

# Climate Change and the Road to Rio: Renewable Energy Options

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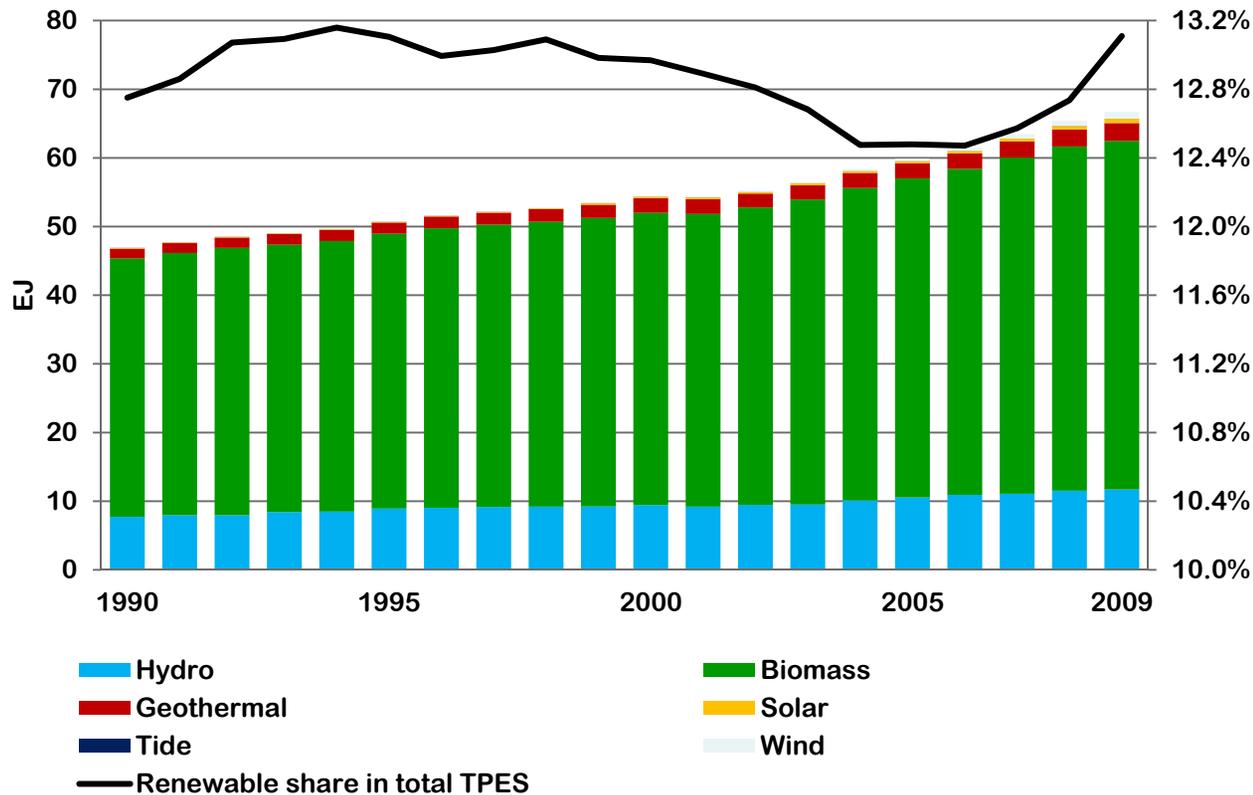
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# 1) Latest developments and trends in the renewable energy sector

**World Total Primary Energy Supply from Renewables 1990-2009**

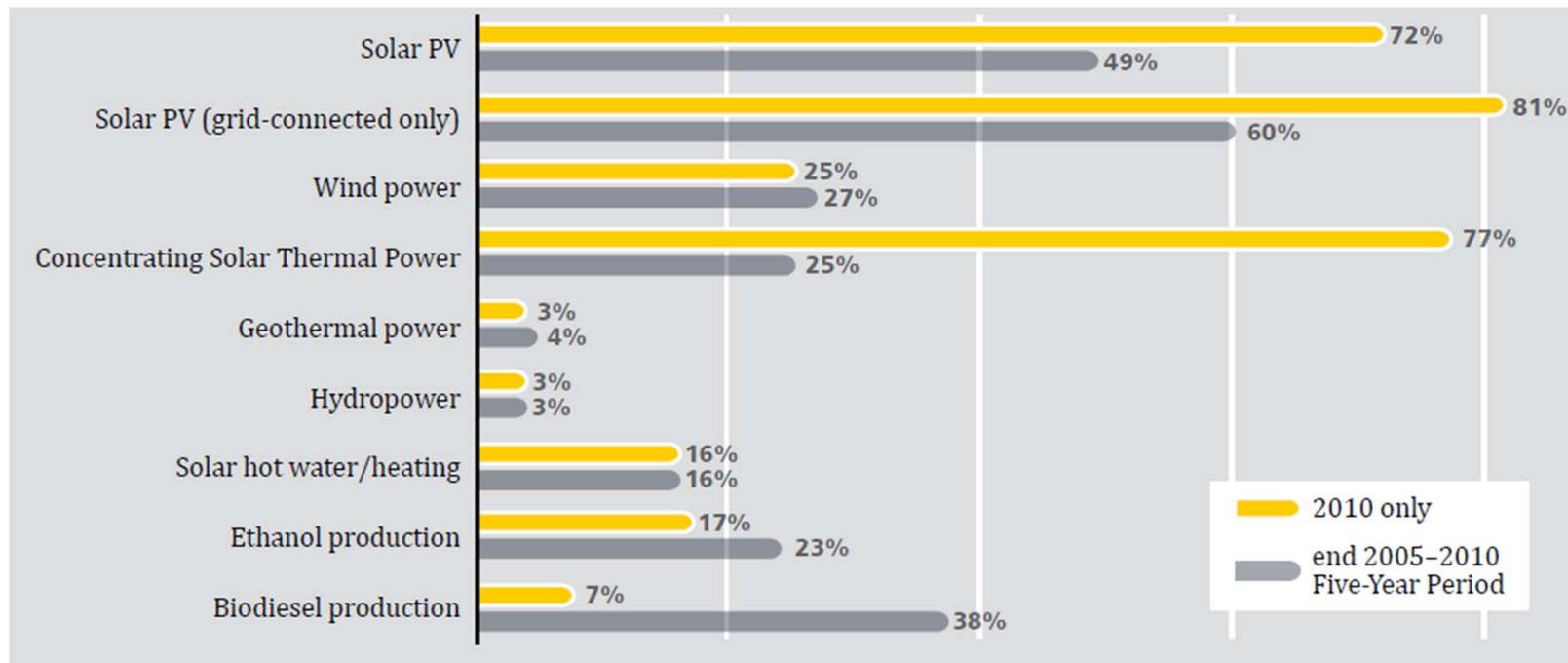


**In 2010  
renewables  
contributed  
an estimated  
16% of global  
final energy  
consumption**

***(REN 21,  
2011)***

# 1) Latest developments and trends in the renewable energy sector (continued)

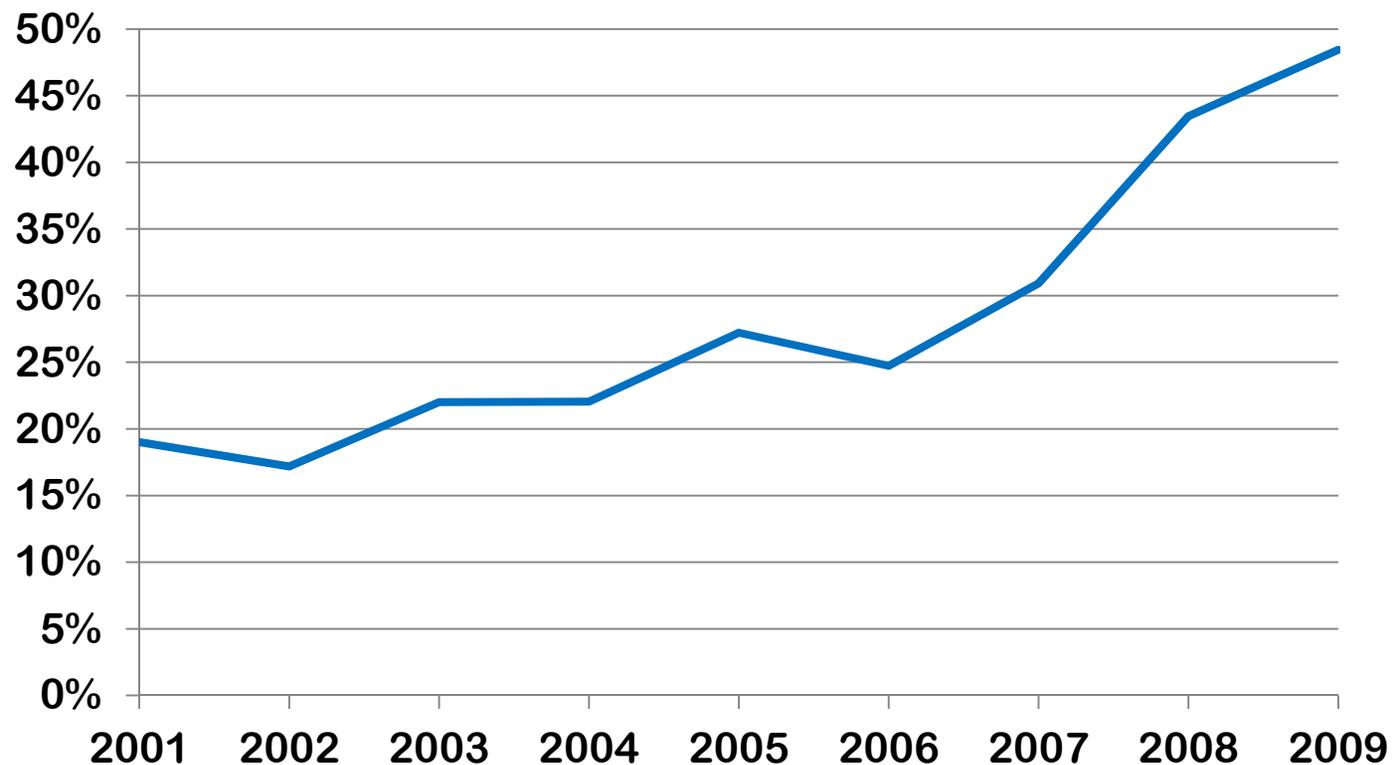
## Annual Growth Rate of Renewable Energy Capacity and biofuels production (2005-2010)



Source: REN21-GSR

# 1) Latest developments and trends in the renewable energy sector (continued)

## Renewables account for half of power generation capacity additions worldwide

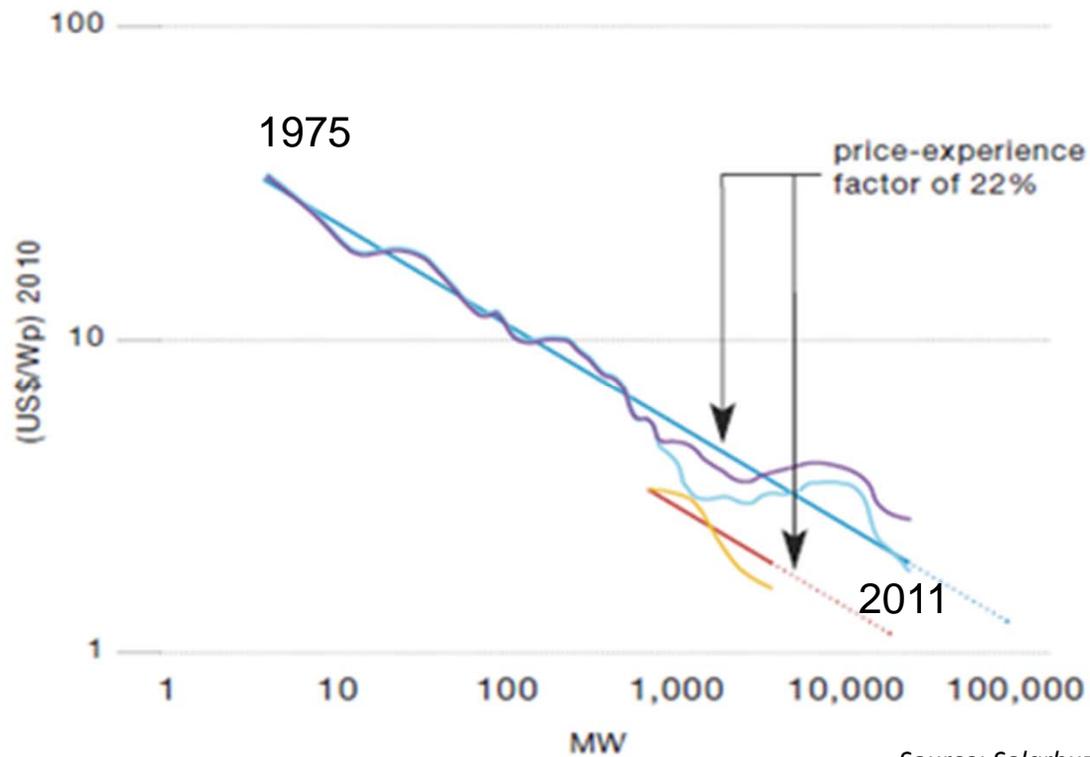


About 4% of global gasoline demand, 5-10% of heating demand capacity expansions

Source: IRENA analysis

# 1) Latest developments and trends in the renewable energy sector (continued)

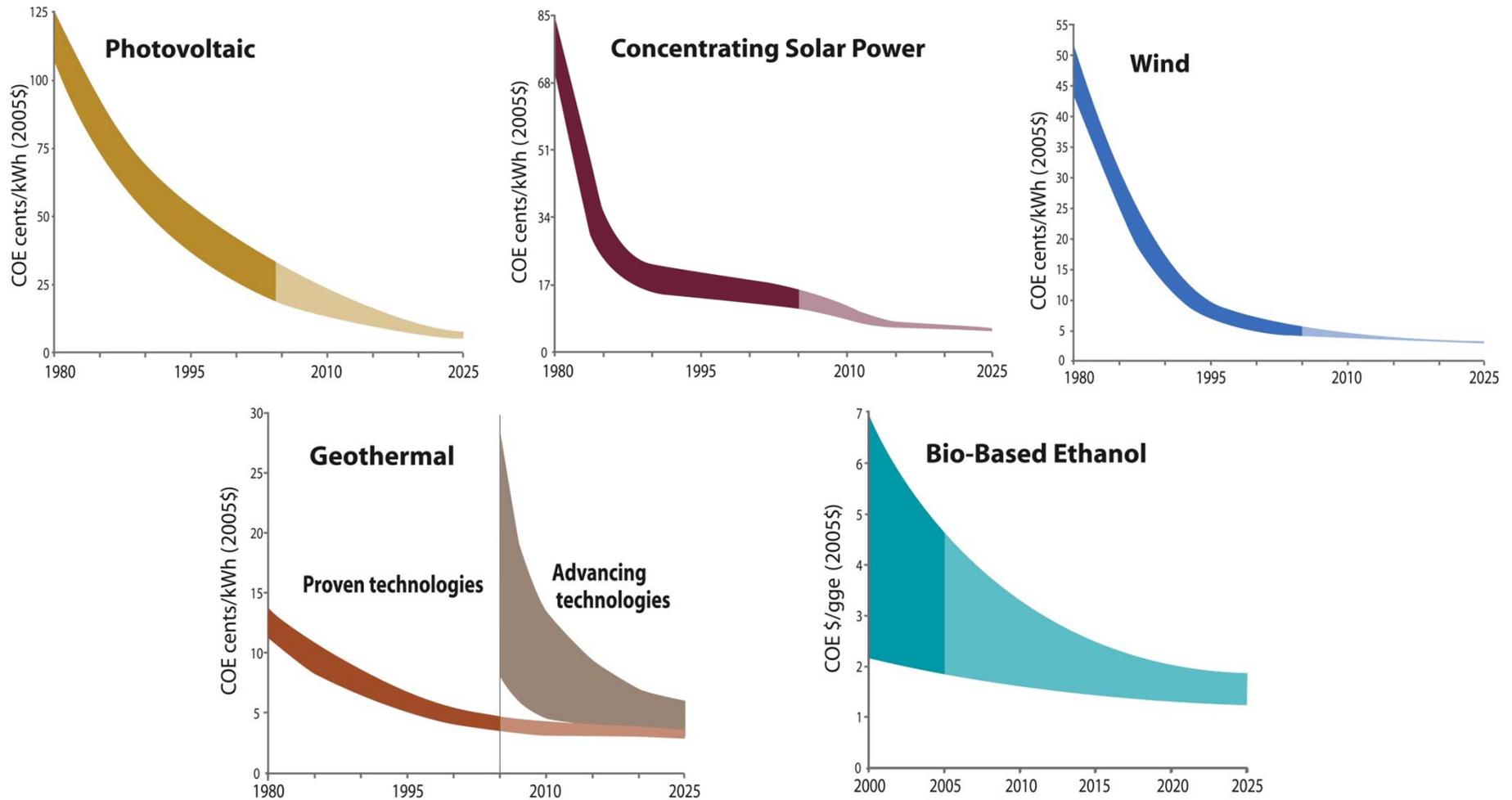
### Rapid and predictable cost reductions for PV modules



Source: Solarbuzz (2011)

# 1) Latest developments and trends in the renewable energy sector (continued)

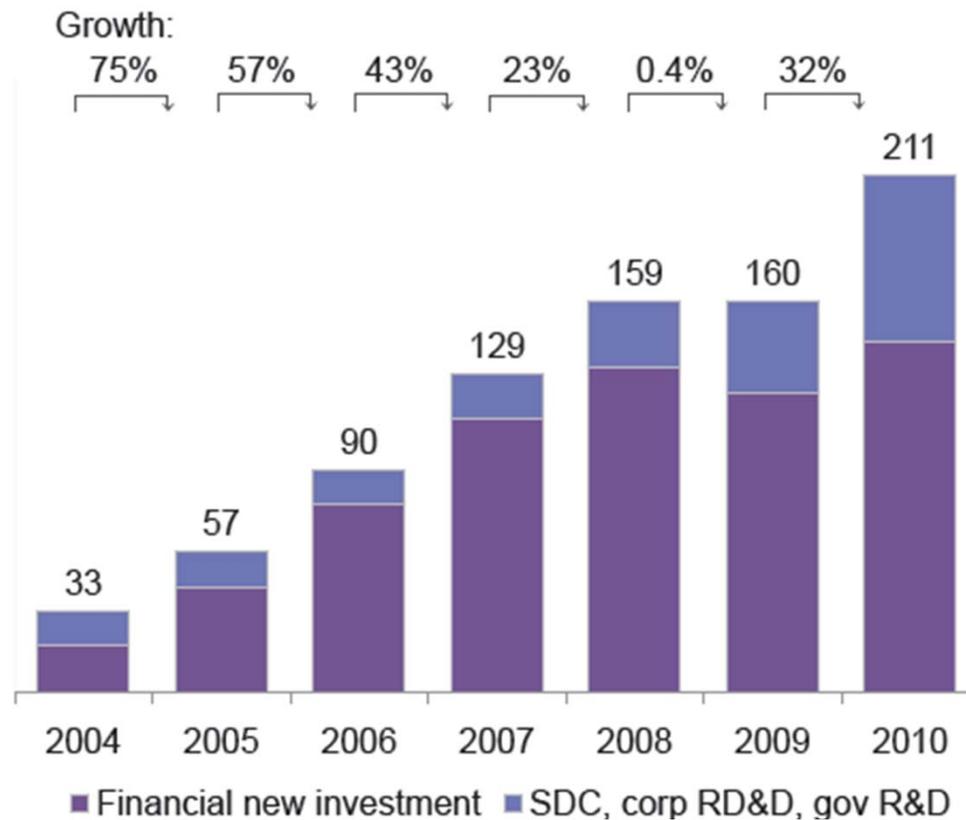
**Levelized cost of energy in 2005 (\$)**



Source: NREL (2005)

# 1) Latest developments and trends in the renewable energy sector (continued)

## Trends in Investment in Renewable Energy



Global New Investment in Renewable Energy (2004-2010) in \$BN

Source: Bloomberg New Energy Finance

# 1) Latest developments and trends in the renewable energy sector (continued)

**Trends in Investment in Renewable Energy by Region (2004-2010) in \$bn**



Source: Bloomberg New  
Energy Finance

## 2) The energy access challenge

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- ❖ There are **large variations in electrification rates** across and within regions
- ❖ Today **1.4 billion people** lack access to electricity, mostly in sub-Saharan Africa, India, and South Asia
- ❖ More than 2.7 billion still rely on traditional biomass for cooking
- ❖ Household air pollution from the use of biomass in inefficient stoves leads to almost 4000 premature deaths per day
- ❖ If the UN Millennium Development goals are to be achieved, 400 million people need access to energy by 2015
- ❖ Estimates indicate an additional **US\$36 billion/year is needed until 2030** to provide universal access to modern energy services

### 3) Key role for renewables

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**Renewable energy offers various benefits to address the energy access challenge:**

- ❖ Socio-economic, technology, environment
- ❖ Unrealized potential of renewable energy resources
- ❖ Decentralized nature of many renewable energy technologies

## 4) Barriers to renewable energy deployment in the context of energy access

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- ❖ High costs of supplying rural and peri-urban households
  - Low population density
  - High percentage of poor households
  - High dispersion
  
- ❖ Low demand and low load factor
  
- ❖ Lack of appropriate incentives and limited capacity to pay
  
- ❖ Weak implementing capacity
  
- ❖ Electricity generation shortage
  - Insufficient generation capacity of national grid
  - Large distance from national grid
  - Difficulty in accessing national grid/harsh climates
  
- ❖ Population growth

## 5) IRENA and its engagement in energy access

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### Energy Access is addressed in IRENA's 2011 three substantive sub-Programmes

- ❑ Global knowledge on relevant renewable energy information will be systematized through the Sub-Programme on Knowledge Management and Technology Cooperation.
  - Global mapping of resource potential
  - Renewable energy readiness report
  - Catalyzing south-south technology transfer to rural areas
  
- ❑ A framework for technology development support to governments will be designed through the Sub-Programme on Innovation and Technology
  - Costs of renewables
  - Assessment of end-use technology options (patents and technology transfer)
  - Standards and testing procedures
  
- ❑ An enabling policy, financial and human resource environment for the deployment of renewable energy technologies will be fostered through the Sub-Programme on Policy Advisory Services and Capacity Building
  - Policies and measures to overcome barriers in rural electrification
  - Renewable jobs in the context of access to energy in developing countries
  - Business models for enabling local renewable energy entrepreneurship

## 5) IRENA and Energy Access (continued)

### Policy Advisory Services and Capacity Building

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#### Policies and measures to overcome barriers in rural electrification

Based on case studies in India, East Africa and Latin America, the aim with GNESD is to

- ❖ Identify high replicability potential of successful programmes
- ❖ Identify lessons from local experiences with different approaches to policy, technological solutions, financing and business models for expanding rural access through up-scaling the use of renewable energy
  - **India mini-grid model** through analyzing the trends in the implementation of mini-grids with time (both technological development as well as institutional models), policy dynamism and impacts on livelihoods
  - Assessment of off-grid and mini-grid rural electrification solutions based on renewable energy systems in **South America**
  - **Kenya** as a case study and examine the current and potential role of renewables in expanding rural access to electricity within the context of key drivers of rural electrification
- ❖ Outreach
  - Report
  - Handbook for policy-makers
  - Dissemination through regional workshops and side-events

## 5) IRENA and Energy Access (continued) Policy Advisory Services and Capacity Building

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### Renewable jobs in the context of access to energy in developing countries

- ❖ Focus on renewables and application creating more localized employment opportunities
  - Benefits to households
  - Employment/enterprise creation and income
  - Conditions for viability and sustainability
- ❖ Based on case studies with the following partners
  - E+Co: solar companies Africa and Latin America; hydro companies in Central America
  - GVEP: Developing Energy Enterprise Project (DEEP) in Kenya, Tanzania, Uganda (micro-hydro enterprises)
  - ARE: stand alone PV and hybrid mini-grid in 5 African countries
  - Rural Energy for Rural Livelihood (RERL): micro-hydro schemes in Nepal
- ❖ Outreach
  - Report
  - Handbook for policy-makers
  - Dissemination through regional workshops and side-events

## 5) IRENA and Energy Access (continued)

### Policy Advisory Services and Capacity Building

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#### **Business models for enabling local renewable energy entrepreneurship**

- The enterprise-driven model has proven successful in improving sustainable energy services, but most projects have not been scaled up or replicated
- Workshop for solar energy entrepreneurs to improve knowledge about micro-enterprise creation and end-user finance (in collaboration with E+Co and SELCO)
- Workshop for practitioners to explore how governments, financiers and entrepreneurs can better enable RE entrepreneurship and rural RE market creation
- Outreach
  - Report
  - Handbook for policy-makers
  - Dissemination through regional workshops and side-events

## 6) Enabling environment – Financing

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- ❖ Primary source of finance has been national and international funding
- ❖ Current investments are insufficient to provide universal access to modern energy services
- ❖ Need for a paradigm shift creation of locally-owned businesses that are self-sustaining in the long-term
- ❖ Funding should aim to support the creation of markets
- ❖ Financing options (Case of off-grid) include:
  - ❖ Microfinance
  - ❖ End-user finance
  - ❖ Mobilization of private resources
  - ❖ Public-private partnerships

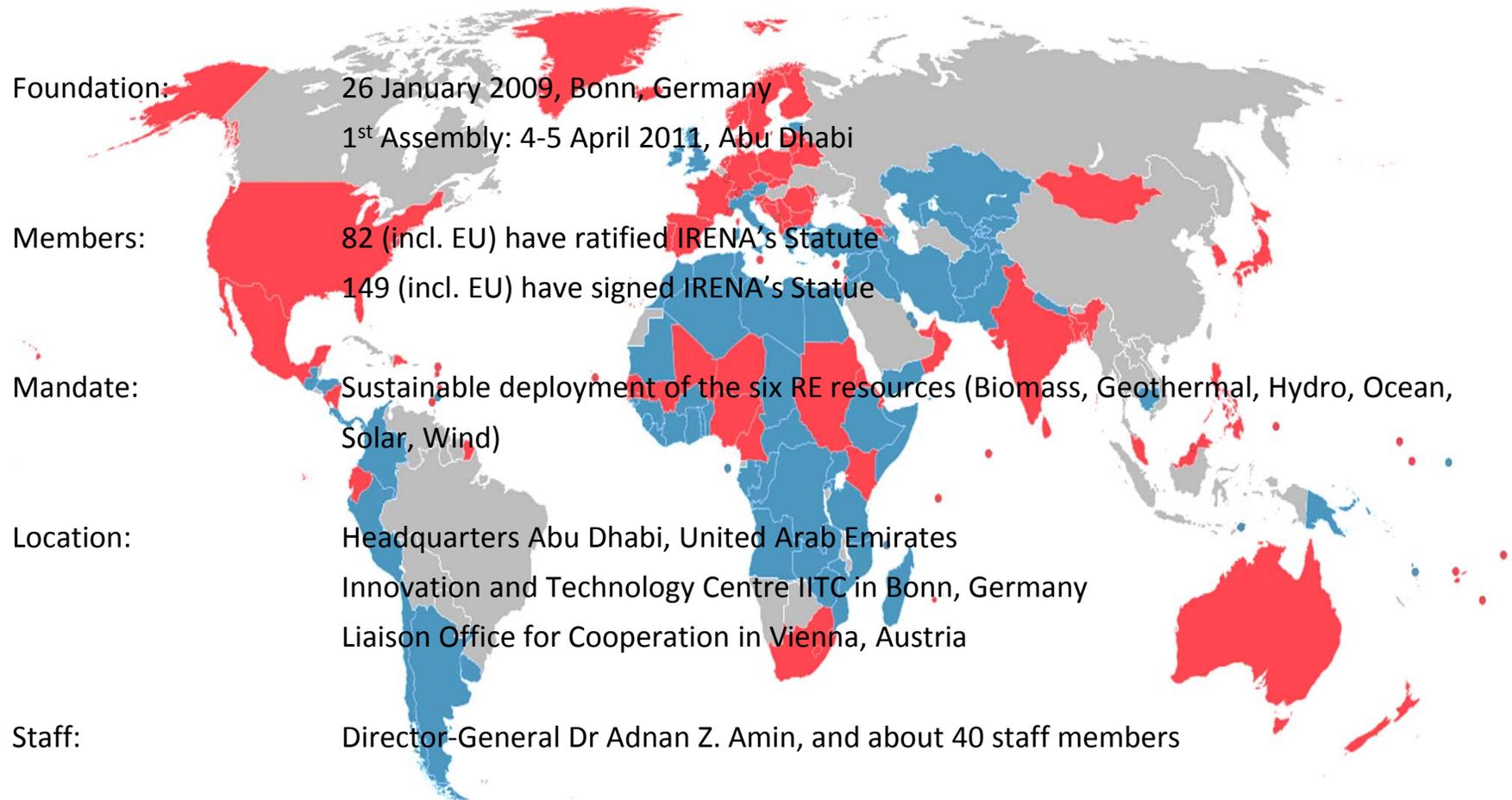


## 6) Enabling environment – Policy Frameworks

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- ❖ An appropriate incentives system (removal of trade barriers)
- ❖ Lowering of the transaction costs governments and private sector to enter the RE sector
- ❖ Progressive removal of fossil-fuel subsidies
- ❖ Integrate energy access into national development strategies
- ❖ Adopt energy access targets
- ❖ Little evidence for the superiority of any institutional model for electrification

## 6. The International Renewable Energy Agency (IRENA) and its engagement in energy access



**THANK YOU**

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