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## Renewable pathways to climate-neutral Japan

*Reaching zero emissions by 2050  
in the energy system*



# The partnership between Agora and REI promotes independent analysis and stakeholder dialogues in favor of the energy transition

**Goal of the cooperation:** develop and disseminate new fact-based analysis in favor of the energy transition in Germany and in Japan.

## Main activities

- Conduct independent research with stakeholders' involvement
- Joint dialogue, workshops, conference with various stakeholders
- Promote transparency in energy data

End 2019, REI and Agora Energiewende have launched an ambitious project on **“renewables pathways to climate neutral Japan”**\* and commissioned the LUT University to develop a one of its kind analysis for the Japan energy system



The collage features several research reports and logos. On the left, a report titled 'ドイツのエネルギー転換 10のQ&A' (Germany's Energy Transition 10 Q&A) is shown. In the center, a report titled 'Minimizing the cost of integrating wind and solar power in Japan' is displayed, with the Agora Energiewende logo. Below it, a report titled 'Renewable pathways to climate-neutral Japan' is shown, featuring the LUT University logo and the text 'Reaching zero emissions by 2050 in the Japanese energy system EXECUTIVE SUMMARY'. On the right, a report titled '2030年日本における変動型自然エネルギーの大量導入と電力システムの安定性分析' (Large-scale introduction of variable natural energy in Japan in 2030 and stability analysis of the power system) is shown, with the REI logo. The collage also includes logos for Agora Energiewende, REI, and GRIDLAB.

\*supported by the German Federal Ministry of Energy and Economics



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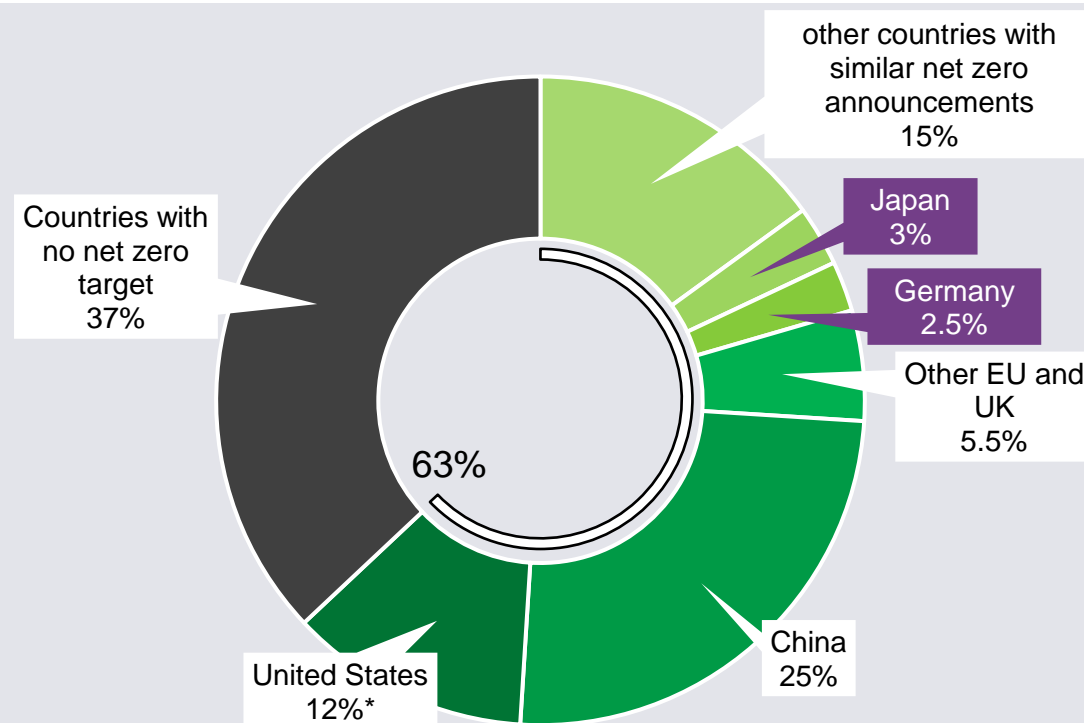
## Reaching net zero emission in Germany and Japan

**PATRICK GRAICHEN, AGORA ENERGIEWENDE**  
**BERLIN, 10.03.2021**



# Net zero emissions targets put Paris 1.5 degrees within striking distance

Share of world's greenhouse gas emissions in 2020



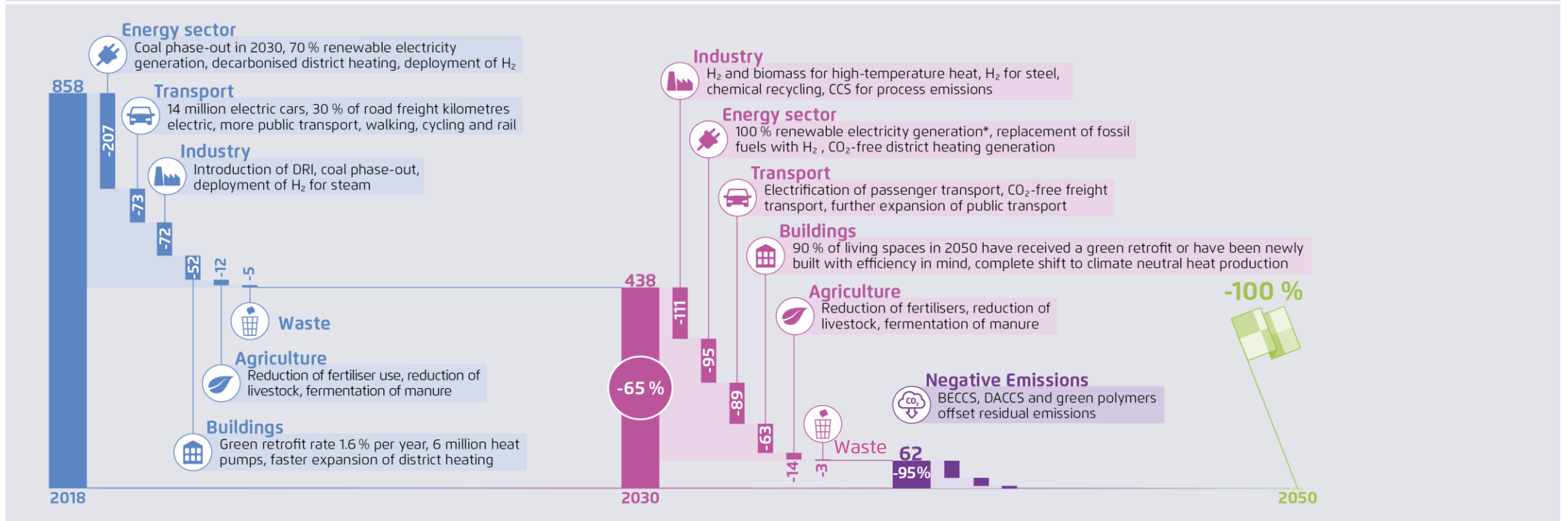
New Climate Institute (2020), ECIU (2020), EDGAR (2019) – updated March 2021

- Five years after the adoption of the Paris agreement, 2020 saw many countries committing to climate neutrality targets by the middle of this century or soon after. Those countries cover 63% of global greenhouse gas emissions.
- This represent a very positive driving force few months before the COP 26 in Glasgow



# What is needed in Germany given the latest EU and German climate policy announcements: Climate Neutral Germany 2050 and -65% emissions until 2030

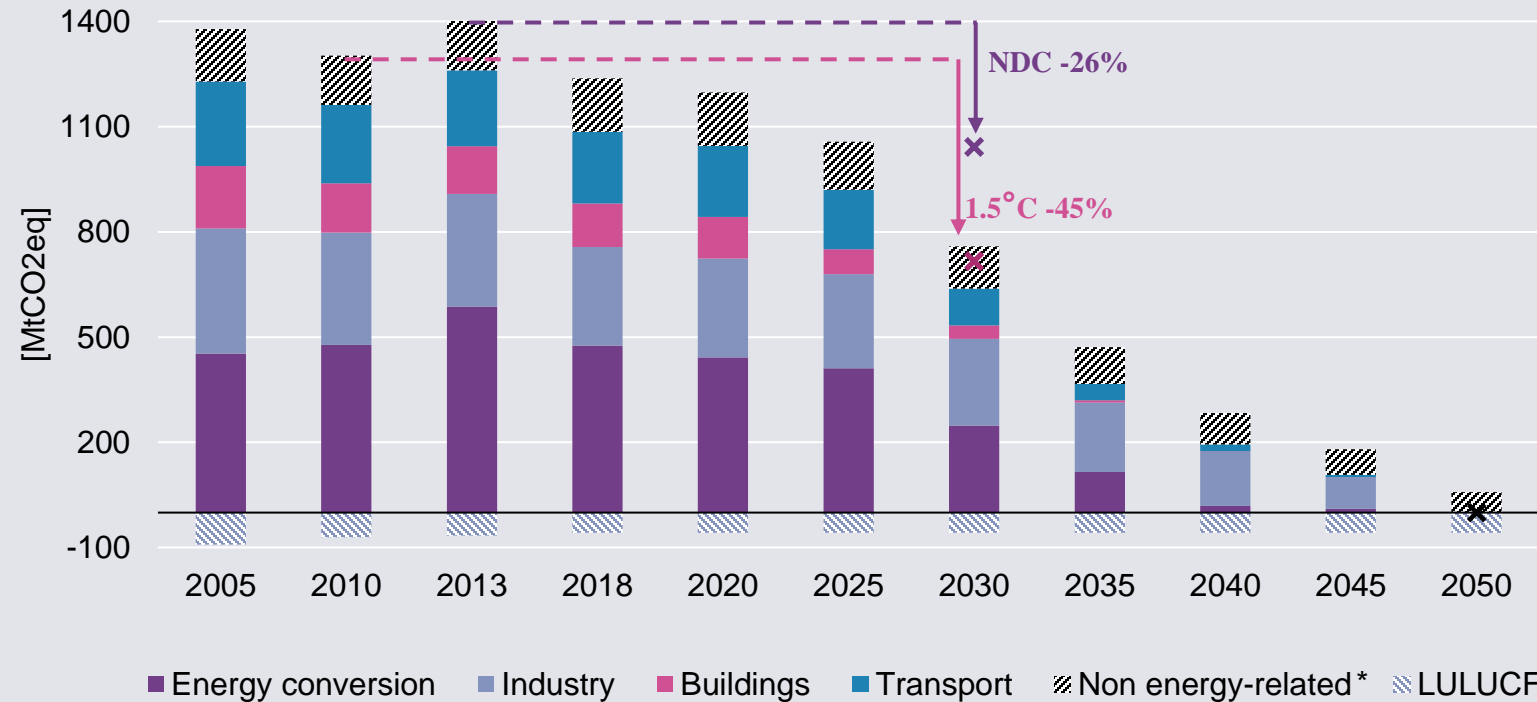
Measures in the climate neutrality 2050 scenario (KN2050) (GHG emissions in mio. t CO<sub>2</sub>-eq.)



Prognos, Öko-Institut, Wuppertal-Institut (2020): Towards a Climate-Neutral Germany. Executive Summary conducted for Agora Energiewende, Agora Verkehrswende and Stiftung Klimaneutralität.

# In line with European trends, Japan should also kick-start enhanced climate action as soon as possible and could increase interim GHG reduction target to -45% in 2030

Energy-related GHG emissions in Japan per sector and current climate targets (in Mt CO<sub>2</sub>eq)

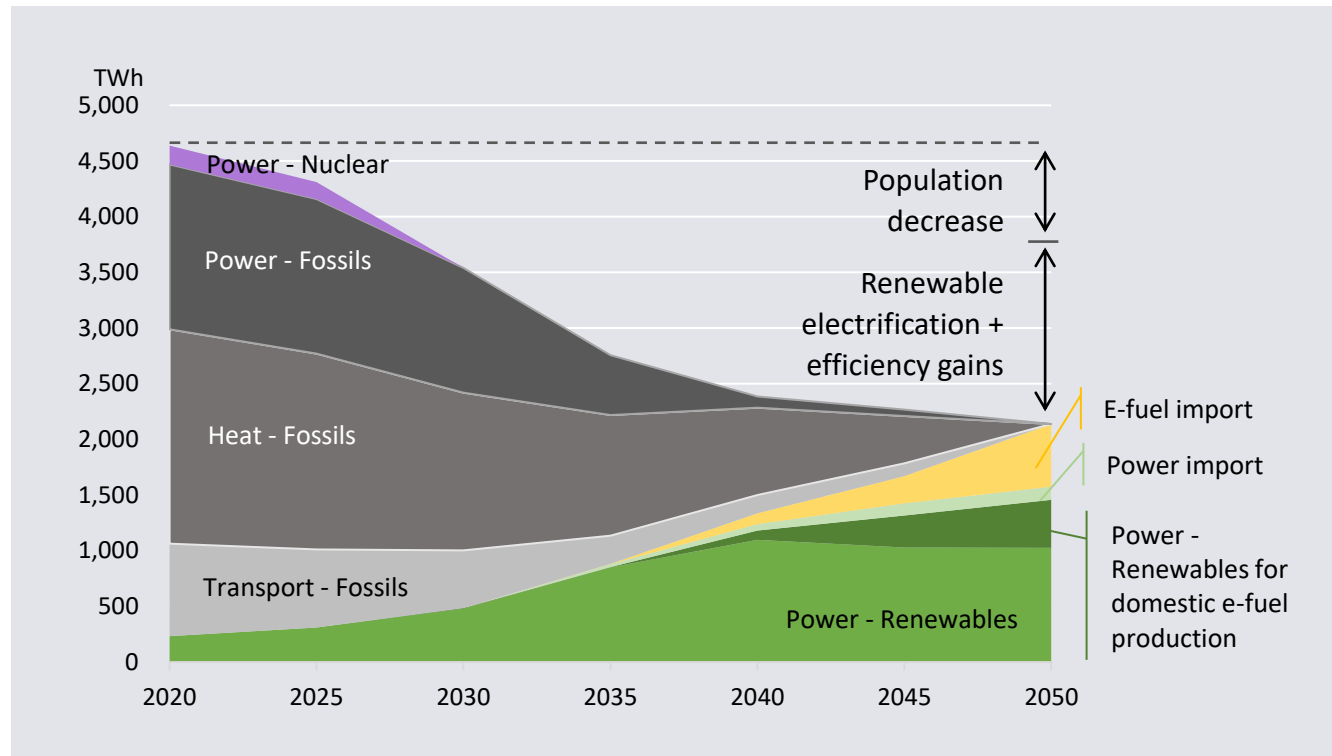


Agora-REI-LUT (2021)

\* The non-energy related emissions are not considered in this study and should decrease at least to the level of availability of carbon sinks (LULUCF) for the overall emissions to reach net zero by 2050.

# Net zero emissions can be achieved in Japan at reasonable costs based on renewables deployment, efficiency and electrification.

Primary energy demand between 2020 and 2050

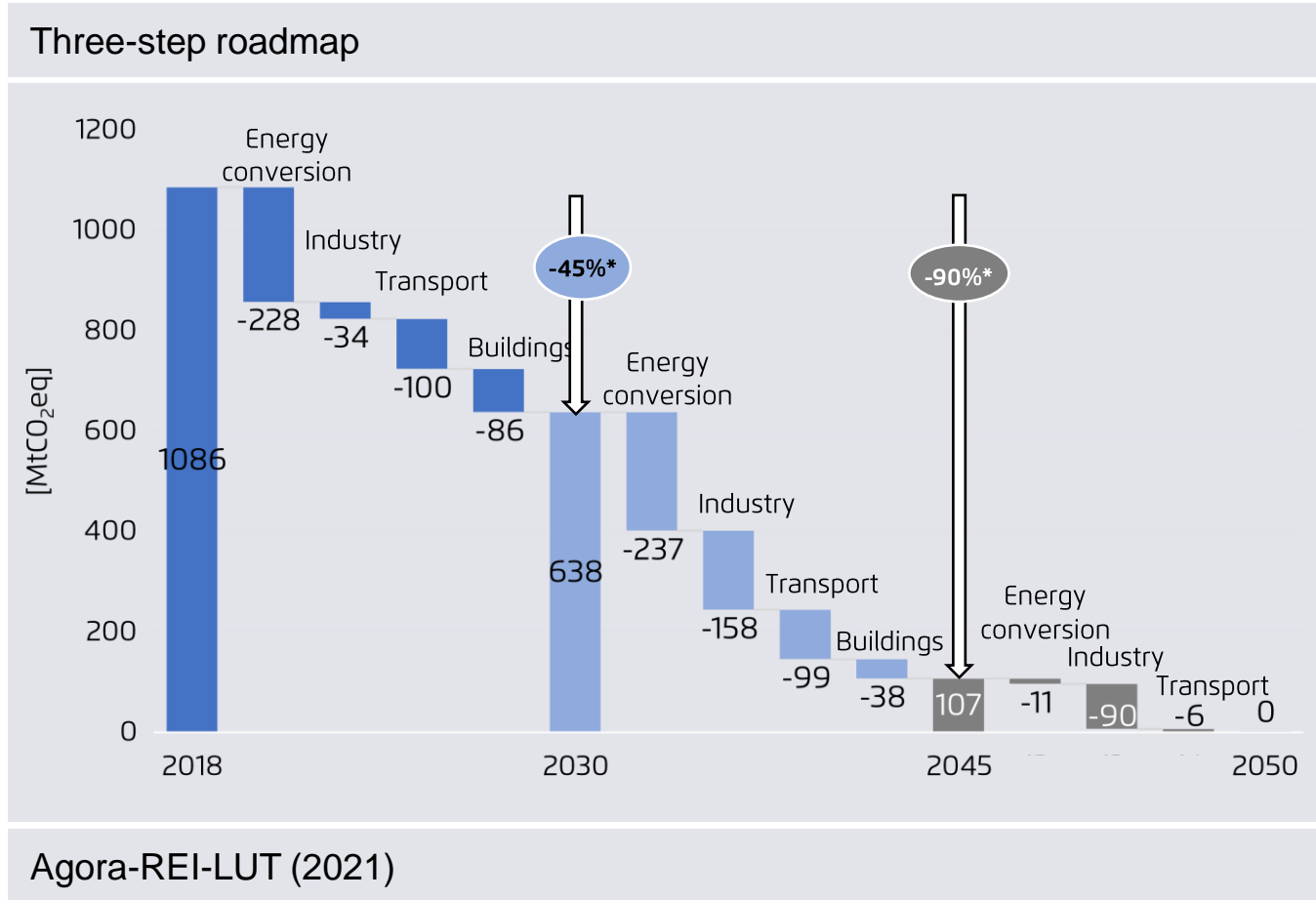


Agora-REI-LUT (2021)

- Primary energy consumption is halved by 2050 (from 4500 TWh to 2100 TWh) via efficiency, electrification\* and population decline (-20% by 2050)
- Power consumption increases by 50% until 2050 to 1400 TWh via electrification of transport, heating and industry, and national production of e-fuels
- Electricity generation from renewables is increased seven-fold until 2050
- Nuclear power is not necessary to achieve the long-term decarbonization target at lower cost

\*The deployment of renewable electricity increases the efficiency of power and heat generation by replacing thermal power plants and fossil-based heat generation that have high conversion losses

# A three-steps roadmap is needed to achieve climate neutrality in Japan by 2050.



**Step 1: -45% GHG by 2030.** Coal phase-out and at least 40% renewable electricity contributes the lion's share of emission reduction

**Step 2: -90% GHG by 2045.** Beyond 2030, only carbon-free technologies are installed in industry, electricity, heating and transport

**Step 3: zero energy-related emissions in 2050.** Green synthetic fuels eliminate residual emissions, mostly from high-temperature heat generation in industry.