

UNECE Renewable Energy Status

Sneak preview: Key findings of the UNECE Renewable Energy Status report



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REENCON XXI

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is a **multi stakeholder network dedicated** to the rapid uptake of **renewable energy worldwide.**

Science & Academia:

IIASA, ISES, SANEDI, TERI, Fundacion Bariloche

NGOs:

CURES, GFSE,
Greenpeace, ICLEI,
ISEP, JREF, RCREEE,
WCRE, WFC, WRI,
WWF

Industry

Associations:

ACORE, ARE, CEC,
CREIA, EREF, GWEC,
IGA, IHA, IREF, WBA,
WWEA



International Organisations:

ADB, EC, ECREEE, GEF,
IEA, IRENA, UNDP,
UNEP, UNIDO,
World Bank

National

Governments:

Brazil, Denmark,
Germany, India,
Norway, Spain,
Uganda, UAE, UK

REN21 Renewables 2015 Global Status Report



**Officially launched at Vienna Energy Forum
on 18 June 2015**

**Network of over 500 contributors, researchers &
reviewers worldwide**

The report features:

- Global Overview
- Market & Industry Trends
- Investment Flows
- Policy Landscape
- Distributed Renewable Energy for Energy Access
- Feature: Using Renewables for Climate Change Adaptation

www.ren21.net/gsr

The report covers:

- All renewable energy technologies
- The power, heating & cooling, and transport sector
- Energy Efficiency











A Decade Of Renewable Energy Growth Surpassing Expectations

Projected levels of renewable energy for 2020 were already surpassed by 2010.

Global installed capacity and production from all renewable technologies have increased substantially.

Significant cost reductions for most technologies.

Supporting policies spread throughout the world.

		START 2004	2013	2014
INVESTMENT				
New investment (annual) in renewable power and fuels	billion USD	45	232	270
POWER				
Renewable power capacity (total, not including hydro)	GW	85	560	657
Renewable power capacity (total, including hydro)	GW	800	1,578	1,712
 Hydropower capacity (total)	GW	715	1,018	1,055
 Bio-power capacity	GW	<36	88	93
 Bio-power generation	TWh	227	396	433
 Geothermal power capacity	GW	8.9	12.1	12.8
 Solar PV capacity (total)	GW	2.6	138	177
 Concentrating solar thermal power (total)	GW	0.4	3.4	4.4
 Wind power capacity (total)	GW	48	319	370
HEAT				
 Solar hot water capacity (total)	GW _{th}	86	373	406
TRANSPORT				
 Ethanol production (annual)	billion litres	28.5	87.8	94
 Biodiesel production (annual)	billion litres	2.4	26.3	29.7

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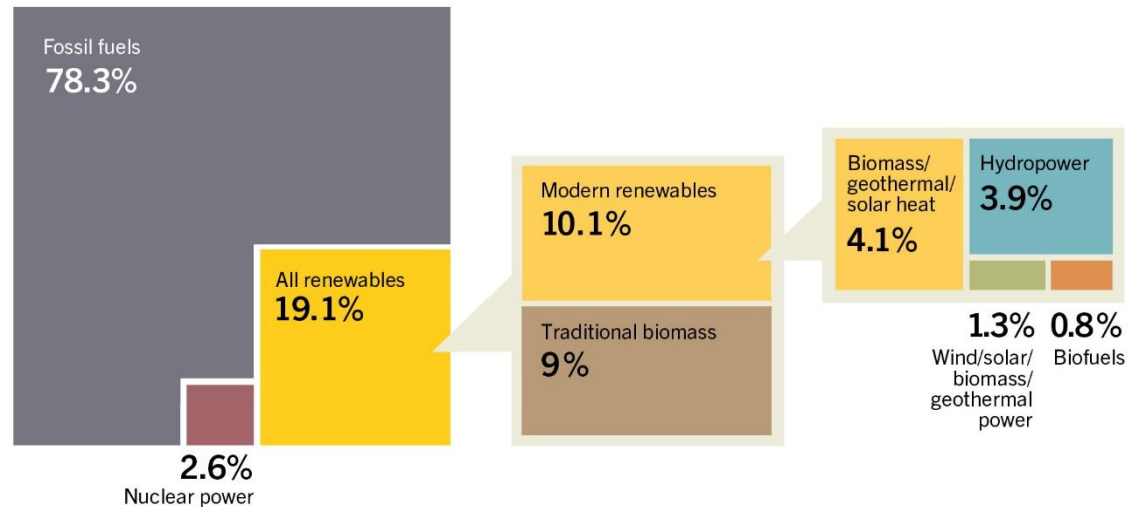
Renewable Energy in the World

Renewable energy provided an estimated **19.1%** of global final energy consumption in 2013.

The share of **modern renewable energy** increased to 10.1%.

The share of **traditional biomass** was of 9%, same in 2013.

Estimated Renewable Energy Share of Global Final Energy Consumption, 2013



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Renewable Energy “Champions” - annual investment/capacity additions

ANNUAL INVESTMENT / NET CAPACITY ADDITIONS / PRODUCTION IN 2014

	1	2	3	4	5
Investment in renewable power and fuels (not including hydro > 50 MW)	China	United States	Japan	United Kingdom	Germany
Investment relative to annual GDP ¹	Burundi	Kenya	Honduras	Jordan	Uruguay
 Geothermal power capacity	Kenya	Turkey	Indonesia	Philippines	Italy
 Hydropower capacity	China	Brazil	Canada	Turkey	India
 Solar PV capacity	China	Japan	United States	United Kingdom	Germany
 CSP capacity	United States	India	–	–	–
 Wind power capacity	China	Germany	United States	Brazil	India
 Solar water heating capacity ²	China	Turkey	Brazil	India	Germany
 Biodiesel production	United States	Brazil	Germany	Indonesia	Argentina
 Fuel ethanol production	United States	Brazil	China	Canada	Thailand

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Renewable Energy “Champions” – total capacity

TOTAL CAPACITY OR GENERATION AS OF END-2014

	1	2	3	4	5
POWER					
Renewable power (incl. hydro)	China	United States	Brazil	Germany	Canada
Renewable power (not incl. hydro)	China	United States	Germany	Spain / Italy	Japan / India
Renewable power capacity <i>per capita</i> (not incl. hydro) among the top 20 ³	Denmark	Germany	Sweden	Spain	Portugal
🔌 Biopower generation	United States	Germany	China	Brazil	Japan
🔌 Geothermal power capacity	United States	Philippines	Indonesia	Mexico	New Zealand
💧 Hydropower capacity ⁴	China	Brazil	United States	Canada	Russia
💧 Hydropower generation ⁴	China	Brazil	Canada	United States	Russia
⚙️ Concentrating solar thermal power (CSP)	Spain	United States	India	United Arab Emirates	Algeria
⚙️ Solar PV capacity	Germany	China	Japan	Italy	United States
⚙️ Solar PV capacity <i>per capita</i>	Germany	Italy	Belgium	Greece	Czech Republic
🌬️ Wind power capacity	China	United States	Germany	Spain	India
🌬️ Wind power capacity <i>per capita</i>	Denmark	Sweden	Germany	Spain	Ireland
HEAT					
🔌 Solar water collector capacity ²	China	United States	Germany	Turkey	Brazil
🔌 Solar water heating collector capacity <i>per capita</i> ²	Cyprus	Austria	Israel	Barbados	Greece
🔌 Geothermal heat capacity ⁵	China	Turkey	Japan	Iceland	India
🔌 Geothermal heat capacity <i>per capita</i> ⁵	Iceland	New Zealand	Hungary	Turkey	Japan



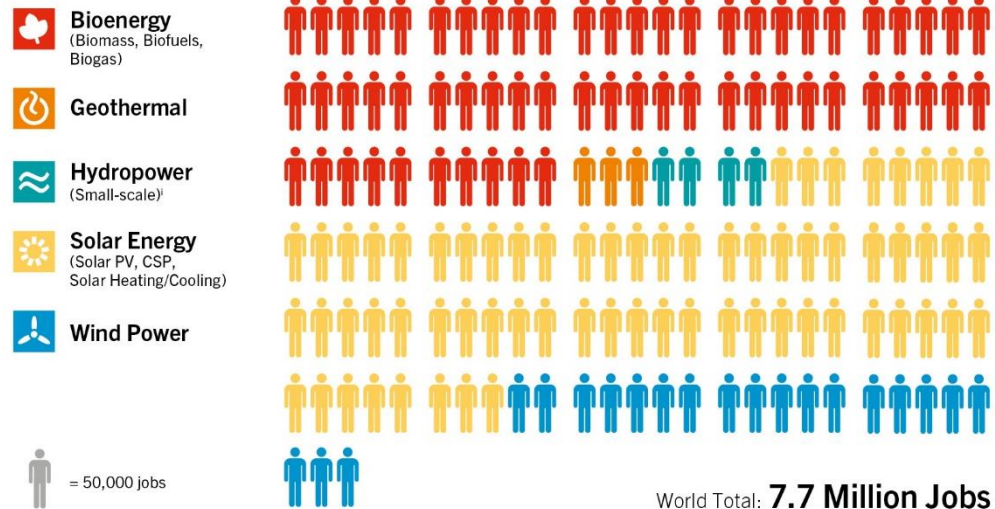
Jobs in Renewable Energy

Global employment continued to increase

An estimated **7.7 million** direct or indirect jobs in the renewable energy industry

Global wind power employment crossed the 1 million jobs threshold in 2014

Jobs in Renewable Energy, 2014



i - Employment information for large-scale hydropower not included.

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Source: IRENA



The UNECE Renewable Energy Status Report

- Detailed look at the status of renewable energy in select 17 countries in the UNECE region
- Part of the initiatives of the UNECE Group of Experts on Renewable Energy (GERE) – building on existing process
- Utilisation of the established REN21 global data collection process from formal and informal sources
- Objective to obtain a reliable data baseline for increased investment activity
- Strong Involvement of governments, international organisations (IEA, EBRD, European Commission, World Bank, UNDP, etc.) and civil society during data collection and review



REN21 Renewable Energy Policy Network for the 21st Century



UNECE



giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:



Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

of the Federal Republic of Germany



iea International Energy Agency

Final report to be launched in December 2015



- Covered countries very diverse in terms of territory, economic, social and political characteristics
- Overall population of over 300 Million
- Density ranges from 6,4 persons/km to 123,9 persons/km
- Three countries amongst coldest globally in terms of heating degree days
- Countries partake in different forms of regional energy cooperation

Energy overview

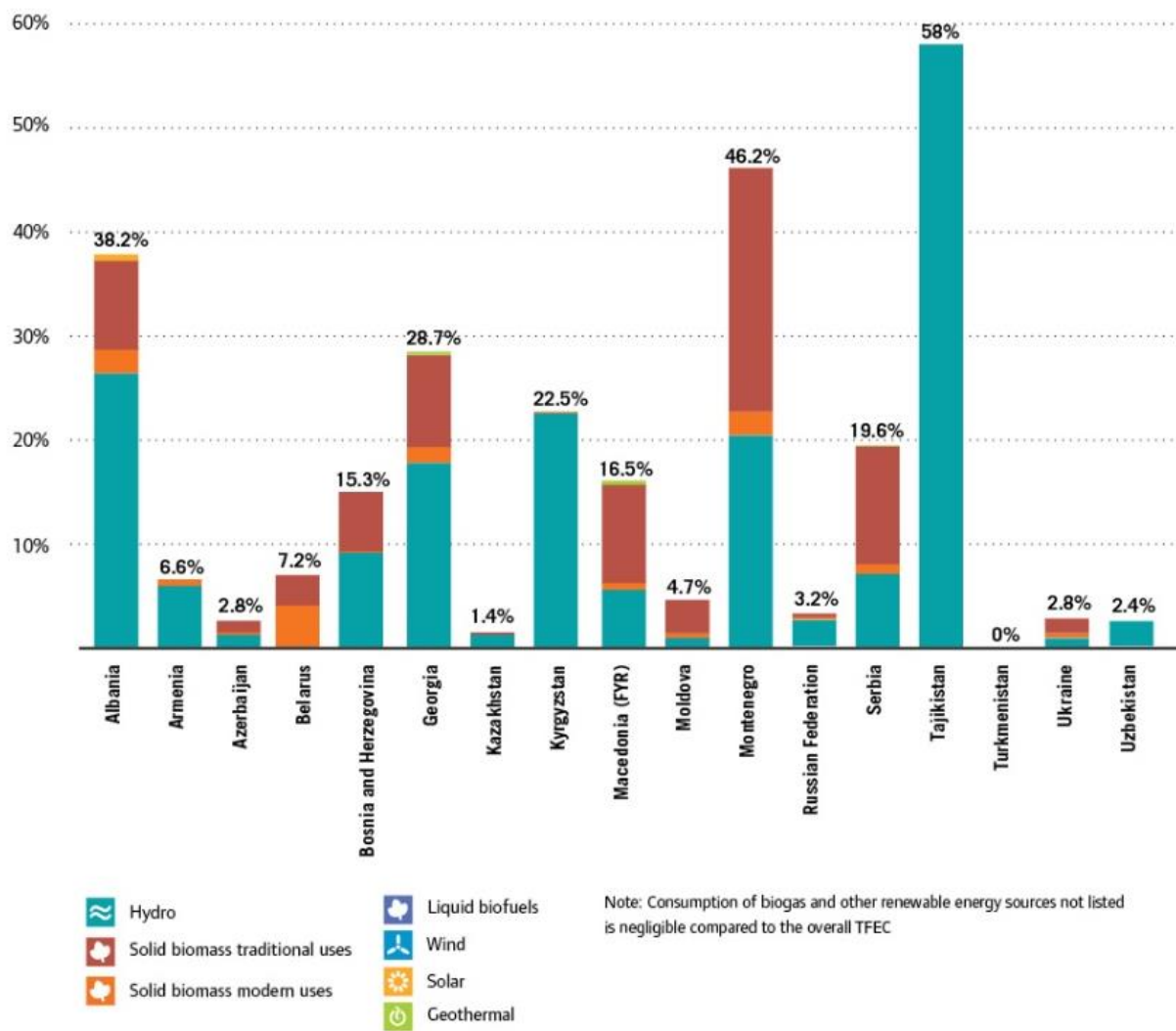
	Energy imports, net (% of energy use) 2011	Energy Subsidies as % of GDP 2015	Energy use per capita (MJ/capita) 2011	Electrification rate (% of population) 2012
Albania	34%	1,9%	32 253	100%
Armenia	67%	4,3%	38 362	100%
Azerbaijan	-377%	6,3%	57 332	100%
Belarus	86%	7,0%	129 695	100%
Bosnia and Herzegovina	35%	37,0%	77 268	100%
Georgia	68%	5,2%	33 099	100%
Kazakhstan	-107%	11,0%	195 565	100%
Kyrgyzstan	51%	26,4%	25 133	100%
Macedonia (FYR)	44%	18,7%	61 833	100%
Moldova	96%	5,6%	39 088	100%
Montenegro	36%	16,7%	76 013	100%
Russian Federation	-78%	16,0%	216 281	100%
Serbia	31%	34,7%	93 674	100%
Tajikistan	30%	7,1%	11 691	100%
Turkmenistan	-164%	23,2%	202 591	100%
Ukraine	32%	60,7%	115 929	100%
Uzbekistan	-21%	26,3%	67 389	100%

- Several countries are facing a number of regional energy challenges:
 - Energy security - seasonal power outages - aging energy infrastructure
 - high energy subsidies - administrative „red tape“
- While electrification rates are high, multidimensional problems like reliable heating and energy poverty in select communities remain



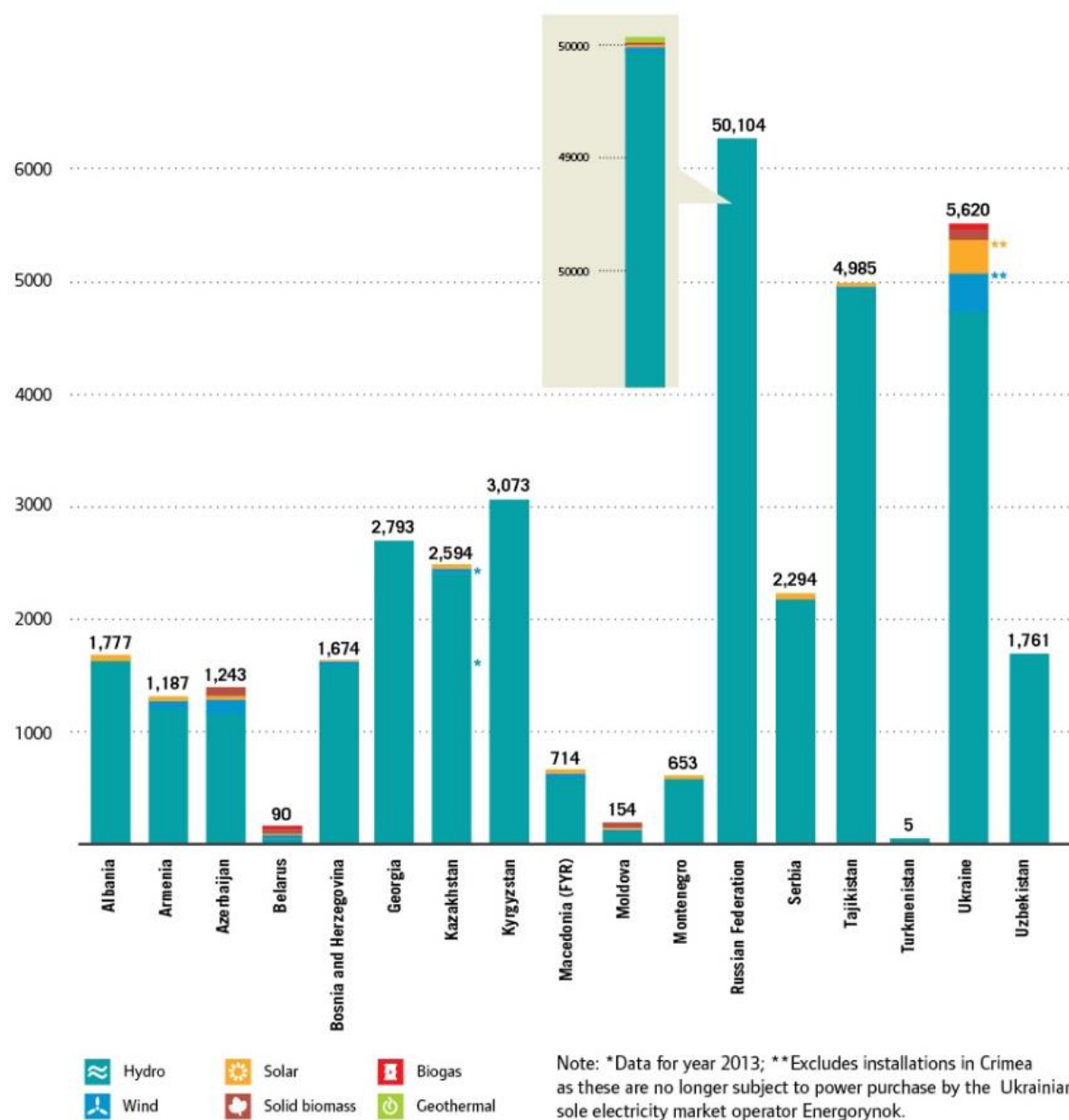
Share of Renewable Energy in Total Final Energy Consumption, 2012

- Often numbers still driven by traditional use of biomass and high shares of hydro
- Energy consumption stemming from modern renewables negligible – even when looking at preliminary 2014 data.



Renewable Energy for Power, Installed Capacity in MW, 2014

- Big variations from country to country
- Hydropower is backbone
- Other renewable energy technologies are nascent, with few regional exceptions
- Smaller developments are beginning to pick up



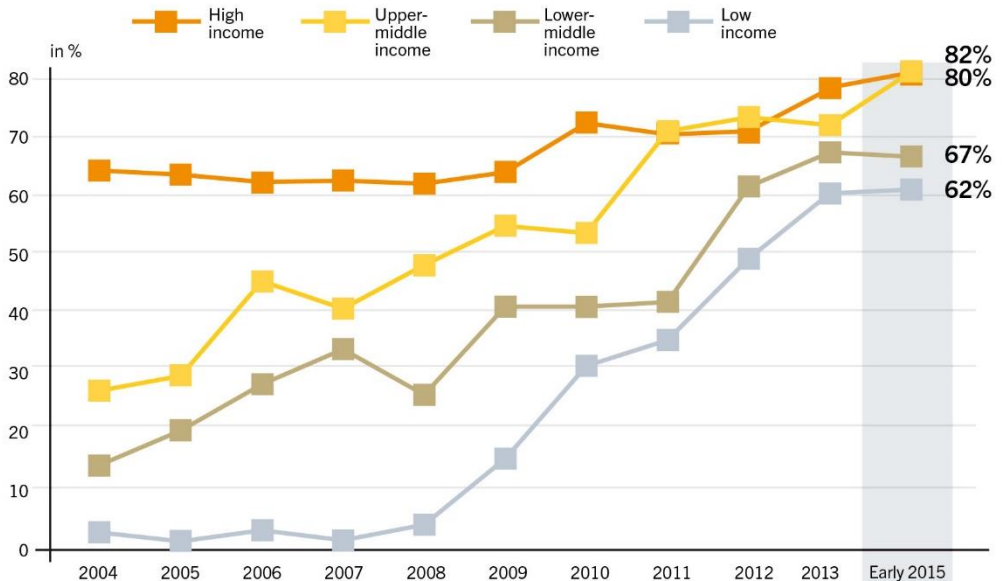
Evolution of Renewable Energy Policy Over Time (2004 – 2014)

At least **164** countries had **renewable energy targets**.

At least **145** countries had **renewable energy support policies** in place.

Low-income, lower-middle income as well as upper-middle income countries feature fastest policy uptake during the last decade.

Share of Countries with Renewable Energy Policies, by Income Group, 2004–Early 2015



Declines in income group shares in specific years are due primarily to countries moving into new income groups. Over the period 2004–2014, 80 countries made a total of 108 changes in income groups.

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RE Policy and Target Landscape – UNECE (17)

- Positive progress has been made
- Targets are widely used and increasingly accompanied by regulatory policies
- Still significant room for improvement
- Only few examples of regional mandatory RE targets
- Still apparent that non-economic barriers hinder unfolding of full policy potential



	Regulatory Policies							Fiscal Incentives and Public Financing					
	Binding obligation / Mandate	Electric utility quota obligation / RPS	Feed-in tariff / premium payments	Heat obligation / Mandate	Net Metering	Renewable Energy Targets	Tendering	Tradable REC	Capital Subsidies	Energy production payment	Investment or production tax credits	Public investment, loans or grants	Reduction in sales, energy, CO2, VAT or other tax
Albania	X	X	X			X	X	X	X	X		X	
Armenia			X		X	X	X			X		X	
Azerbaijan	X	X	X		X	X	X	X		X			
Belarus						X	X		X				
Bosnia and Herzegovina	X		X									X	
Georgia			X			X	X						
Kazakhstan			X			X		X		X	X	X	X
Kyrgyzstan			X			X							
Macedonia (FYR)	0		X			X						X	X
Moldova						X	X	X		X		X	
Montenegro	X	X	X	X	X	X	X	X	X	X	X		
Russian Federation		X				X							
Serbia			X			X					X	X	X
Tajikistan						X							
Turkmenistan						X	X				X	X	X
Ukraine	X		X			X	X						
Uzbekistan							X						

EE Policy and Target Landscape – UNECE (17)

- Energy Efficiency targets and policies are being pursued directly or through residential building initiatives
- Pushed by energy security concerns and by support of international donors
- Still significant room for improvement – especially in the industry and transportation sector



	Energy efficiency target	National energy efficiency awareness campaigns	National energy efficiency regulations, standards of laws	Governmental institutions to formulate and implement energy efficiency strategies and policies
Albania	X		X	X
Armenia		X	X	X
Azerbaijan		X	X	X
Belarus	X	X	X	X
Bosnia and Herzegovina	X	X		X
Georgia	X	X	X	X
Kazakhstan		X		
Kyrgyzstan		X	X	X
Macedonia (FYR)	X	X	X	X
Moldova	X	X	X	X
Montenegro	X	X	X	X
Russian Federation	X	X	X	X
Serbia	X	X	X	X
Tajikistan				
Turkmenistan	X		X	X
Ukraine	X	X	X	X
Uzbekistan				

Global Investment in Renewable Energy

Global new investment estimated USD **USD 270.2 billion in 2014**

(including hydropower 301 billion)

Reasons for the increase:

- Increase in solar power installations in China and Japan
- Investment in solar power up **25%**
- Record investment in offshore wind projects in Europe

Global New Investment in Renewable Power and Fuels, Developed and Developing Countries, 2004–2014



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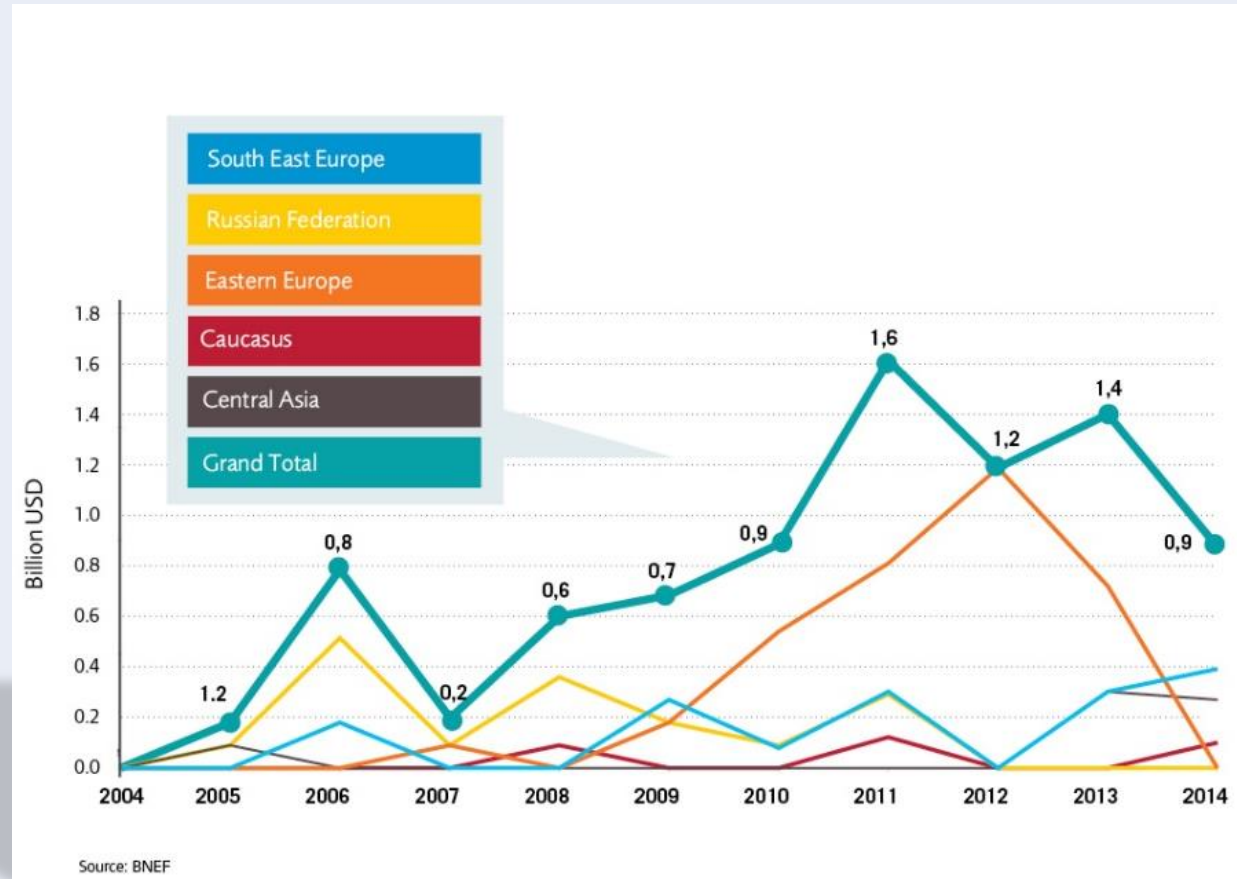
Source: Frankfurt School–UNEP and BNEF



Investment flows in UNECE (17)

Renewable Energy Investment Overview, 2004 - 2014

- The covered countries only represent 0.5 % of new RE investment in 2014 worldwide
- Investment attraction remains an issue for RE development in the region
- Downward trend in investment activity since 2012 (in Eastern Europe & Russia)



Investment flows in UNECE (17)

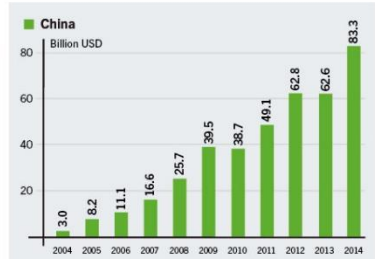
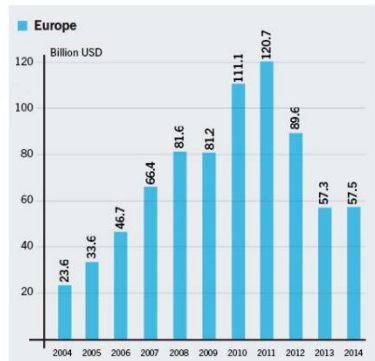
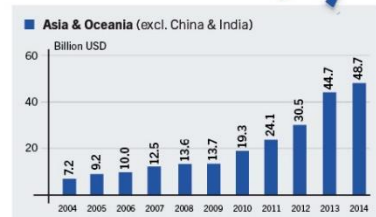
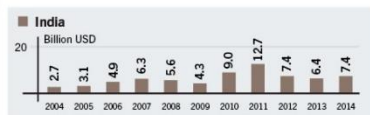
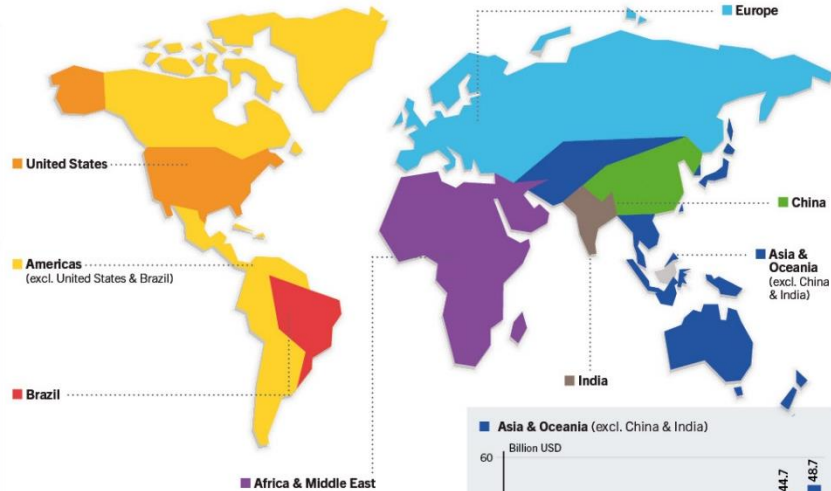
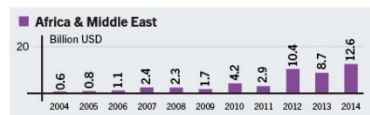
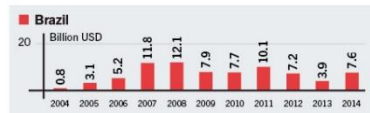
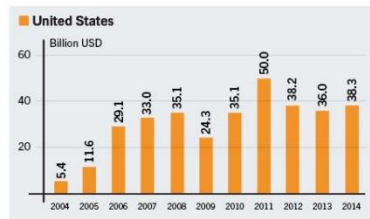
Renewable Energy Investment Overview, 2004 – 2014 – selected countries



- Investment is unevenly distributed (regionally and by sector)
- Funding sources mainly originating in national governments, international donors and multilateral development banks.



Global New Investment in Renewable Power and Fuels, by Region, 2004–2013



Data include government and corporate R&D.

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Developed Countries: Annual investment in 2014: **USD 138.9 billion** (increase of 3 % compared to 2013)

Developing Countries: annual investment in 2014: **USD 131.3 billion** (increase of 36% compared to 2013)

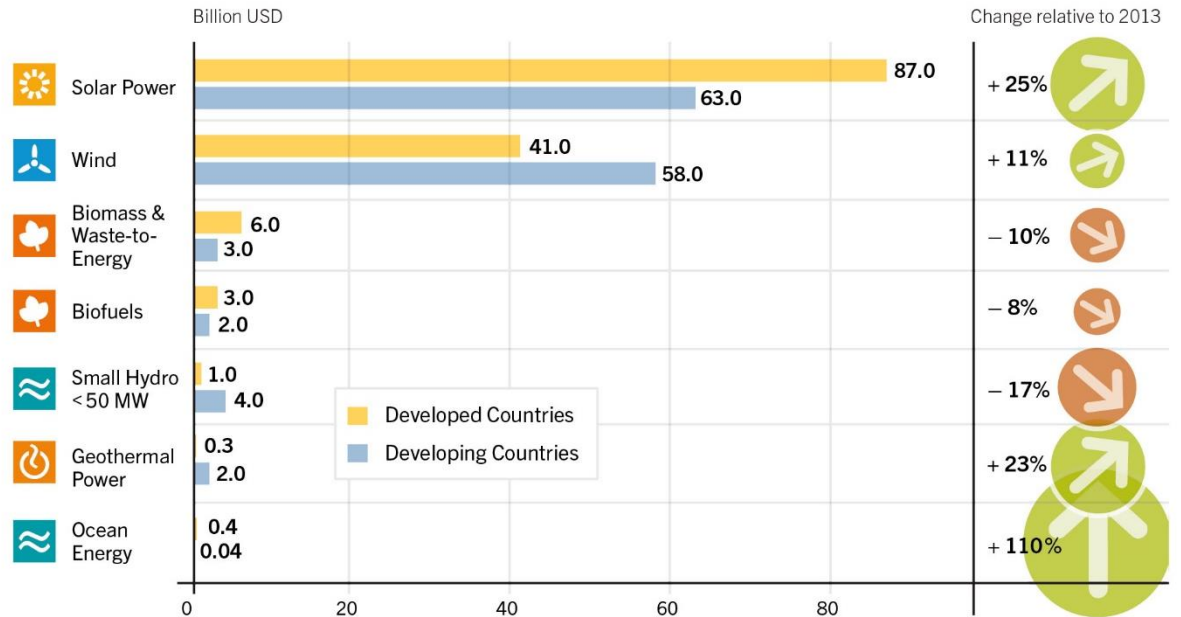


Global Investment in Renewable Energy by Technology

Solar power - leading sector for money committed during 2014, receiving more than **55%** (USD 149.6 billion) of total new investment in renewable power and fuels

Wind power followed with **USD 99.5 billion**

Global New Investment in Renewable Energy by Technology, Developed and Developing Countries, 2014



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Source: Frankfurt School-UNEP and BNEF

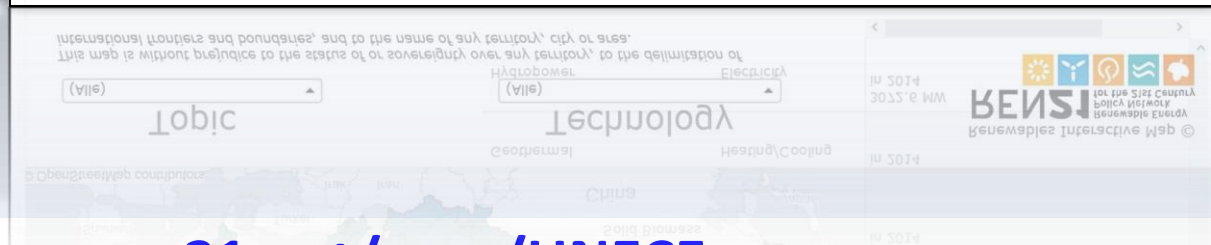
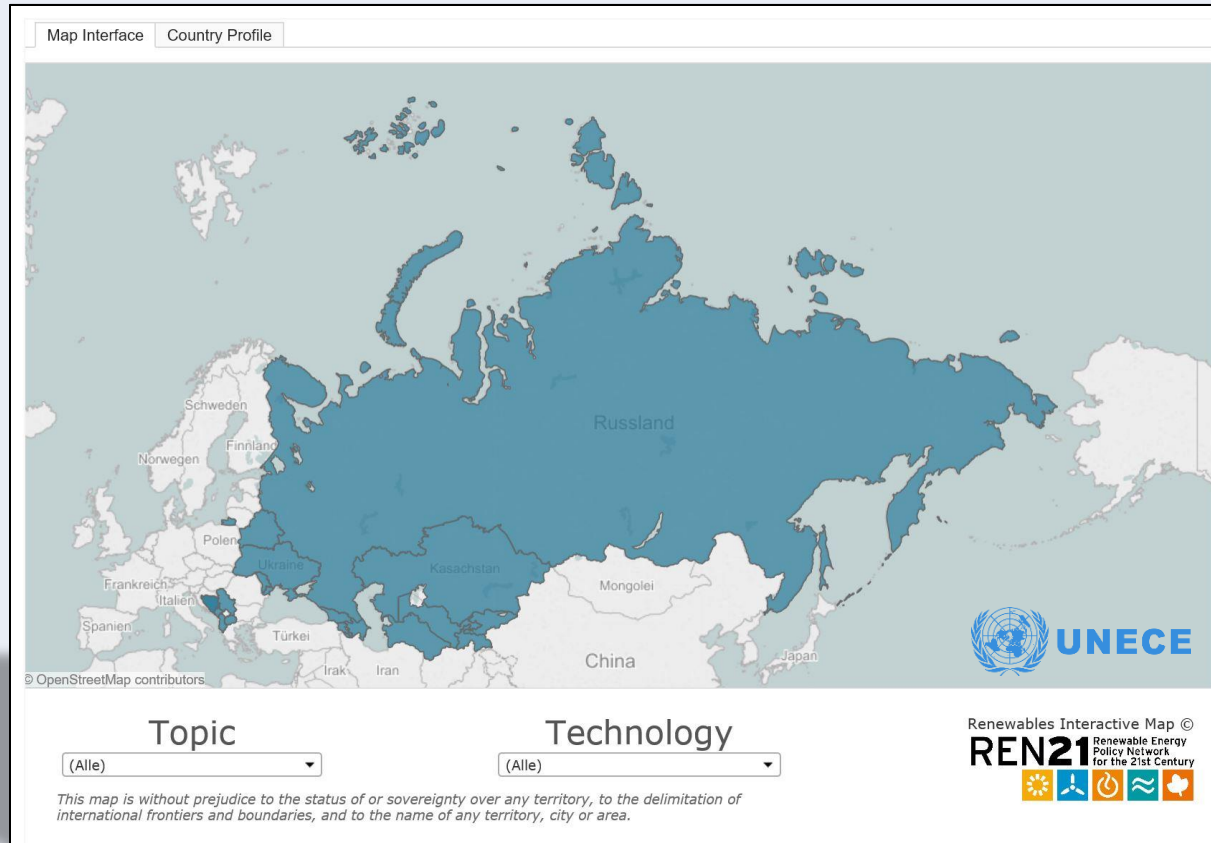


Introducing the **UNECE Renewables Interactive Map** - Prototype

Contains all information collected during the development of the **UNECE Renewable Energy Status Report**

The map can be easily **integrated into existing websites** without IT know-how

Can be simply expanded with **data of future initiatives and updates to the status report**



www.ren21.net/map/UNECE

pass: unece



Conclusion I

- South East and Eastern Europe, Caucasus, Central Asia and Russian Federation made strides into the realm of renewable energy and energy efficiency over the past two decades
- Governments advance in developing targets and policies that promote renewable energy sources present abundantly in different forms across the region
- Numerous barriers remain (energy subsidies, legal & administrative complexities, awareness of affordability, etc.) and delay projects implementation
- Viewed from global perspective, capacity and investment in the covered 17 countries remain marginal



Conclusion II

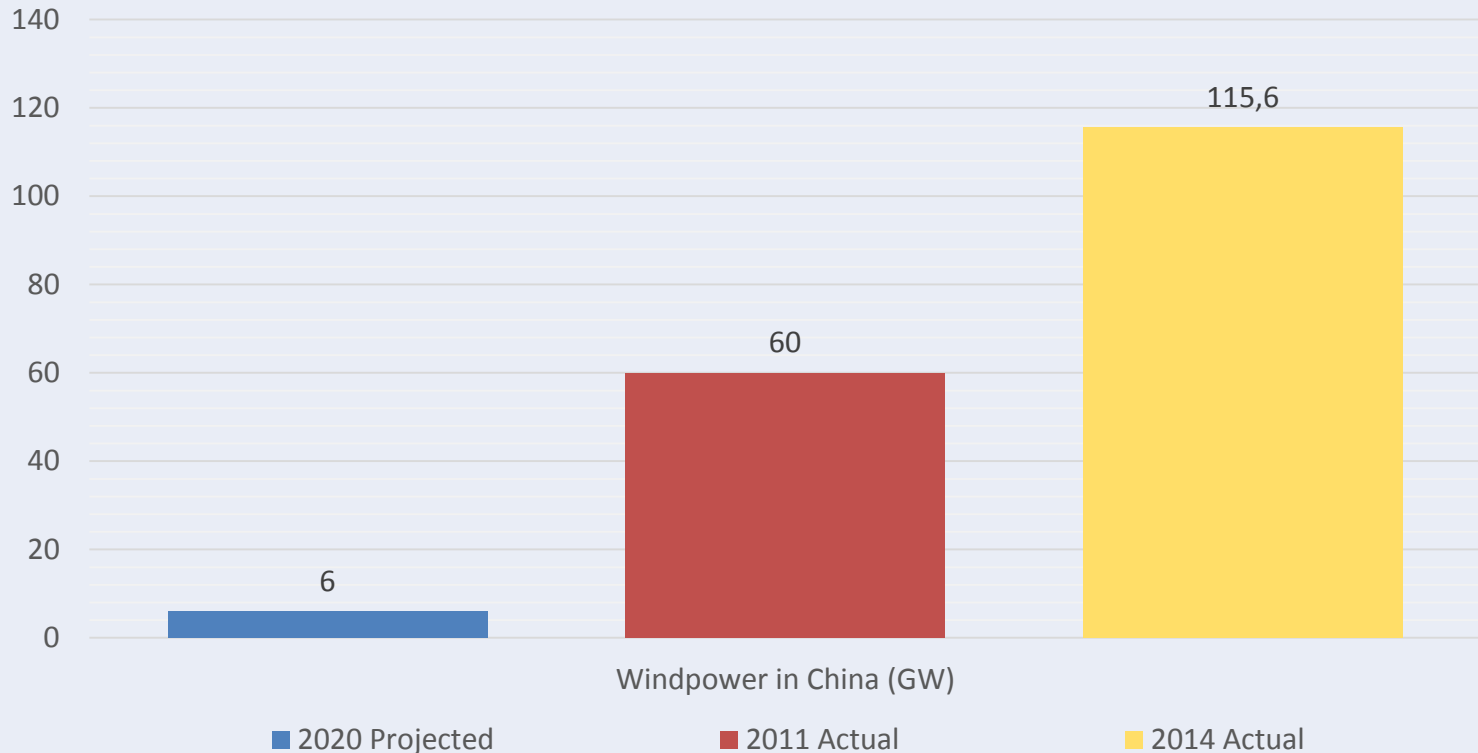
Main takeaways from the global perspective:

- Establish and strengthen institutional, financial, legal, and regulatory support mechanisms
- Long-term and stable policy frameworks, which can adapt to changing environment, to sustain and increase investment levels
- Greater attention to the heating and cooling and the transport sector and “energy system thinking”
- Improve information on distributed renewable energy markets in developing countries and improve access to up-front finance



Historic Projections Fall Short...

World Bank (1997) - Projection



“The 1997 report of the World Bank predicted a foundation in China for 2020, the resources and technologies were there, but legislators and governments have chosen a long-term path in China’s path.”



THANK YOU / Спасибо

for your attention



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Moscow, 27 October 2015