RENEWABLES 2016
GLOBAL STATUS REPORT

REN21 Renewable Energy Policy Network for the 21st Century

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REENCON XXI
Moscow, Russian Federation
13 October 2016

2016

REN21 is a **global multi stakeholder network** dedicated to the rapid uptake of **renewable energy worldwide.**

Science & Academia:
IIASA, ISES, NREL, SANEDI, TERI, Fundacion Bariloche

NGOs:
ALER, CURES, GFSE, Gogla, Greenpeace, ICLEI, ISEP, Renewable Energy Institute, RCREEE, SLoCaT, WCRE, WFC, WRI, WWF

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

Industry Associations:
ACORE, ARE, CEC, CREIA, EREF, GSC, GWEC, IGA, IHA, IREF, RES4MED, WBA, WWEA

National Governments:
Brazil, Denmark, Germany, India, Norway, Spain, UAE, US, UK

REN21 Renewables 2016 Global Status Report

- **The report features:**
  - Global Overview
  - Market & Industry Trends
  - Distributed Renewable Energy for Energy Access
  - Investment Flows
  - Policy Landscape
  - Energy Efficiency
  - Feature: Community Energy
- **The report covers:**
  - All renewable energy technologies
  - Power, heating & cooling, and transport sectors
- **Country data** available on REN21 Renewables Interactive Map: www.ren21.net/map

An extraordinary year for renewable energy

- **147 GW** of renewable power capacity added in 2015 – the largest annual increase ever
- Renewable heat capacity increased by **38 GW_{th}**
- Total biofuels production also rose

Renewable Energy Indicators 2015

		2014	2015
INVESTMENT			
New investment (annual) in renewable power and fuels[1]	billion USD	273	**285.9**
POWER			
Renewable power capacity (total, not including hydro)	GW	665	**785**
Renewable power capacity (total, including hydro)	GW	1,701	**1,849**
Hydropower capacity[2]	GW	1,036	**1,064**
Bio-power capacity[3]	GW	101	**106**
Bio-power generation (annual)	TWh	429	**464**
Geothermal power capacity	GW	12.9	**13.2**
Solar PV capacity	GW	177	**227**
Concentrating solar thermal power	GW	4.3	**4.8**
Wind power capacity	GW	370	**433**
HEAT			
Solar hot water capacity[4]	GW_{th}	409	**435**
TRANSPORT			
Ethanol production (annual)	billion litres	94.5	**98.3**
Biodiesel production (annual)	billion litres	30.4	**30.1**

Renewable Energy "Champions"

Annual investment/capacity additions/production

	1	2	3	4	5
Investment in renewable power and fuels (not including hydro > 50 MW)	**China**	United States	Japan	United Kingdom	India
Investment in renewable power and fuels per unit GDP[1]	**Mauritania**	Honduras	Uruguay	Morocco	Jamaica
Geothermal power capacity	**Turkey**	United States	Mexico	Kenya	Germany/Japan
Hydropower capacity	**China**	Brazil	Turkey	India	Vietnam
Solar PV capacity	**China**	Japan	United States	United Kingdom	India
Concentrating solar thermal power (CSP) capacity[2]	**Morocco**	South Africa	United States	–	–
Wind power capacity	**China**	United States	Germany	Brazil	India
Solar water heating capacity	**China**	Turkey	Brazil	India	United States
Biodiesel production	**United States**	Brazil	Germany	Argentina	France
Fuel ethanol production	**United States**	Brazil	China	Canada	Thailand

Renewable Energy "Champions"

Total capacity

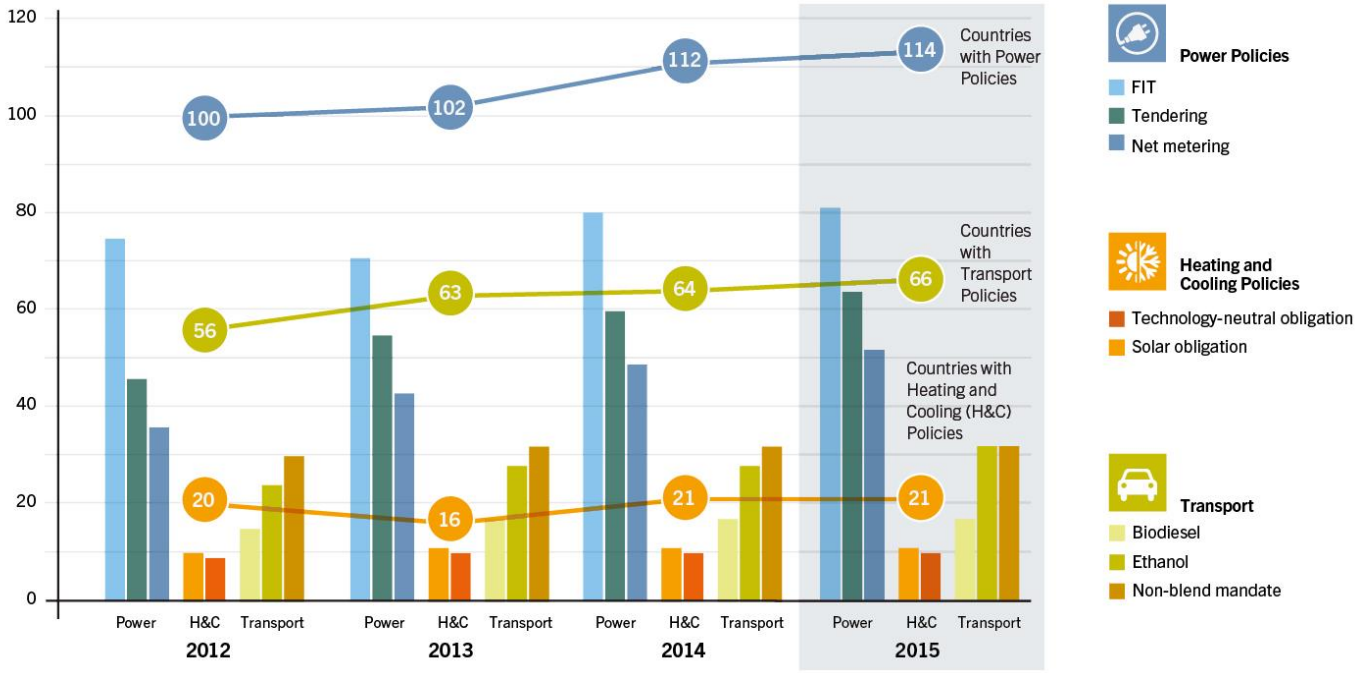
	1	2	3	4	5
POWER					
Renewable power (incl. hydro)	**China**	United States	Brazil	Germany	Canada
Renewable power (not incl. hydro)	**China**	United States	Germany	Japan	India
Renewable power capacity *per capita* (among top 20, not including hydro[3])	**Denmark**	Germany	Sweden	Spain	Portugal
Biopower generation	**United States**	China	Germany	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
CSP	**Spain**	United States	India	Morocco	South Africa
Solar PV capacity	**China**	Germany	Japan	United States	Italy
Solar PV capacity *per capita*	**Germany**	Italy	Belgium	Japan	Greece
Wind power capacity	**China**	United States	Germany	India	Spain
Wind power capacity *per capita*	**Denmark**	Sweden	Germany	Ireland	Spain
HEAT					
Solar water heating collector capacity[5]	**China**	United States	Germany	Turkey	Brazil
Solar water heating collector capacity *per capita*[5]	**Austria**	Cyprus	Israel	Barbados	Greece
Geothermal heat capacity[6]	**China**	Turkey	Japan	Iceland	India
Geothermal heat capacity *per capita*[6]	**Iceland**	New Zealand	Hungary	Turkey	Japan

Renewable Energy Policy Landscape

173 countries had renewable energy **targets**, and an estimated **146** countries had renewable energy support **policies**:

- **114** countries with **power** policies
- **66** countries with **transport** policies
- **21** countries with **H&C** policies

Number of Renewable Energy Policies and Number of Countries with Policies, by Type, 2012–15



Note: Figure does not show all policy types in use. Countries are considered to have policies when at least one national or state/provincial-level policy is in place. Some transport policies include both biodiesel and ethanol; in this case, the policy is counted once in each category (biodiesel and ethanol).

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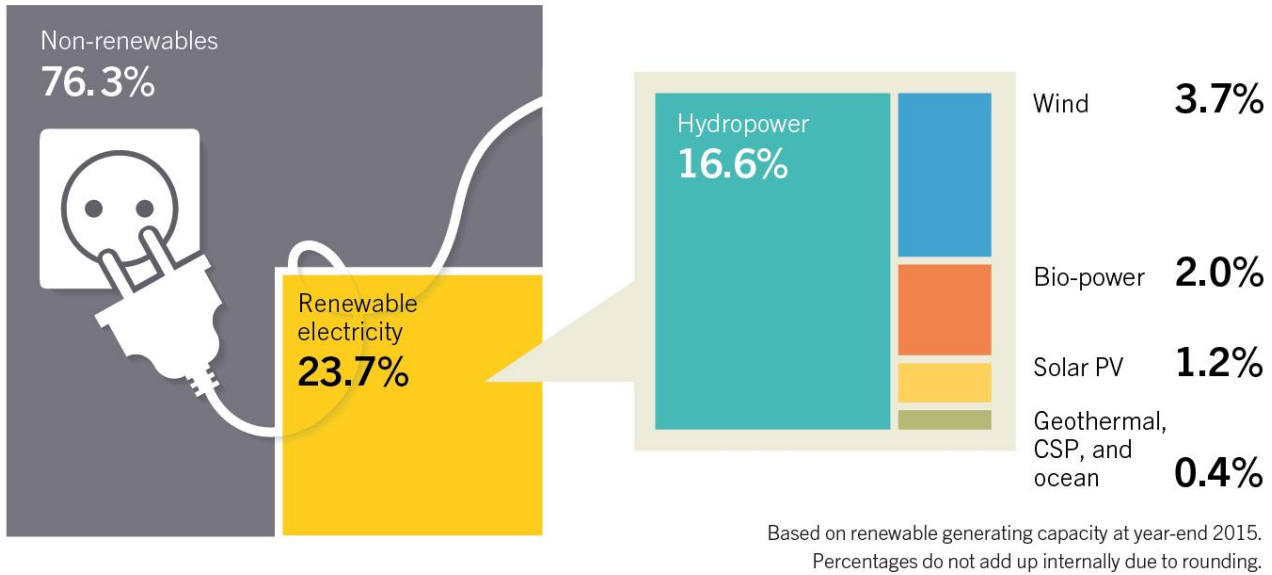
Source: REN21 Policy Database

Power Sector

Estimated Renewable Energy Share of Global Electricity Production, End-2015



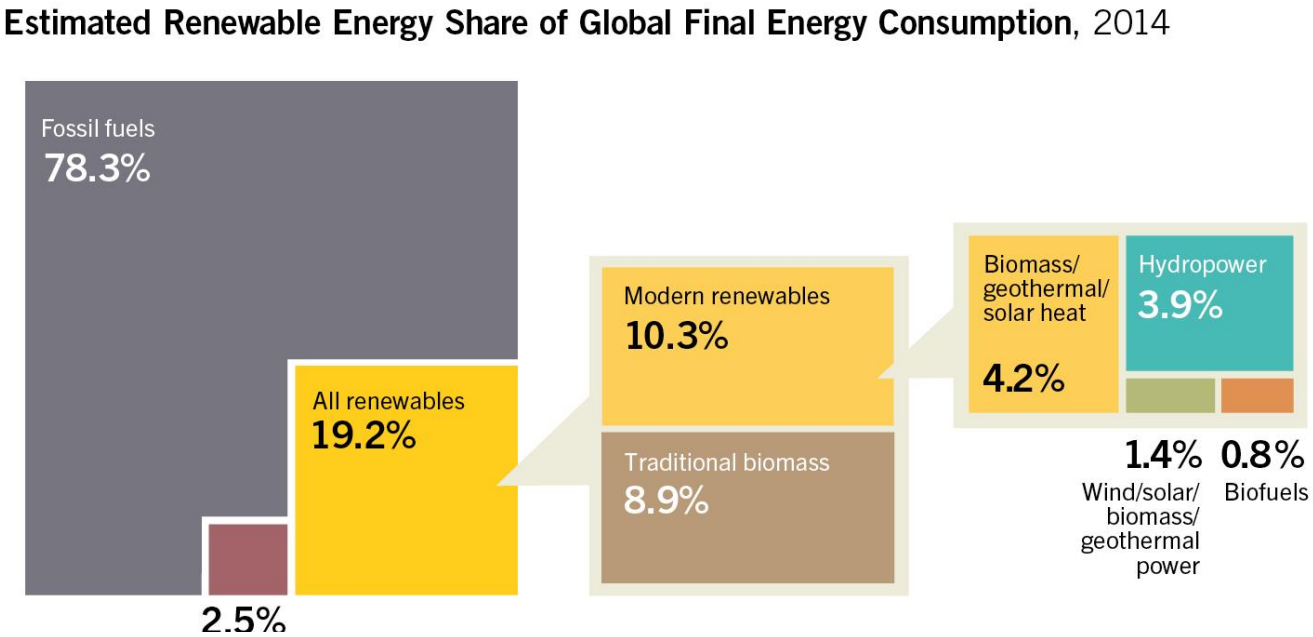
Based on renewable generating capacity at year-end 2015.
Percentages do not add up internally due to rounding.

- Renewables accounted **28.9%** of global power generation capacity and **23.7%** of global electricity demand
- Renewables made up for **60%** of net additions to global power capacity
- Total RE power capacity: **1,849 GW**, an increase of almost 9% over 2014

Renewable Energy in the World

Renewable energy provided an estimated **19.2% of global final energy consumption** in 2014

Share of modern renewable energy increased to 10.3% while the share of traditional biomass was of 8.9%



Solar PV

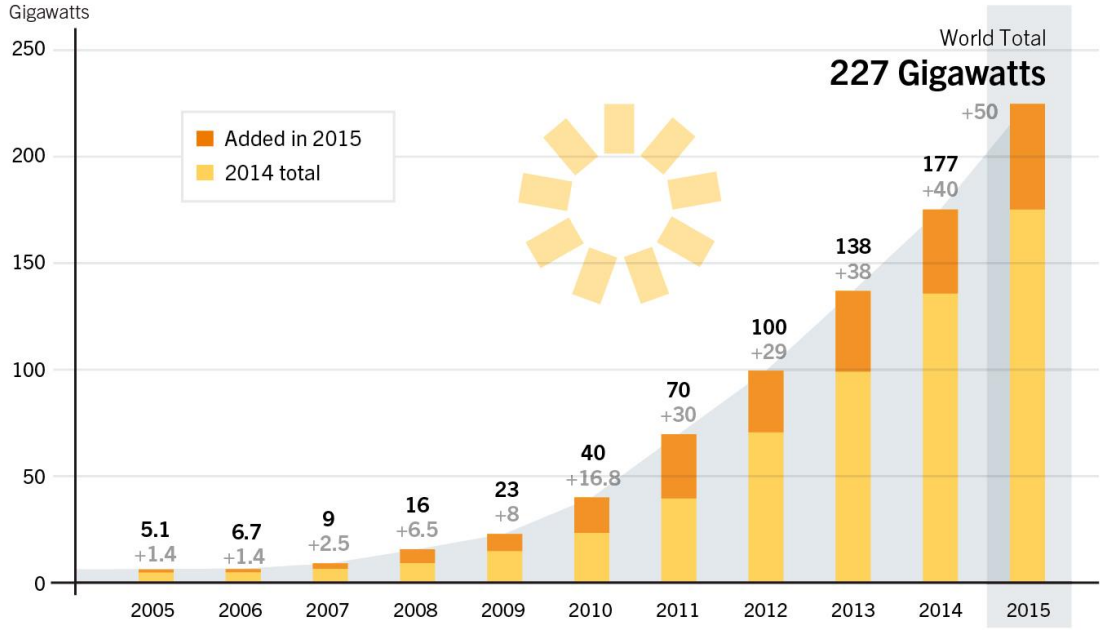
Capacity added:
+50 GW

Total capacity:

227 GW

Annual PV market in 2015 was nearly **10 times** the world's cumulative solar PV capacity of a decade earlier

Solar PV Total Global Capacity Annual Additions and Capacity, 2005–2015



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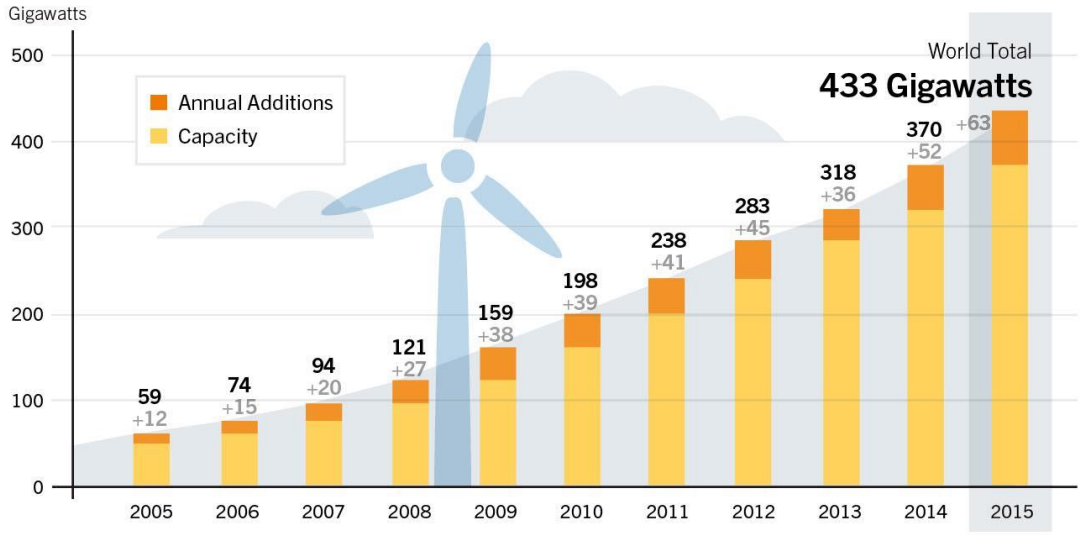
Wind Power

63 GW of capacity were added

Total capacity: **433 GW**

Offshore, an estimated **3.4 GW** of grid-connected capacity was added in 2015, for a world total exceeding **12 GW**

Wind Power Global Annual Additions and Capacity, 2005–2015



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The UNECE Renewable Energy Status Report

- Detailled 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 – **new edition will be published in spring 2017**
- Strong Involvement of governments, international organisations (IEA, EBRD, European Commission, World Bank, UNDP, UNECE) and civil society during data collection and review

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UNECE

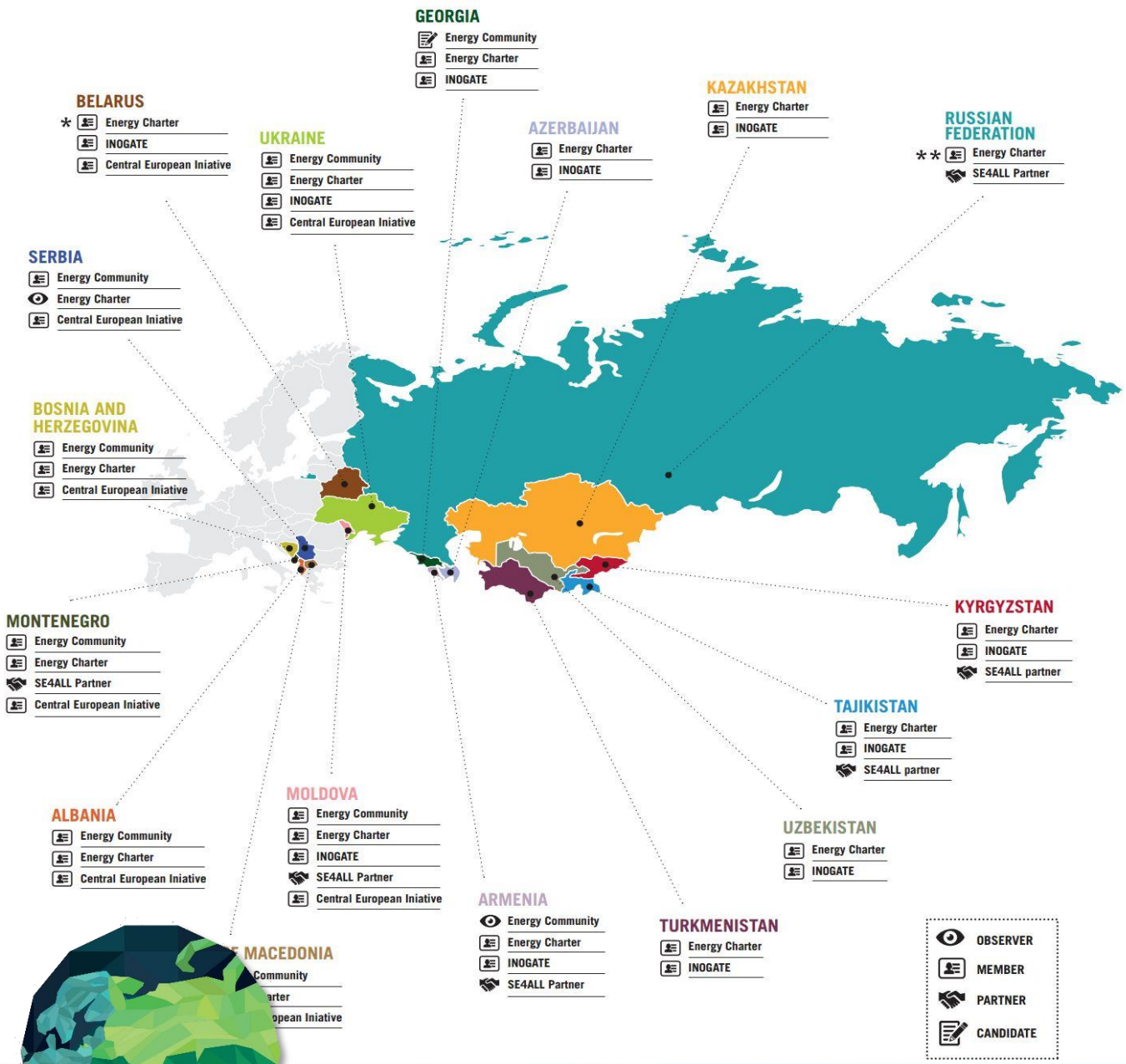
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:

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

of the Federal Republic of Germany

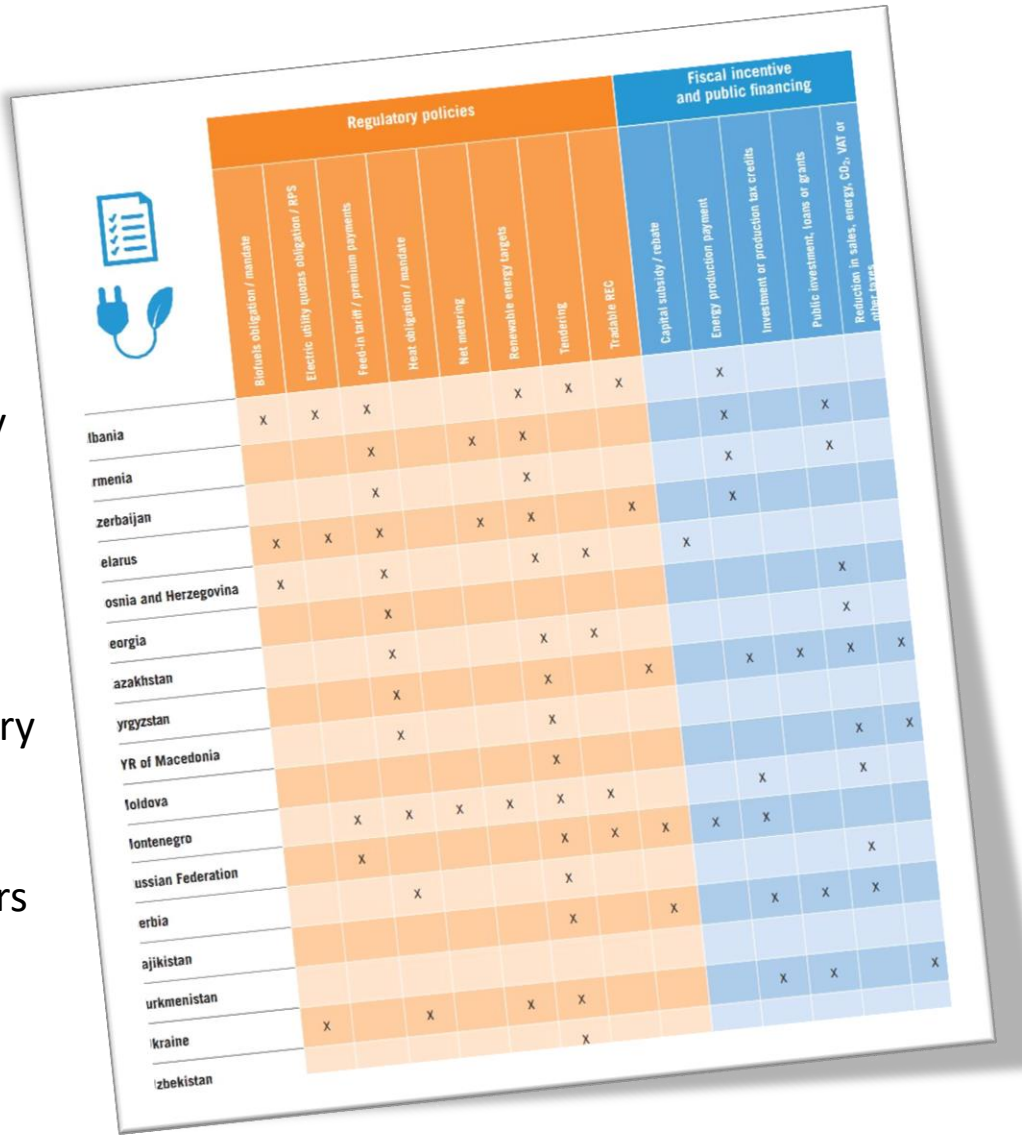
iea International Energy Agency



- 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

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



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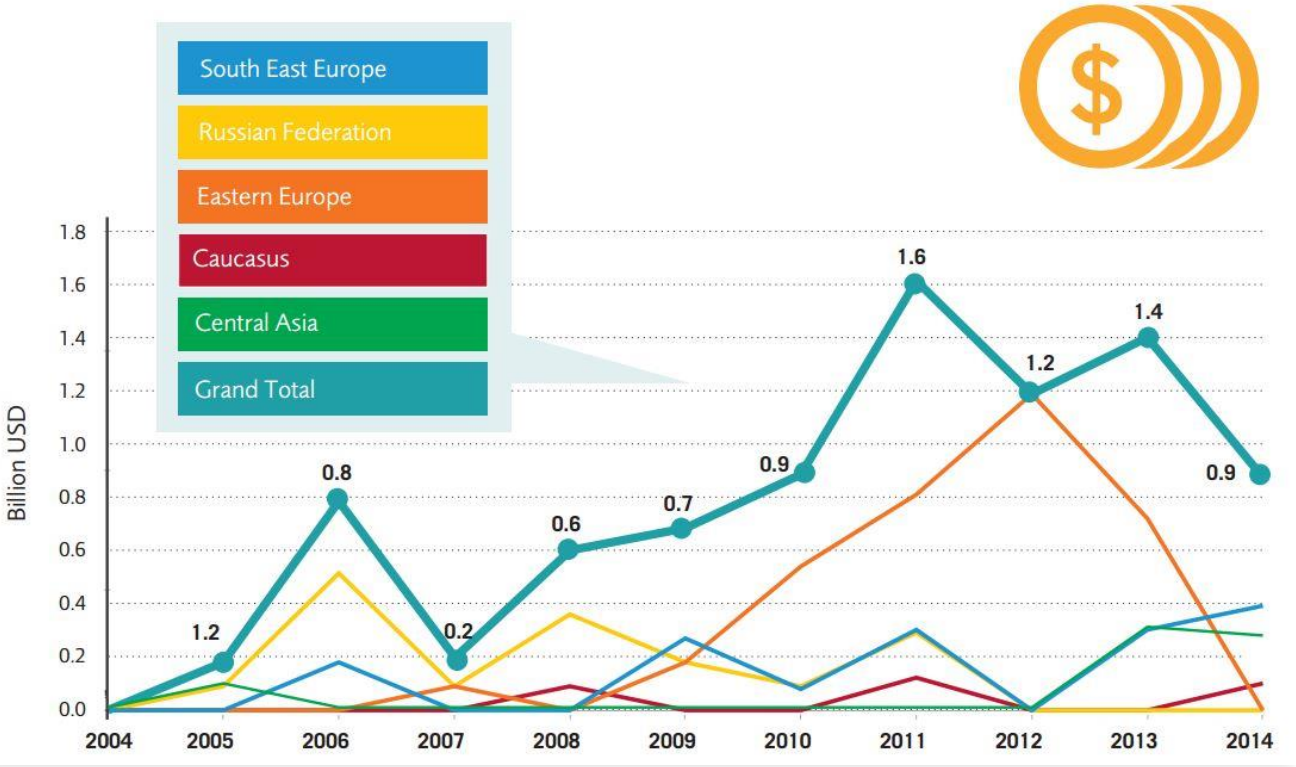
Investment flows in UNECE (17)

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 (regionaly and by sector)
- Funding sources mainly originating in national governments, international donors and multilateral development banks.

Global Investment in Renewable Energy

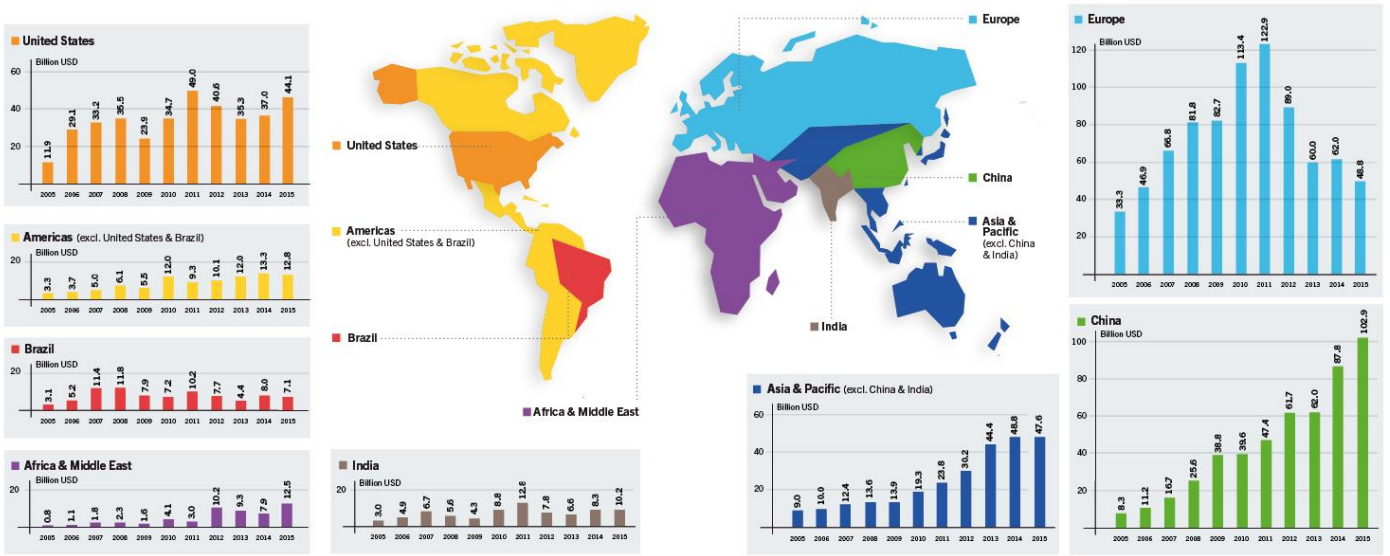
Developing & emerging countries:

- **USD 156 billion**
- **Increase of 19%** compared to 2014

Developed countries:

- **USD 130 billion**
- **Decrease of 8%** compared to 2014

Global New Investment in Renewable Power and Fuels, by Country and Region, 2005–2015



Data include government and corporate R&D.

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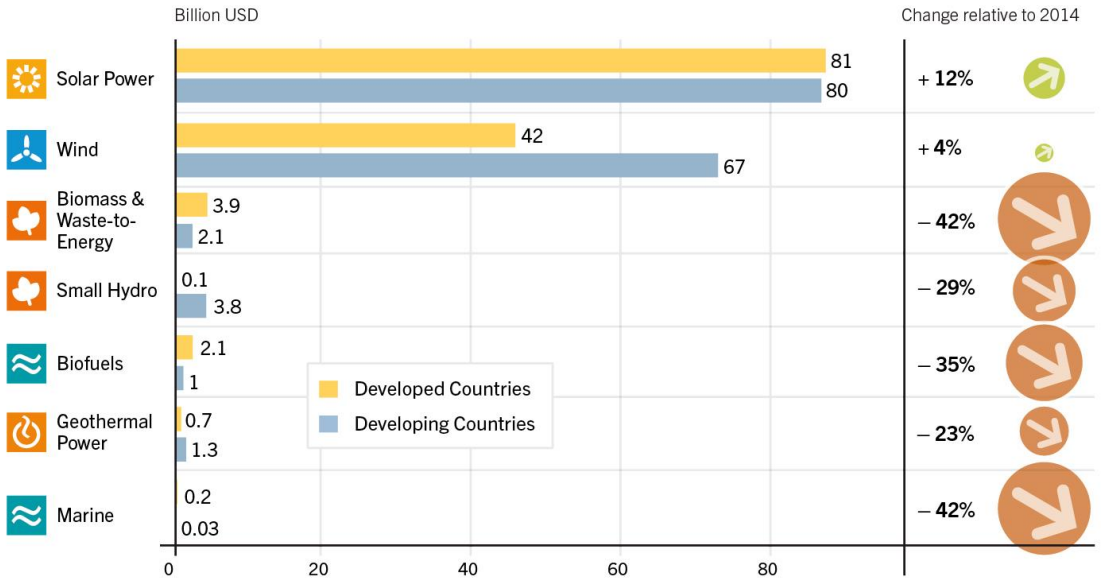
Source: BNEF

Global Investment in Renewable Energy

Solar power leading sector for money committed during 2015, receiving more than 56% (**USD 161 billion**) of total new investment in RE

Wind power followed with **USD 109.6 billion** (38.3% of total, up 4%)

Global New Investment in Renewable Energy by Technology, Developed and Developing Countries, 2015



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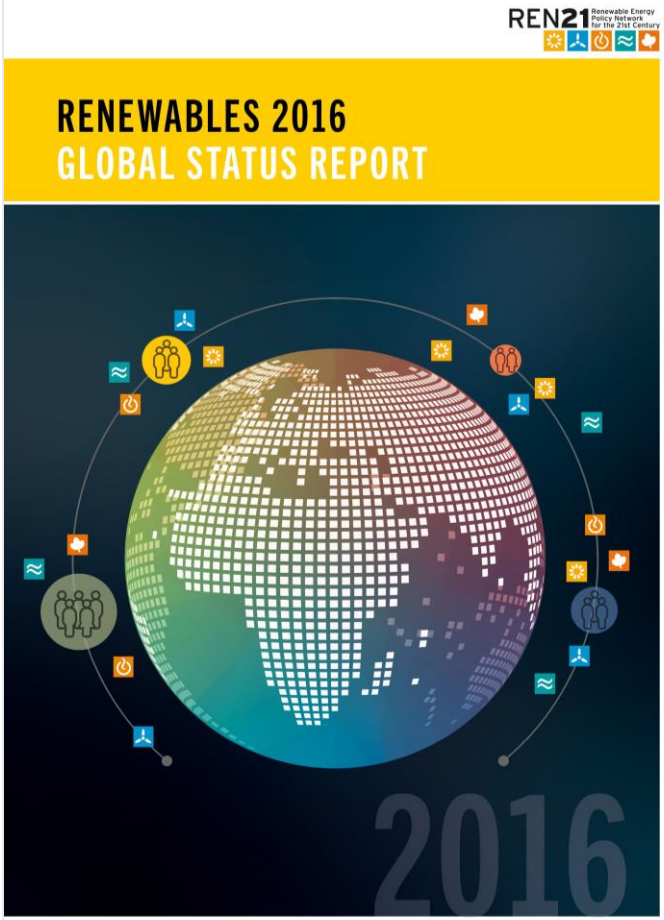
Source: BNEF

Conclusions – Global Development

- **Largest global capacity additions** from renewables to date
- For the second year in a row, **global carbon emissions** associated with energy consumption **remained stable in 2015** while the global economy grew.
- **Majority of remaining fossil fuel reserves** will have to be kept in the ground in order to reach 2° climate target
- **More emphasis on renewable energy in the heating and cooling as well as transport** sectors and on sector-coupling
- **Need to build a smarter, more flexible system** that accommodates both centralised as well as decentralised generation



Conclusion UNECE

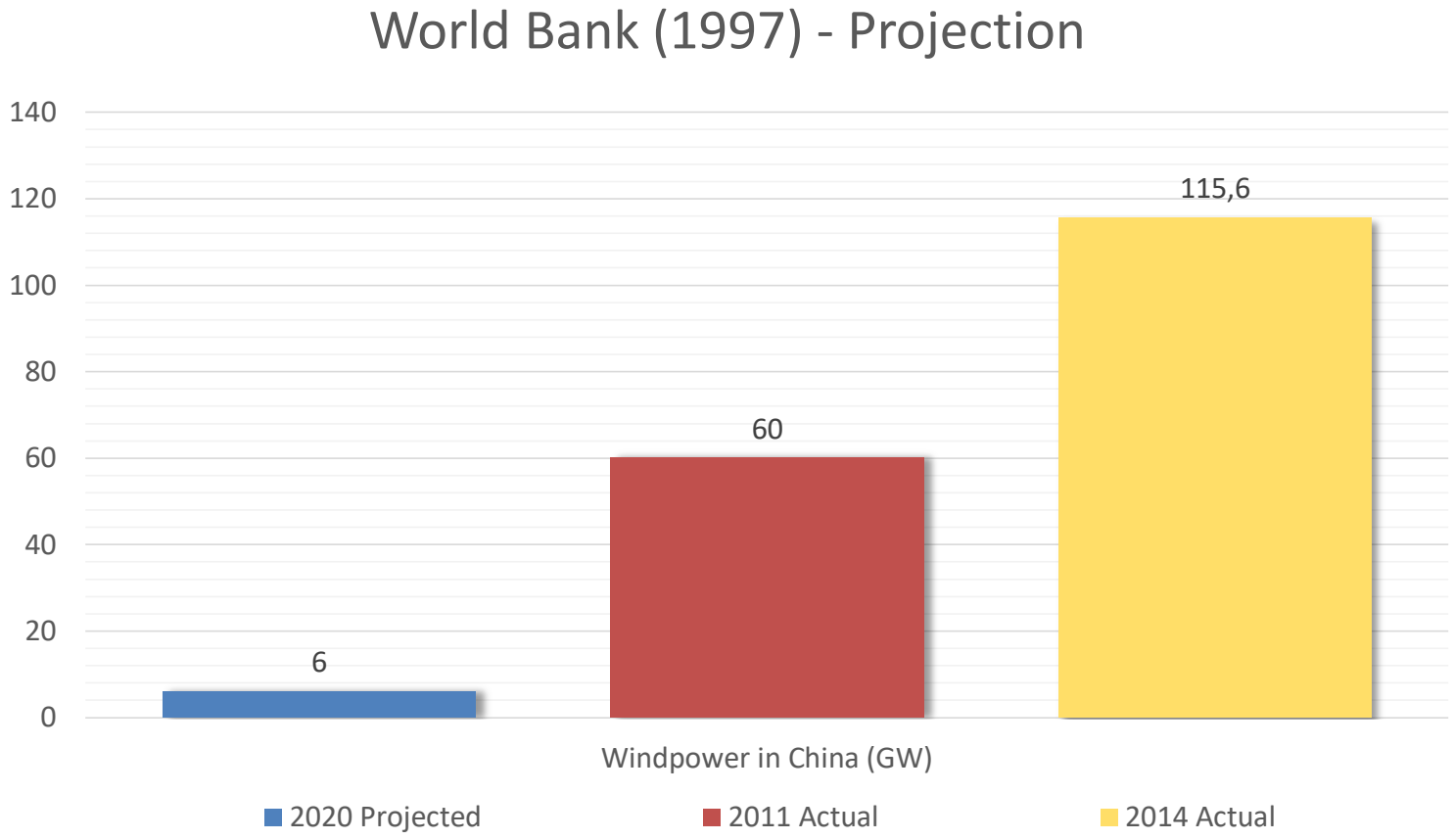
- South East and Eastern Europe, Caucasus, Central Asia and Russian Federation made strides into the realm of renewable energy and energy efficiency over the past two decades

- 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

Historic Projections Fall Short…



"The future of renewable energy is fundamentally a choice. All of the resources and technologies are there, but legislators and governments have to choose a long-term renewables path."

In 1997, the World Bank predicted 6 GW of wind in China for 2020, nearly 10 years earlier with 60 GW installed in 2011.

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