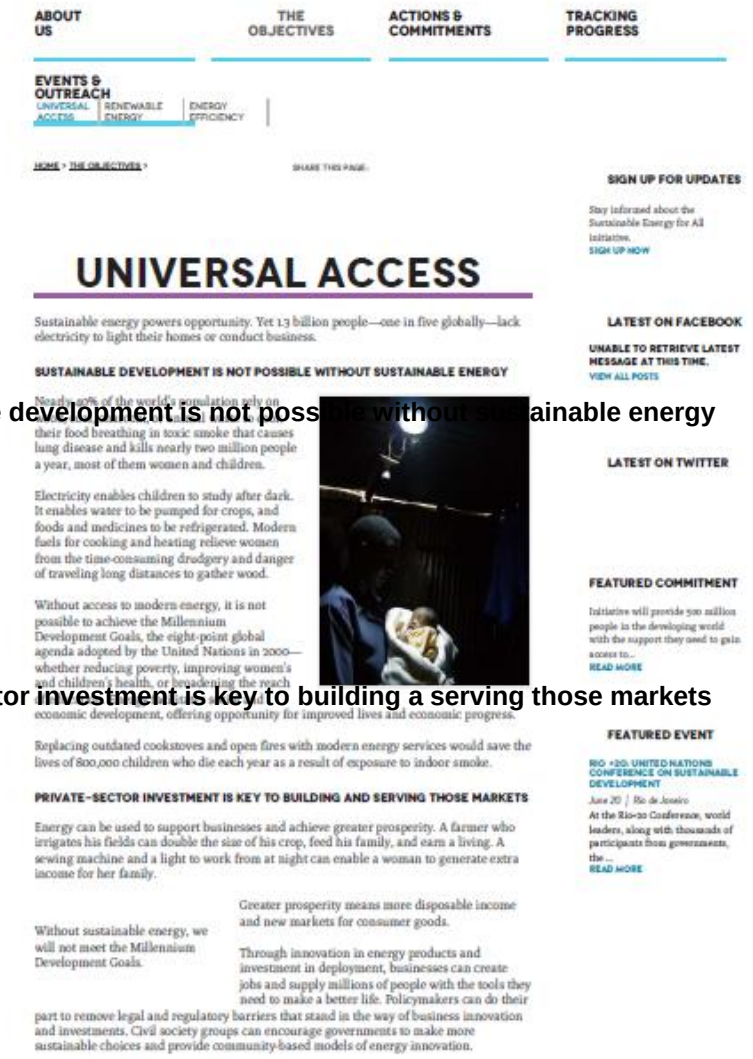
b) An ambitious objective: to achieve a standard of service comparable to the rest of the world

An energy mix that does not jeopardize sustainability

Business models that allow scalability of the solution (more than 1Trillion $ till 2030)

Institutional support: SE4All





Sustainable development is not possible without sustainable energy

Private-sector investment is key to building a serving those markets

Universal access not included as one of the Millenium Goals, but recognised by SE4All as key for achieving them

What does “universalize access to electricity supply” mean?

“Lack of electricity does constitute a barrier to the people development and their welfare”

100% electrified countries

- **All the consumers are “in the grid” but there are economic vulnerable consumers** (*fuel poverty*).
  - Public subsidies, tariff subsidies, obligation schemes (CERT/CEST/ECO en UK), social bund…

No electrified countries

- **Consumers “out of the grid”**
  - Expansion of the existing grid
  - By using micro grids
  - By domestic electrification
- **Economic vulnerable consumers**
  - Public subsidies, tariff subsidies,…

The theory to successful: multistakeholder solution

IBERDROLA

Traditional models of public service are no longer useful: concession holder/Administration

Multistakeholder solution

- **Governments as responsible for ensuring supply**
  - Central/Federal
  - Regional
  - Local
- **Beneficiary community. Essential involvement**
- **NGOs**
  - International
  - Local
  - Volunteer groups in companies
- **Private sector**
  - Multinational companies
  - Grid concession holders
  - Local suppliers
  - New companies: cooperative ventures, Joint Ventures, social enterprises, etc.,…
- **Other agents: multilateral development institutions, Universities**

New models of governance: Public Private Partnerships for development

The theory to successful: steps to be solved among all

IBERDROLA

Some steps for the good governance of any type of universalisation project

1. Need	Contacts among communities, Administrations
2.- Eligibility	Priorities and community
3.- Technical solutions	Data, adequate technical solutions (investment and O&M), optimising scarce resourses
4.- Environment	Data, consequences
5.- Synergies	Water, health, education, new economies…
6.- Side-effects	Sociological and cultural effects
7.- Regulation	Existing legal frameworks and their changes
8.- Business models	Local partners, chain of private companies , scale, from projects/assets driven to services driven…
9- Sustainability	Funding (investment, O&M, subsidies, tariffs, Affordability, ability to pay in equity …) involvement of beneficiaries

New governance models: importance of allocation of responsibilities.

The theory to successful: the private companies contribution

IBERDROLA

Technical capabilities (HHRR, Technical resources…) **to implement projects**

Efficient use of resources

Higher funding sources

Innovation (technical, business models…)

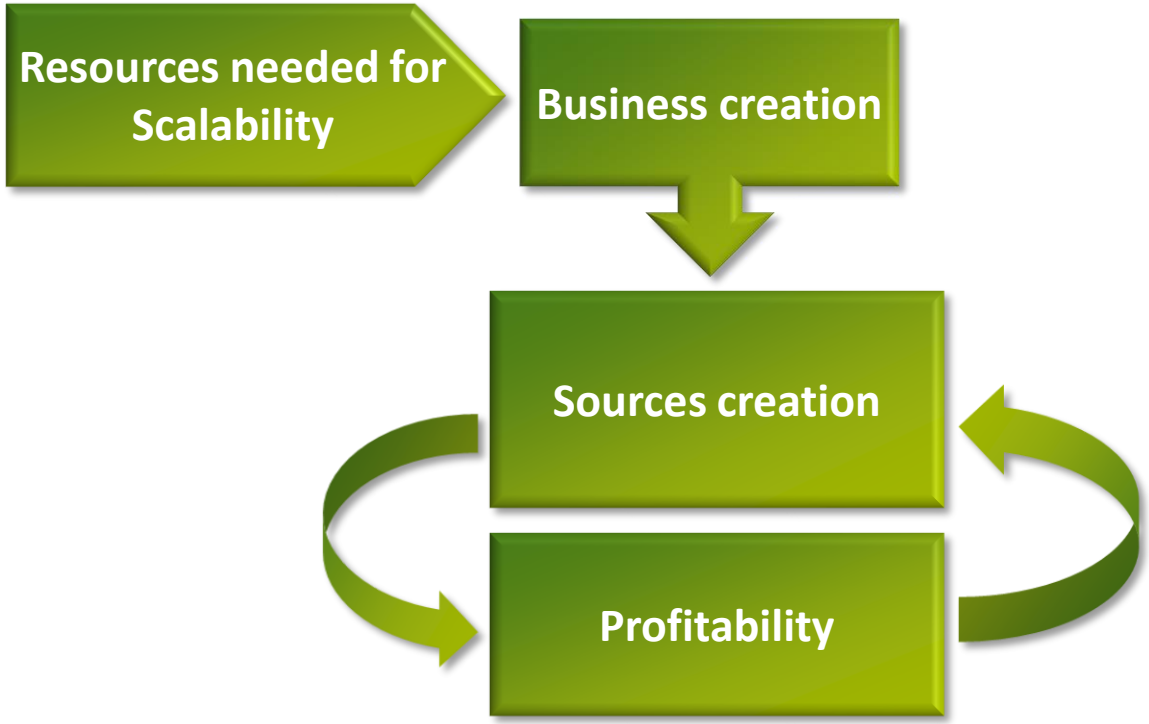
Contribution of Volunteer groups and retirees

Greater added value (less cost, more services,…)

Risk management

SCALABILITY

The theory to success: Scalability required for universal supply cannot be achieved only with philanthropy and social action



Shared Value= Economic Value + Social Value

"Why business can be good at solving social problems" (Michael Porter) (*)

(*) http://www.youtube.com/watch?v=0iIh5YYDR2o&feature=player_detailpage

Some help to scalability: The “Reverse innovation”…

Developing countries

One Laptop per child (Negroponte): affordable, resistant and functional laptop personal computer

Developed countries

Learn from emerging markets experience

New products:

- **Ultraportable notebooks**
- **Smartphone components**
- **…**

HANG, C., & GARNSEY, E. (17 de June de 2011). Opportunities and resources for disruptive technological innovation. *Working Paper, University of Cambridge*. Cambridge.

…to link “universal service” and “utility of the future”

Developing countries

Innovation in a context defined by:

- Scarce resources
- Less stringent requirements

Testing experience

Resources

New products and business models

Value of experience

Developed countries

- Constraints networks expansion
- Strict requirements
- Resilience
- Value of energy non supplied

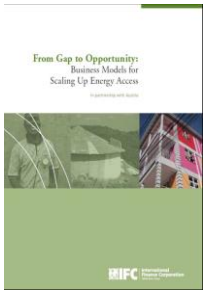
Useful for utility of the future

Applying to global market the knowledge extracted from local developing countries markets

Some help to scalability: Understanding the base of the pyramid to develop new business models

The double discrimination

Value added + New opportunities



No subsidies since they are not connected to network

No electricity, but aprox $40 billions spent on poor energy resources *

New economic opportunities and new demands

New regulatory frameworks for rural zones

Affordable expense on electricity
(Capacity to pay)

Sustainable tariffs

1ST PHASE
No electricity access

2ND PHASE
Access to electricity

(*) Source: *"From gap to opportunity: Business models for Scaling up energy access. IFC".*

Luz para todos (Light for all)

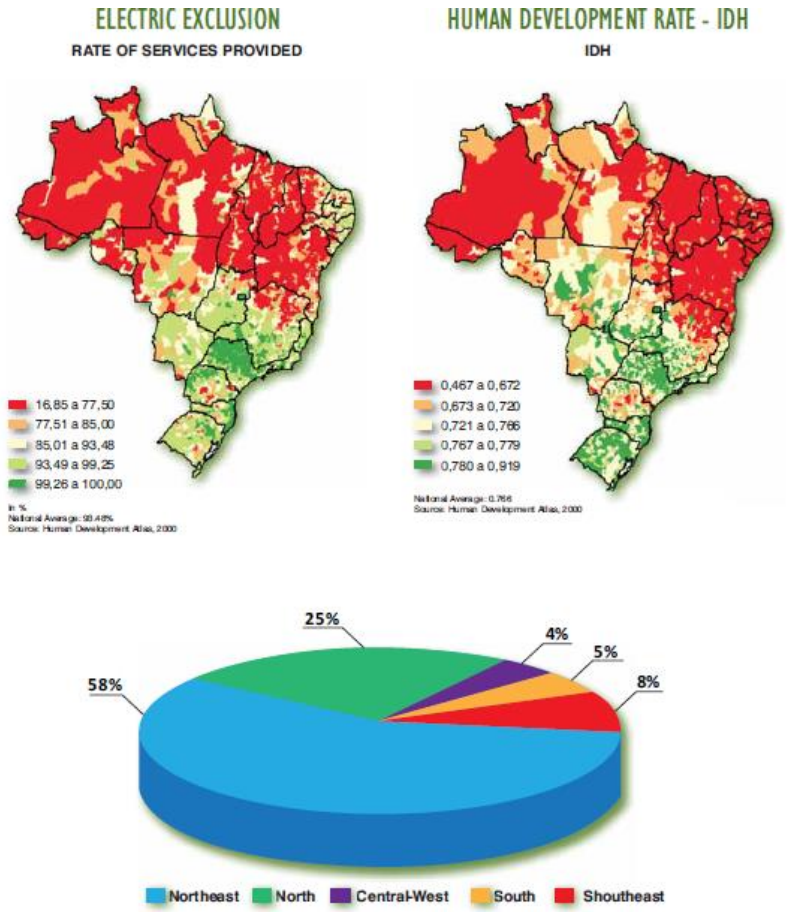
Previous programs for universalization in Brasil

Initial experiences start in 90's

Learning of failures

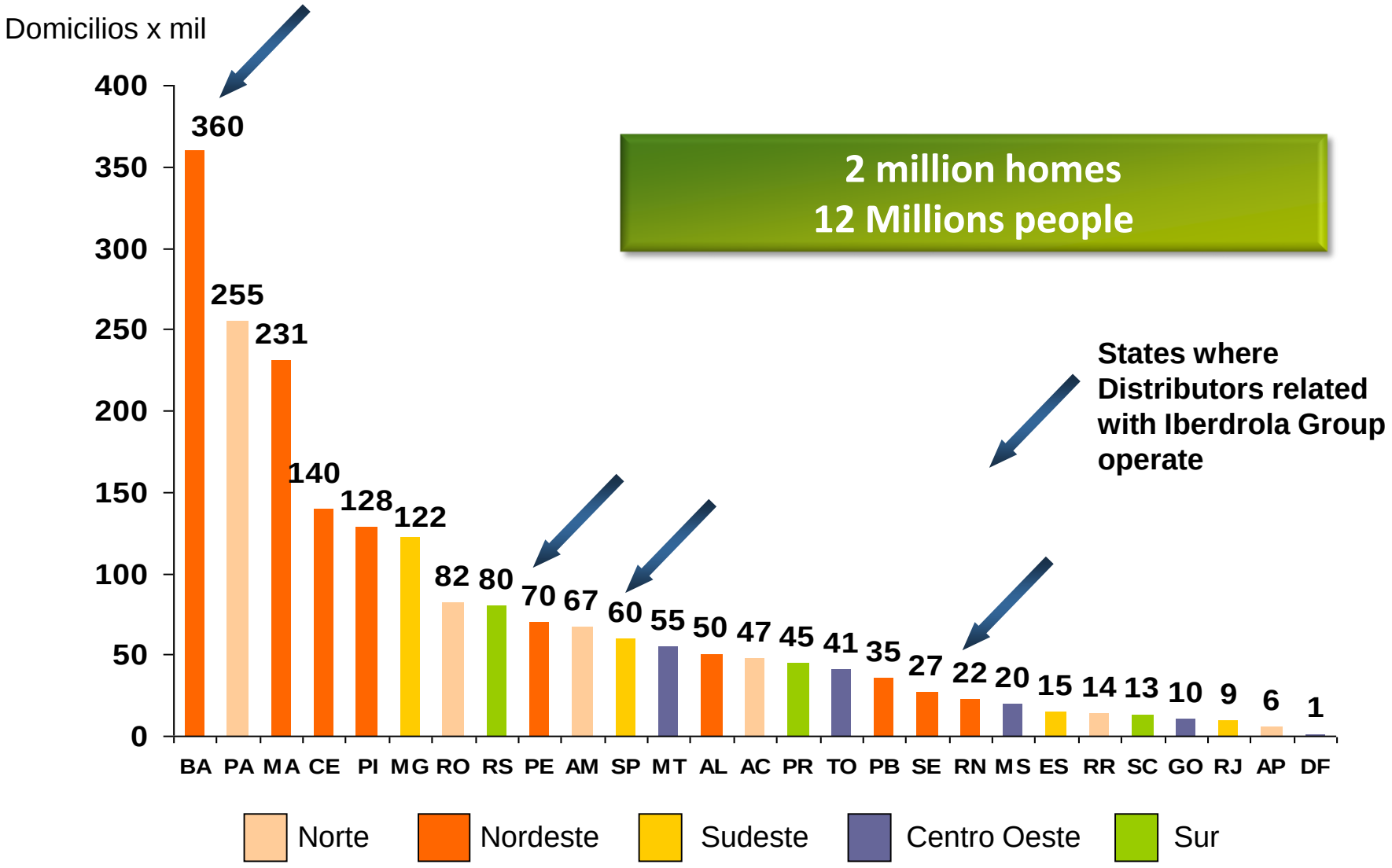
Luz para todos (Light for All)

National electricity exclusion in 2000



Families without electricity access were mainly located in areas with the lowest Human Developed Index (IDH) and were Very Low rents families and located in rural areas

Homes without electricity at the beginning of the program



Fuente: Censo IBGE, con actualización, ampliación y elaboración de ABRADEE

Launching Light for all

Creation

- Decreto N.º 4.873 de 11 de noviembre de 2003

Objectives

- To guarantee energy access in all rural areas in 2008, with intermediate goal of 90% in 2006. Extended in 2011 till 2014.
  - Priorities for zones with low development index and families with low rents
- To mitigate tariffs impacts using official subsidies complemented with financial and own recourses of Distribution

Information http://luzparatodos.mme.gov.br/luzparatodos/asp/

A Multistakeholder solution.
Main agents in Light for all

IBERDROLA

Coordination: Ministry of Mining and Energy

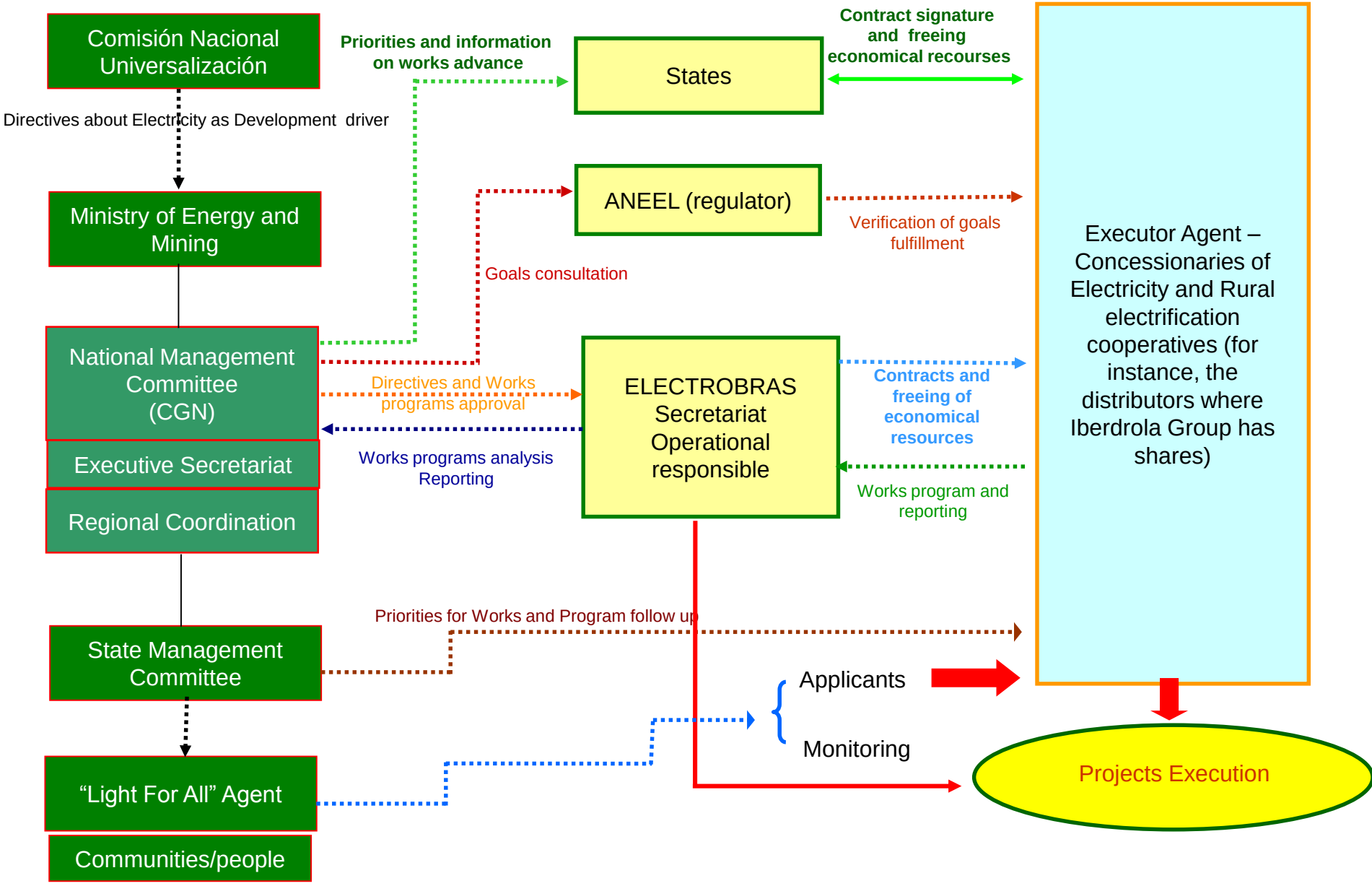
Operation: Electrobras and State Governments

Execution: Distributors (as Coelba, Distributor with a share of Iberdrola)

Detection of needs, information and education about the program to communities: Community agents

The applicants: people in rural areas

The governance structure of Light for All



Economical Resources and concretion of governance

IBERDROLA

Funding from public budget, and contracts with Electrobras and with State Governments guarantee the economical sustainability

Federal Government:	75% (originally 50% Subsidy (Funds CDE Electrobras))
State/Municipalities:	0 % (initially 10% minimum)
Distributor:	25% in RAB (initially 15% minimum + xx% completing 100% soft financing(Funds RGR))
Total	100%

A comprehensive legislative, contractual, operational and technical set of documents establishes the obligation/rights of all the stakeholders

Goals of Light for all (1)

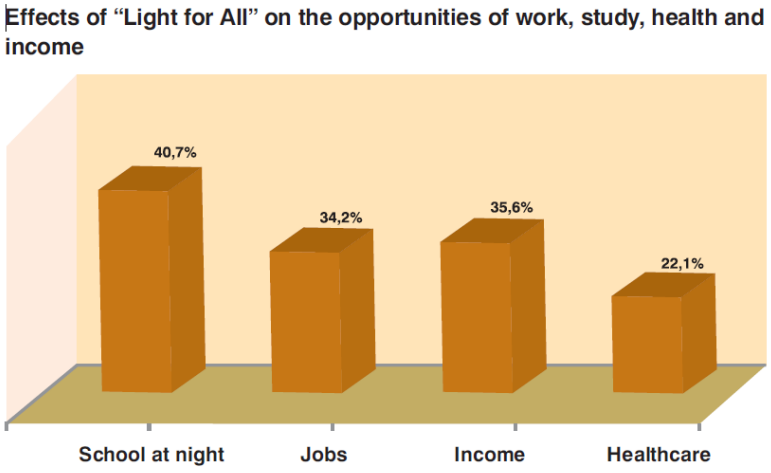
Main goal:
Initial objective: Access for 10 million people.
Currently 15,1

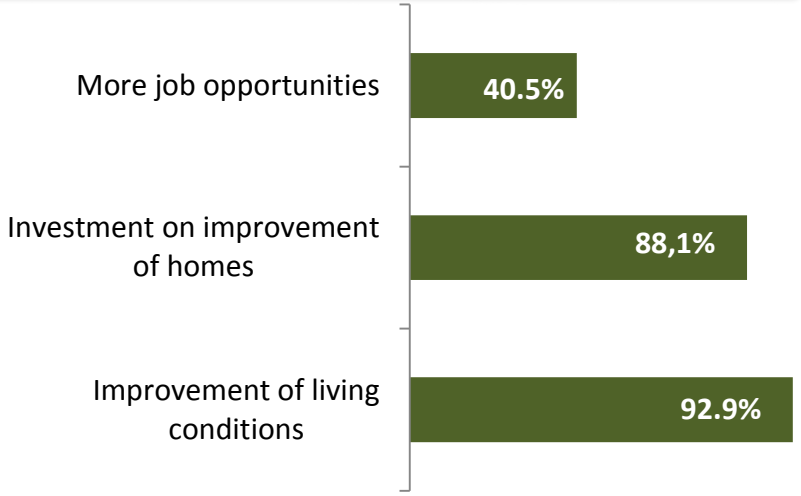
Investment: USA$ 20.000 Millions

New jobs: 460.000

Source: http://www.mme.gov.br/10anosluzparatodos/resultados.html

Other effects

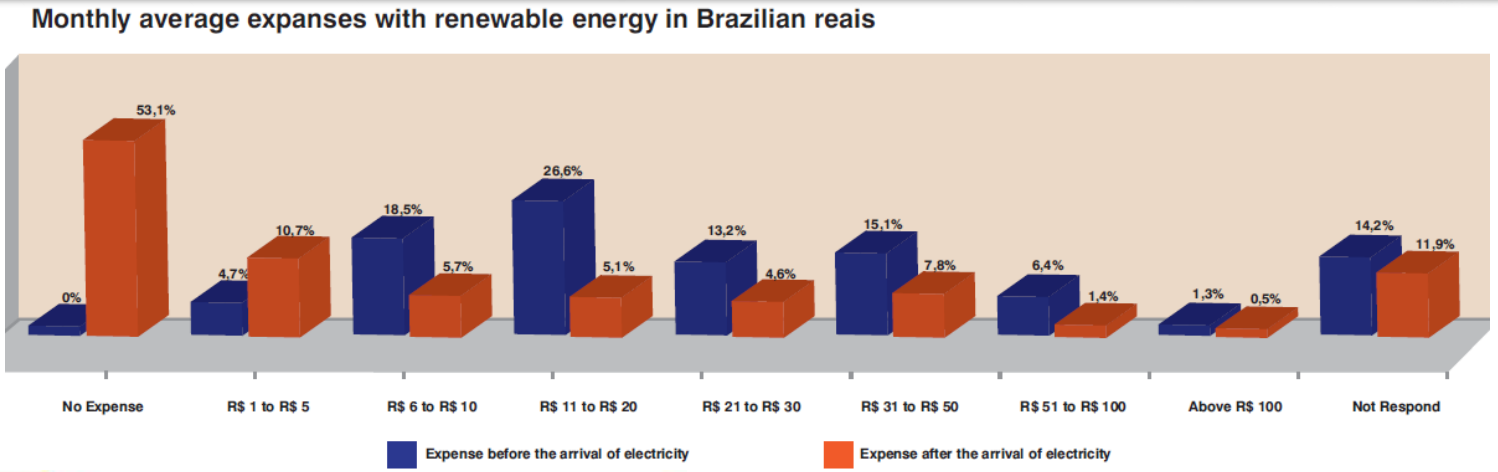




Source: http://luzparatodos.mme.gov.br/luzparatodos/downloads/Informativo_LpT_nr.41.pdf

Goals of Light for all (2)

Improvement of welfare, creation of new economies, avoiding emigration from rural areas, availability of rents for efficient ways of energy….



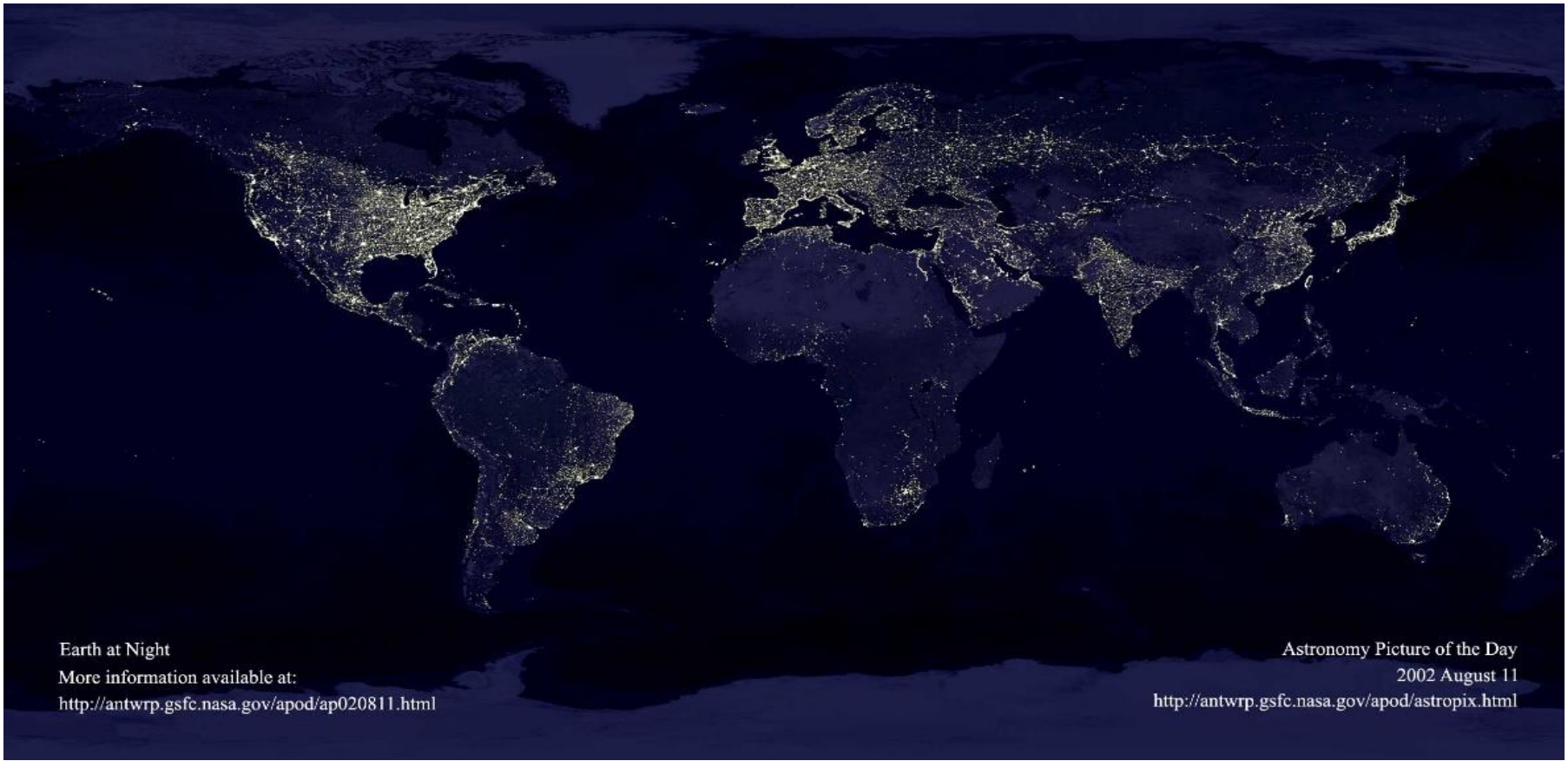
Strong increase of household appliances for more than 3 million households benefited from the program

7 Million poles
1,5 million kms of lines

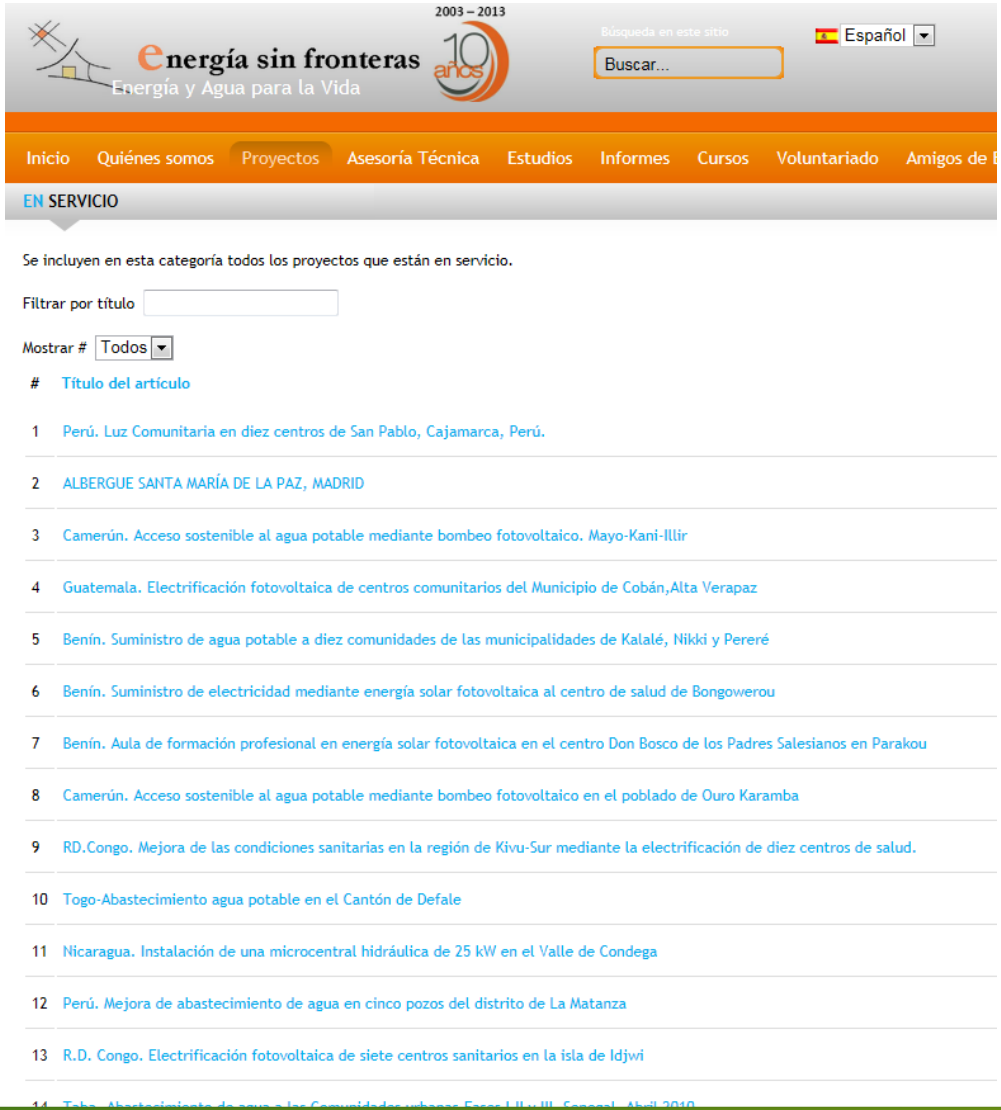
Source: http://www.mme.gov.br/10anosluzparatodos/noticia3.html

…and Research & Development in new technologies (e.g. Construction in complicated regions/access, electricity poles with resins of polyester)

Other initiatives/references

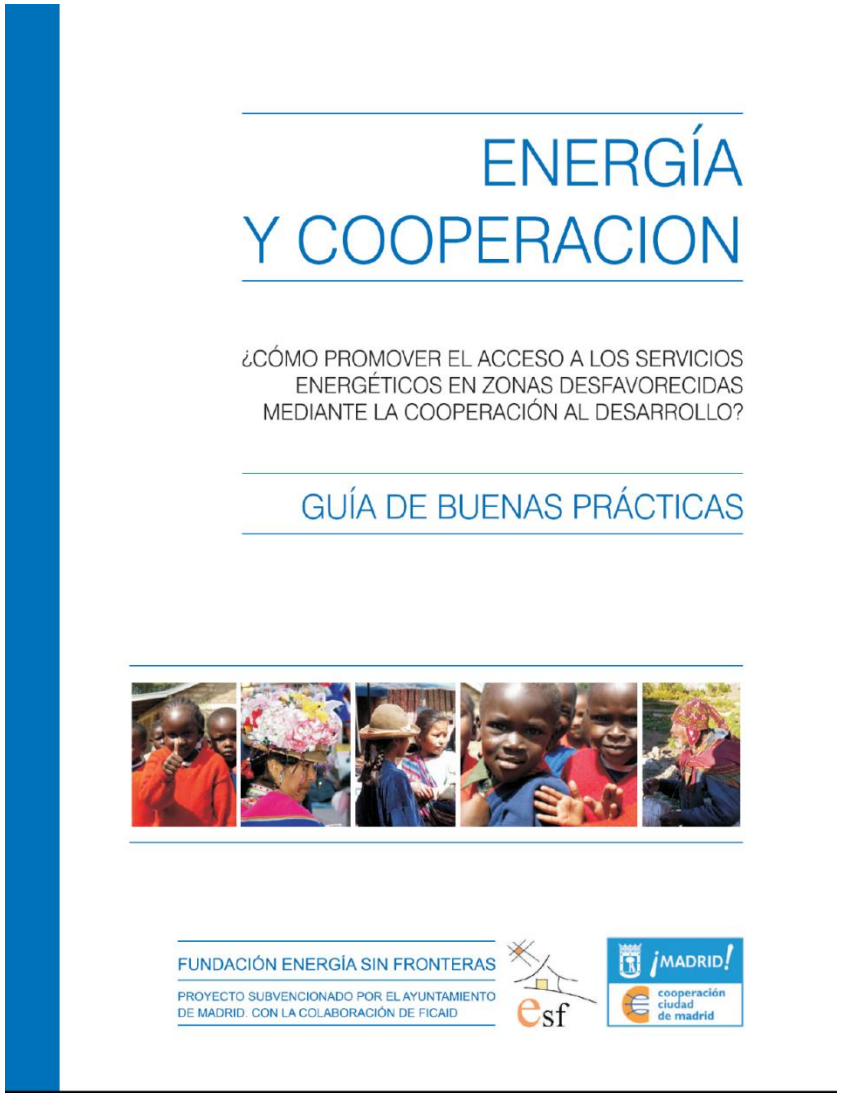


Energía Sin Fronteras (EsF).



A NGO dedicated to Universal Service (Electricity and Water). Near 100% of volunteers

Guide to good practices (EsF)



Solar field Nyumbani Ecovillage Project (Kenya)

First village of this kind in Kenya

- The village initially was comprised 1000 orphaned children of both parents, dead because of HIV, and 100 grandparents who care for children.
- Nowadays, **it deals with 4,152 children**, grandparents who live in the village and people who come to the health center.

- The project, with a **budget of 220.000€**, has been run by the Foundation **Energía sin Fronteras** (EsF)*.
- The **project consists of a village** where each house has its own vegetable patch and a farm with pets. It involves the **installation of a solar field of 216 panels** 210 w/unit (~45.5 kw) connected to a local micro network.

Access to solar energy will avoid from dependence from fossil fuels, with high costs and other harmful consequences, allowing the Ecovillage be self-sufficient and sustainable.

*These funds have come both from EsF own resources and thanks to the contribution of external donors: HC Energía, Fundación Iberdrola and Iberdrola Ingeniería y Construcción, Sunalia, SMA, Sunpower (donation of PV panels) Tudor (batteries) and Praxia (grant structures).

IBERDROLA

Global Sustainable Electricity Partnership

Association founded after the Rio Summit in 1992 dedicated to promoting sustainable development in the electricity sector globally

ABOUT US | MEMBERS | PROJECTS | CAPACITY BUILDING | SCHOLARSHIP | PUBLICATIONS

Home » Renewable Energy Projects » Energy for Education Project

Renewable Energy Projects

Project Videos

AEP American Electric Power · EDF · Eletrobras · Enel · Hydro Québec · RusHydro · KANSAI · RWE · State Grid · CFE · IBERDROLA · TEPCO

Nepal — Energy for Education Project

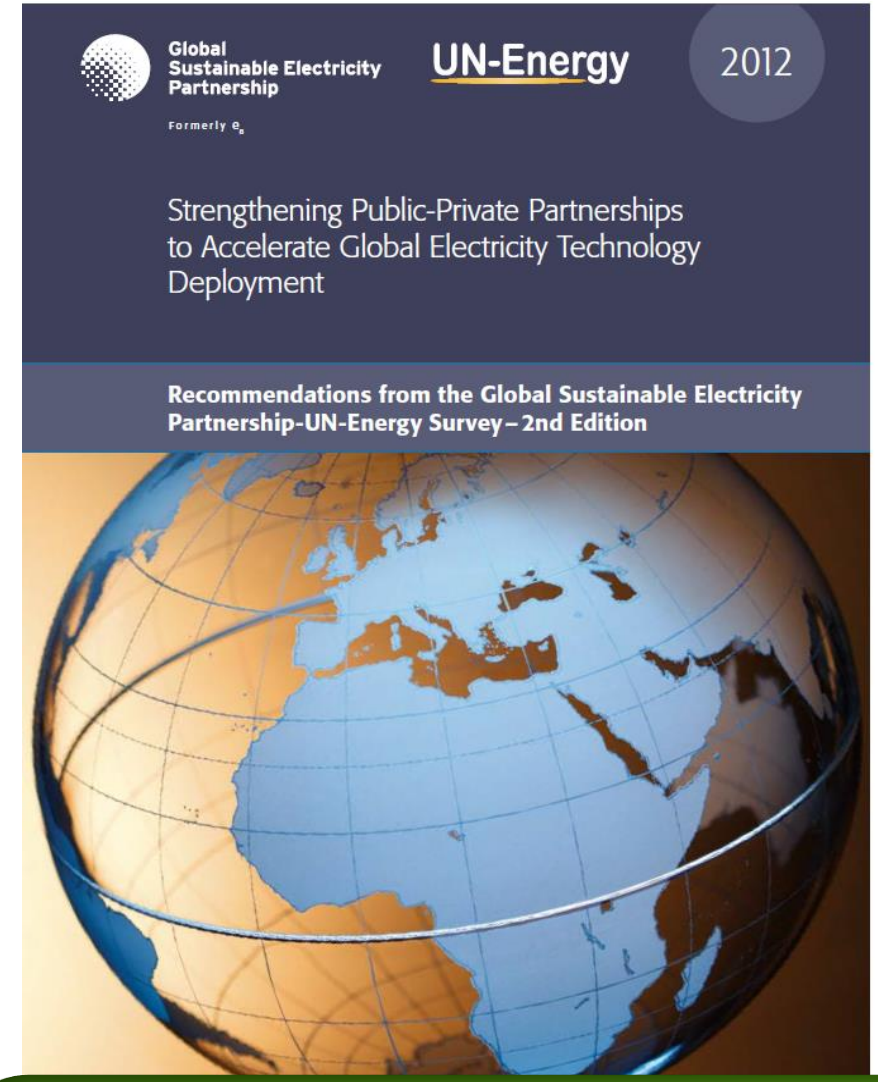
KEY OBJECTIVES:

- To demonstrate the potential of solar energy as a viable power source for improving education in the region.
- To use the energy from photovoltaic system for lighting and to launch a computer program in two rural schools.
- To provide clean portable small solar home systems for students and residents of rural Matela, significantly reducing the emission of toxic gases from the current use of kerosene lamps.

STATUS:
Completed

Sample video on:
http://www.globalelectricity.org/en/index.jsp?p=271

Survey on Public-Private Partnerships



Strengthening Public-Private Partnerships to accelerate global electricity technology deployment.
What is given to a Public Private Partnership by each party

Technical aspects

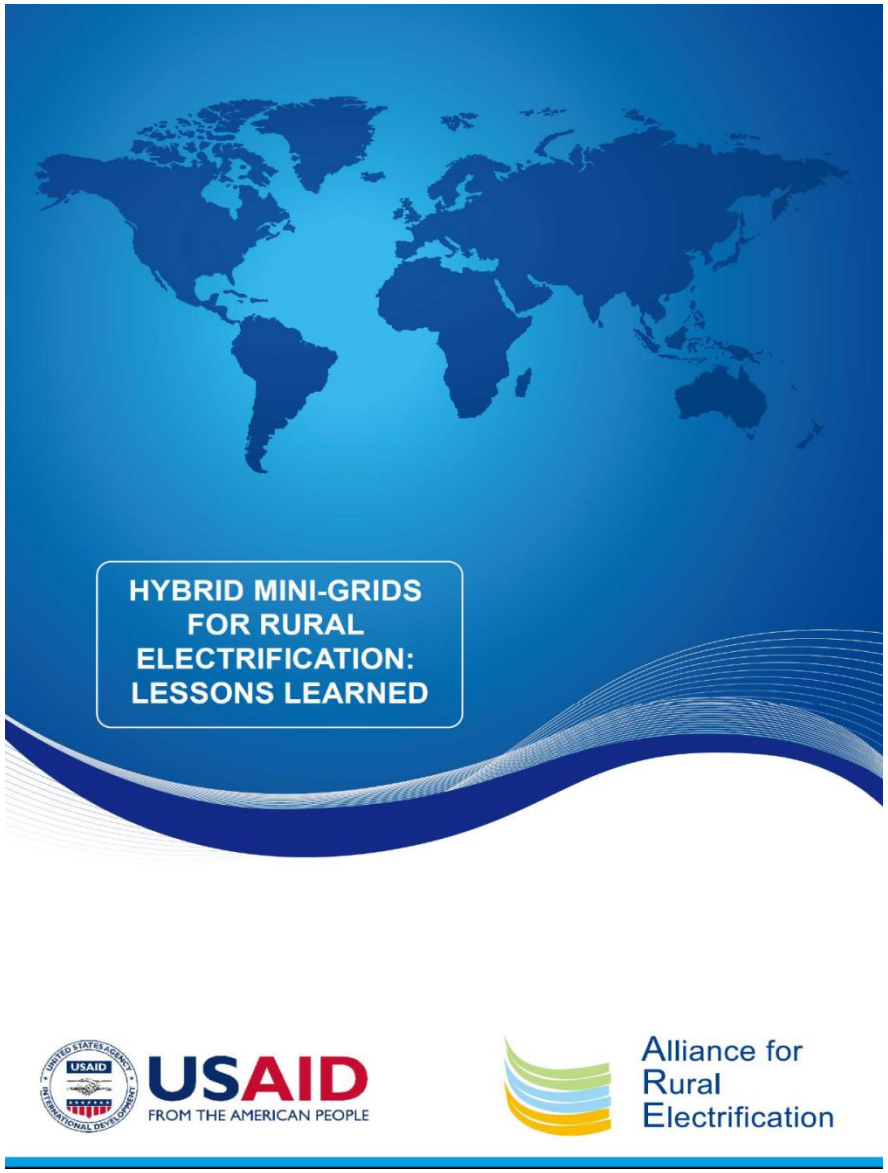
(Real Academia de ingeniería)

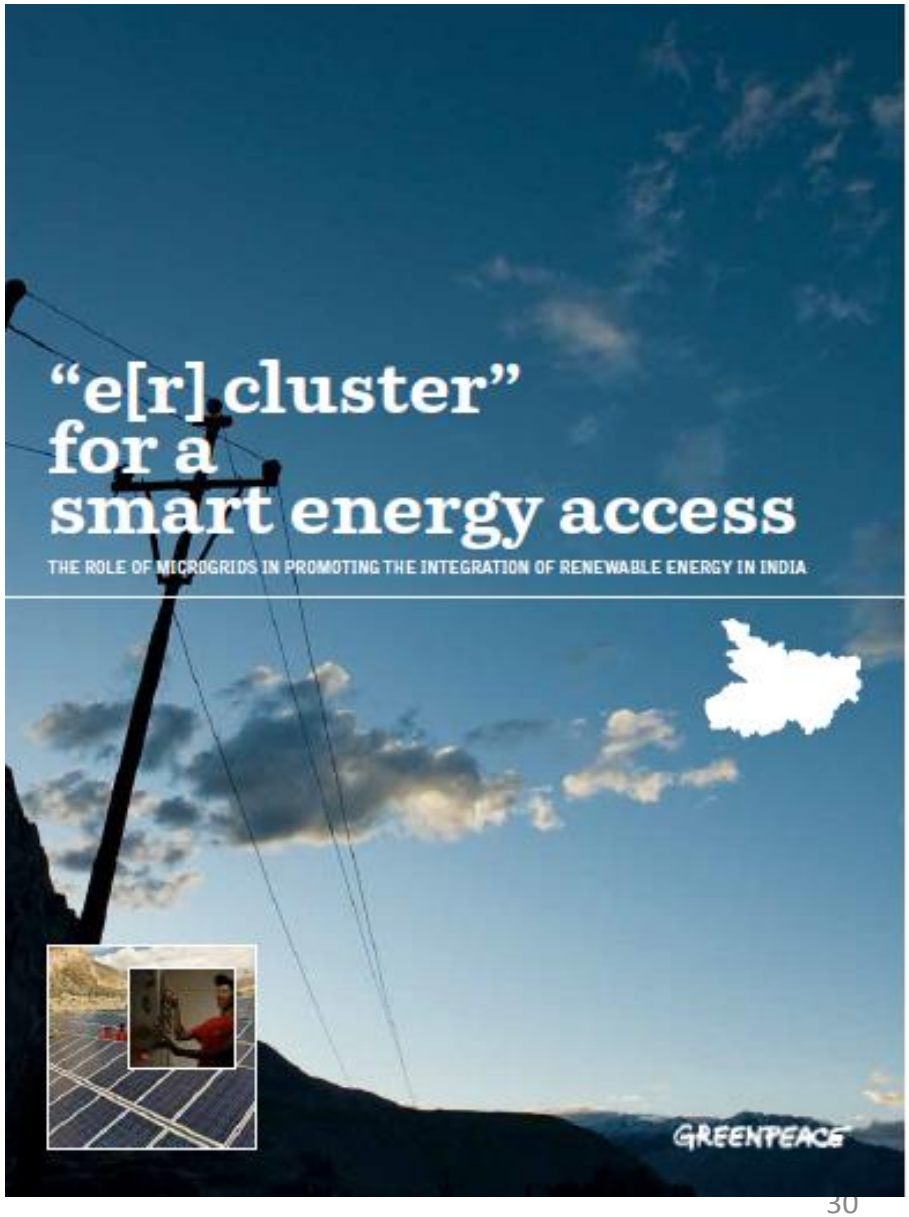
Decalogue for electrification
(Real Academia de ingeniería)

General conclusions: A Decalogue for electrification in isolated rural locations

1. Energy access is an essential requirement to poverty reduction fight and human development.
2. Isolated rural locations (IRL), devoid of adequate energy supply and without predictable access to the electricity grid, hold much of poverty.
3. The states, through their various administrations (central, regional or local) are responsible for ensuring universal access to energy services.
4. Renewable energy technologies allow access to energy in IRL through isolated systems from the grid.
5. The energy actions must be technically and economically affordable and requiring novel solutions for an efficient and sustainable management.
6. Consumers in IRL should not pay for electricity over their ability to pay, and by a principle of equity, no more than those in similar condition serviced from power grids.
7. There is a consensus among multilateral development organizations that universal access to modern energy sources needs crucial private sector involvement.
8. However, the free functioning of the market is not enough to supply ISL in terms of equity.
9. Along with the new technologies, creating companies or organizations providing energy services at the local level and an appropriate institutional framework are necessary for the electrification in IRL.
10. Active and joint position of governments, businesses, cooperating institutions and communities is required to promote the sustainable provision of services to IRL.

General approach to mini-grids





Governance aspects

Proyecto: APPD para la electrificación de ZRA en Latinoamérica

Grupo de Investigación en Organizaciones Sostenibles

Universidad Politécnica de Madrid

Tarea 3: Desarrollo de modelos de APPD para el suministro de energía eléctrica a las ZRA:

Documento de avance 1:

APLICACIÓN DE LA EMPRESA SOCIAL A LA ELECTRIFICACIÓN DE ZONAS RURALES AISLADAS EN LATINOAMÉRICA

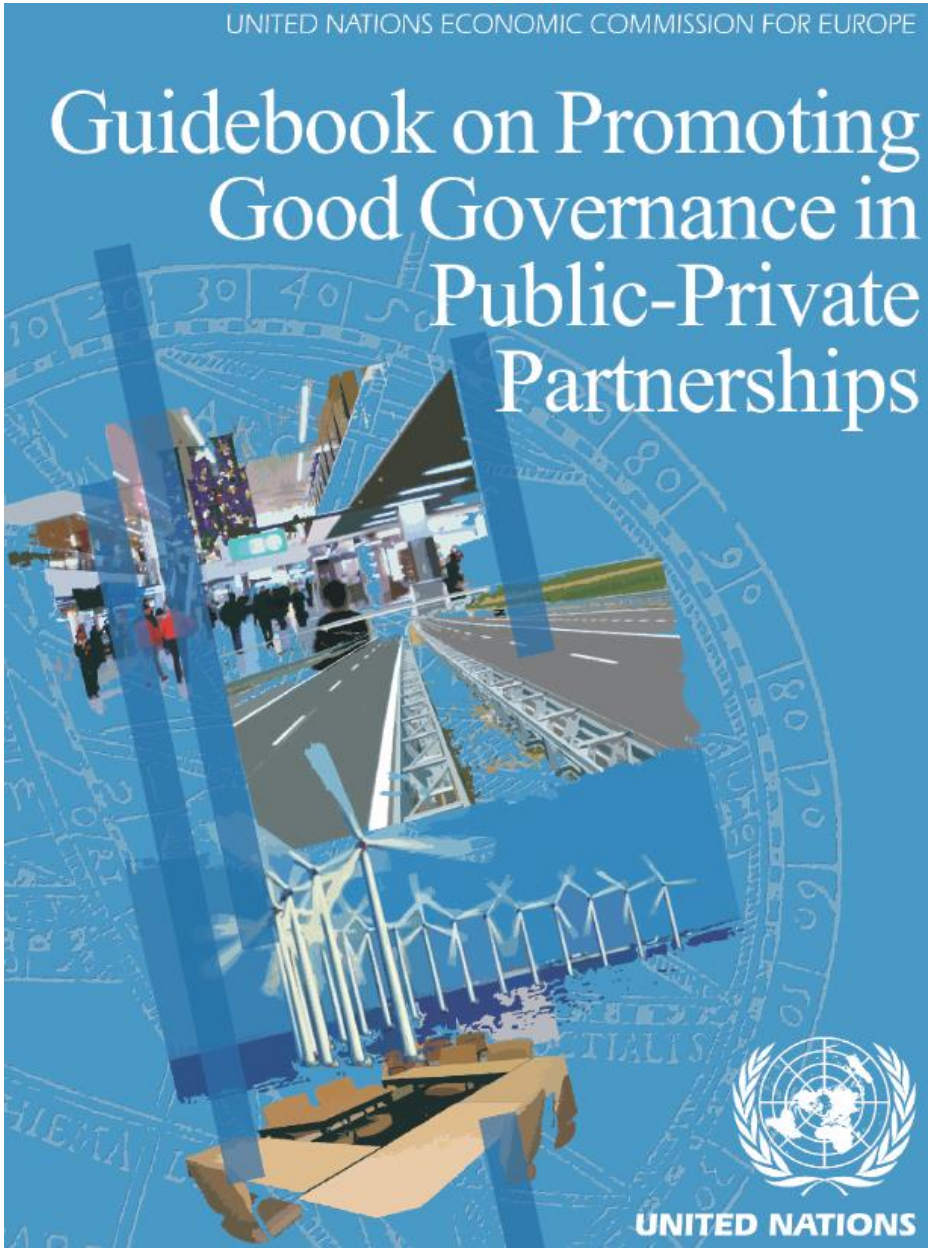
Ana Moreno Romero – Ramón Fisac García – Luis Miguel Uriarte

EsF - Aula de Solidaridad – UPM – FICAIpD

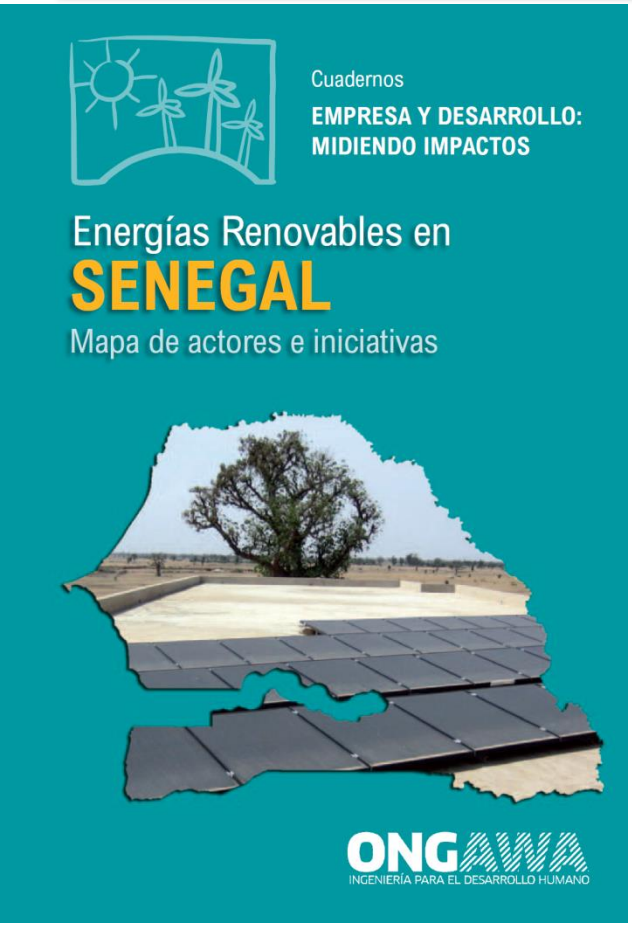
Enero de 2011

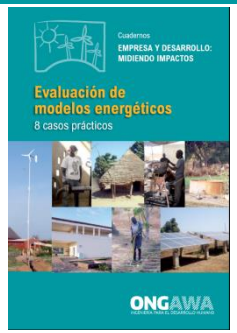
Preparado y Revisado: Ana Moreno Romero

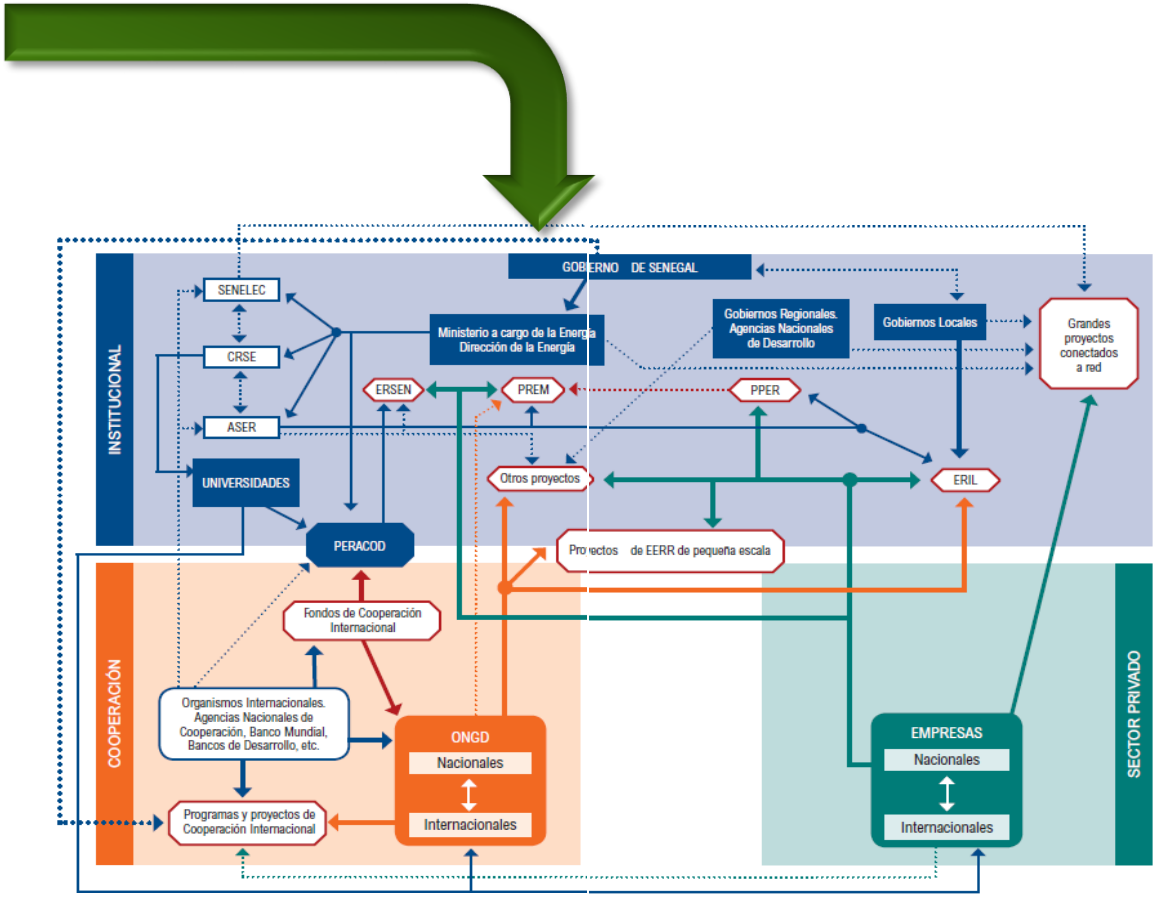
Governance aspects



Governance aspects and Public Private Partnerships







Business to solve social problems

http://www.youtube.com/watch?v=0iIh5YYDR2o&feature=player_detailpage

Thank you very much for your attention

IBERDROLA