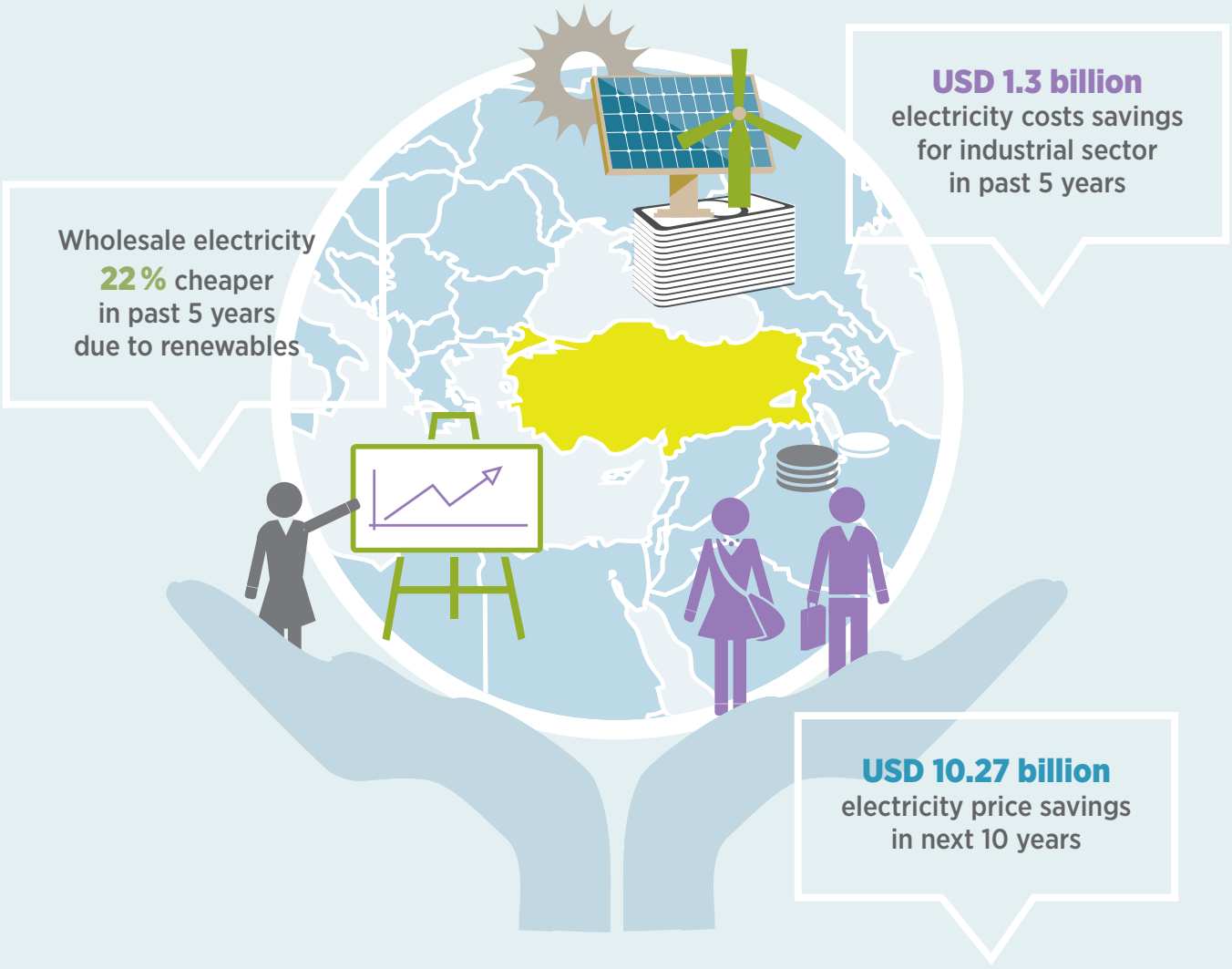
MAKING THE PARIS AGREEMENT A SUCCESS FOR THE PLANET AND THE PEOPLE OF TURKEY

COP26 Briefing:
Reducing electricity prices and increasing economic competitiveness with renewable energy

November 2021



COBENEFITS Turkey

This COP26 briefing summarises key findings from the upcoming COBENEFITS report 'Reducing electricity prices and increasing economic competitiveness: The impact of renewable energy deployment on the industry sector in Turkey', prepared by EPRA, METU and OZU, and published by IASS, IET, IPC and UfU.

Key Policy Opportunities:

- **Policy opportunity 1: A higher share of renewables can significantly reduce wholesale electricity prices.** The industrial sector in particular can benefit from cost reductions, which in turn will improve the sector's economic competitiveness. Compared with the currently planned scale-up of wind and solar PV until 2030, a scenario with high share of renewables can reduce wholesale electricity price by 2.4 % on average. This would amount to total savings of TRY 1.96 billion (USD 477 million) in 2030 alone. Compared with a market lacking any renewables, a high-renewables scenario can reduce wholesale market prices by 12.6 %, amounting to total cost savings of up to TRY 13.49 billion (USD 2.8 billion) in 2030 alone.

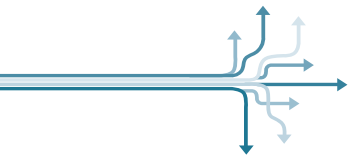
- **Policy opportunity 2: The retail electricity price for the industrial sector can be reduced by 1.65 % in 2030** when comparing current renewable energy expansion plans with more rapid expansion of wind and solar PV under the Advanced RE scenario. This would amount to total electricity cost savings of TRY 1.32 billion (USD 274 million) for the industrial sector in 2030 alone. Compared with an electricity market lacking any renewables, the Advanced RE scenario is predicted to reduce the retail electricity price by 9 %. This can amount to electricity cost savings for the industrial sector of TRY 6.92 billion (USD 1.4 billion) in 2030 alone. For energy-intensive industries such as the metallurgical industries, savings can amount to TRY 2.15 billion (USD 446 million) in 2030 alone.

- **Policy opportunity 3: Renewable energy procurement can reduce the risks associated with fuel price volatility.** Assuming a 38 % increase in fuel prices (gas price) by 2030, this would increase retail electricity prices for industrial consumers by 5 % based on current RE expansion plans and as much as 16 % in a market lacking any renewables. However, with high shares of renewables, the same increase in fuel price would only lead to a 3 % increase in retail electricity prices, thus protecting industrial consumers from price shocks.

In the past five years (2015–2019), wholesale electricity market prices have declined by **22 %** due to an increase of renewable energy sources.

From 2020 to 2025, total accumulated electricity price savings for Turkish industry can amount to **TRY 21.47 billion** (USD 4.45 billion). From 2020 to 2030 (comparing BAU with an Advanced RE scenario), total accumulated electricity price savings for Turkey's industrial sector can amount to **TRY 49.5 billion** (USD 10.27 billion).

Over the same period, renewable energy deployment has saved the industrial sector **TRY 6.3 billion** (USD 1.3 billion) through reduced electricity costs.



Prospects of decarbonising Turkey's power sector following the ratification of the Paris Agreement

As of 6 October 2021, the Turkish parliament has ratified the Paris Agreement. In line with the ratification, the Turkish Government announced its intention to set a national "net-zero target", to be achieved by 2053. This pledge needs to be formulated into bold actions in the next cycle of nationally determined contributions for transformation of the power sector and industrial sectors, which are responsible for most of Turkey's greenhouse gas emissions.

Aspiring to "net-zero" by 2053 not only recognises the opportunities facilitated by the climate-neutral economy and society, but also anticipates the risks of continued dependence on fossil fuels. Recent record-high power prices in the European Union have again emphasised the economy-wide risks of dependency on fossil fuels, which ultimately manifests as high energy bills for the industrial sector. Considering the present volatility of the energy market, the future development of electricity prices will have important implications for industrial competitiveness in Turkey. This research study shows how more ambitious deployment of renewable energy can both reduce electricity prices and mitigate the risks of price volatility associated with increasing gas prices.[1]

Renewable energy technologies have emerged as the least-cost power generation technology in many markets around the world. In the past ten years, capital costs for solar photovoltaics (PV) decreased by 85 % and that of wind energy by 56 %. By adding more renewable energy sources to the Turkish electricity system, electricity prices can be reduced, thus increasing economic competitiveness. This is especially important for the industrial sector, where energy frequently constitutes a high share of overall production costs. At the same time, greater renewable capacity can also avert price shocks arising from volatile prices for coal, oil and gas. Since most renewable energy technologies do not have any fuel costs – they have zero marginal costs and are therefore dispatched first – they push other, more expensive technologies out of the market. This has reduced the wholesale electricity market price and consequently also the retail electricity price. This so-called merit order effect has been observed in many countries around the world in the past decade. This study quantifies the merit order effect in Turkey for the first time.

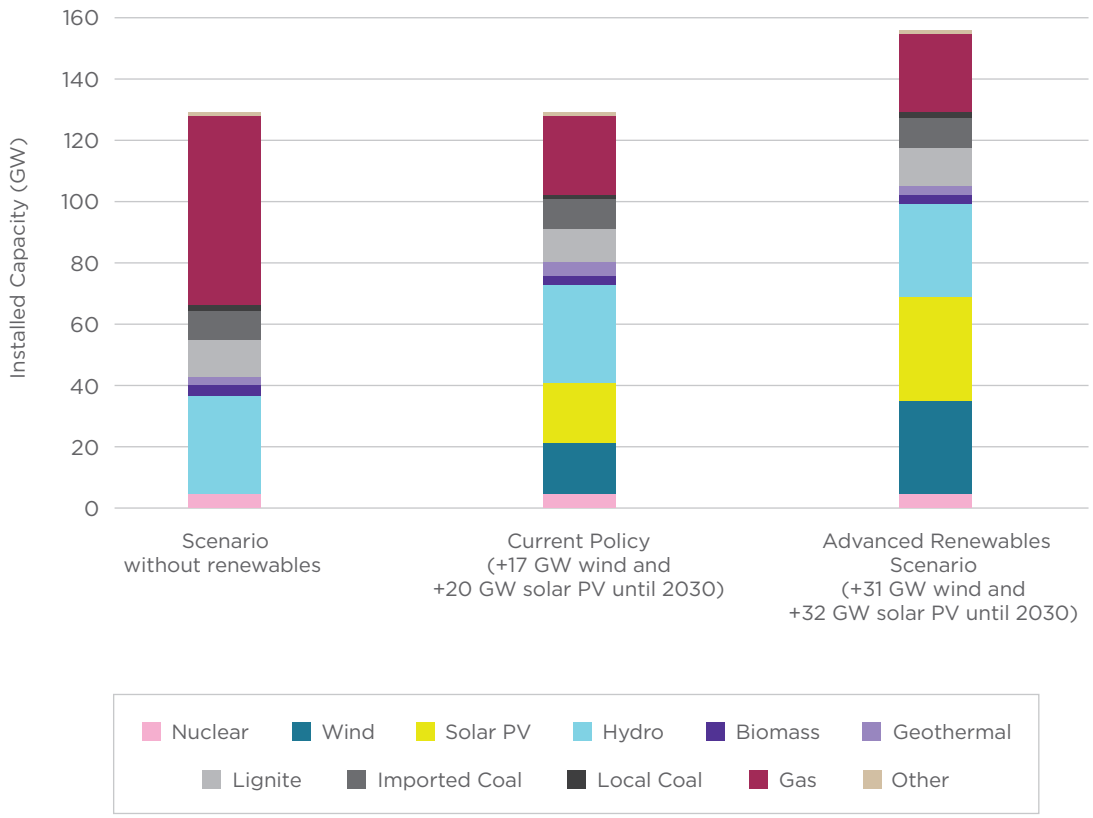
This study analyses and quantifies how incorporating higher shares of renewable energies in the Turkish electricity mix affects electricity prices for the industrial sector. The impacts are quantified for both wholesale and retail electricity prices. Moreover, additional positive socio-economic effects are also quantified in terms of job creation, GDP growth, and reduced inflation.

The study analyses both the real-world historic savings between 2015 and 2020 as well as potential future savings based on various scenarios until 2030. Under the current policy scenario, total capacity additions of 17 GW wind energy and 20 GW solar PV are assumed by 2030. This scenario is based on projections and assumptions of different public stakeholders in Turkey, such as the Ministry of Energy and Natural Resources and the Turkish Electricity Transmission Corporation (TEİAŞ). In the Advanced Renewables Scenario, capacity additions of 31 GW wind energy and 32 GW solar PV are expected up to 2030. This is based on a scenario developed by the SHURA Energy Transition Center as part of the report "Increasing the Share of Renewables in Turkey's Power System: Options for Transmission Expansion and Flexibility". Finally, a third scenario assumes that no renewables at all would be deployed in the Turkish electricity sector. In this case, it is assumed that all renewable capacity would be replaced with efficient gas-based power plants. The comparison with this hypothetical scenario can show the total cost savings associated with renewable energy deployment in Turkey.

The quantifications of wholesale market development are based on a market simulation engine and statistical analysis for retail price calculation. The macroeconomic effects on the Turkish economy are based on a dynamic applied general equilibrium model with a horizon of 2030.

[1] The savings for the industry sector expressed in this report are depicted as real-term values for the base year 2018. This is important, since Turkey has experienced high inflation in recent years. Also, the currency comparisons between TYR and USD are based on 2018 conversion rates.

Installed power generation capacity in selected scenarios in 2030 (GW)



Key Findings:

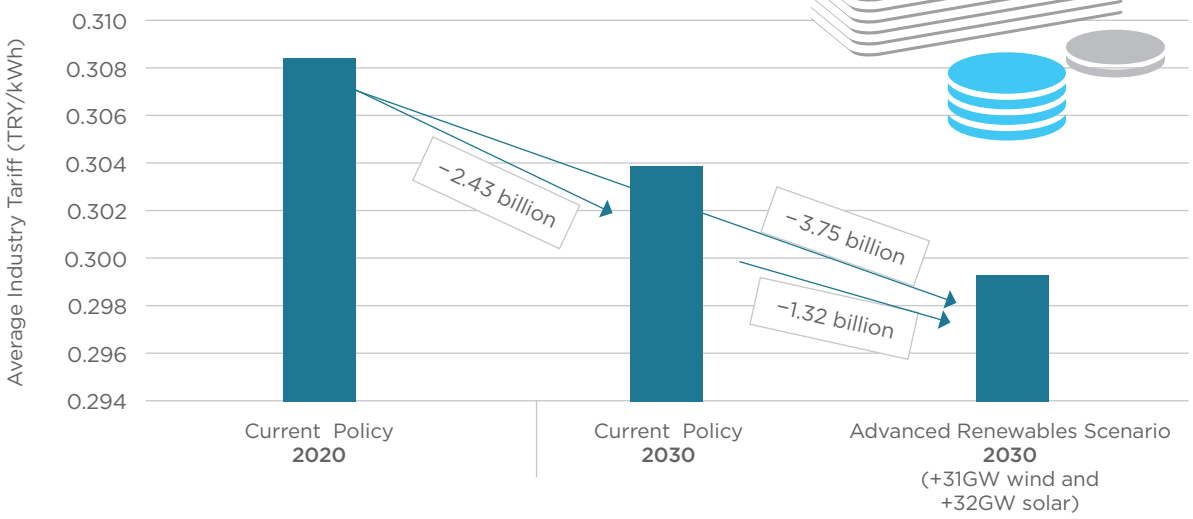
- **Historic savings:** In the past five years, wholesale electricity prices have declined by 22 % due to an increase in renewable energy sources (with zero marginal costs). This results in annual savings of TRY 17.6 billion (USD 3.7 billion) compared with an electricity system without renewables. When analysing the retail electricity price, a reduction of 15.2 % was observed, resulting in total savings of TRY 16.7 billion (USD 3.5 billion).

- **Future savings potential**: In the coming 10 years (2021–2030), savings in the industrial sector will be even greater. When comparing the Advanced Renewables scenario with the current deployment plans (BAU), the retail electricity price will decline by 1.65%, resulting in total savings of TRY 1.32 billion (USD 274 million) in the year 2030 alone.

- **Hedging against fuel price risk:** Renewable energy procurement can reduce the economic and societal risks associated with fuel price volatility. Assuming a 38% increase in fuel prices (gas price) by 2030, this would increase retail electricity prices for industrial consumers by 5% based on current RE expansion plans and by as much as 16% in a market without any renewables. However, with high shares of renewables, this increase in fuel price would only lead to a 3% increase in retail electricity price, thus protecting industrial consumers from price shocks.

- **Macroeconomic benefits:** By reducing electricity prices and increasing the economic competitiveness of the industrial sector, exports are expected to increase by TRY 5.6 billion (USD 1.16 billion), amounting to a 0.13% increase in GDP. By making the Turkish industrial sector more competitive internationally, it can grow more rapidly, with the prospect of creating up to 19,000 new jobs.

- **Climate benefits:** By increasing the shares of renewables in Turkey's electricity mix, CO_2 intensity will decrease by 5% with a shift from the currently planned BAU capacities (17 GW wind, 20 GW solar PV) to the Advanced RE (31 GW wind, 32 GW solar PV) scenario. Compared with an electricity market lacking any renewables, CO_2 intensity is reduced by 9%, amounting to 12 million metric tonnes (1,000 kg) less CO_2 emitted in 2030. This will likely increase export opportunities for the Turkish industry sector, with the proposed EU Carbon Border Adjustment Mechanism (CBAM) looming on the horizon.



COBENEFITS assessments in Turkey

In Turkey, the project is guided by the Istanbul Policy Center (IPC) and a council consisting of representatives of the Ministry of Energy and Natural Resources (MENR), Ministry of Environment and Urban Affairs (MoEU), Ministry of Treasury and Finance (MoTF, formerly Ministry of Economics MoE), Ministry of Foreign Affairs (MFA), and Ministry of Health (MoH).

COBENEFITS has assessed important social and economic co-benefits of increasing the shares of carbon-neutral renewable energy in Turkey's power systems. Building on these assessment results, the project consortium has worked with the government of Turkey to develop policy options to unlock these co-benefits for the country's citizens and businesses. The results of the co-benefits assessments have been published in the COBENEFITS Turkey Study series, which can be downloaded from **www.cobenefits.info**

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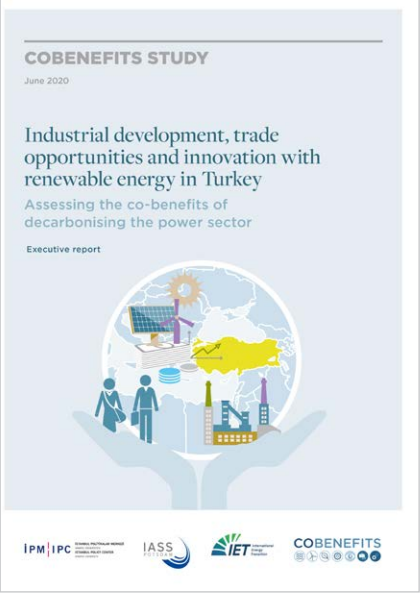

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COBENEFITS: Unlocking social and economic co-benefits for a just and sustainable energy future

The COBENEFITS project supports national authorities and knowledge partners in countries worldwide to connect social and economic co-benefits of decarbonizing the power sector to national development priorities and to mobilise these co-benefits for early and ambitious climate action. The project supports efforts to develop enhanced NDCs with the ambition to deliver on the Paris Agreement and the 2030 Agenda on Sustainable Development (SDGs) and to enable a just transition.

COBENEFITS facilitates international mutual learning and capacity building among policymakers, knowledge partners, and multipliers through a range of connected measures: country-specific co-benefits assessments, online and face-to-face trainings, and policy dialogue sessions on enabling policy options and overcoming barriers to unlock the identified co-benefits in the target countries.

COBENEFITS is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag. The project is coordinated by the Institute for Advanced Sustainability Studies (IASS, Lead) in partnership with the Renewables Academy (RENAC), Independent Institute for Environmental Issues (UfU), and International Energy Transition GmbH (IET).

Reports and infographics available on www.cobenefits.info

Upcoming COBENEFITS report

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Additional policy opportunities to unlock co-benefits of decarbonizing the power sector in Turkey can be found in our COBENEFITS Policy Report "Making the Paris Agreement a success for the planet and the people of Turkey".

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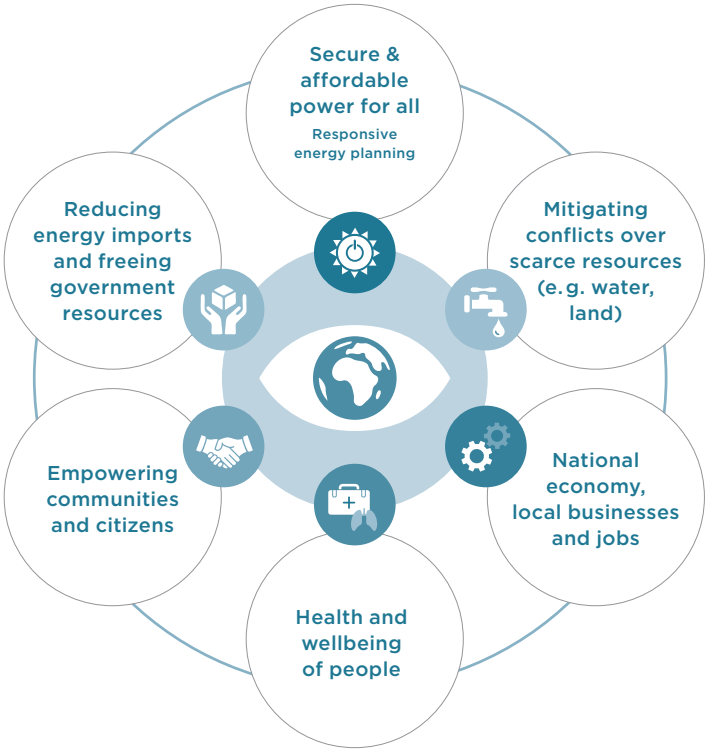

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