Renewables:Decisive for Jordan

Prosperity, economic growth and greening degraded Land
IIFREEE 2016 Amman 6th Dez 2016

Hans-Josef Fell
Member German Parliament (1998-2013)
President Energy Watch Group

Political challenges

- Climate warming, loss of biodiversity
- nuclear and environmental desasters
- peak oil, energy security
- oil wars, economic crises
- Poverty, hunger, refugies

All these challenges are connected with fossil and nuclear Energies

Renewables will solve these problems

Where Oil is, is mostly war

Refugee Reasons

- Poverty, Degradation of land
  - Climate refugee: desertification, sea-level rise
  - Eviction because of mining: e.g. coal, uranium,
- war, terror, ecivtion:
  - Where Oil is, is mostly war
  - Terror financing by oil (e.g. IS, Assad)

Transition to 100% Renewables

- Reduce cause of war and terror financing
- Fight against poverty and climate warming

100% REN and greening degraded land is decisive to overcome poverty and oil wars

Refugees, Budapest Sept 2015

COP 21: Stop Climate warming at 2° C

But at todays warming at 1° C is already unacceptable:
aridity and forest fires, floods and storms, sea level rising

The better choice is:

Global Cooling

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www.hans-josef-fell.de

Global Cooling

Not accept 2° Global Warming

National Geographic Edition November 2015:

6,4 Millionen Readers Globaly

Global cooling can be achieved by two parallel strategies:

1. **Stop greenhouse gas emission**

   (not only a reduction of emissions)

- switch to 100% renewables
- completely stop the use of fossil and nuclear energies in energy, chemistry, transport, agriculture

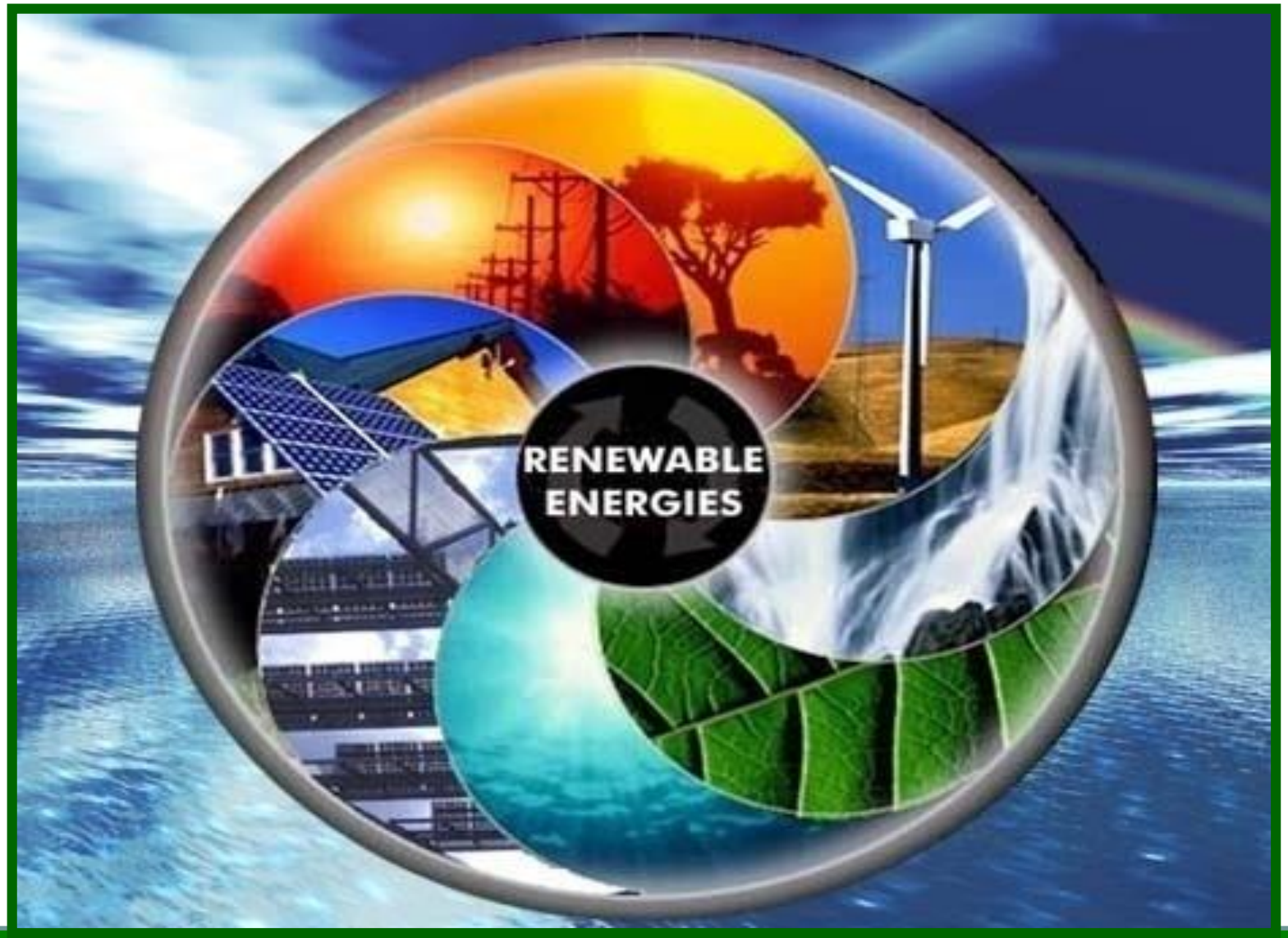
2. **Take out carbon from atmosphere**

- convert plants to humus soil (biocoal)
- reforesting big areas, greening deserts and degraded land
- Organic agriculture

The Target must be 330 ppm CO_2

This leads to global cooling, instead of global warming

Tomorrow´s Energy Production



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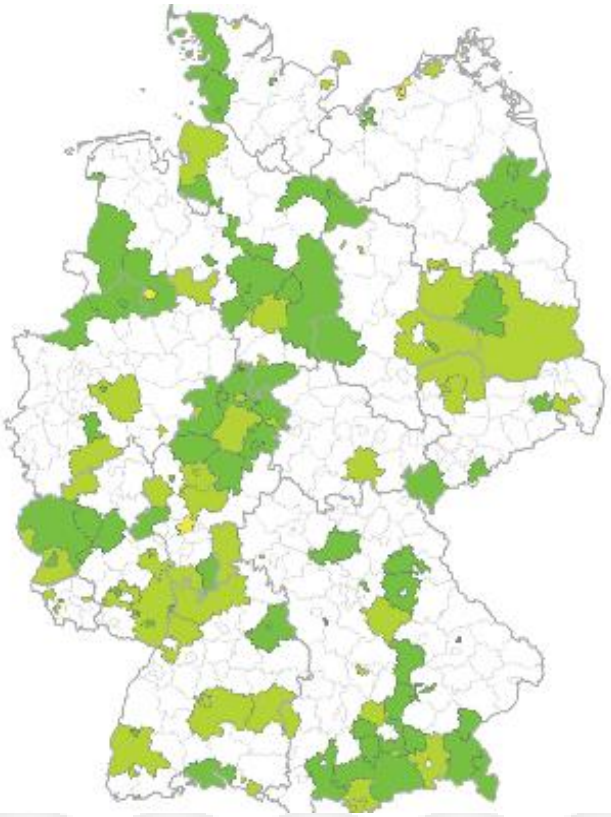
100% RENEWABLES

www.go100re.net



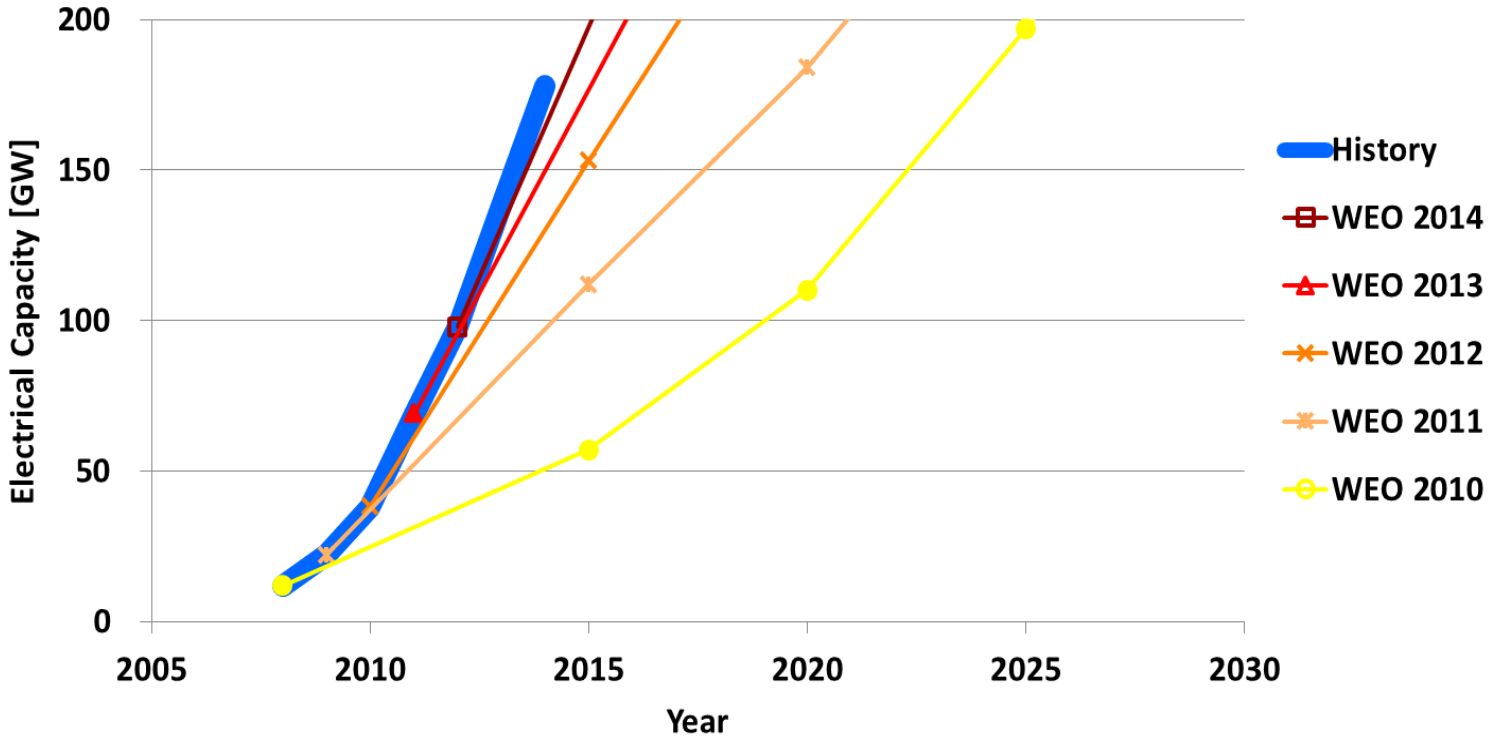
Nov 2016, CPO22, Marrakech:
48 countries (Climate Vulnerable Forum) decided for 100% RE target

More Countries e.g.: Denmark; Sweden; Costa Rica; Iceland; Cape Verde

Cities with 100% RE target e.g.:
Barcelona; Masdar City; Munich; Msheireb Downtown Doha; Vancouver; San Francisco; Copenhagen; Sydney;

Regions with 100% RE target e.g.:
Scotland; Upper Austria; Fukushima; Jecu/Korea; Kasese/Uganda

WEO Photovoltaic: Projections and Reality



Reality exceeded all projections of WEO by far.
PV, Wind grow much faster than by IEA projected.
Nuclear and fossil grow much less than projected

ENERGYWATCHGROUP

Source Energy Watch Group (2015): The projections for the future and quality in the past of the World Energy Outlook for solar PV and other renewable energy technologies. www.energywatchgroup.org

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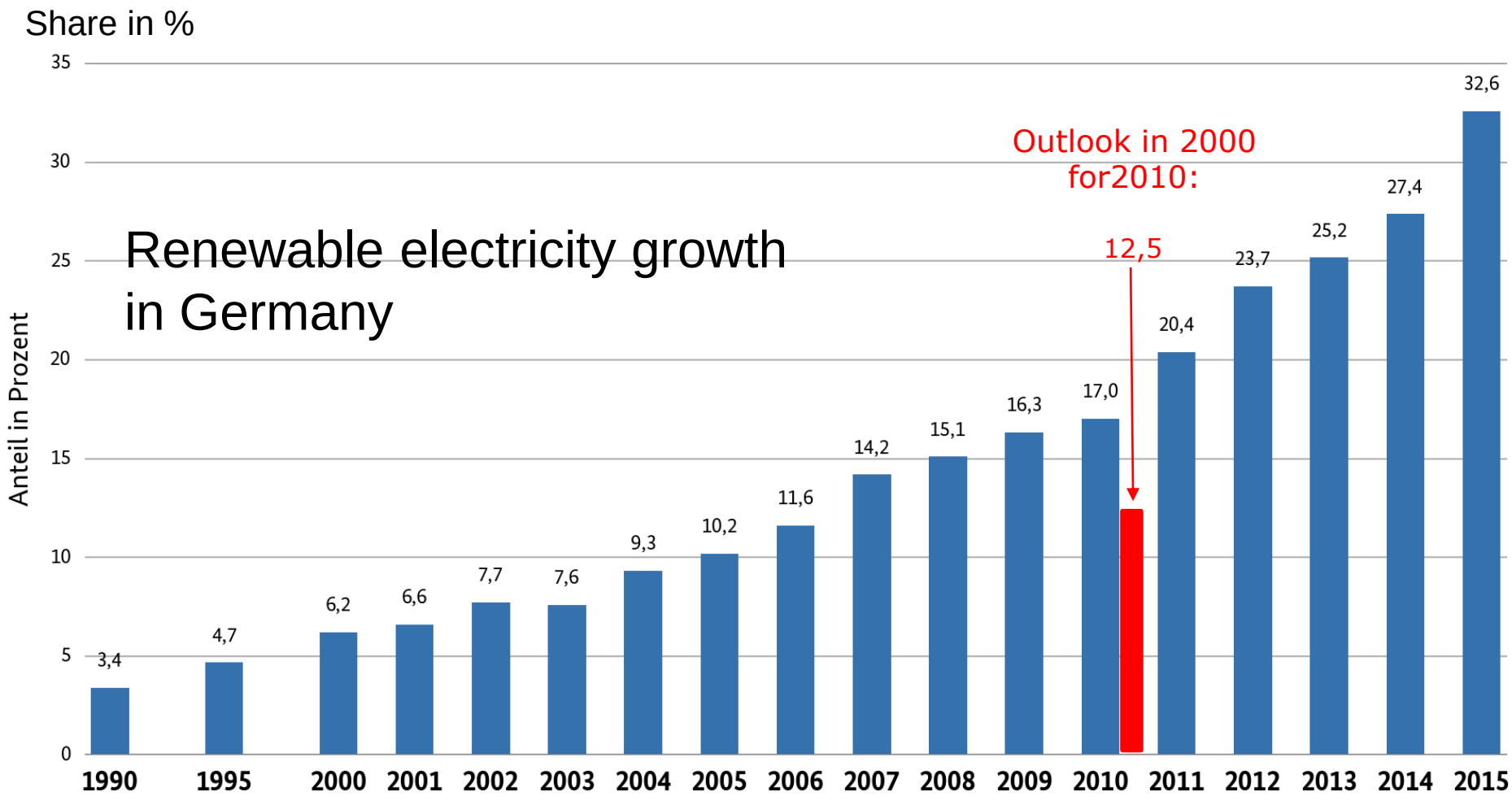
Renewables conquer German Energy

In the background:
nuclear power plant Grafenrheinfeld shut off in June 2015

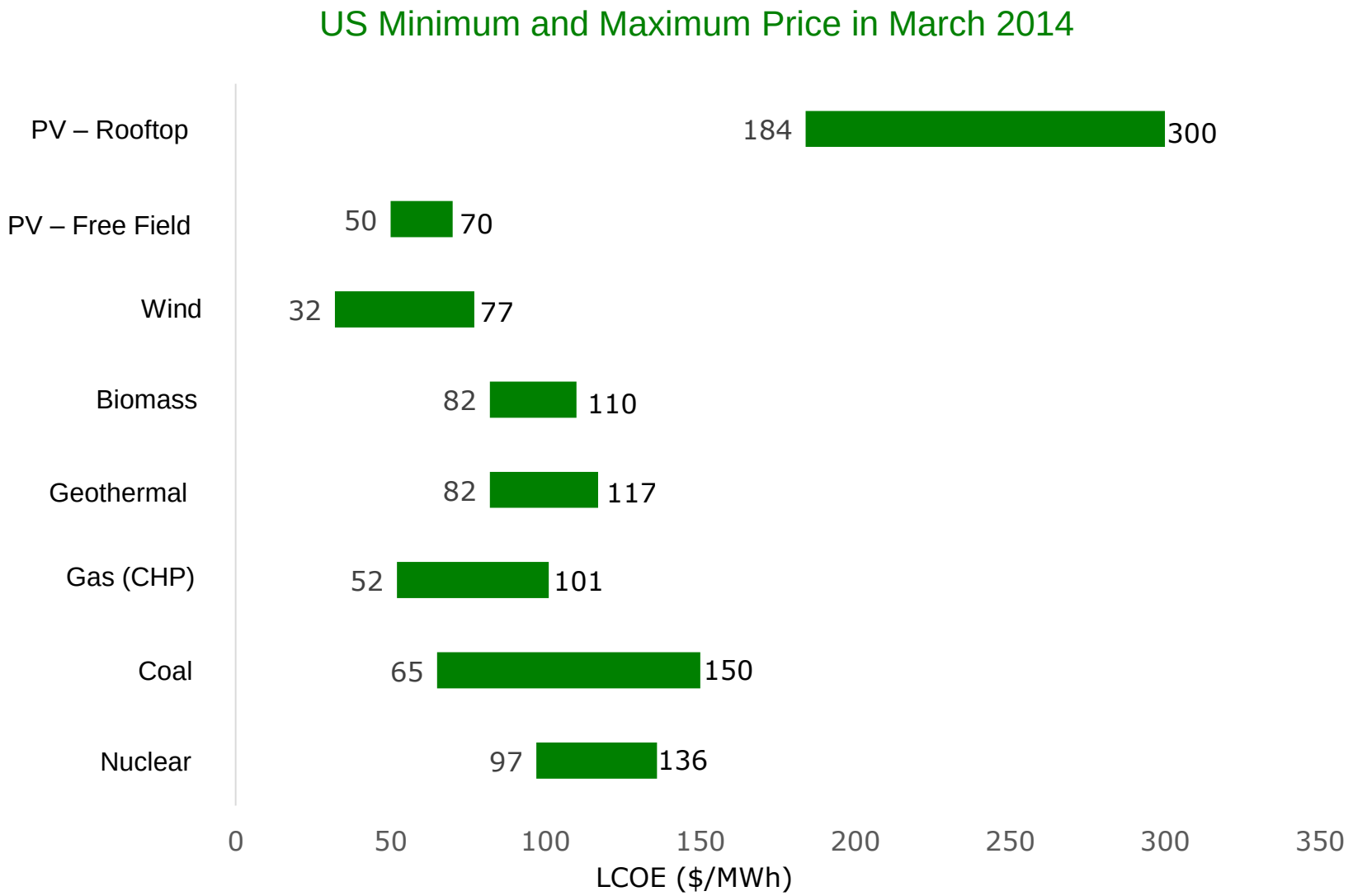
In the foreground:
Windpower named „Hans-Josef Fell“ PV and biogas farmland

With political support, renewable energy grows very fast



Source: BMWi, AGEE-Stat

Solar & wind are the cheapest energy options now



Source: Lazard's LCOE Analysis, Version 9.0 (2015)

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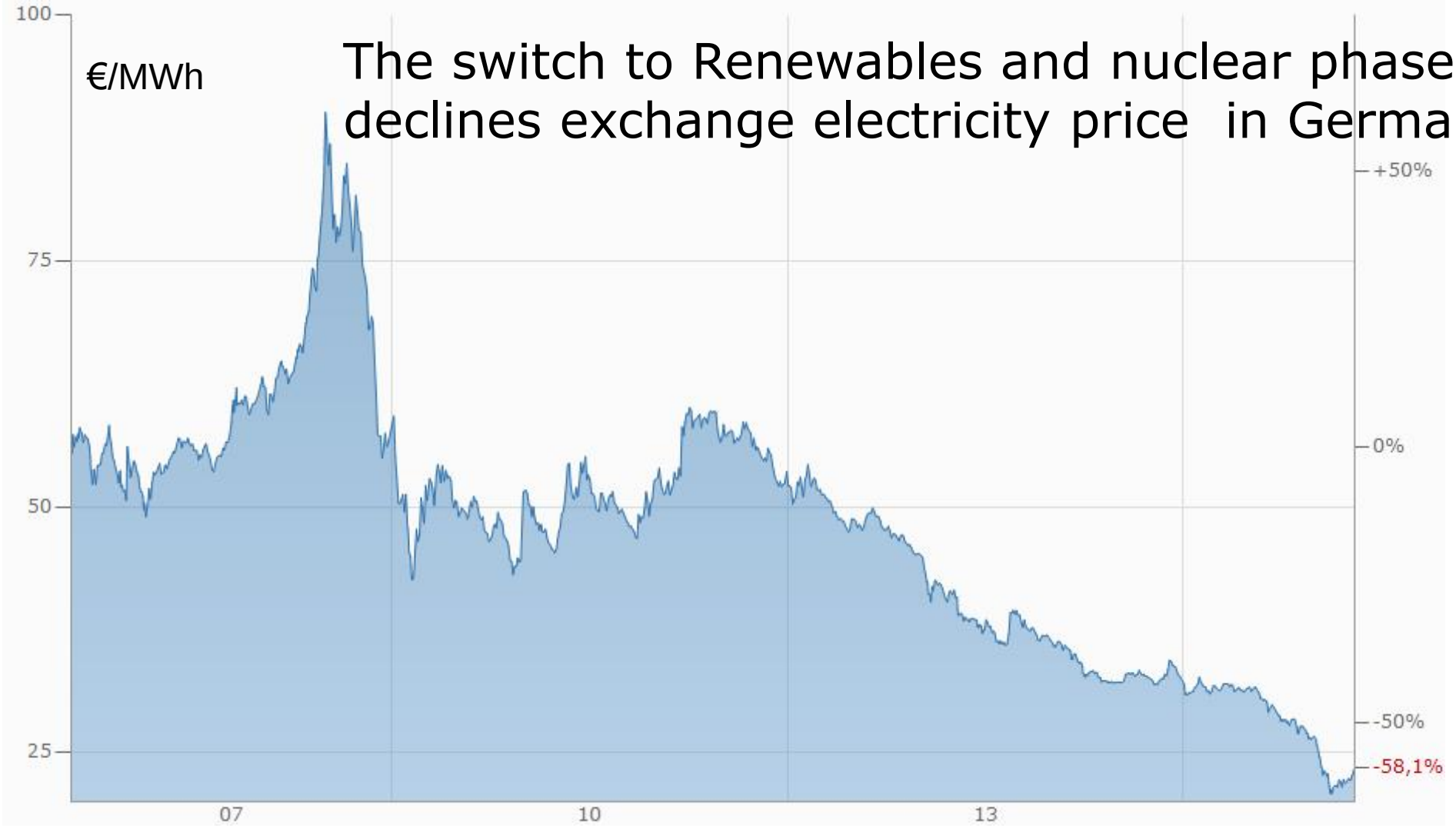
Exchange Electricity Price (Baseload) since 2005



source: EEX(2015);
http://www.finanzen.net/rohstoffe/eex-strom-phelix-baseload-year-future/Chart

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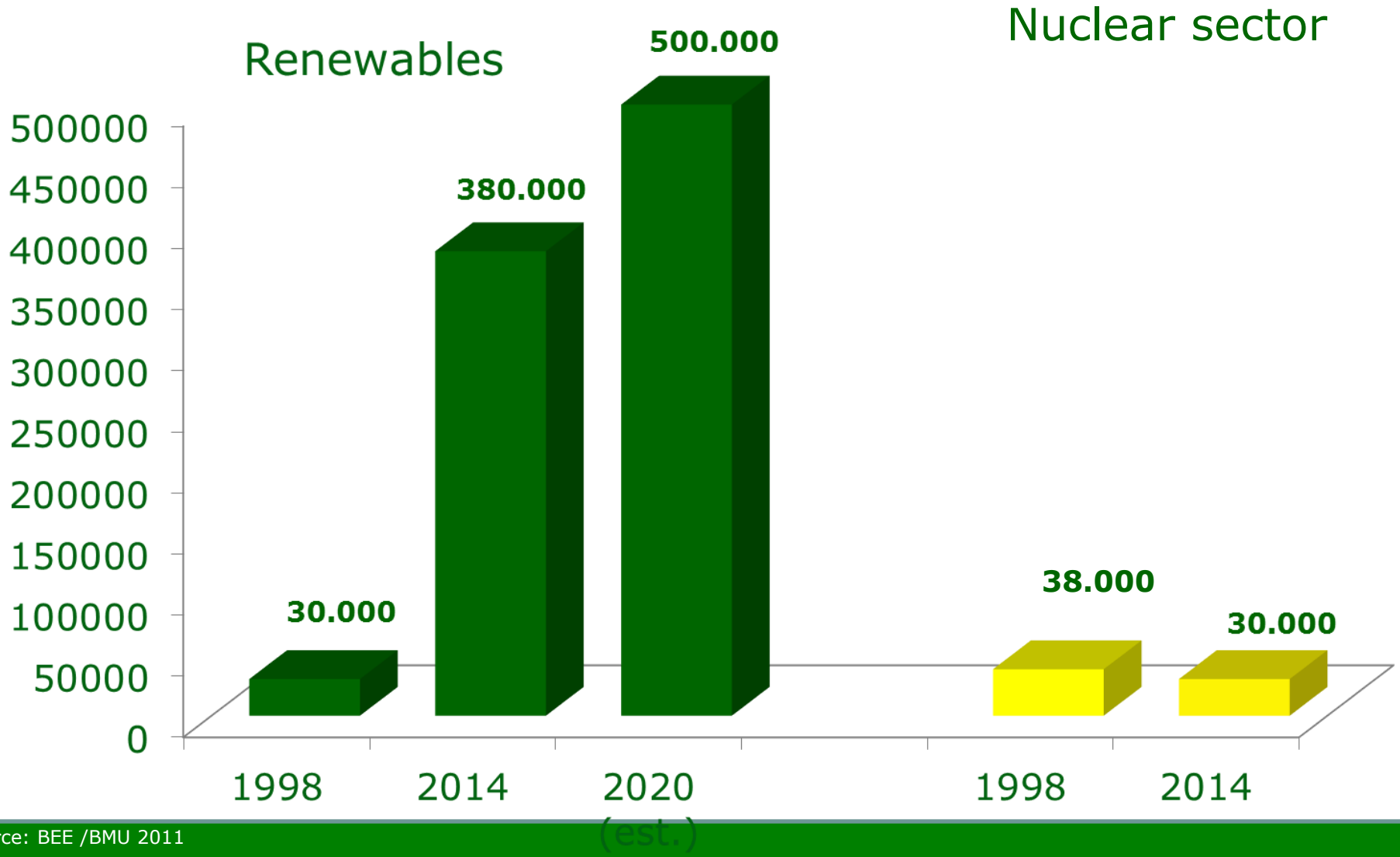
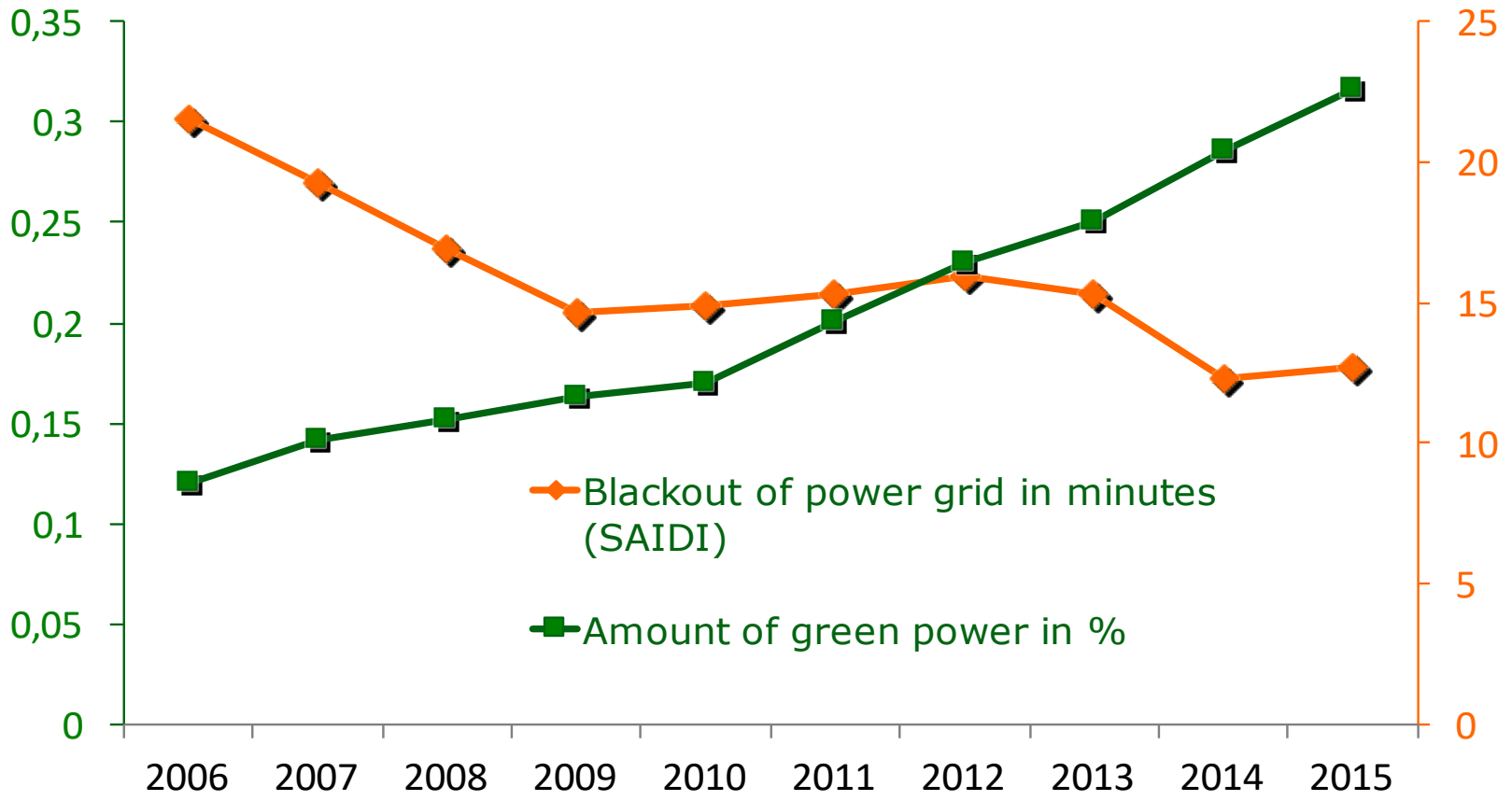
Renewable Energy as a Job Engine in Germany
Mostly jobs in operation, construction



Source: BEE /BMU 2011

German reality: expansion of green power improves grid stability



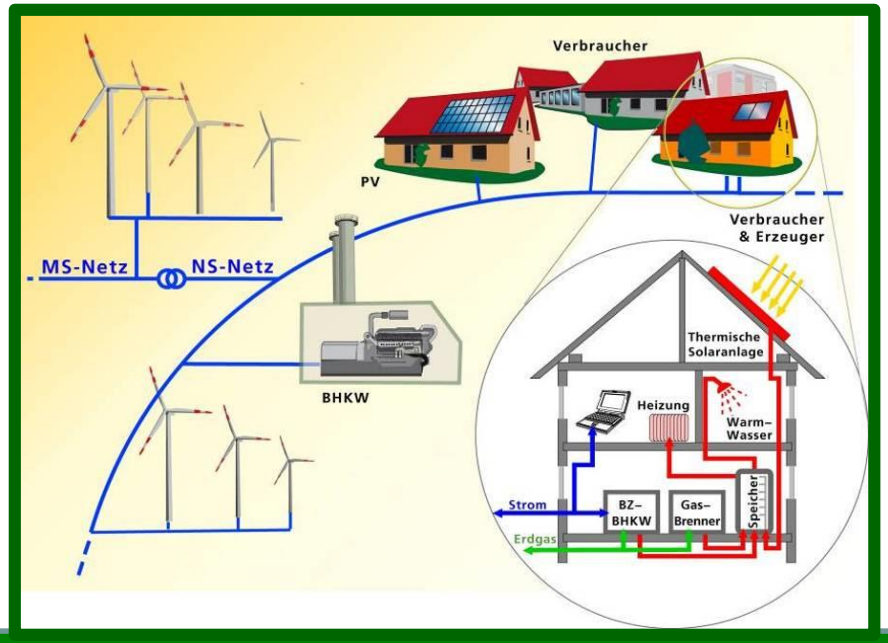
source: Bundesnetzagentur (2015); http://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/Versorgungssicherheit/Stromnetze/Versorgungsqualität/Versorgungsqualität-node.html ; BMU, BEE, bdew

Complete Concepts for 100% Renewables

- Sustainable energy supplies for vehicles
- Wind, hydropower, photovoltaics, biomass…
- Contributions to solving storage problem of power grids

Growing importance of renewable electrical power

Hybrid or electric vehicles



7 Years ´Energiewende´ in Großbardorf
Inhabitants financed it with cooperative

Power

475%

Heat

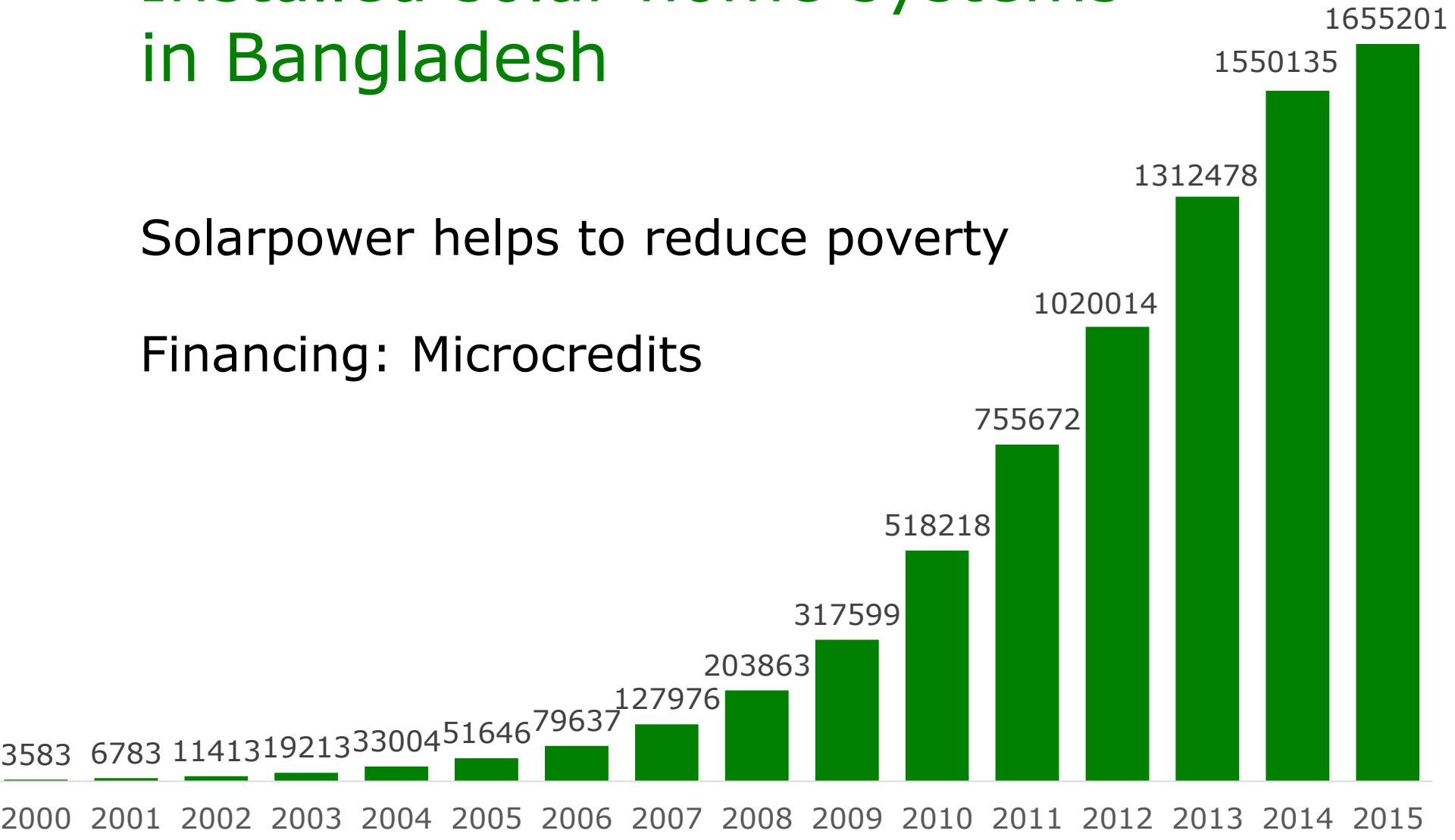
90%

Annual electricity demand 2011:	Annual heat demand 2011
ca. 1.600.000 kWh	ca. 3.200.000 kWh
Annual supply through RE 2011:	Annual supply through REN 2011:
ca. 7.600.000 kWh	ca. 2.880.000 kWh

Installed solar home systems in Bangladesh

Solarpower helps to reduce poverty

Financing: Microcredits



Source: Grameen Shakti, SOLAR HOME SYSTEM, http://www.gshakti.org/index.php?option=com_content&view=article&id=58&Itemid=62

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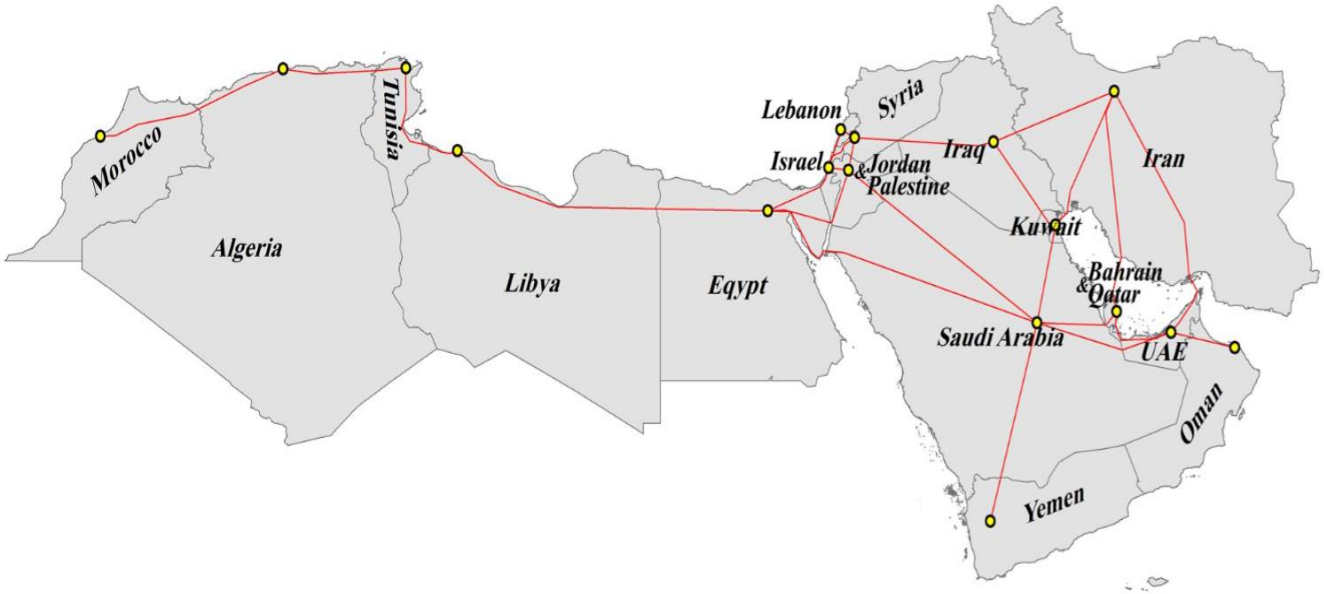
MENA Region: 100% Renewables Lappeenranta University Finland



Levelized cost el. (Generation, Transport, Storage): 6,1 Eurocent/kWh

Energy Watch Group will create global study.
Doners are welcome
We can simulate also Jordan 100% renewables

Source: Lappeenranta Universität, Finnland
Authors Dimitrii Bogdanov, Christian Breyer

Climate Protection and Energy Security Policies

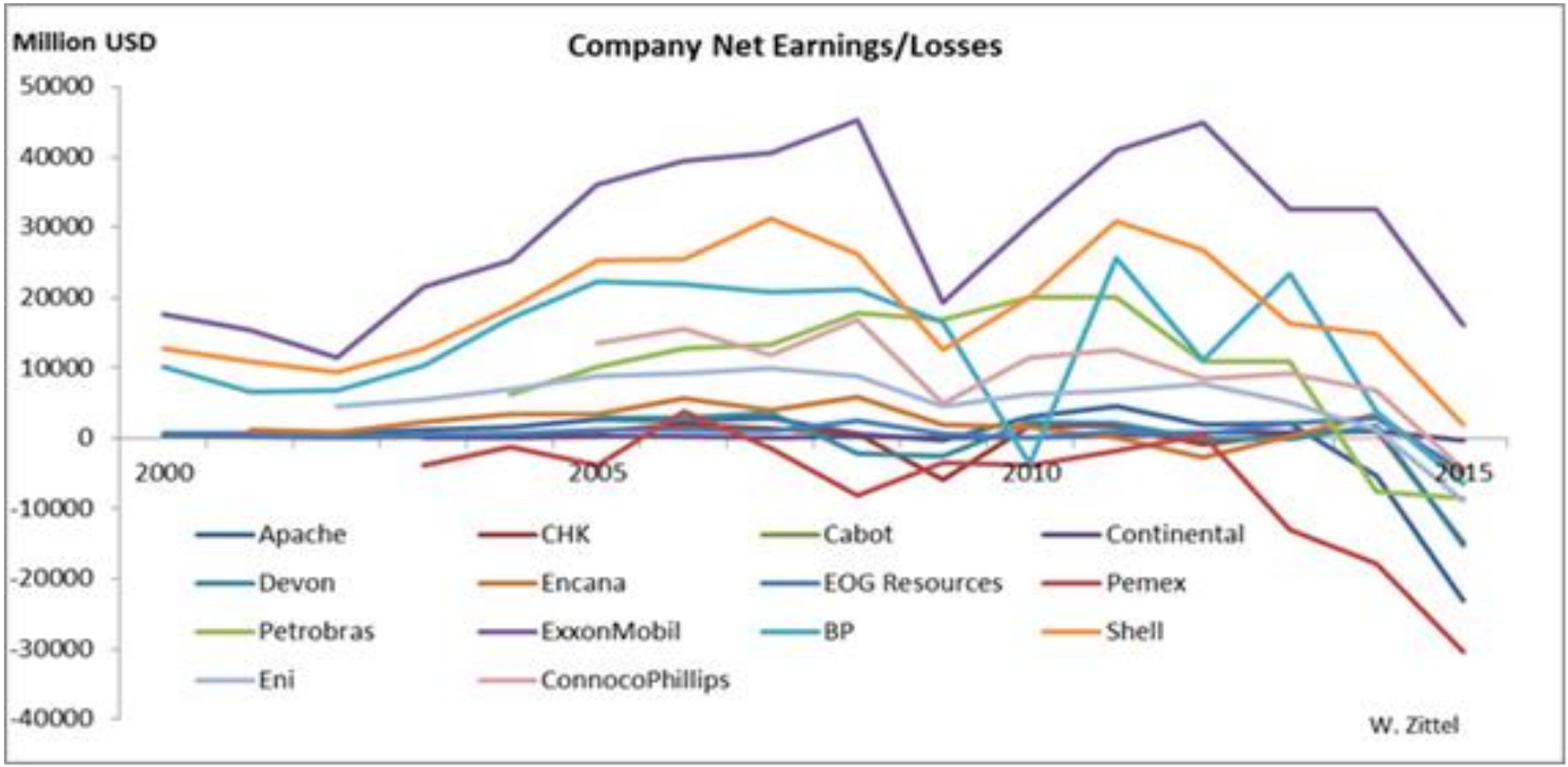
Promoting Renewable Energy and Chemistry & Organic Farming:

- **Climate protection into national constitution**
- **Laws for feed-in-tariffs** (GET FIT for developing countries)
- **Tax relief** for renewables
- **Carbon tax**
- **Canceling subsidies** for fossil and nuclear energy, fossil chemistry and intensive agriculture
- **Research and education** for renewables and organic farming
- **Reducing obstacles** for approval
- Dispose big areas for reforesting and regreening

Not successful:

- Tendering or certificate systems
- Emission trading

2015: Oilcompanies: declined earnings or massiv losses



Source: Energy Watch Group; Werner Zittel

Nuclear power is too expensive

- New nuclear power plants
  - GB: Hinkley point is double so expensive then solar and wind (Guardian: British government in an unpublished Study)
- Existing nuclear power becomes uncompetitiv with renewables
  - USA: 5 atomic plants closed in 2013/14
  - USA: 9 atomic plants will close next years:
    - Fort Calhoun 2016; Clinton and Fitzpatrick 2017; two in Quad Cities 2018; Pilgrim and Oyster Creek 2019;two in Diablo Canyon 2025.

Source: Temelin.cs 19.9.2016
Guardian 11.8.2016

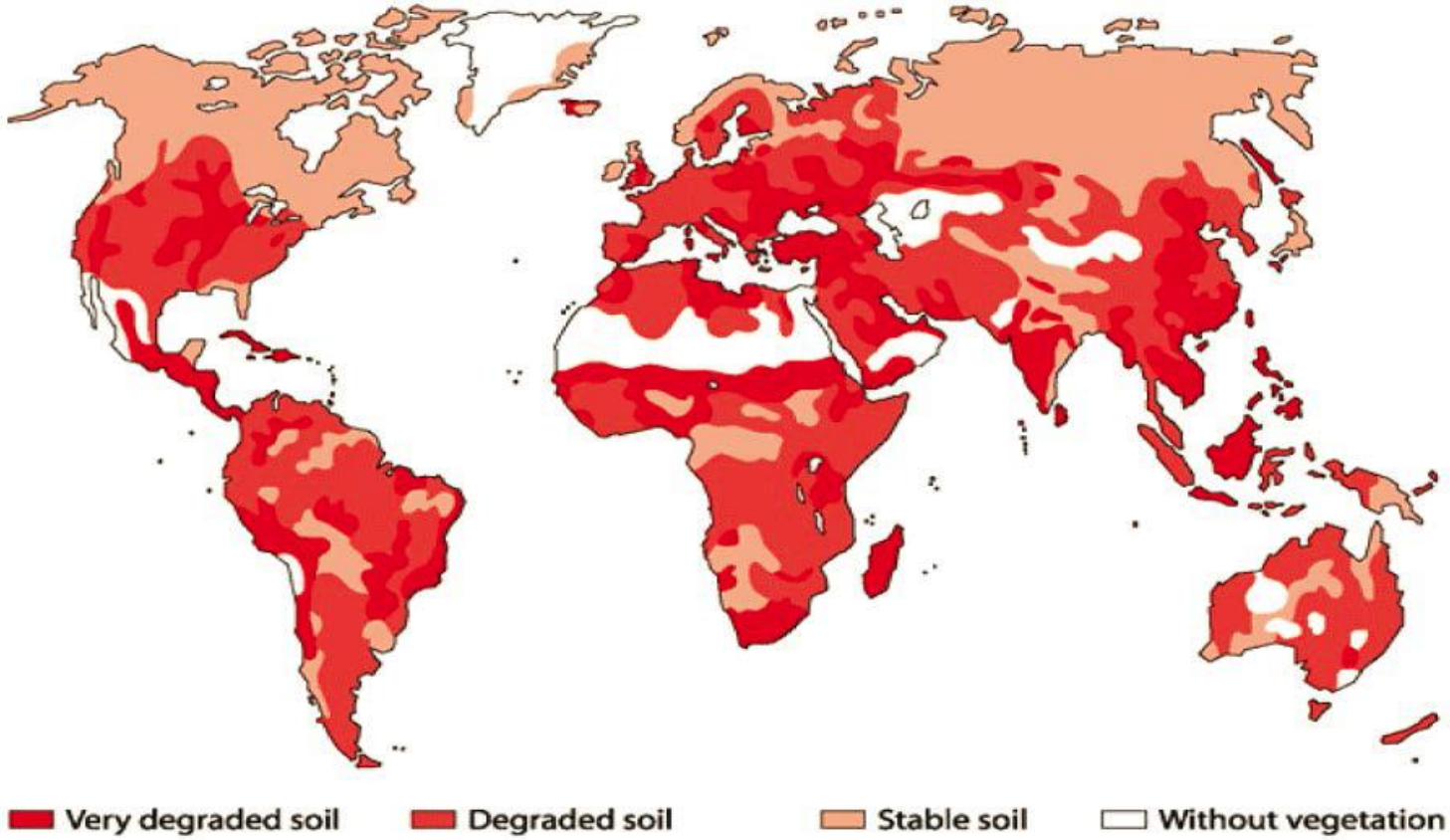
Double pitfall for fossil/nuclear business

- Rising oil/gas/coal/uranium prices
  - Energy consumers switch to renewables
- Declining oil/gas/coal/uranium prices
  - Financers stop financing
  - Oil countries state budget goes bankrupt

Both leads to economic pressure for fossil/nuclear companies

- $3.4 trillion fossil fuel assets are flagged for divestment by more than 500 institutions and 2,040 individuals from 43 countries

Distribution of degraded land in the different continents



Degraded land: about 20 million km²

Source: UNEP

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Greening the degraded land:

20% greened degraded land areas with oleiferous plants can substitute for the global mineral oil demand

Around 2000 Gt CO2 could be taken out of atmosphere in next 30 years

With 100% REN this will lead to **350 ppm (Global Cooling)**

Greened Egypt desert at Luxor with Yatropha brings oil & food

Source: Jatrosolutions; Gerhard Herres

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India: DaimlerChrysler jatropha project

At the beginning

First plantings

After some years

Driving with biodiesel

Quelle: DaimlerChrysler, Jatropha – Biodiesel from Eroded Soils, A Concept for Sustainable Mobility in Developing Countries, RBP/CF July 17, 2006

Water + Electricity from the same windmill

Water desalination: up to 1000 m³ per day
Electricity additional: up to 50 kW

Water cost: about 1 EURO per m³

Source: SolteQ

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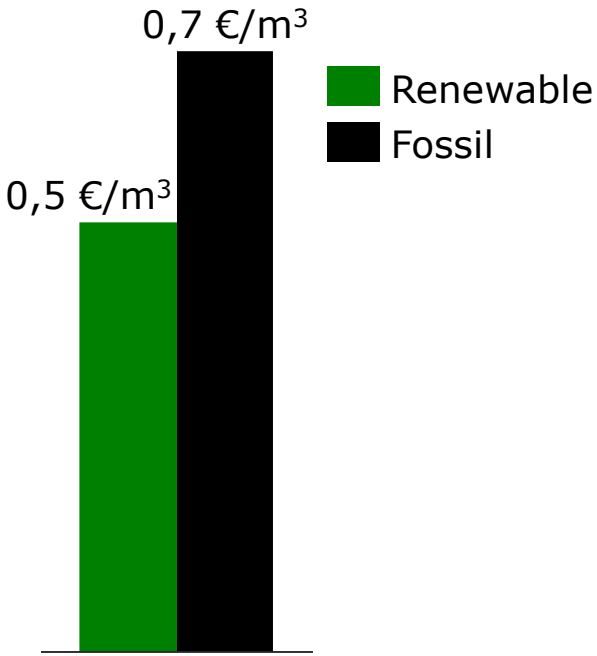
Desalination: Renewable cheaper than Fossil



Water Production Costs

Source: Lappeenranta University of Technology, Caldera, Upeksha: Renewable Energy Powered Desalination: A Sustainable Solution to the Iranian Water Crisis

Wastewater treatment in Forestry + Freshwater-Agro-PV + Nano-Irrigation

40%

ROI: 7 years

Source: Volker.Korrmann@ewind.eu

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Wastewater treatment in Forestry + Freshwater-Agro-PV + Nano-Irrigation

- Trees purify the wastewater
- Cost savings in sewage treatment
- Additional foresty income
- Groundwater stabilisation
- Wind and dust protection for Freshwater Agro-PV
- Better micro climate for agriculture
- 60% less water consumption

Source: Volker.Korrmann@ewind.eu

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Enhanced drip irrigation

- 30% cheaper...
- 20% less water consumption...
- Less ground salination...
- More yield...

...compared to normal drip irrigation

1,000 L water storage & irrigation - for 3 $

- Frost protection in the night
- Cooling during the hot day
- 40% less water consumption
- Long term irrigation without any water pipeline
- 2-4 month water support

Cultivate even strawberries, tomatos or wine in the desert

Pilot project in Kenya

Agro PV in China, Yinchuan

Source: Gimbel, BayWa Re

Shadowing saves water, drip irrigation: Food can grow in former desert

Source: Gimbel, BayWa Re

Agro PV made by BYD, China

Combine with Agriculture

Date	Dec 2015
Location	An Hui,China
Module Type	BYD 255P6C-30-DG
Project Size	**10 MW**

Source: BYD

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Greening degraded areas with biochar

July 2010

August 2011

For 60 years it looked like this

Now it looks like this

Coalmining area in USA

Source: Aspen Global Change Institute

Hydrothermal carbonization (HTC)

Process:

- Input: plants (+ side products)
- Outcome: biochar (+ energy)

Usage of biochar:

- fuel
- chemical base (oil substitute)
- CO_2–binding in soil

Source: MPI of Colloids and Interfaces

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Global Cooling

published in summer 2012.

paperback edition for 19 €.

www.globalcooling-climateprotection.net

Source: Beuth

Thank You Very Much for Your Attention!

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