

Long-term macroeconomic effects of the German Energy Transition

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Rabat, 28 September 2017

First Moroccan-German Energy Day



Why a long-term energy vision?

An economic perspective

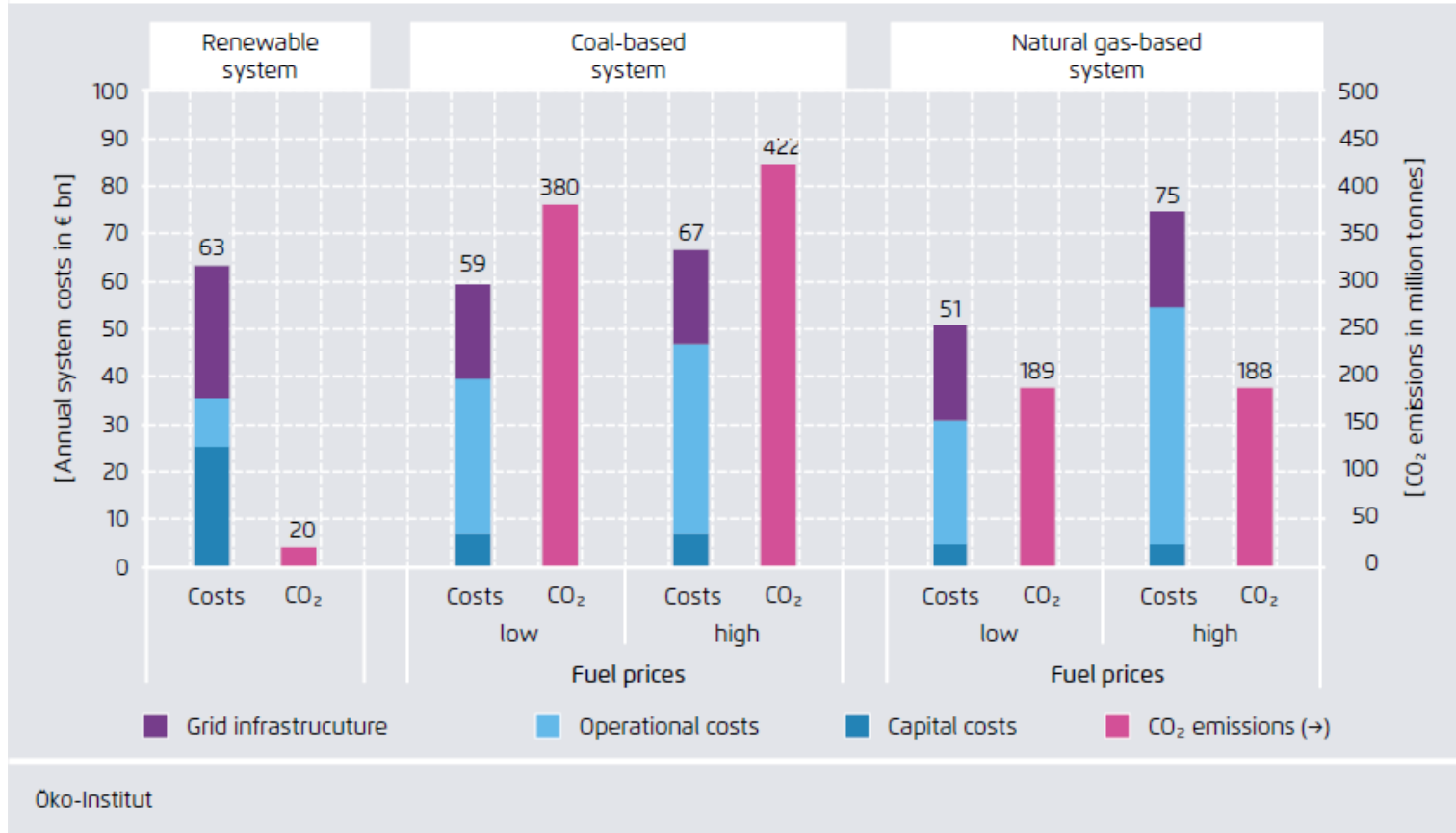
- Germany has pledged to move away from fossil fuels and reduce emissions in the long term
 - Electricity sector important, but also building and transport sectors
 - Key roles for renewables and energy efficiency
 - Long-lived capital stocks in key sectors → measures need to be implemented within one modernization cycle only
- ✓ First mover advantages: Innovation, business opportunities, avoiding lock-in effects
- ✓ Import independency, reduce exposure to fuel price uncertainties, health and environmental benefits
- ✓ Costs of a fossil-based electricity system in the long-term likely similar or higher than in a renewables-based system (Agora Energiewende / Oeko-Institut, 2017)

Why a long-term energy vision?

Costs of a renewable vs. fossil electricity system

Comparison of total system costs of predominantly renewable, coal and natural gas-based power systems with CO₂ prices of €50, 2050

Figure S-1



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Source: Agora Energiewende / Oeko-Institut (2017)

Estimating macro-economic effects

What to consider?

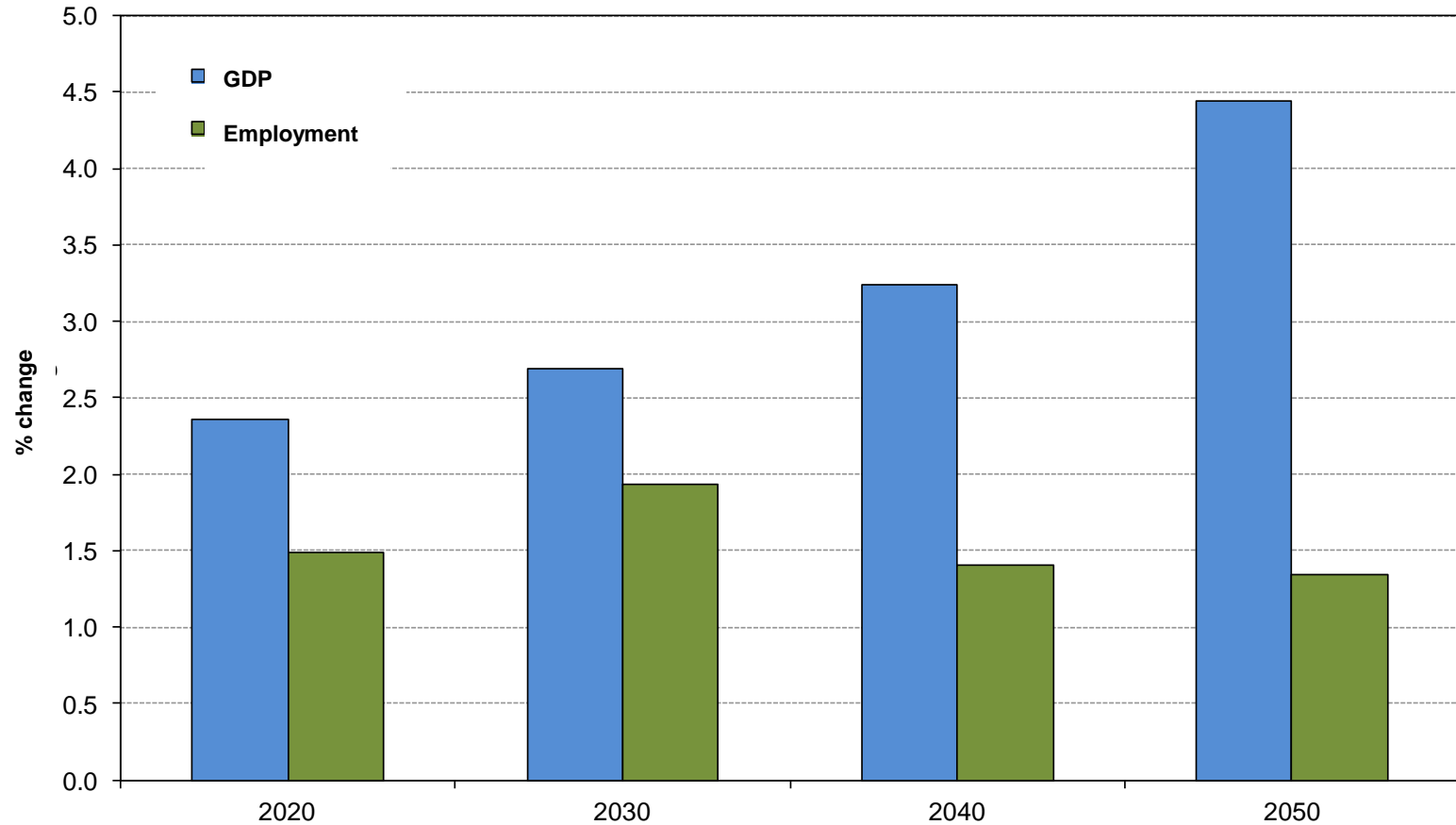
- Which sectors and actors are important?
 - Key sectors: Electricity, building and transport (as well as agriculture and forestry)
 - Key actors: Industry, services, private households
- Important effects
 - GDP and value added
 - Employment
 - Structural changes
 - Welfare
 - International trade
- Key input parameters: Investments, energy prices and expenditures, changes in imports and government funding / financing
- Costs and benefits may occur at different points in time and have to be considered in a holistic view

Climate Protection Scenario analysis for Germany

- Modelling the German reduction targets
 - At least 80% decrease in GHG emissions by 2050 (up to 95%)
 - Interim and sectoral targets on renewable penetration and energy efficiency
- Main results on GDP, employment and structural shifts
 - GDP in 2050 4.4% higher than in reference case
 - Creation of 500,000 domestic jobs by 2050 compared to reference
 - Most sectors benefit, especially building, real estate and consulting, energy and transport sectors

Climate Protection Scenario analysis for Germany

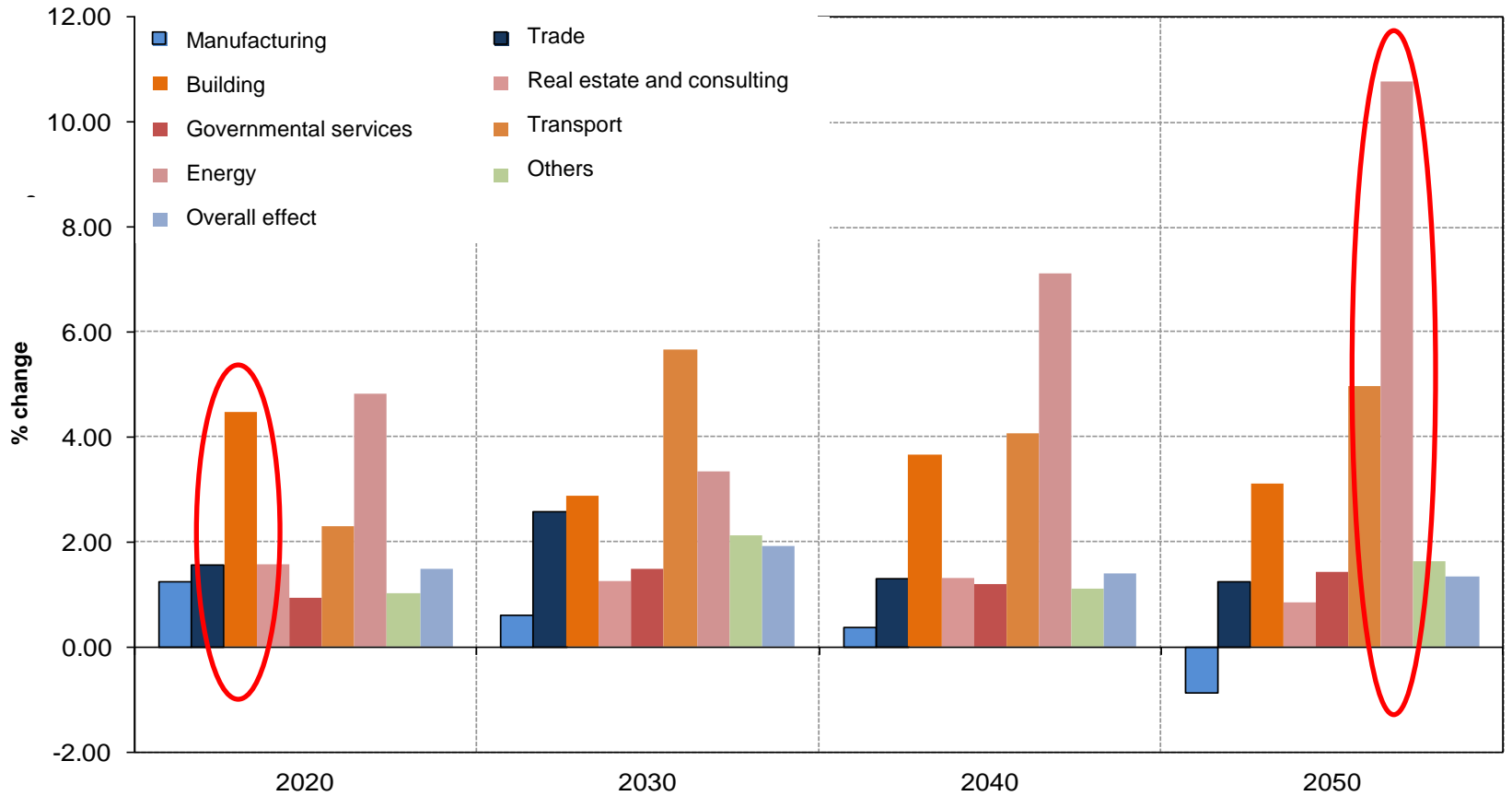
GDP and employment



Source: Oeko-Institut and Fraunhofer ISI (2015)

Climate Protection Scenario analysis for Germany

Sectoral employment impacts

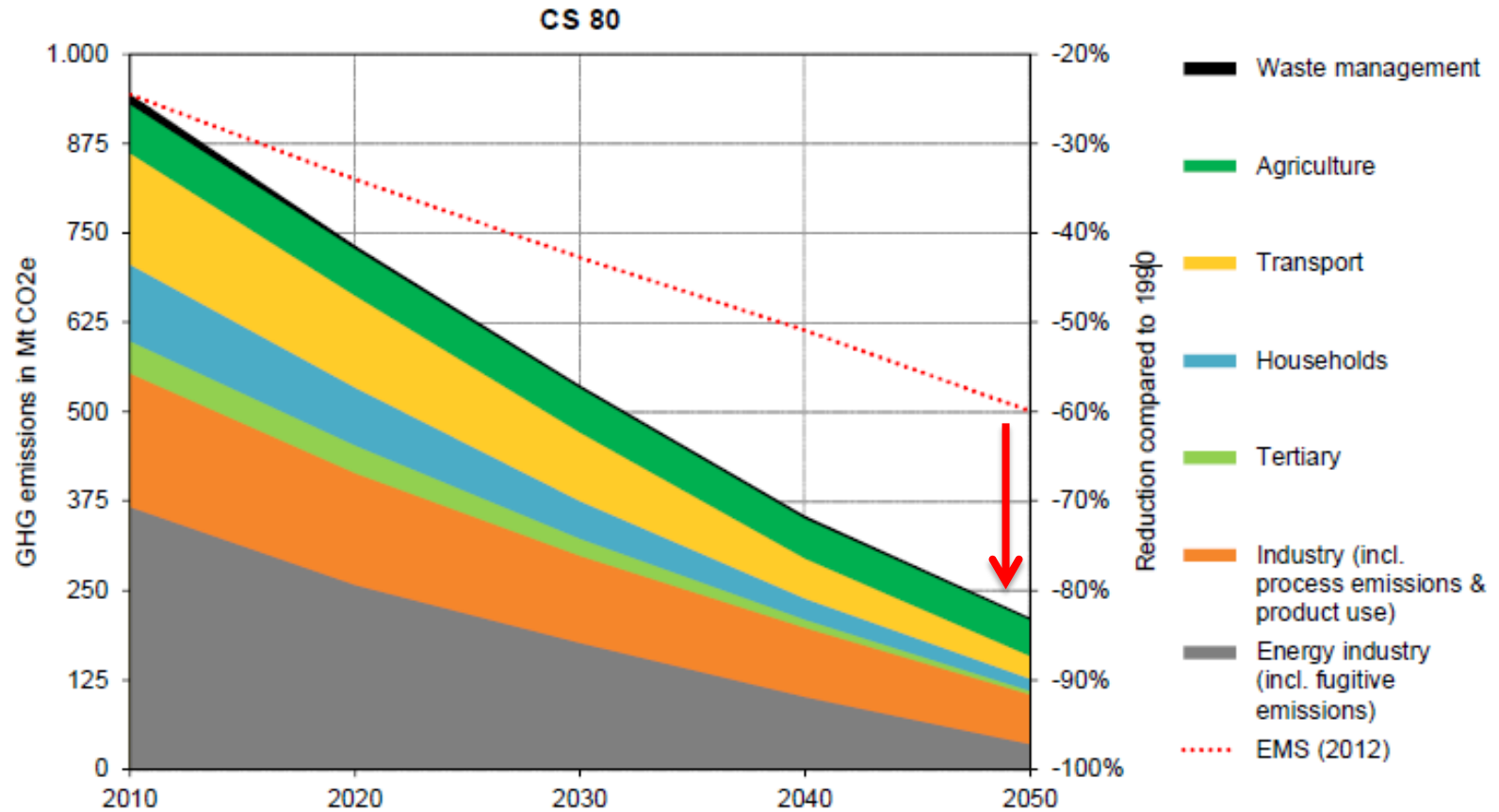


Source: Oeko-Institut and Fraunhofer ISI (2015)

Factors contributing to a successful Energy Transition in Germany

- Implementation of the Energy Transition
 - Renewable electricity: Investor certainty through long-term strategy, feed-in tariff and priority feed-in (at least at beginning)
 - Multitude of policies to support energy efficiency, e.g. National Strategy on Energy Efficiency bringing about further investment
- Market conditions
 - Liberalised electricity market allowing for efficient market outcomes and broad business participation; market access and integration of renewables into market
- Outcomes
 - Many new actors and/or business opportunities for established actors
 - Broad participation, e.g. owners of renewable electricity installations in 2012: 35% private households, 11% farmers and 14% small business

Further action needed to close the gap to 2050 reduction target



Source: Oeko-Institut and Fraunhofer ISI (2016)

Outlook for the German Energy Transition

- Further action needed to reach 2050 targets
 - Climate Action Plan (2016) sets out milestones and strategies for all sectors addressing individual challenges; Further programmes of measures to follow
- Not only need to get into renewables, but out of fossils
 - Support policies to facilitate transition in regions / for actors affected
- Broad-based support in society important for the structural changes necessary
 - Safeguard diversity of actors participating in Energy Transition
 - Additional policies and measures targeted at vulnerable groups
 - Ensure fair distribution of costs and benefits

Key role for energy efficiency in increasing benefits, reducing costs of transition and supporting vulnerable groups

Thank you for your attention!

Do you have any questions?



Research reports and publications cited

Agora Energiewende / Oeko-Institut (2017) Erneuerbare vs. fossile Stromsysteme: ein Kostenvergleich. Stromwelten 2050 – Analyse von Erneuerbaren, kohle- und gasbasierten Elektrizitätssystemen.

Oeko-Institut and Fraunhofer ISI (2016) Climate Protection Scenario 2050 - Summary of second final report. Study conducted on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety.

Oeko-Institut and Fraunhofer ISI (2015) Klimaschutzszenario 2050 - 2. Endbericht. Studie im Auftrag des Bundesministeriums für Umwelt, Naturschutz, Bau und Reaktorsicherheit.

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