100% Renewables
Main Key to Achieve SDGs

Bangkok, 7th October 2019

Hans-Josef Fell
President of the Energy Watch Group
Member of the German Parliament 1998-2013

Climate-Activist Greta Thunberg at the World Economic Forum in Davos

- *„Our house [earth] is on fire"*
- *„the main answer is so simple that even a small child can understand it:* ***We have to stop the emissions of greenhouse gases.***"
- *„I want you to panic [...], to act is if it were a crisis."*

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Source: https://www.youtube.com/watch?v=M7dVF9xylaw

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Impact of 3 °C Global Warming by 2050: Existence of Human Civilization is Threatened

2050 Scenario: degradation, sea level rise and scarcity of resources lead to one billion people being displaced, an increase of armed conflicts and a possible nuclear war.

3°C ("business as usual") means for 2050:

- **Sea level rise of 0.5m by 2050:** Miami, New York, Shanghai, Amsterdam threatened by inundation.
- Annually, 55% of the global population are subject to more than 20 days of **lethal heat conditions**.
- **Desertification emerges over more than 30% of the world's land surface:** Food production inadequate to feed the global population. Water scarcity affects 2 billion people worldwide.

This can only be prevented by a **global zero-emission system by 2030 at the latest.**

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Quelle: https://docs.wixstatic.com/ugd/148cb0_90dc2a2637f348edae45943a88da04d4.pdf

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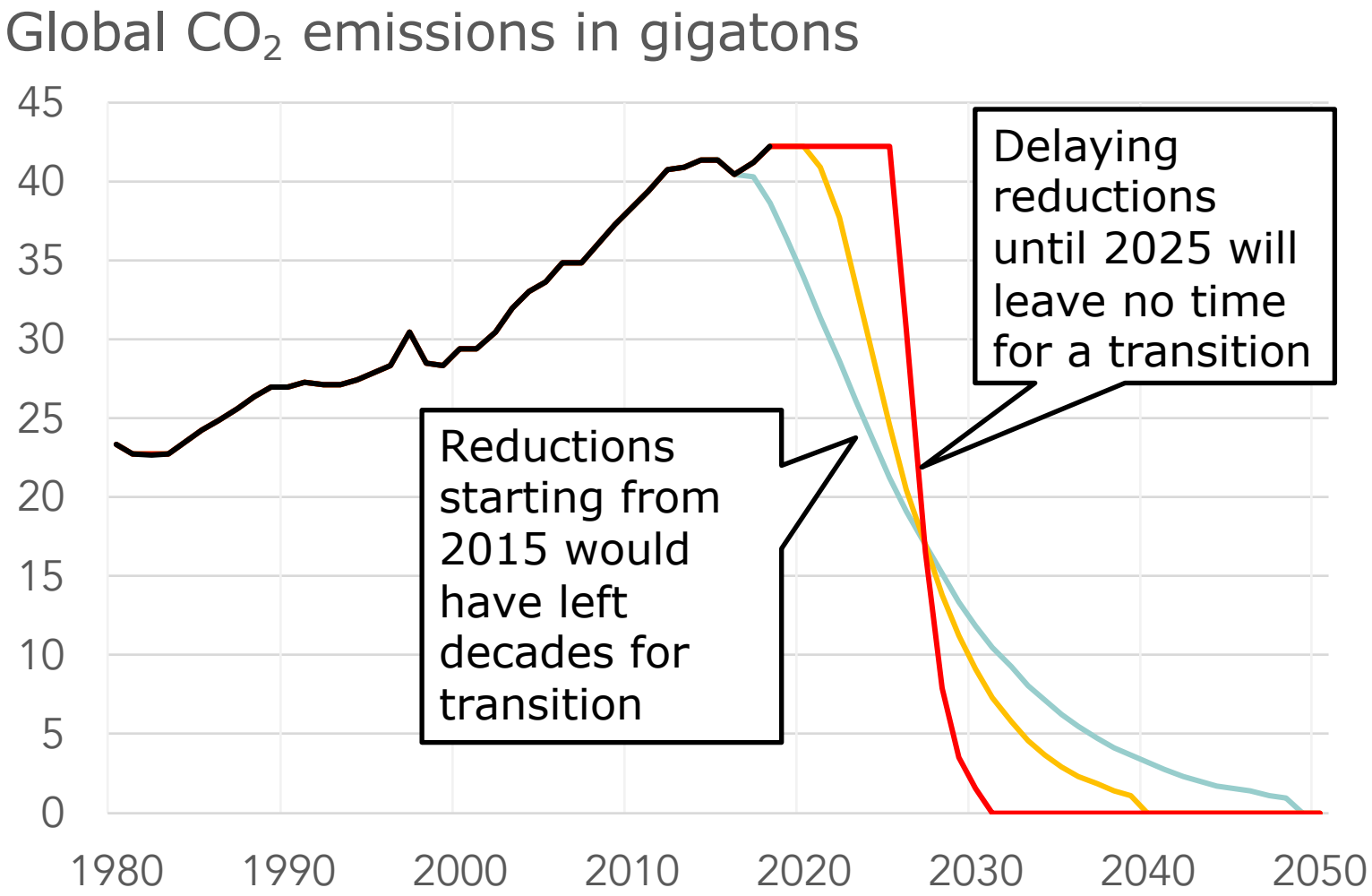
Präsident der Energy Watch Group

Global GHG Emissions Must Come to Zero by 2030 to Reach the Paris Target of 1.5 °C



Quelle: Global Carbon Budget 2018

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Crisis of Global Warming and Energy Dependencies can only be Solved with two Parallel Strategies:

1. **Stop greenhouse gas emissions (best by 2030)**

   (Not only reduction of emissions)

- Switch to 100% renewables
- Complete stop the use of fossil & nuclear energies in energy, chemistry, transport, agriculture

2. **Taking out carbon out of the atmosphere**

- Convert plants to humus soil (biocoal)
- Large-scale afforestation, greening of arid areas
- Organic agriculture

The target must be 330 ppm CO_2

This would lead to <u>global cooling</u> instead of global warming and to increased energy independency

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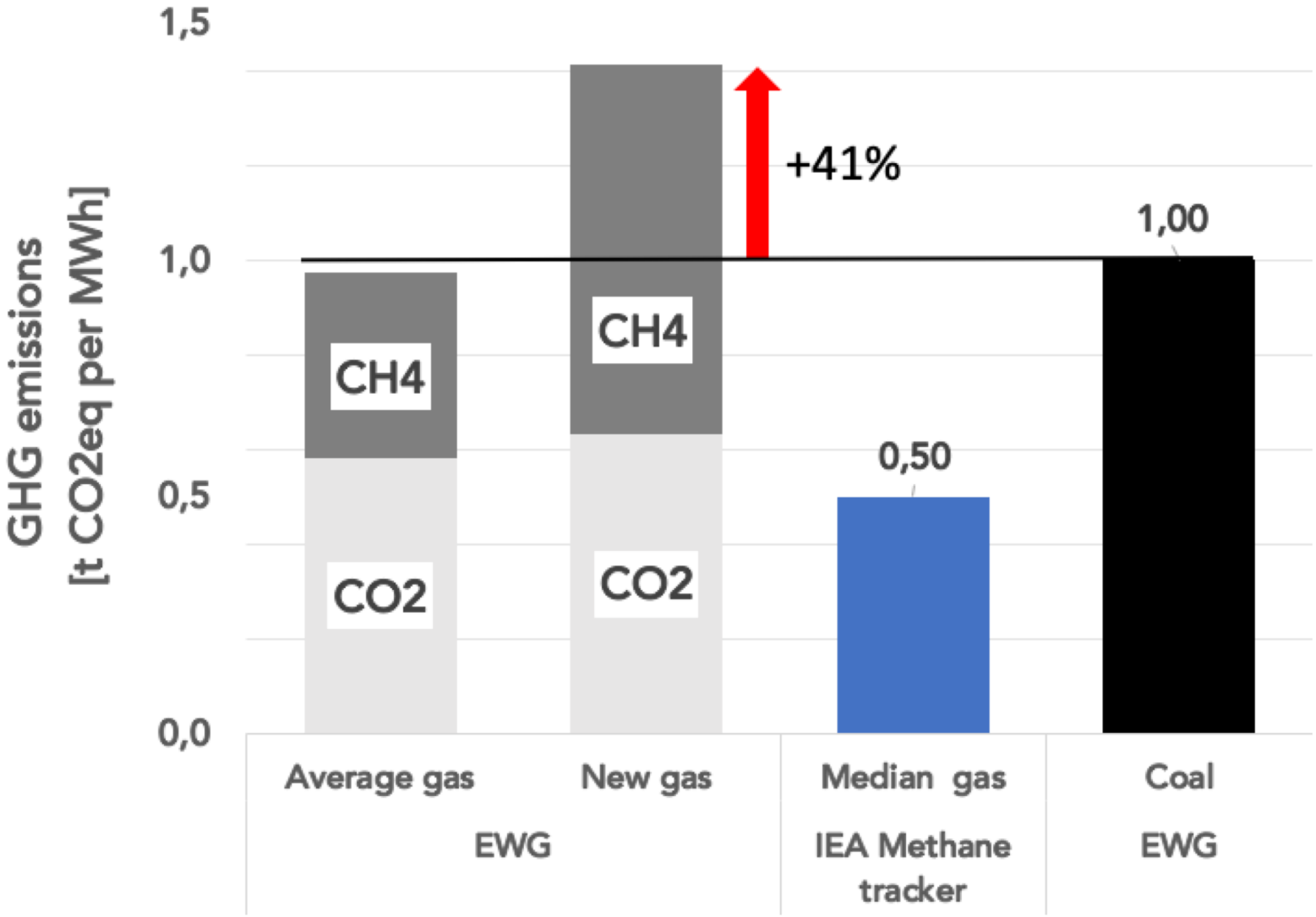
Natural Gas for Electricity: +41% Global Warming

Methane Emissions more than Offset any CO_2 Savings by far



Source: EWG Natural Gas Study 2019

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Future Energy Production: 100 % Renewables

Solar, Wind, Bioenergy, Hydro, Ocean, Geothermal

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Renewable Energy is a Major Contributing Factor to Most SDGs

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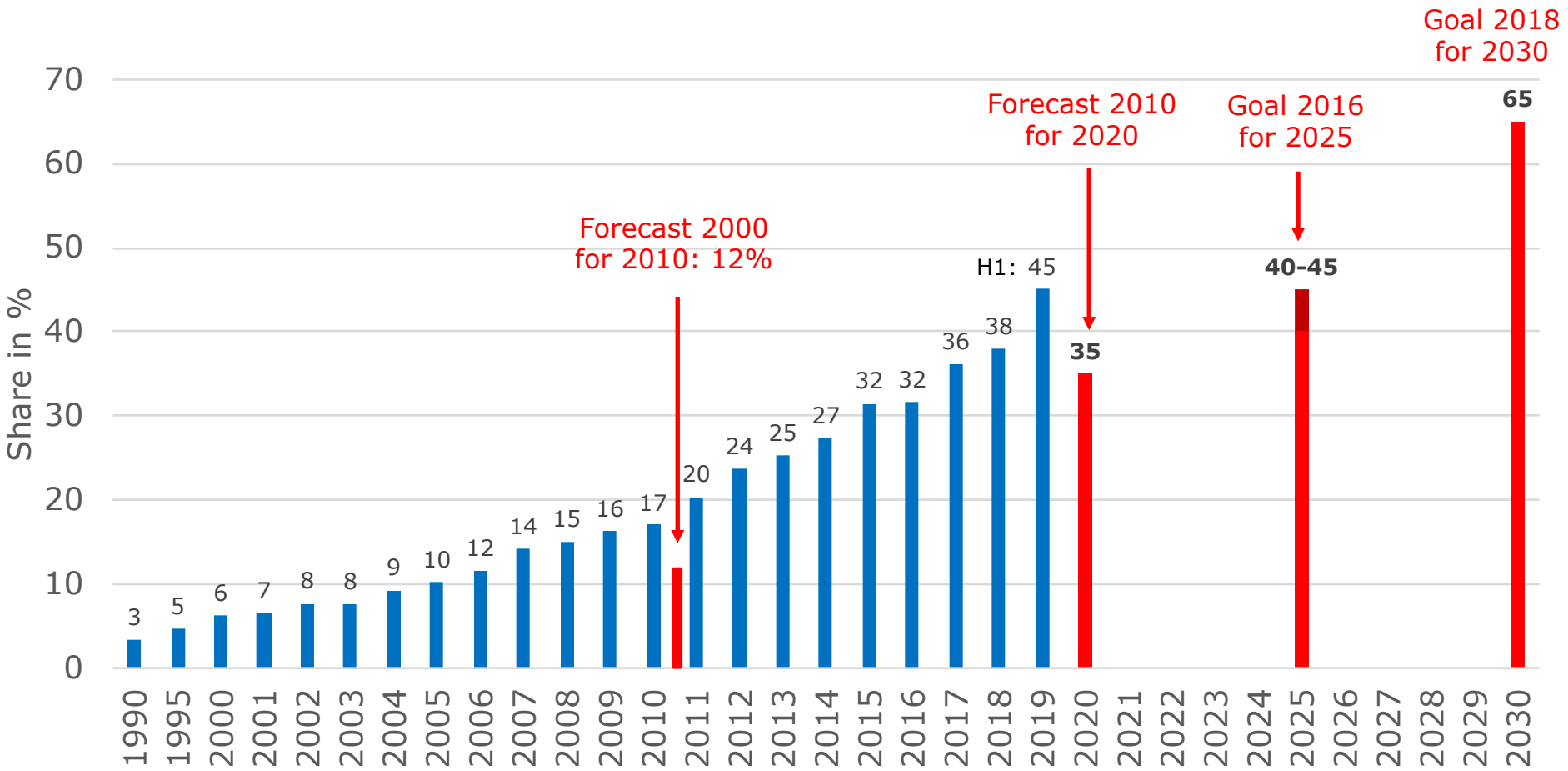
Political Support (Feed-In Tariff) Stimulates Renewable Growth

Share of renewable electricity in Germany



Quelle: BMWi, AGEE-Stat, BEE, UBA, Fraunhofer ISE
https://www.umweltbundesamt.de/daten/energie/stromverbrauch
https://www.energy-charts.de/ren_share_de.htm?source=ren-share&period=annual&year=all

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German District Rhein-Hunsrück: Energy Transition - A Success Story

1995

- Energy import ratio: 100%
  Costs: €300m (≈13% BIP)
- Almost 100% fossil energy
- Unemployment rate 1995: 8,3%

2018

- Unemployment rate 2018: 3,5%
- Financial Zero-Emissions-District across the sectors power, heat & waste
- Renewable energies provide over 300% of power demand
- Annual revenue of €44m due to renewables
- Reserves of €84m held by municipalities
- Lowest debt level in the whole state
- Approx. 53% GDP-growth since 1999 (5% above state-wide average)

Sources: mueef.rlp.de, statistik.rlp.de (2017), statistik.rlp.de (2004), swr.de, dw.com, rhein-hunsrück.de

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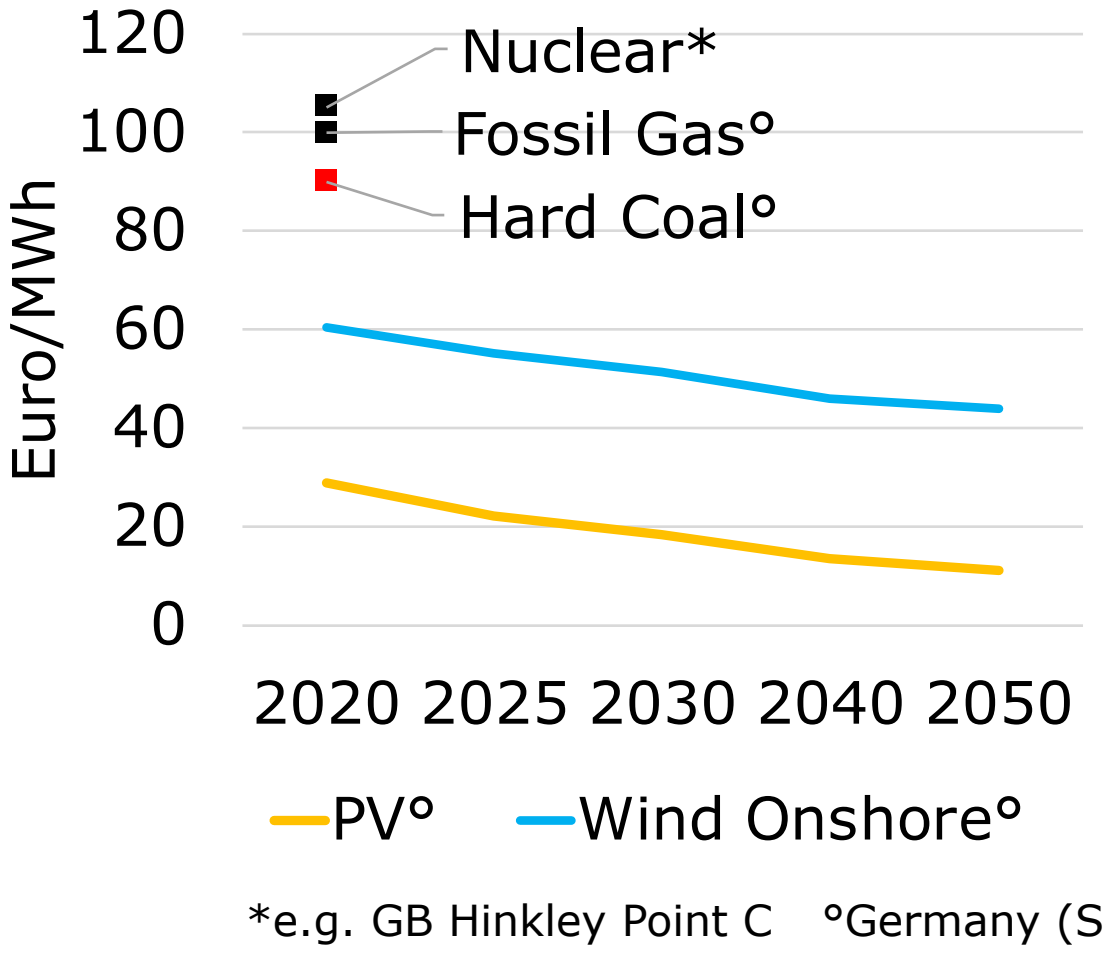
LCoE of Wind and Solar PV fairly below of Nuclear/Fossil Energy: Gap likely to increase



- PV 33%
- Wind Onshore 66%

of the costs of hard coal electricity

*e.g. GB Hinkley Point C °Germany (South)

Sources: Fraunhofer ISE (2018), ETIP (2019), own calculation.

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Double Harvest with Agro-PV :

- **Solar power & grain**
- **Solar power & animal welfare**
- **Shading protects soil moisture**
- **PV on 1% of the world's agricultural land covers entire global energy demand**

Source: https://www.nature.com/articles/s41598-019-47803-3

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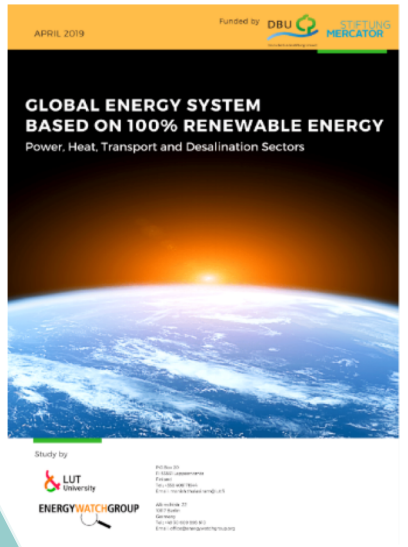
New Study by EWG & LUT Shows:

The energy transition is not a question of technical feasibility or economic viability, but one of political will.



100% renewable energy worldwide is more cost effective than the current energy system and leads to zero emissions before 2050.

Largely domestic energy systems based on 100% renewables will create energy independence and support millions of local jobs in the energy sector.

Source: Ram M., Fell H.-J., Breyer C. et al. Global Energy System based on 100% Renewable Energy – Power, Heat, Transport and Desalination Sectors. LUT University & EWG. 2019. Link: http://energywatchgroup.org/wp-content/uploads/EWG_LUT_100RE_All_Sectors_Global_Report_2019.pdf

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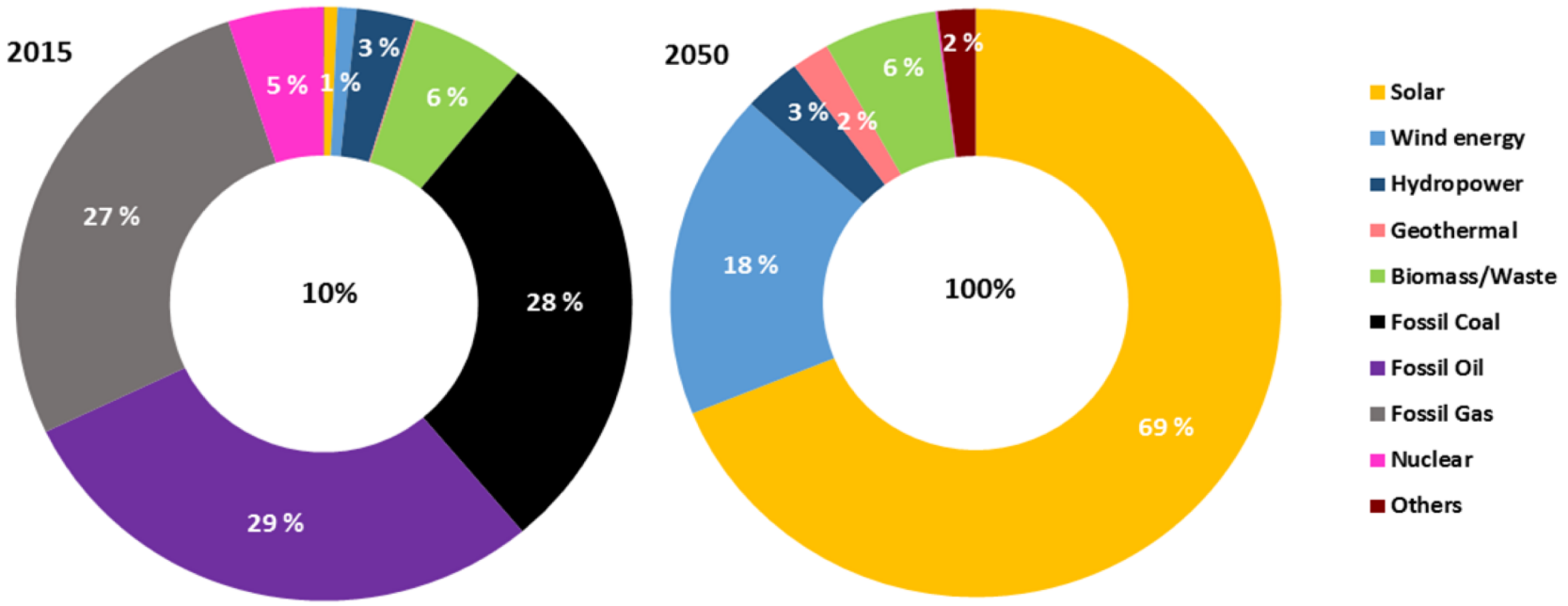
Solar and Wind Will Dominate the 100% Renewable World



Primary energy source	Solar	Wind	Biomass/ Waste	Hydro	Geo-thermal
Share in 2050	69%	18%	6%	3%	2%

Source: Ram M., Fell H.-J., Breyer C. et al. Global Energy System based on 100% Renewable Energy – Power, Heat, Transport and Desalination Sectors. LUT University & EWG. 2019. Link: http://energywatchgroup.org/wp-content/uploads/EWG_LUT_100RE_All_Sectors_Global_Report_2019.pdf

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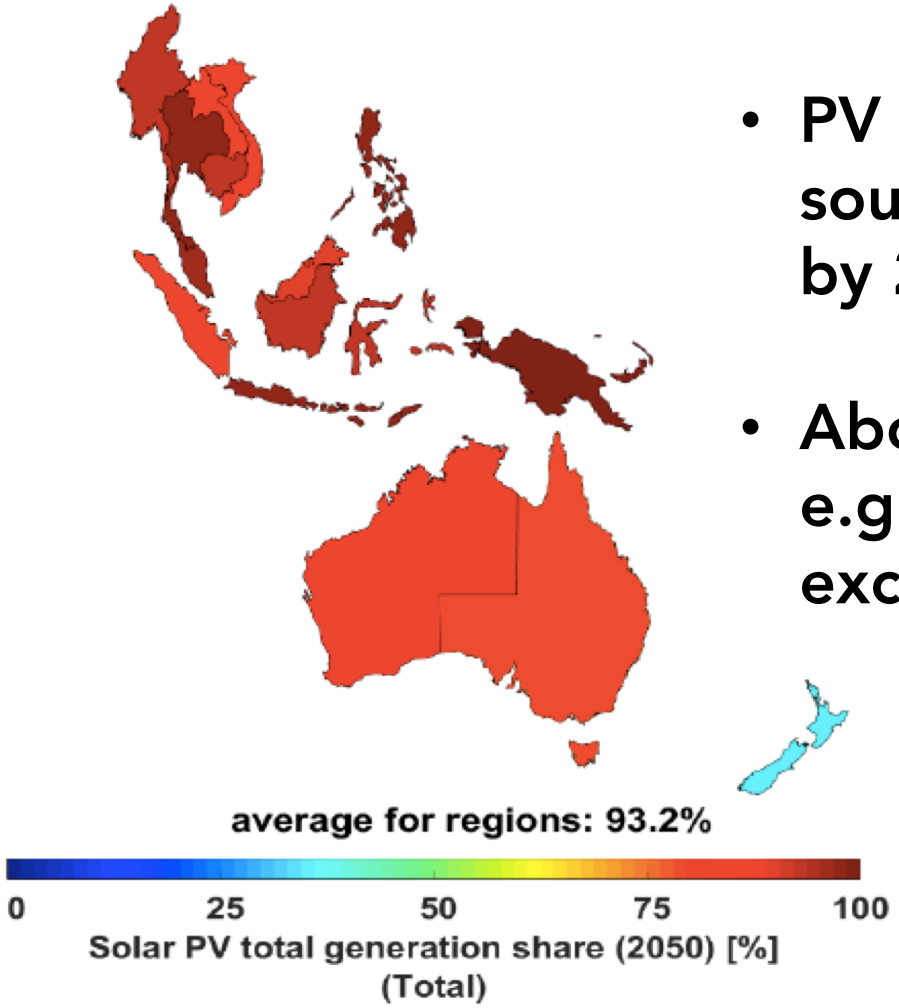
100% Renewables in South-East Asia: 93% of Energy from PV



- PV shares above 80% across south-east Asian countries by 2050
- About 1397 TWh supplied e.g. in Thailand almost exclusively by PV

Source: Ram M., Fell H.-J., Breyer C. et al. Global Energy System based on 100% Renewable Energy – Power, Heat, Transport and Desalination Sectors. 3.8. Southeast asia and the Pacific Rim.LUT University & EWG. 2019. Link: http://energywatchgroup.org/wp-content/uploads/EWG_LUT_100RE_All_Sectors_Global_Report_2019.pdf

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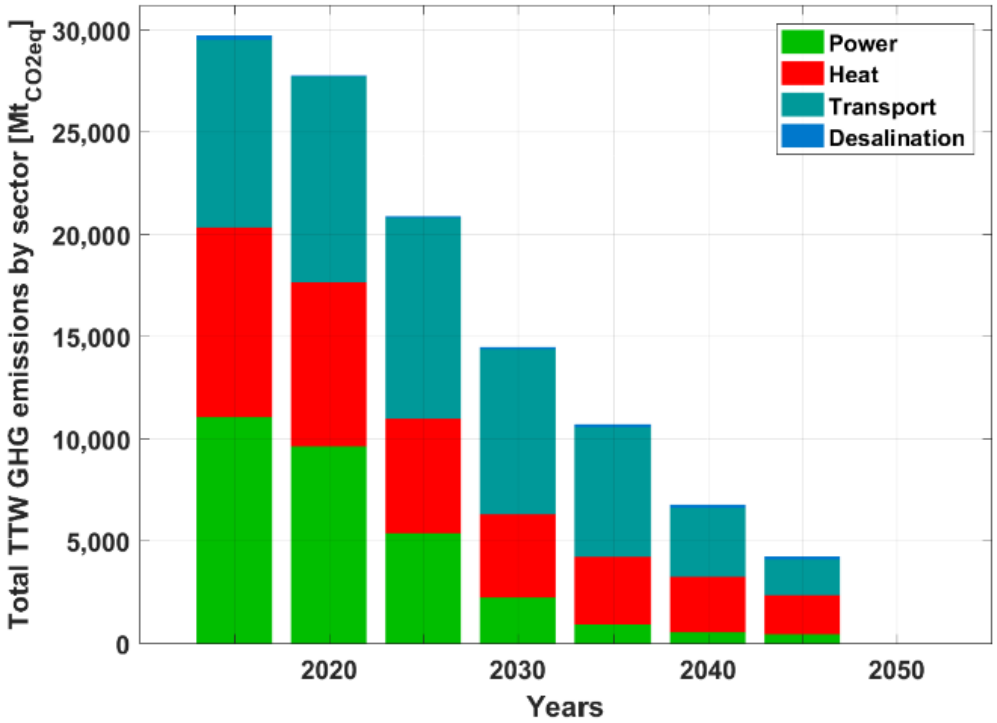
Greenhouse Gases Emissions



- Greenhouse gas (GHG) emissions can be reduced from around 30,000 $MtCO_{2eq}$ in 2015 to zero by 2050 across all energy sectors
- Remaining cumulative GHG emissions: 422 $GtCO_{2eq}$ from 2018 to 2050
- The presented 100% RE scenario is compatible with the Paris Agreement for 1.5°C

Source: Ram M., Fell H.-J., Breyer C. et al. Global Energy System based on 100% Renewable Energy – Power, Heat, Transport and Desalination Sectors. LUT University & EWG. 2019. Link: http://energywatchgroup.org/wp-content/uploads/EWG_LUT_100RE_All_Sectors_Global_Report_2019.pdf

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Jatropha: Fighting Desertification & Producing Renewable Biofuel

Jatropha:

- Global growth potential: 6,7 mio km^2
- Energy potential: 2,2700 TWh
- Cultivation in areas unusable for food production
- No conflicts between food & Jatropha

Jatropha plant in Fuerte Ventura

Benefits:

- Job Generation (e.g. 84 mio in Africa)
  - Preventing forced migration
- Jatropha oil able to substitute aviation fuel demand (263 mt)
- Creating new Farmland
- Natural Carbon Sink
- Jatropha plantations in semi-arid areas is a powerful tool to fight climate change, desertification, poverty and migration at the same time

Source: Ram M., Fell H.-J., Breyer C. et al. Global Energy System based on 100% Renewable Energy – Power, Heat, Transport and Desalination Sectors. LUT University & EWG. 2019. Link: http://energywatchgroup.org/wp-content/uploads/EWG_LUT_100RE_All_Sectors_Global_Report_2019.pdf

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Thank you very much for your attention!

www.hans-josef-fell.de

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