2012 INTERNATIONAL YEAR OF SUSTAINABLE ENERGY FOR ALL

REN21 Renewable Energy Policy Network for the 21st Century

Renewables 2012 Global Status Report

Key findings

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ECOWAS-GFSE-GEF-UNIOD High Level Energy Forum
Towards Sustainable Energy for All in Wesst Africa

29-31 Ocotber 2012, Accra, Ghana

About REN21

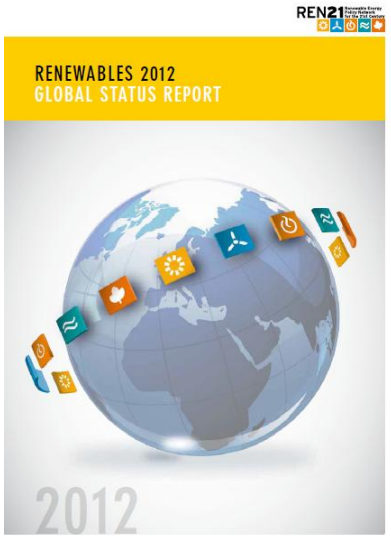
- **Multi-stakeholder Policy Network grouping:**
  - **National governments:** Brazil, Germany, Denmark, UK, Spain, Norway, India, UAE, US, Uganda, Morocco, etc.
  - **International organisations**: EC, IEA, IRENA, UNEP, UNIDO, UNDP, ADB, GEF, etc.
  - **Industry associations:** RENAlliance (WWEA, WBA, IGA, ISES, IHA), ARE, GWEC, EREC, etc.
  - **Science & Academia:** SANEDI, IIASA, TERI, etc.
  - **NGOs:** WWF, Greenpeace, ICLEI, CURES, WRI, etc.
- **Objective**: enable a **rapid global transition to renewable energy**
- **REN21 Secretariat** based at UNEP in Paris, France

REN21 Renewables Global Status Report

- Launched on **June 11, 2012** along with UNEP's Global trends in RE investment
- Team of **over 400 contributors, researchers & reviewers worldwide**
  - Lead author (Janet Sawin) & Chapter authors
  - Regional Contributors , Technology contributors & Rural energy contributors
  - REN21 Secretariat research support team

The report features:

- Global Market Overview, Investment Flows, Industry Trends, Policy Landscape, Rural Renewable Energy
- All renewable energy technologies
- Sectors: power, heating/cooling, transport
- New elements in 2012:
  - Rural renewable energy
  - Renewable energy & energy efficiency



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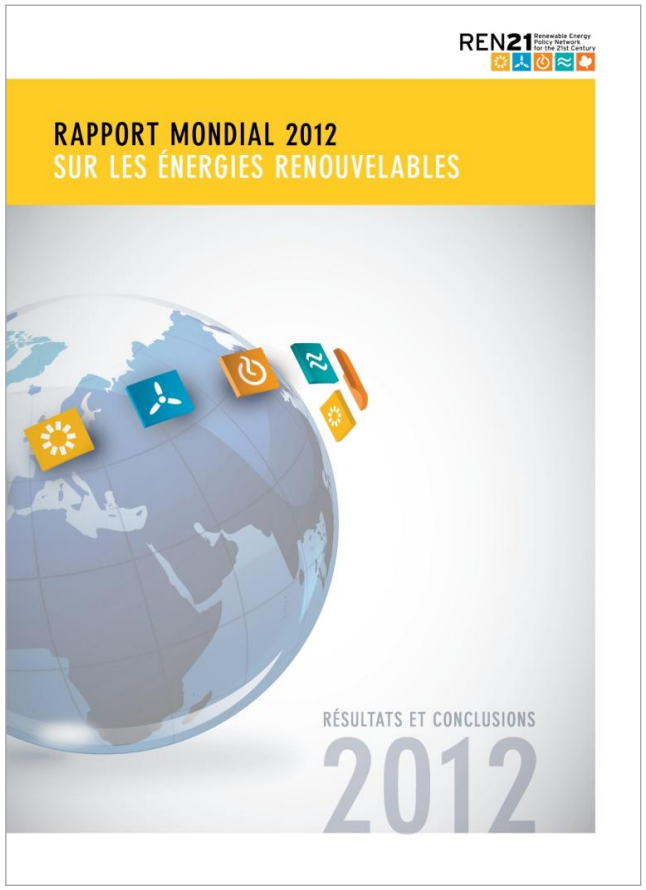
REN21 Renewables Global Status Report

With ECREEE support production of key findings in **French** and **Portuguese**



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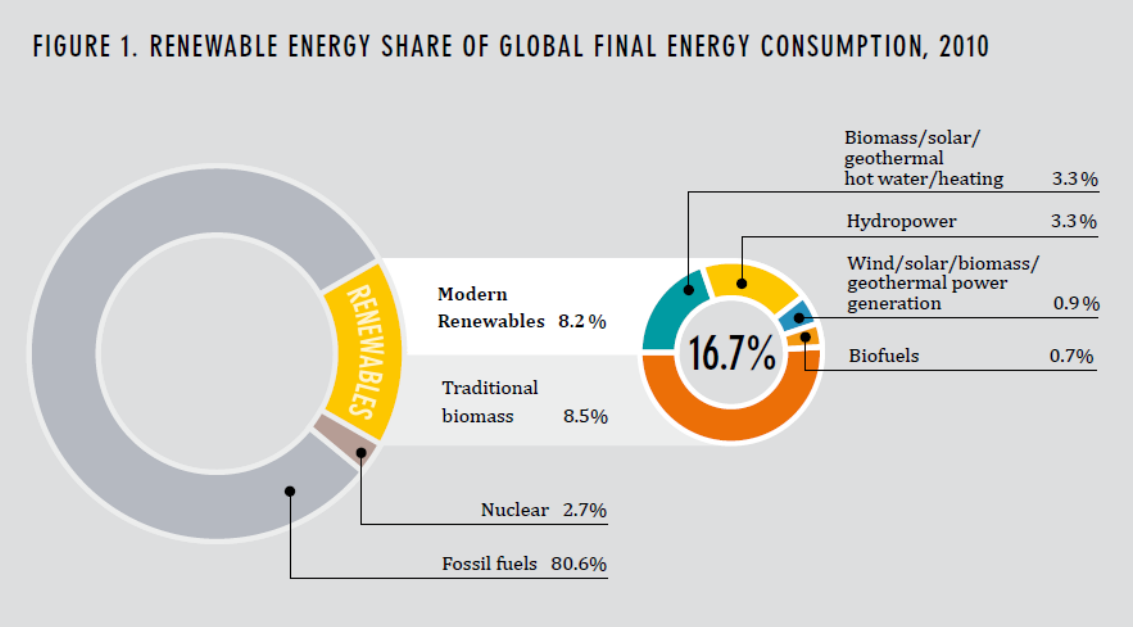
Renewable Energy in the World



- RE supplied an estimated **17%** of **global final energy consumption**
- **UN Secretary General's goal : doubling the share of renewable energy in the global energy mix by 2030**
- Renewable energy continued to grow strongly despite policy uncertainty in some countries
- Geography of renewables is expanding as prices fall and policies spread

Top 5 Countries in 2012

REN21 Renewable Energy Policy Network for the 21st Century

ANNUAL ADDITIONS/PRODUCTION IN 2011

	New capacity investment	Hydropower capacity	Solar PV capacity	Wind power capacity	Solar hot water/heat capacity[1]	Biodiesel production	Ethanol production
1	China	China	Italy	China	China	United States	United States
2	United States	Vietnam	Germany	United States	Turkey	Germany	Brazil
3	Germany	Brazil	China	India	Germany	Argentina	China
4	Italy	India	United States	Germany	India	Brazil	Canada
5	India	Canada	France	U.K./ Canada	Italy	France	France

TOTAL CAPACITY AS OF END-2011

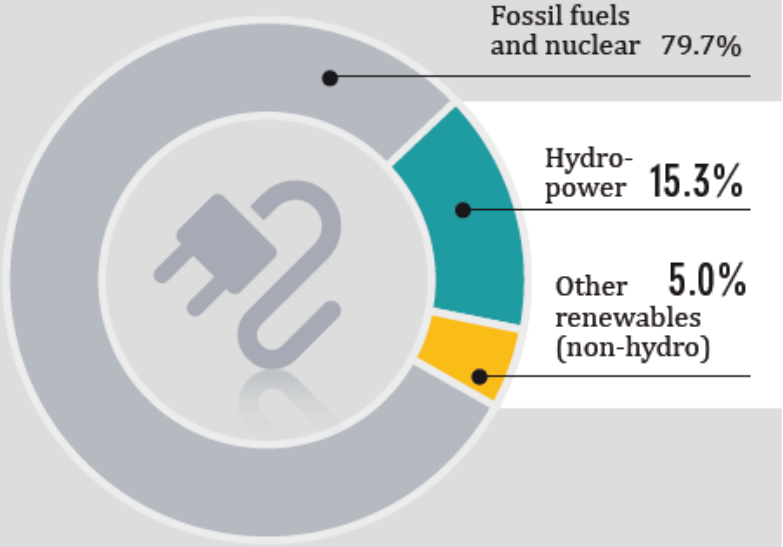
	Renewable power capacity (incl. hydro)	Renewable power capacity (not incl. hydro)	Renewable power capacity per capita (not incl. hydro)[2]	Biomass power capacity	Geothermal power capacity	Hydropower capacity
1	China	China	Germany	United States	United States	China
2	United States	United States	Spain	Brazil	Philippines	Brazil
3	Brazil	Germany	Italy	Germany	Indonesia	United States
4	Canada	Spain	United States	China	Mexico	Canada
5	Germany	Italy	Japan	Sweden	Italy	Russia

	Solar PV capacity	Solar PV capacity per capita	Wind power capacity	Solar hot water/heat capacity[1]	Solar hot water/heat capacity per capita[1]	Geothermal heat installed capacity	Geothermal direct heat use[3]
1	Germany	Germany	China	China	Cyprus	United States	China
2	Italy	Italy	United States	Turkey	Israel	China	United States
3	Japan	Czech Rep.	Germany	Germany	Austria	Sweden	Sweden
4	Spain	Belgium	Spain	Japan	Barbados	Germany	Turkey
5	United States	Spain	India	Brazil	Greece	Japan	Japan

- **Germany** continues to lead in Europe and to be in the forefront globally, remaining among the top users of many renewable technologies for power, heating, and transport.
- **China** ended 2011 with more renewable power capacity than any other country, with an estimated 282 GW; one-quarter of this total (70 GW) was non-hydro.

Global Market Overview – Power Markets

FIGURE 3. ESTIMATED RENEWABLE ENERGY SHARE OF GLOBAL ELECTRICITY PRODUCTION, 2011

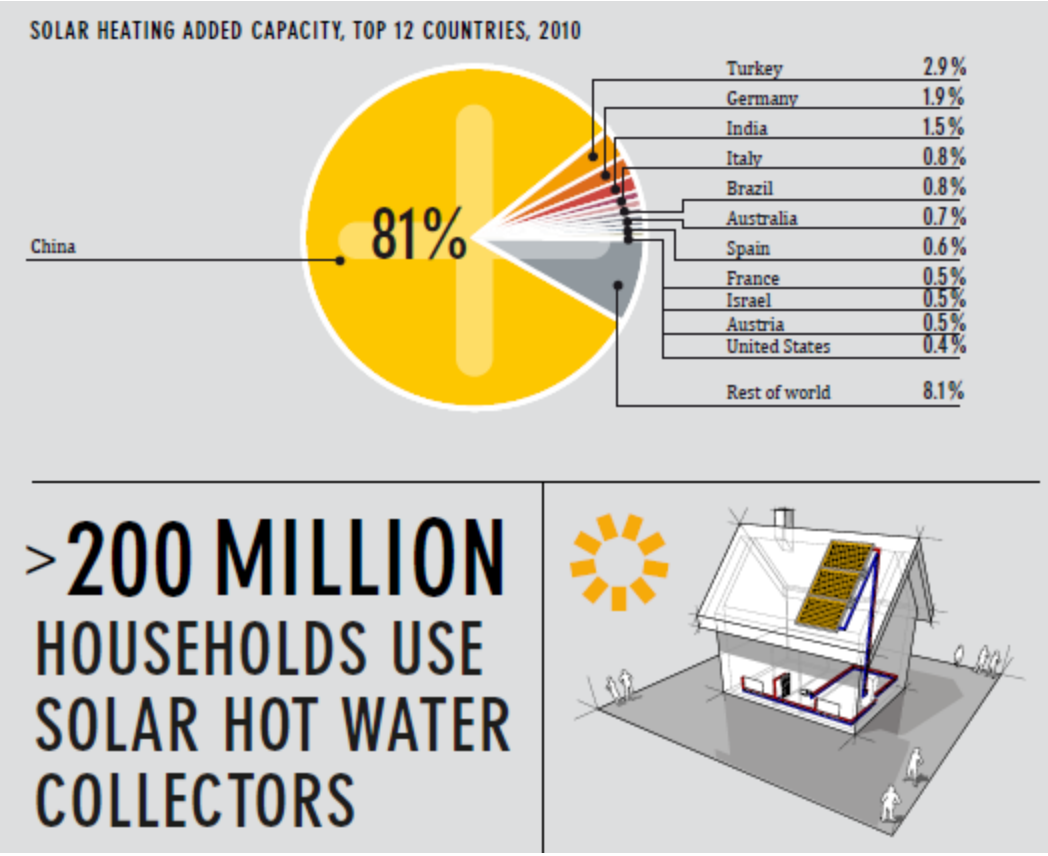


Note: Based on renewable generating capacity in operation at year-end 2011.

- Renewables accounted for nearly **half of the estimated 208 GW of new electric capacity** installed in 2011
- Renewable electric power capacity worldwide reached **1,360 GW** (+8%) in 2011
- Renewable energy comprised more than **25%** of **global power generation capacity**
- **20.3% of global electricity** was produced from renewable energy

Global Market Overview – Heating & Cooling

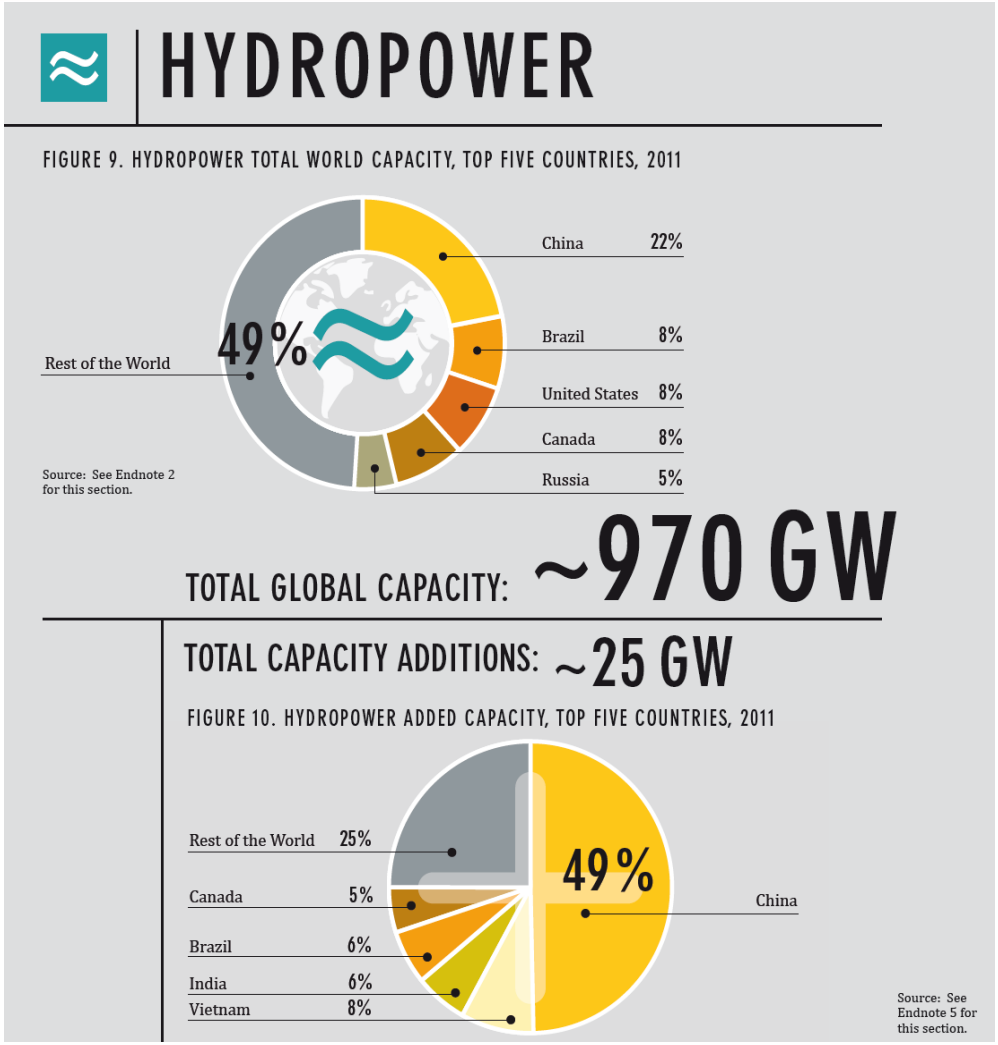
- Immense, yet untapped potential
- Transition towards the use of larger systems, increasing use of CHP and district schemes.
- Growing trend to use solar resources to **generate process heat for industry**.
- Solar hot water used in over **200 million households** and commercial buildings.



Global Market Overview - Transport

- RE used in form of electricity, hydrogen, biogas, liquid biofuels. Liquid biofuels provided 3% of global road transport fuel in 2011.
- Electric transport is being tied directly with renewable energy through policy directives in many countries.
- Johannesburg, South Africa introduced 25 ethanol buses into its public transportation fleet during 2011

Hydropower



- 25GW of new hydropower was added in 2011, increasing capacity by nearly 3%, bringing installed capacity to **970GW**
- Globally hydropower generated **3,400TW$_h$** of electricity in 2011. China alone produced 663TWh followed by Brazil (450TWh)
- In late 2011, **Burundi, Rwanda,** and **Tanzania** announced plans to build a 90MW hydropower plant, with financing expected from the World Bank and AfDB
- South Africa is expected to have 1332MW of pumped storage facility by 2013-2014

Solar Power

FIGURE 11. SOLAR PV TOTAL WORLD CAPACITY, 1995–2011

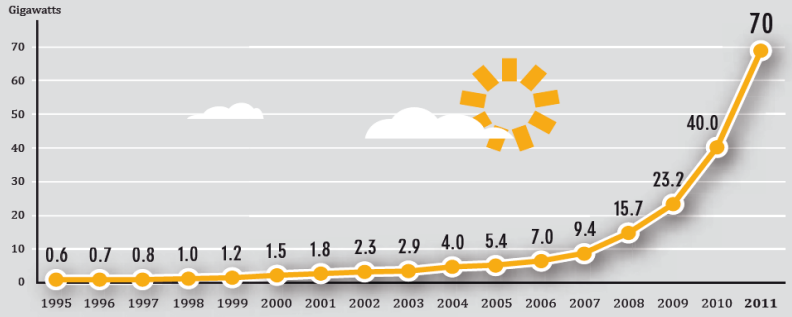


FIGURE 12. SOLAR PV OPERATING CAPACITY, TOP 10 COUNTRIES, 2011

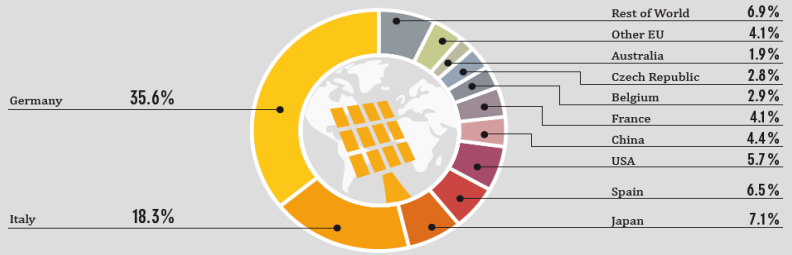
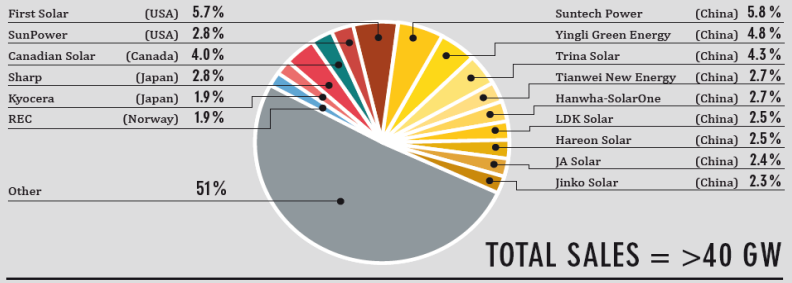
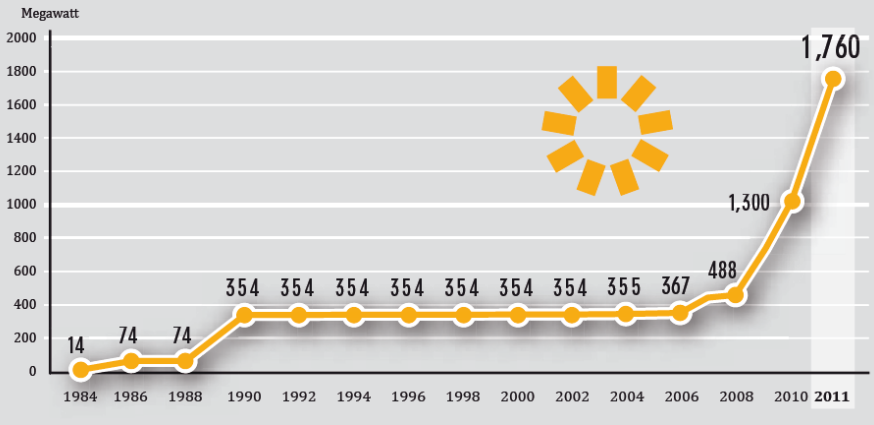


FIGURE 13. MARKET SHARES OF TOP 15 SOLAR PV MODULE MANUFACTURERS, 2011



- **30GW** of new solar PV capacity came into being in 2011
- 460 MW of CSP installed in 2011 bringing the total installed capacity to **1.760 MW**

FIGURE 14. CONCENTRATING SOLAR THERMAL POWER, TOTAL WORLD CAPACITY, 1984–2011



Wind Power

WIND POWER

FIGURE 17. WIND POWER TOTAL WORLD CAPACITY, 1996–2011

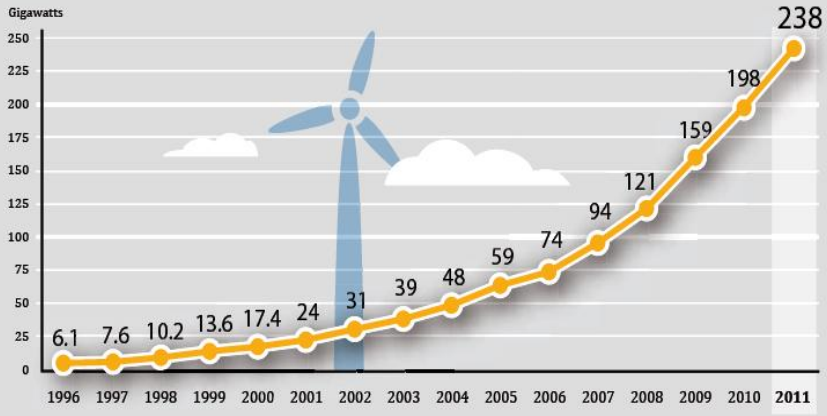
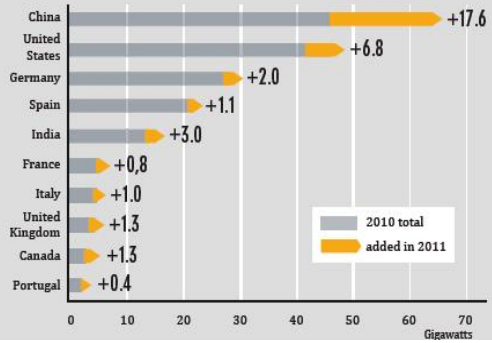
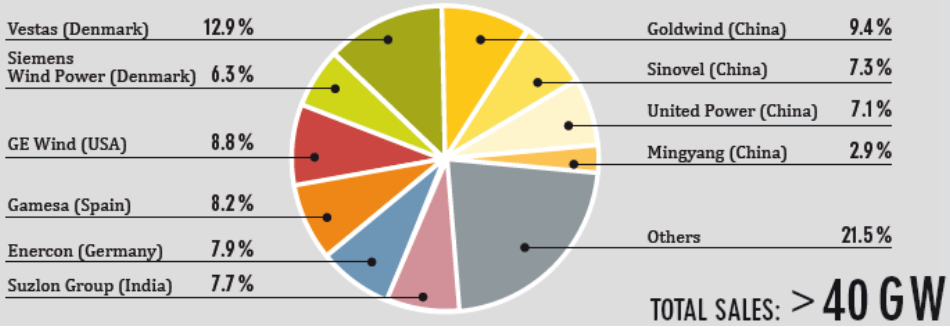


FIGURE 18. WIND POWER CAPACITY, TOP 10 COUNTRIES, 2011

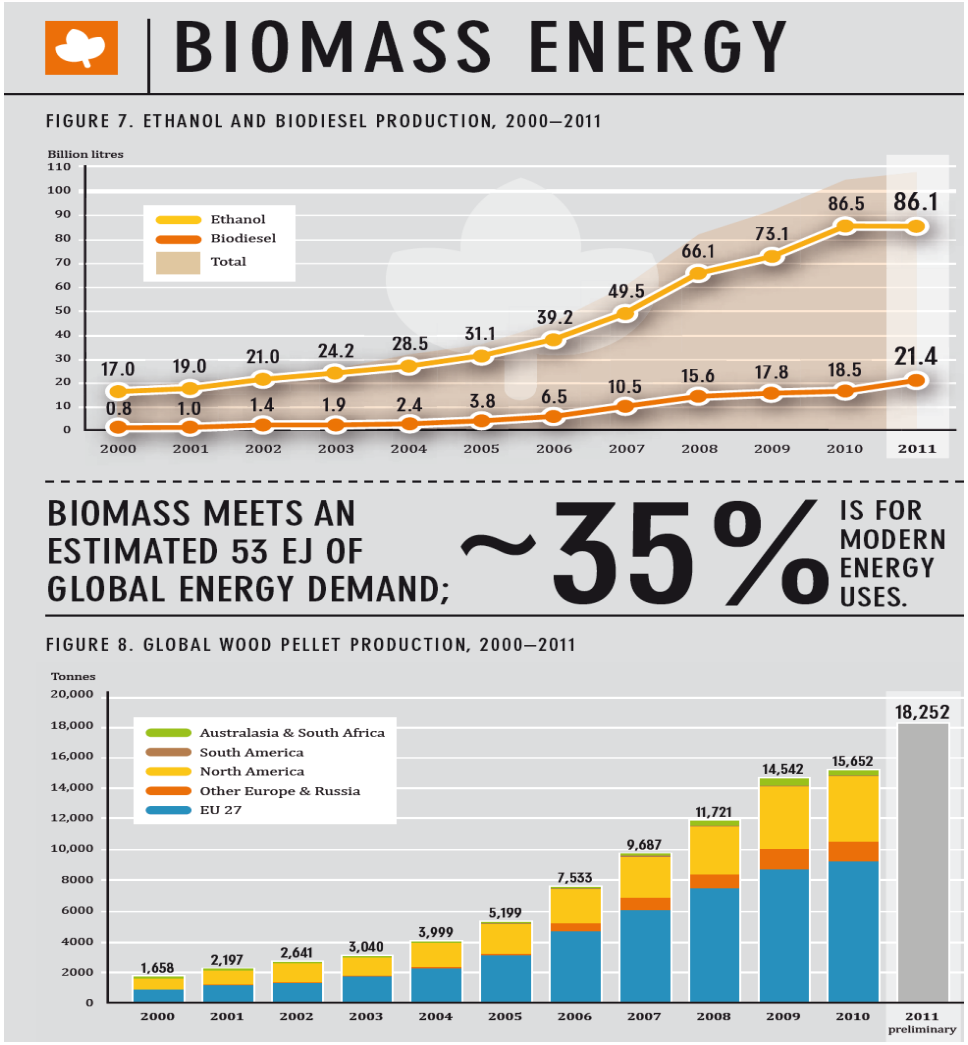


- In 2011, 40GW of wind power capacity was installed, increasing the total to **238GW**.
- Annual growth rate of cumulative wind power capacity between 2006-2010 averaged at **26%**
- Wind power accounted for 30% of the total new renewable energy capacity

FIGURE 19. MARKET SHARES OF TOP 10 WIND TURBINE MANUFACTURERS, 2011



Biomass Energy



- Biomass energy accounted for over **10%** of global primary energy supply in 2011
- The present global demand for biomass is **53EJ**, mainly used for heating, cooking and industrial applications
- Liquid biofuels production grew rapidly at 17% for ethanol and 27% for biodiesel
- Most sugar producing countries in Africa generate power and heat with bagasse-based combined heat and power plants. Grid connected CHP exists in Kenya, Mauritius, Tanzania, Uganda and Zimbabwe
- Large companies, incl. utilities, investing in biomass plantations across Africa

Geothermal Energy

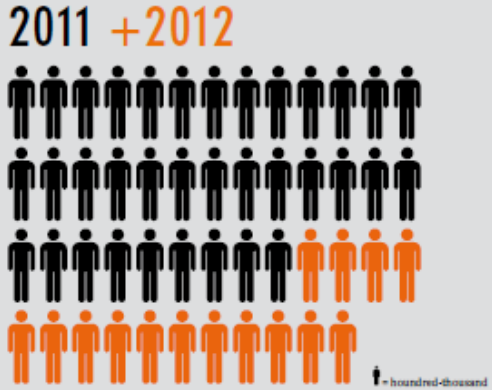
- **205 TW$_h$** (738PJ) of district heat and electricity was provided by geothermal resources in 2011
- Heat output from geothermal sources grew at 100% p.a. from 2005-2010; reaching 489PJ in 2011
- Geothermal power became more attractive due to flexibility offered by new technologies such as flash plants combined with binary bottoming cycles for increased efficiency
- Geothermal Power has taken hold in East Africa's Rift Valley. Drought in the region has increased interest on geothermal to reduce reliability on hydropower

Industry Trends

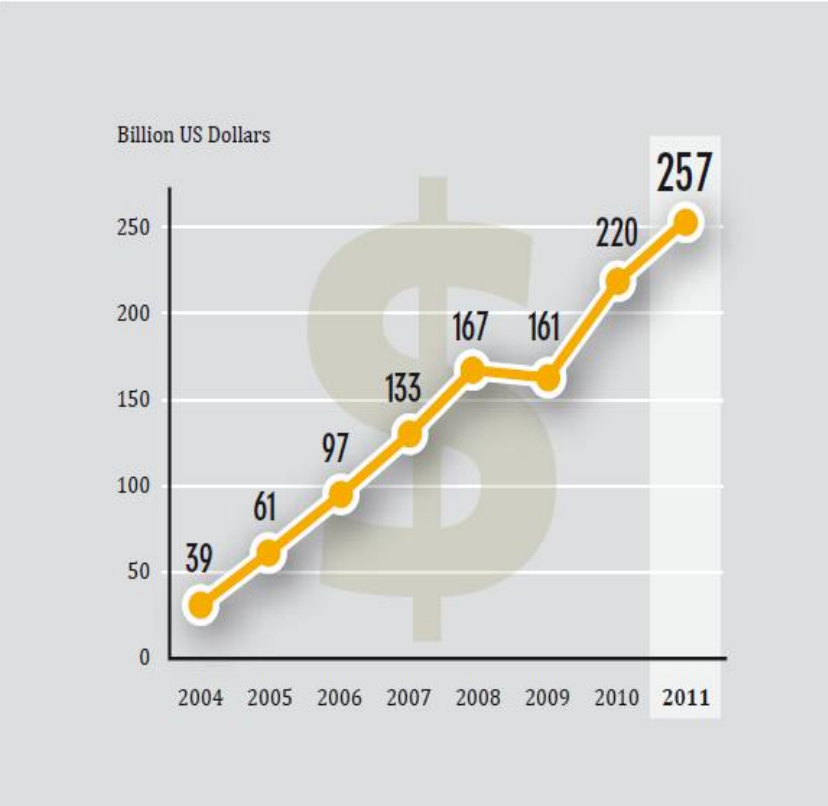
- RE industry saw **continued growth** in manufacturing, sales and installation
- **Cost reductions** (especially in PV and onshore wind) contributed to growth
- Changing policy landscape in many countries → industry uncertainties, declining policy support, international financial crisis and barriers to trade
- **Worldwide jobs** in renewable energy industries exceeded **5 million** in 2011; clustered primarily in bioenergy and solar industries
- Green power markets are emerging in South Africa, with at least one company providing green power to retail customers in South Africa

TABLE 1. ESTIMATED JOBS IN RENEWABLE ENERGY WORLDWIDE, BY INDUSTRY

TECHNOLOGIES	Global	China	India	Brazil	USA	EU[7]	Germany	Spain	Others
	Thousand jobs								
Biomass[1]	750	266	58		152	273	51	14	2[8]
Biofuels	1,500			889[6]	47–160	151	23	2	194[9]
Biogas	230	90	85			53	51	1.4	
Geothermal[1]	90				10	53	14	0.6	
Hydropower (Small[2])	40		12		8	16	7	1.6	1[8]
Solar PV	820[4]	300[5]	112		82	268	111	28	60[10]
CSP	40				9		2	24	
Solar Heating/ Cooling	900	800	41		9	50	12	10	1[8]
Wind Power	670[4]	150	42	14	75	253	101	55	33[11]
Total[3]	**5,000**	**1,606**	**350**	**889**	**392–505**	**1,117**	**372**	**137**	**291**



Investment Flows



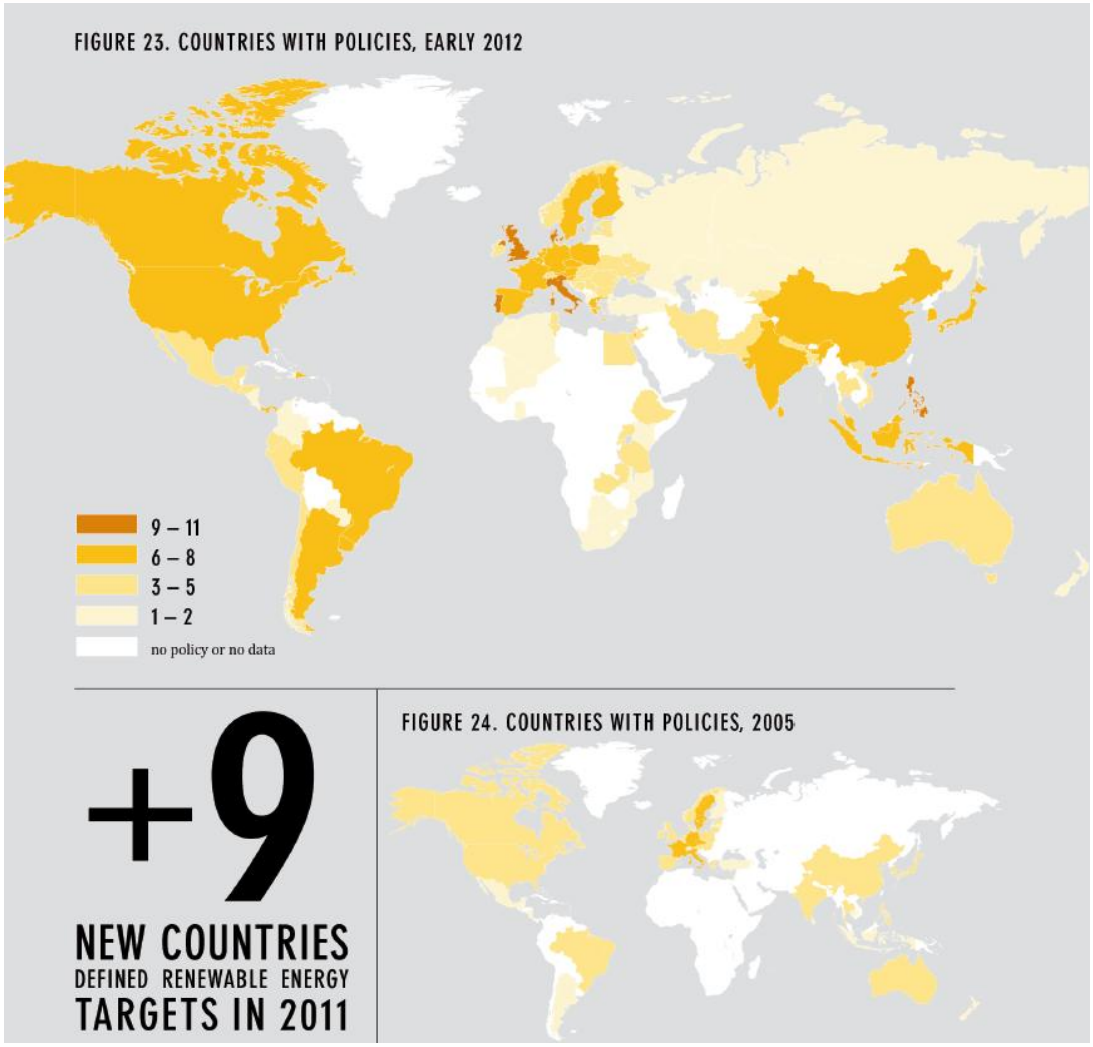
Source: UNEP/Bloomberg: Global Trends in Renewable Energy Investment 2011

- **Total global investment** in RE jumped in 2011to a **record** of **$257 billion , up 17%** from 2010 (15 % for Asia Oceania region).
- This is **6 times** the level of investment in 2004 and **94% more** than the total investment in RE in 2007.
- Despite the rise in investment, the rate of growth of investment was below the 37% rise in investment from 2009 to 2010.
- Total investment in the RE sector in the Middle East and Africa combined was USD 4.9 Billion.

Investment Flows

- The top 5 countries for total investment in 2011: **China, USA, Germany, Italy and India**.
- RE Investment in China went up by 17% in 2011
- Investment in RE in USA made a significant leap of 57% in 2011.
- Investment in Germany (excluding R&D) dipped 12% from the 2010 levels
- Investment in RE in India went up by 62% in 2011
- relative share of total global investment of **developing countries** slip back :
  - USD 89 billion of new investment in 2011 in developing countries
  - USD 168 billion in developed countries

Policy Landscape

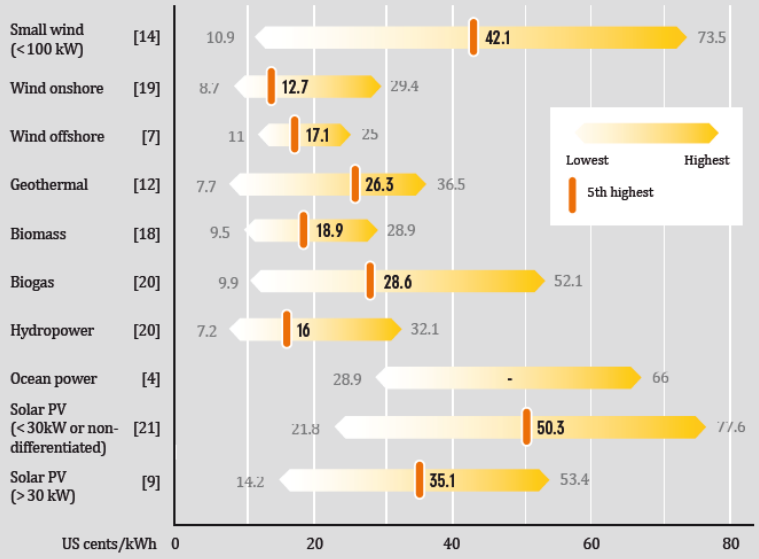


- Targets in at least **118 countries** up from the 96 reported in previous year; **more than half are developing countries**
- Some setbacks resulting from a lack of long-term policy certainty and stability in many countries
- South Africa introduced a new 20 year plan calling for renewables to account for 42% of all new capacity installed up to 2030

Policy Landscape

- Renewable power generation policies remain the most common type of support policy, in particular Feed-in-tariffs (FIT) and renewable portfolio standards (RPS)
- FIT policies were in place in at least 65 countries and 27 states worldwide by early 2012.
- Policies to promote renewable heating and cooling expanded.
- Almost two-thirds of the world's largest cities had adopted climate change action plans by the end of 2011, with more than half of them planning to increase their uptake of renewable energy.

FIGURE 22. FIT PAYMENTS FOR A RANGE OF RENEWABLE ENERGY TECHNOLOGIES, SELECTED COUNTRIES, 2011/2012



Energy Access

- 2.6 billion people still employed traditional cookstoves and open fires for heating and cooking in 2011
- UN Secretary General's goal: Global action to achieve universal access to modern energy services by 2030
- In order to achieve universal access for all, **current global investments on energy access of annual 9 billion USD** need to be increased to **48 billion USD**
- Lower prices of renewable energy technology is allowing manufacturers to **diversify into emerging markets**
- Large numbers of actors and programmes, with limited coordination, makes impact assessment and **data collection a big challenge**

REN21 objective: strengthen GSR rural renewable energy section

- Strengthening of the Rural Renewable Energy Community
- Reviewed methodology: programmatic & grassroot information

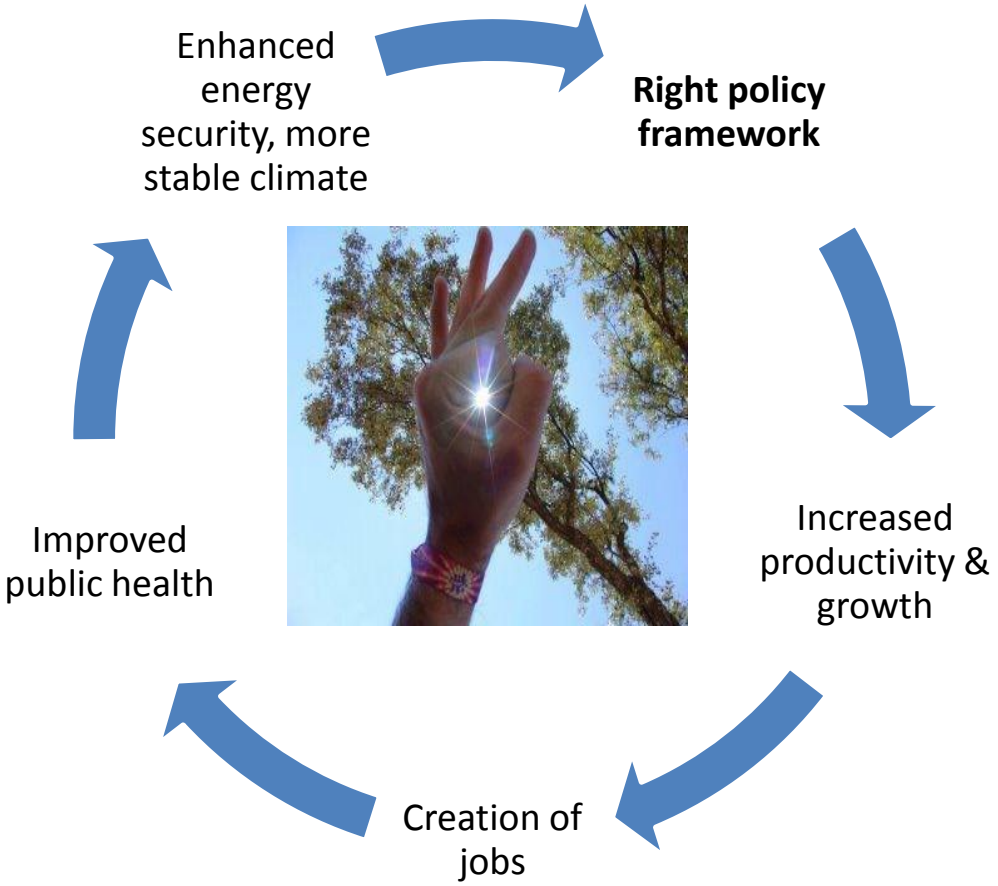
Rural Renewable Energy in Africa

Electricity Access by Region

COUNTRY	Electrification Rate (rural, urban and/or national)	Target
All Developing Countries	75.0%	
Africa	42.0%	
North Africa	99.0%	
Sub-Saharan Africa	30.0%	
Developing Asia[1]	81.0%	
China and East Asia	91.0%	
South Asia	68.0%	
Latin America	93.0%	
Middle East	90.0%	

- Africa : lowest rates of access to modern energy services
- More than 650 million people rely on using traditional biomass for cooking
- Ghana is the frontrunner with an electrification rate of 72% and aims for universal energy access by 2020
- Most renewable energy projects being implemented in Africa are off-grid (though grid connected renewable energy necessary to attract investment)
- 550,000 improved cookstoves have been disseminated in Benin, Burkina Faso, Burundi, Ethiopia, Kenya, Senegal and Uganda since 2009

Enabling Framework



REN21 facilitates global dialogue on renewable energy transition

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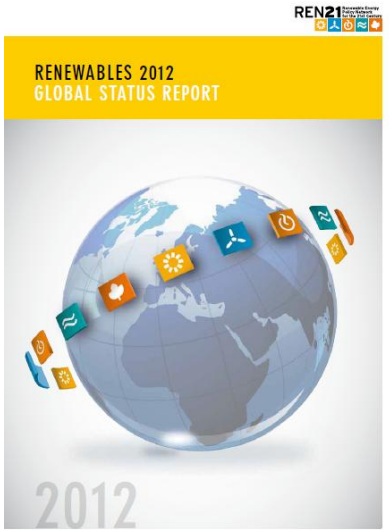

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incl. Launch of REN21 Global Futures Report

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Renewable energy minigrid policy toolkit

Why develop a RE Mini-Grid Policy Toolkit?

- Minigrids present a great potential for increasing energy access and renewable energy utilisation.

Objectives

- Policy framework → Unleash this potential
  - Including RE mini-grids in energy plans and policies
  - Creating regulations specifically for mini-grids
- Toolkit will Provide hands-on recommendations
- Participation of decision-makers, policy-makers, planners & practitioners