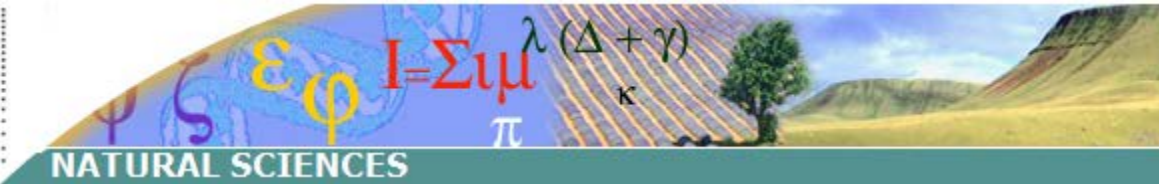




United Nations Educational,  
Scientific and Cultural Organization



International Engineering Conference  
New Approaches for Supplying Sustainable Water and Energy  
27<sup>th</sup> – 29<sup>th</sup> July 2016, Brasilia, Brazil

# ***Addressing the energy challenges Needs and Perspectives***

Dr Osman Benchikh  
Chief of Section  
Innovation and Capacity Building in Science and Engineering  
UNESCO

# SDGs and Energy



# **Main Energy Challenges**

## ✓ **Addressing the UN SDGs**

- Energy services are essential for meeting basic human needs, reducing poverty, sustaining advances in social development
- Energy as a the Goal 7 “*ensure access to affordable, reliable, sustainable and modern energy for all*”

## ✓ **Climate change and other environmental concerns**

## ✓ **Access to affordable energy supply**

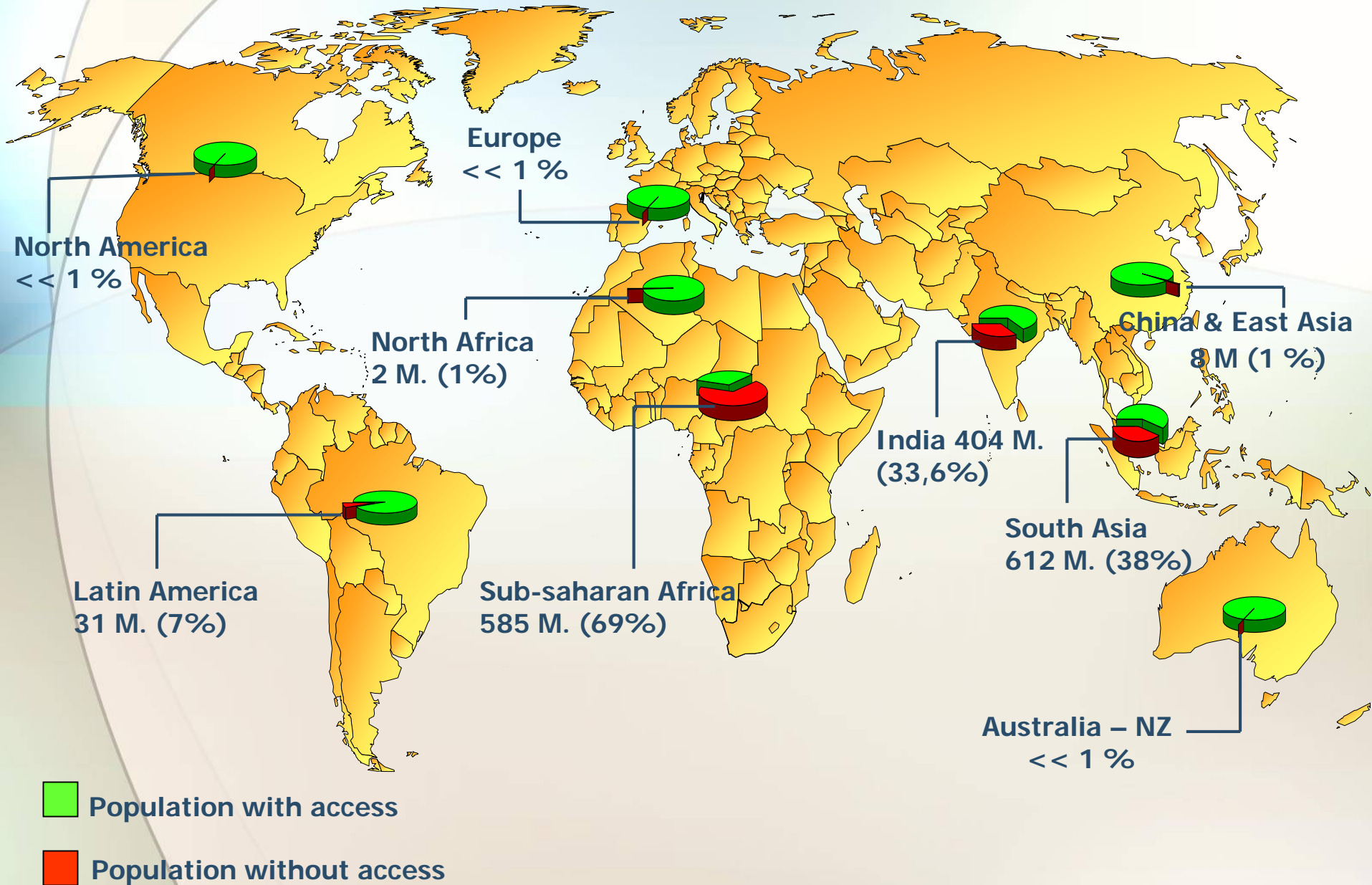
- 2014-2024 UN Decade “*Sustainable Energy for All*”

## ✓ **Sustainability of energy sources**

# ***Energy is the critical issue***

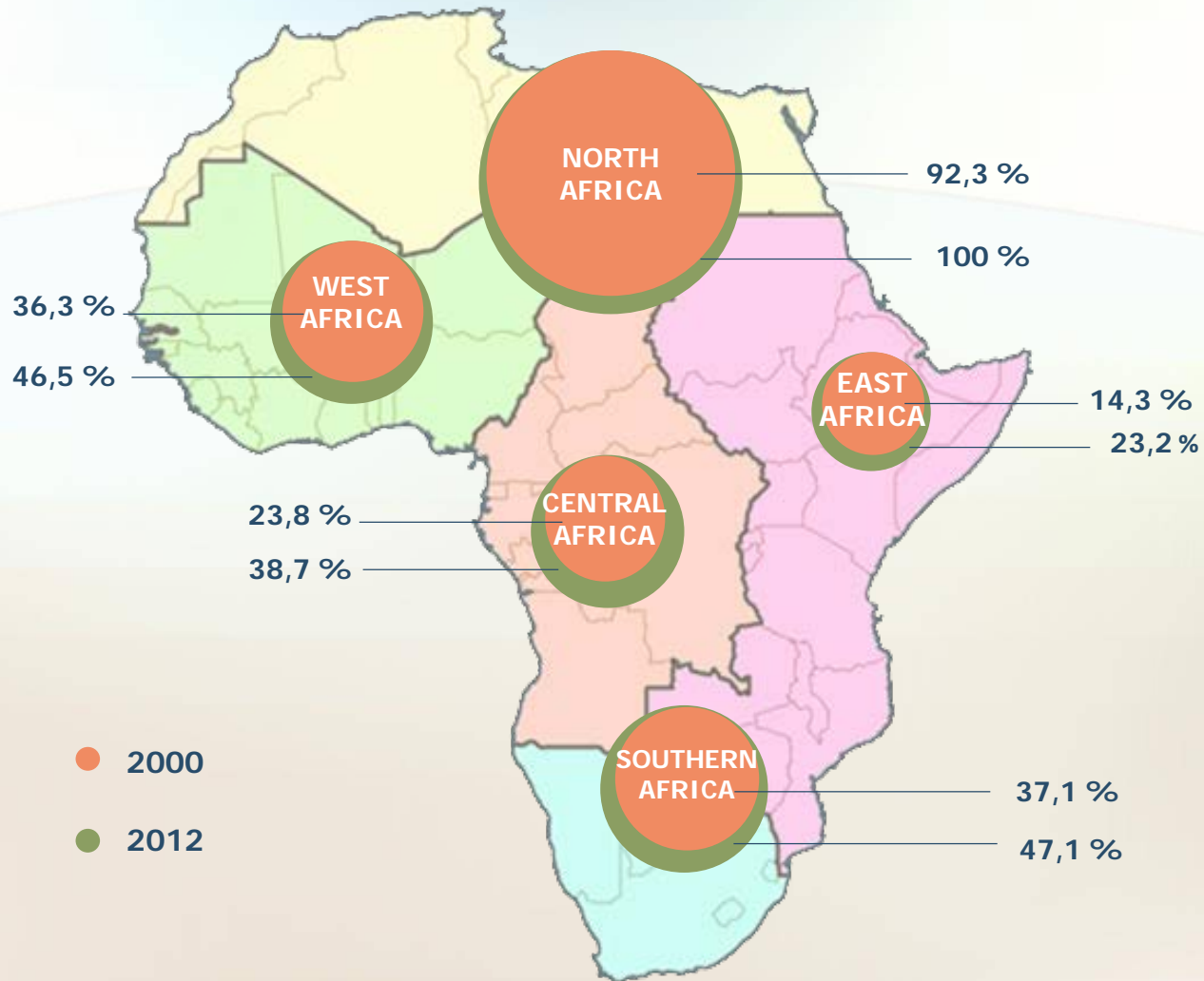
- ✓ Low consumption in developing countries
- ✓ Strongly correlated with Human Development Indicators
- ✓ Developing countries must expand electricity infrastructure 3 to 4 times just to reach their SDGs basic needs
- ✓ Success of COP 22 in Morocco (Nov. 2016) will depend on how new national pledges to reduce emissions can be integrated into an international framework

# Electricity Access

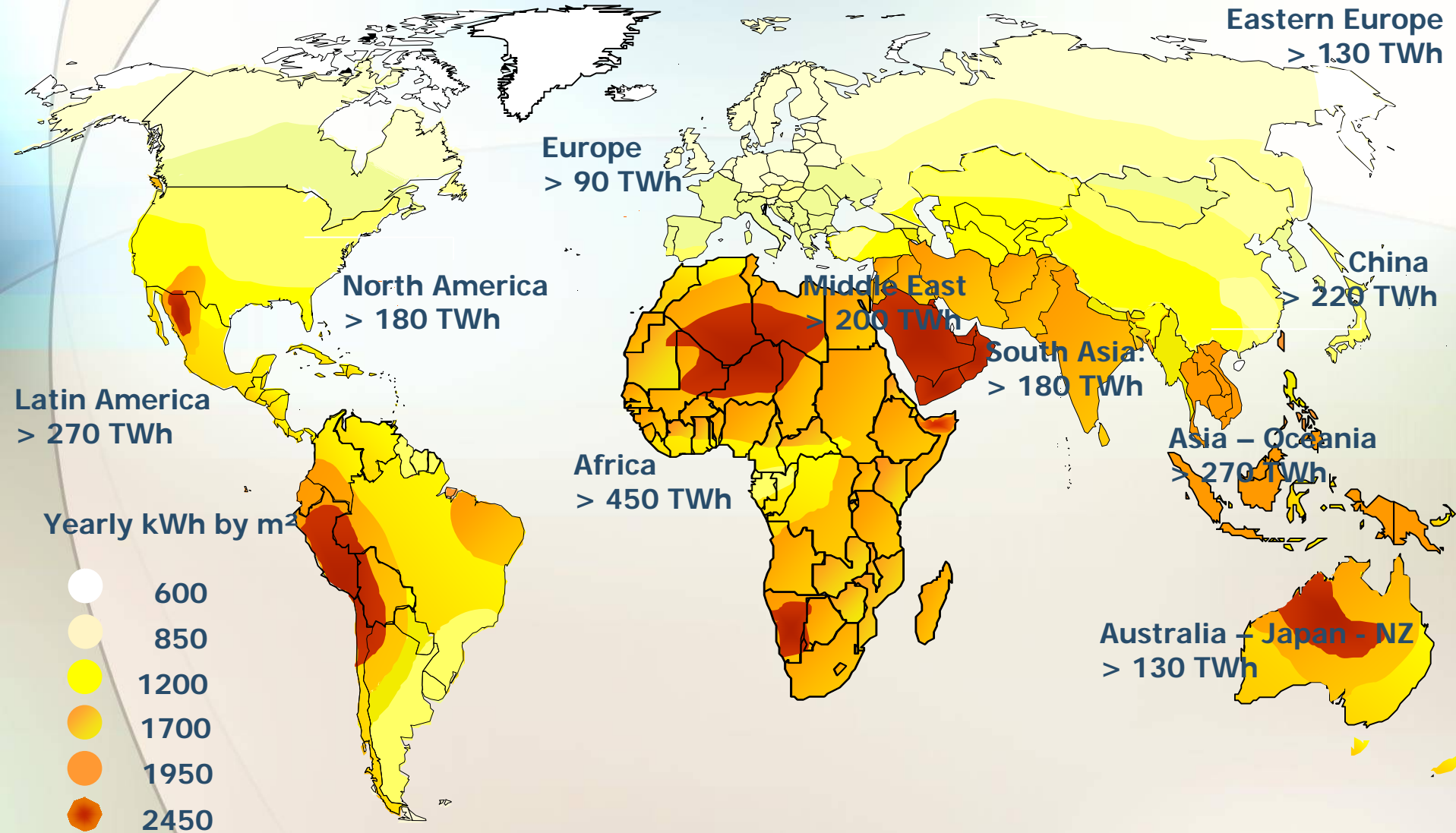




# Slight increase in the Electrification rate In Africa

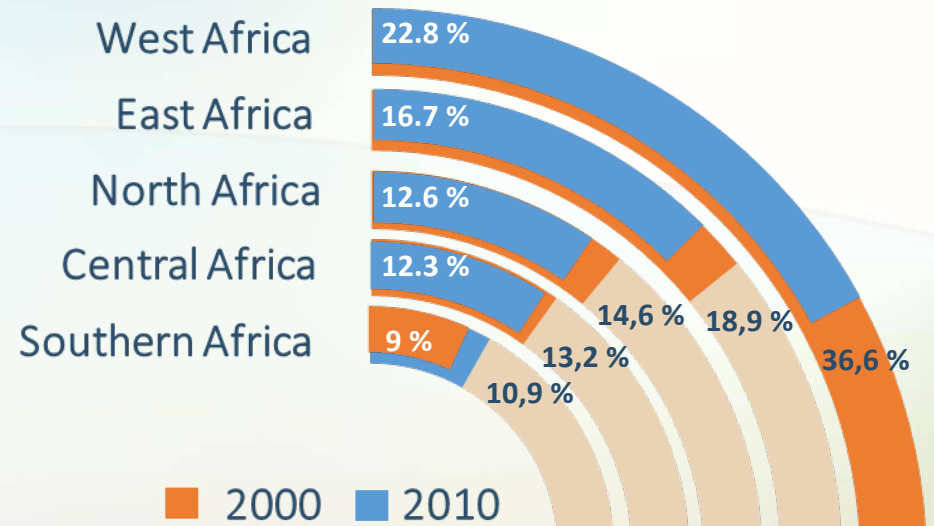


# Solar Energy Reserves



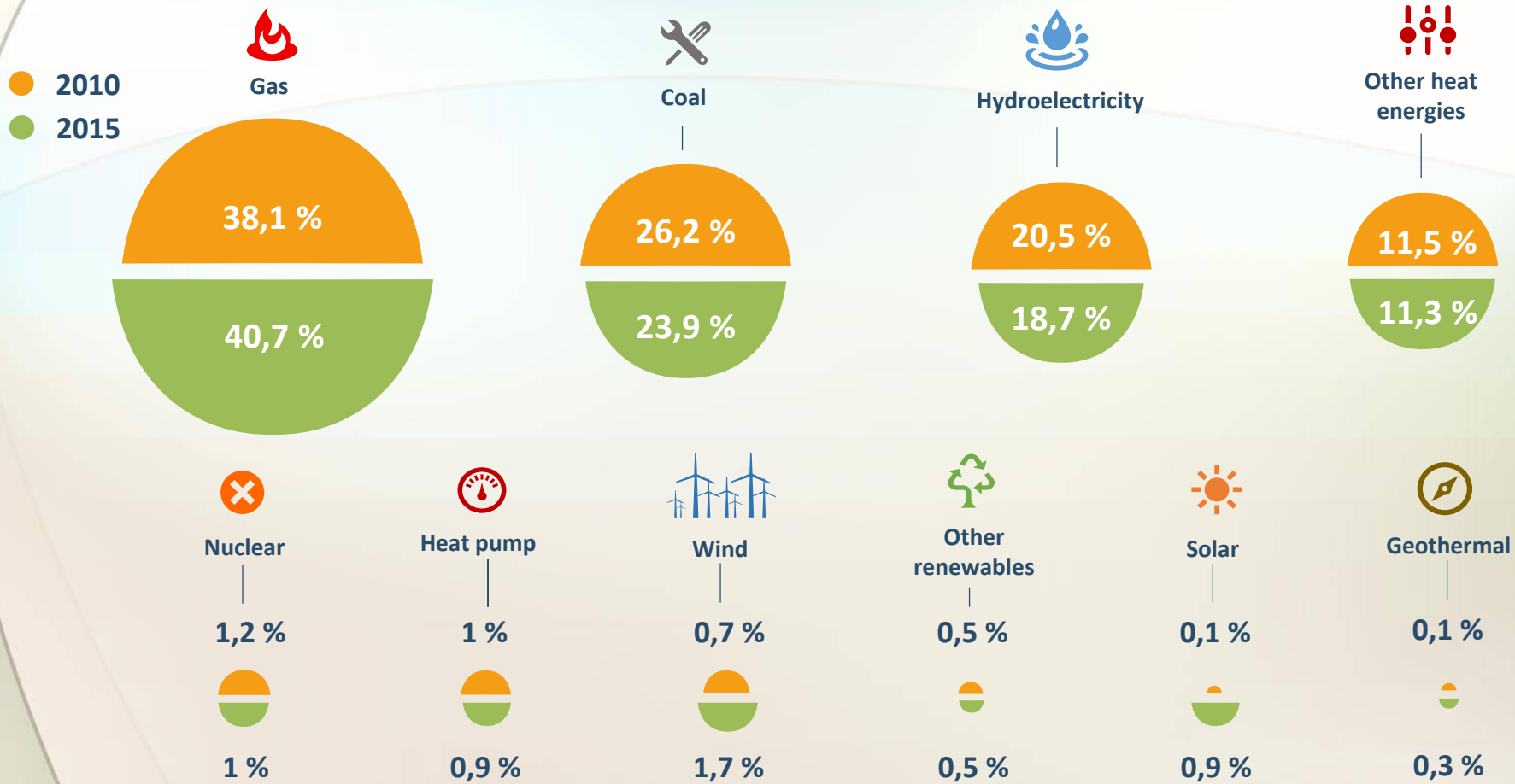
Source: B. Dessus & UNESCO's Summer School

# Decrease of the Losses in the Electricity Transport



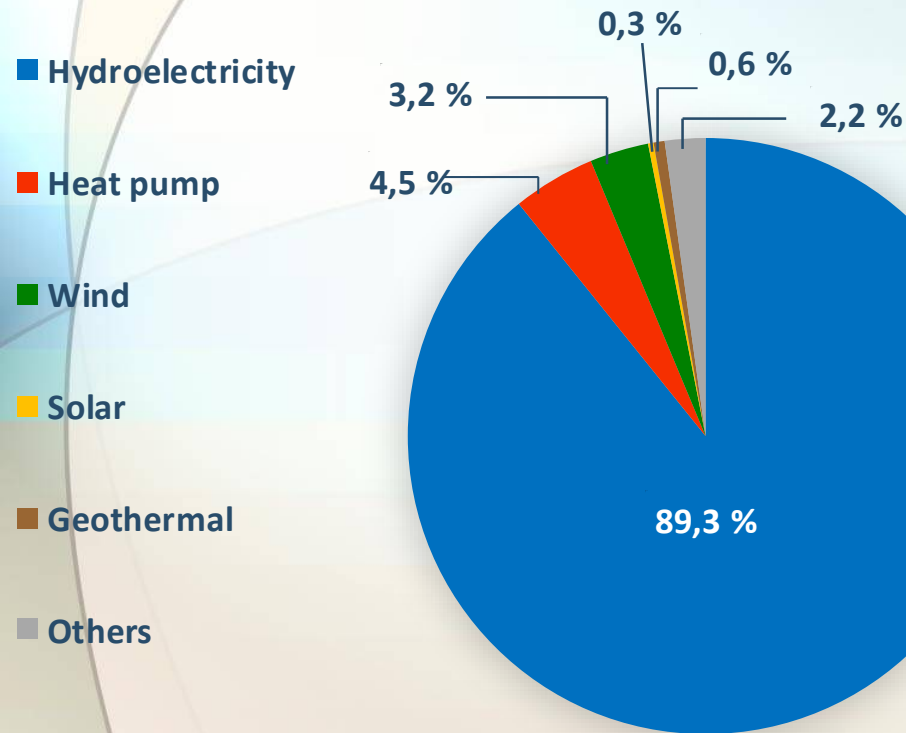


# Renewable Energy Sources in the Global Energy Mix

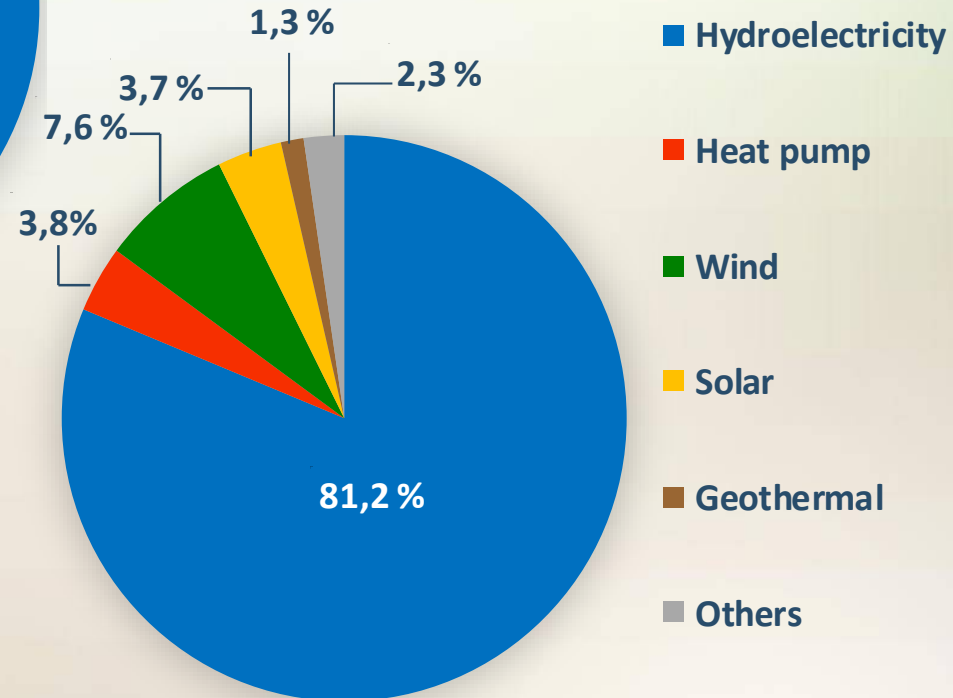


# Contribution by Renewable Energy Source

2010



2015



■ Hydroelectricity

■ Heat pump

■ Wind

■ Solar

■ Geothermal

■ Others

■ Hydroelectricity

■ Heat pump

■ Wind

■ Solar

■ Geothermal

■ Others

# Public spending for the Energy Sector, in average per capita (2012-2014)



# ***Environmental Challenges***

**WHAT NEEDS TO BE DONE ?**

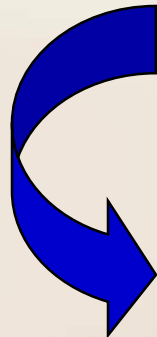
## XIX CENTURY MIDDLE



INDUSTRIAL REVOLUTION

**INTENSIVE ENERGY USE FOR  
INDUSTRIAL AND CONSUMER SOCIETY  
DEVELOPMENT**

## XXI CENTURY



GLOBAL ENVIRONMENTAL CRISIS

**ALTERNATIVE ENERGY SOURCES  
FOR  
GLOBAL SUSTAINABILITY**



**... We need to change the energy development  
paradigm !!!**

# ***Challenges to energy applications and infrastructure***

## **☐ *Electricity production***

- Systems for production and technologies well learned and managed
- Infrastructure well established particularly in developed countries

## **☐ *Challenge 1: STORAGE***

## **☐ *Challenge 2: TRANSPORT***

- More efficient technologies
- Energy product easy to transport and store?

## **☐ *A paradigm shift in energy prospects?***

- Sustainable and clean at the use point of view, transportable and storable, easy infrastructure

# *Remaining challenges in supply*

## **Fusion**

..... Not yet there!

## **Fission**

- Storage of used fuel
- Risk of human errors and external factors
- Requires high level of technological know how and infrastructures

## **Renewable energy**

- Could meet all human energy needs
- But many technologies (PV, Solar thermal, biofuels, etc.) could be further improved in terms of efficiency & economics
- Still many new options are to be discovered or developed (solar, tidal, wave, new generation of biofuels etc.)
- Plus: traditional methods needs to be adapted to today's materials and needs (such as passive solar design)

# ***Policy considerations***

- ✓ Principal Barrier to Technology Transfer is ***COST***
- ✓ An opportunity for leapfrogging exists – synergies between Energy and the other SDGs and climate change goals
- ✓ Relevance of micro credit facilities and targeted subsidies
- ✓ More renewables imply diversification, reliability, less fossil fuel use and synergies in relation to climate change
- ✓ Promote tariffs for the poor (cost sharing, cross subsidies, etc.)
- ✓ Promote decentralized systems (off-grid) based on renewable energy for rural areas
- ✓ Develop regional networks for implementation of renewables (large-scale)
- ✓ Link electrification and renewable targets to tariff increments

# ***Pathways to Universal Energy Access***

- What can simply and realistically be achieved?
- What might we wish to achieve?



# ***Energy Transition***

- ✓ From traditional to post-modern;
- ✓ Components: efficiency, RE, and phase out
- ✓ Conventional Energy: low individual cost but high environmental / Climate cost
- ✓ Modern: Higher individual cost but low environmental / climate cost

# ***Different North-South Challenges***

- ✓ North: Energy efficiency, plus (eventually) phase out/ replacement of existing energy
- ✓ South: Renewable energy pathway, plus (as much as possible) efficiency, plus phase out (eventually)
- ✓ Two options: gradualist versus big push

# *The big push*

- ✓ Avoid the “pollute first clean up later” polluting option
- ✓ Urgent attention to renewable energy
- ✓ Challenges
  - How to lower costs
  - How to ensure energy is affordable
- ✓ Globally funded public investment in renewable energy starting with developing countries

UNESCO's strategy build on its achievements in renewable energy with priority objectives focusing on:

- ✓ Promoting RE for developmental and environmental purposes
- ✓ Building Capacities and knowledge base - GREET Programme
- ✓ Sharing of scientific knowledge and best practices
- ✓ Promoting renewable energy policy frameworks and advocacy for global sustainability and climate change mitigation

## ***Renewable Energy Science and Technologies – transfer and knowledge base***

- ✓ RE Science and Technologies could be easy to develop in countries with less advanced infrastructures and technological habit
- ✓ Leapfrogging in developing countries requires building a local knowledge base, initiatives addressing developmental purposes and easy for duplication and international collaboration
- ✓ Quantum change requires a global organized effort from a wide range of stakeholders in Science and technology transfer, capacity building and financing



# *Solar Powering Africa Schools*



# Solar Powering Africa Schools

## Context



➤ Around 50% of children in developing countries, still go to primary schools without access to electricity – more than 291 million children.

➤ In Sub Saharan Africa, around 69% of the population remain without electricity access, and more than 85% of those living in rural area lack access.

➤ Lack of electricity impact the child's ability to learn, and therefore their future earning potential. The expected income being strongly related to education.

➤ Electricity access in areas, far from the grid is best achieved by solar systems





# *Solar Powering Africa Schools*

## *Why the solar schools initiative*



- Most of rural children's in Africa attend schools without power for lighting, computers, internet, printers and more. This has huge implications on their quality education.
- The project aim at promoting the solar electricity access in African rural schools to improve the quality education and teaching and align it with common standards.
- It is foreseen as a model with multiplier effect that can be duplicated at national and regional levels. The project concern the solar electrification of 75 rural schools in Benin, Madagascar, Mauritania, Niger and Togo.



# Conclusion

*Changing the energy paradigm will require new practices and innovative actions that should call for locally available energy sources and focus on peoples needs!*





United Nations Educational,  
Scientific and Cultural Organization

NATURAL SCIENCES

شكرًا

Большое  
спасибо

Merci

Gracias

谢谢你

Danke schön

Thank you