

Executive Summary:
Designing market-based policy mechanisms supporting energy efficiency in Turkey: Energy efficiency obligations and auctions

SHURA
Energy Transition Center

About SHURA Energy Transition Center

SHURA Energy Transition Center, founded by the European Climate Foundation (ECF), Agora Energiewende and Istanbul Policy Center (IPC) at Sabancı University, contributes to decarbonisation of the energy sector via an innovative energy transition platform. It caters to the need for a sustainable and broadly recognized platform for discussions on technological, economic, and policy aspects of Turkey's energy sector. SHURA supports the debate on the transition to a low-carbon energy system through energy efficiency and renewable energy by using fact-based analysis and the best available data. Taking into account all relevant perspectives by a multitude of stakeholders, it contributes to an enhanced understanding of the economic potential, technical feasibility, and the relevant policy tools for this transition.

Authors: Ayşe Ceren Sarı (SHURA Energy Transition Center), Prof. Dr. Sermin Onaygil, Dr. Ebru Acuner, Rabia Cin (İTÜ Energy Institute), Samuel Thomas, Marion Santini (Regulatory Assistance Project)

Acknowledgements

We thank Ministry of Energy and Natural Resources, Directorate of Energy Efficiency and Environment for their valuable review and feedback through the course of the study. We appreciate the valuable review and feedback received from Ali Erman Aytaç (Uludağ EPSAŞ), Ali Hakan Everekli (Tenera), Arif Akşam (Yeşilırmak EPSAŞ), Arif Künar (Serbest Uzman), Asuman Sönmez (Serbest Uzman), Burak Altun (Meram EDAŞ), Derya Erbay, Abdullah Korkmaz, Suat Kır, Taha Taşdemir, Ömer Kırcalar (EPİAŞ), Emre Oğuzöncül, Elif Baknalı (EBRD), Erdal Yılmaz (AK GIDA), Gürhan Dural (Şişecam, TÜSİAD Enerji Verimliliği Görev Gücü), Hakan Olcay (Siemens), İlker Üçler, Mehtap Alper Sağlam (EPDK), İstemi Mavi, Atacan Gülbay (ELDER), Karsten Lindloff, Deniz Öztürk (dena), Kubilay Kavak (TSKB Escarus), Mustafa Pekaçar (escosolar), Naci Işıklı, Onur Ünlü (EYODER), Özlem Döğerlioğlu (İzmir Ekonomi Üniversitesi), Özlem Yakut, Koray Goytan, Mesut Avcı (TurSEFF), Remezan Arslan (Sakarya EPSAŞ), Sedat Vatandaş, Süleyman Seymen (ENVER), Şerif Çağıl (TEKFEN), Serkan Ahraz, Merve Yağcı, Ahu Köksal, Erkin Girgin (Tofaş), Serkan Emin (Altensis), Tuba Avşar, Mutlu Bektaş (Yeşilırmak EDAŞ), Tuğba Dinçbaş, Bengü Özge Akyürek, Fatih Özyer (ÇŞİDB), Volkan Gerdan, Fatih Memiş (TÜSİAD Energy Efficiency Workforce). SHURA Energy Transition Center Director Alkım Bağ Güllü and Research Coordinator Hasan Aksoy, and Regulatory Assistance Project Director Jan Rosenow have also provided their valuable feedback on the report.

SHURA Energy Transition Center is grateful to the generous funding provided by the CRUX.

This report is available for download from www.shura.org.tr
For further information or to provide feedback, please contact the SHURA team at info@shura.org.tr

Design

Tasarımhane Tanıtım Ltd. Şti.

Copyright © 2022 Sabancı University

ISBN 978-625-90501-3-3

Disclaimer

The interpretations and conclusions made in this report belong solely to the authors and do not reflect SHURA's official position.

İTÜ ENERGY INSTITUTE

RAP®

Executive Summary: Designing market-based policy mechanisms supporting energy efficiency in Turkey: Energy efficiency obligations and auctions





Executive Summary

Climate crisis, energy transition and Turkey

The global climate crisis poses a significant roadblock on the route to achieving the targets set in 2015 through the United Nations (UN) Sustainable Development Goals (UN, 2015). The analyses by the Intergovernmental Panel on Climate Change (IPCC) indicates that to avoid global temperature increases which may potentially cause harm on life on earth, emissions of greenhouse gases, including but not limited to carbon dioxide (CO_2) should be reduced to net zero in the medium- to long-run (IPCC, 2021). Therefore, global cooperation is crucial for the efforts to cope with and adapt to climate change. The 21st Conference of the Parties carried out in 2015 within the framework of the United Nations Framework Convention on Climate Change, the Paris Agreement with legal binding force on limiting the effects of climate change, achieving adaptation to the effects of it, and financing the whole process was signed, and duly entered into force in 2016. The goal of the Paris Agreement is to keep global warming limited to under 2 degrees Celsius (°C), and preferably to 1.5°C. To achieve the said long-term global average warming limit, the countries look forward to a climate-neutral world by mid-century.

According to International Energy Agency (IEA) data, in 2020, global CO_2 emissions fell approximately five-fold compared to the decline experienced in 2009. On the other hand, in the same period, the fall recorded in CO_2 emissions of the energy industry was milder. Furthermore, in 2020, the CO_2 emissions from energy generation activities, amounting to 31.5 gigatons (Gt), brought about the highest annual average figure in the atmosphere (412.5 ppm), since the Industrial Revolution. Following 2020's non-sustainable fall in emissions, caused by the Covid-19 pandemic which affected the whole world, 2021 saw continued increase in the recovery period to follow the pandemic, with CO_2 emissions related to energy sources reaching 33 Gt (IEA, 2021). In this context, it is imperative to accelerate the transition to sustainable energy systems, which is currently in progress in many countries and industries. According to the "6th Assessment Report" published by the Intergovernmental Panel on Climate Change (IPCC) in 2022, in year 2019 the CO_2 concentrations in the atmosphere reached a level higher than those registered in the past 2 million years (IPCC, 2022). Moreover, warming due to human activities led to more than 1°C increase in temperatures in the period 2010-2019 compared to those recorded in the period 1850-1900. On the top of the list of these activities is energy generation, transmission, distribution, and last but certainly not least, consumption, with a share of approximately 75%. In the process which began with the Paris Agreement adopted in the 21st Conference of the Parties (COP) and which culminated in the most stringent measure introduced to date for achieving the target of 1.5°C warming, as introduced in the 26th UN Climate Change Conference (COP26) in 2021, of achieving the net-zero target by the year 2050, technological innovations and changes in a number of critical areas such as increasing energy efficiency, generating low-carbon electricity, and presenting them to end users are imperative (IPCC, 2020). Moreover, to ensure sustainable, adequate and fair energy transition, major goals including the reduction of all greenhouse gas emissions, popularization of low-emission energy resources, transition to alternative energy carriers, and ensuring energy efficiency and savings should be achieved throughout the energy industry.

The global developments are most important for Turkey as well. According to the greenhouse gas emission statistics published by Turkish Statistics Institute (TUIK) in 2022, in 2020, Turkey's overall greenhouse gas emissions were equivalent to 523.9 million tons (Mt) of CO_2. According to TUIK's greenhouse gas inventory, in 2020 total greenhouse gas emission increased 3.1% compared to the figure for the preceding year. In that year, emissions caused by energy related activities accounted for the largest share (70.2%) of overall greenhouse gas emissions, followed by agriculture (14%), industrial processes and product use (12.7%), and the waste sector (3.1%). By 2020, the emissions of the energy sector grew by 163.3% over the figures for 1990, and 0.6% over the figures for the preceding year, amounting to 367.6 Mt CO_2 equivalent (TUIK, 2022).

Turkey ratified the Paris Agreement in 2021, and undertook to reduce its greenhouse gas emissions by 2030, at a rate of 21% over the reference scenario (1990), according to the "Intended Nationally Determined Contribution" submitted in 2015. As COP26 held in 2021 was noteworthy with the reiteration of the determination of all participating countries, it was also a crucial climate conference where all leaders developed common sense to fight the climate crisis, set targets, and came up with road maps. Against this background, Turkey declared its goal to become carbon neutral by the year 2053. Moreover, the Ministry of Environment and Urbanization was renamed as the "Ministry of Environment, Urbanization and Climate Change" (CSIDB). In 2021, the Ministry of Trade prepared the "European Union (EU) Green Deal Action Plan". The Plan contains a total of 32 targets and 81 actions under 9 main chapters, with the goal of contributing to Turkey's transition to a sustainable circular economy based on resource efficiency, along with the integration with European Green Deal and strategies to comply with the Fit for 55 goal. The chapters cover carbon border adjustment mechanisms; a green and circular economy; green financing; clean, economic and safe energy supply; sustainable agriculture; sustainable smart transportation; the fight against climate change; diplomacy and information / awareness-raising activities. To achieve the goals set under these chapters, and to implement the actions envisaged, "Climate Conference of Turkey" was held on 21-25 February, 2022. Among the 217 final decisions of the Climate Conference, energy efficiency was covered by 15 decisions on energy industry, buildings, clean and circular economy, green financing, carbon pricing and emissions trading.

A glance at the energy consumption trends in Turkey reveals 93% increase in primary energy consumption in Turkey, in the period 2000-2021 (IEA, 2022). Within this increase, the consumption of electricity accounts for a significant portion, in proportion to population growth and economic growth. Turkey overall installed electrical power figure was 27 GW in 2000, but rose to 101.5 GW by the end of June, 2022. The share of renewable sources of energy, including hydroelectricity, in the overall installed power is 54.05%. The solar and wind energy plants alone have a total installed power of 19.45 GW, accounting for 19.16% of all installed power (GENSED, 2022). In 2021, total electricity production was 331.5 TWh, with renewable sources of energy including hydroelectricity accounted for 35.75% of all generation, while the share of solar and wind power was 13.4% (TSKB, 2022).

A glance at the overall electricity consumption numbers of Turkey reveals a continuous trend of increase in the period 2000-2021, with the exception of years 2001, 2009, and 2019. In 2018 consumption was 302.8 TWh, followed by a fall to 302.0 TWh in 2019. In 2020 –a year dominated by the Covid-19 pandemic–, the demand for electricity was

304.8 TWh, rising to 329.6 TWh in 2021, with the recovery prevailing after the pandemic (EPDK, 2021). The increase in the share of electricity from renewable sources, in the process of transition to a low-carbon economy, is crucial. Yet, another important matter in the context of complete transition is the utilization of the opportunities with high energy efficiency potential in Turkey. Compared to other countries, Turkey is noteworthy for a low level of electricity consumption per capita. On the other hand, in terms of energy density Turkey ranks in the medium-high category. Furthermore, Turkey's overall energy consumption increases in parallel to its population and economic growth. Yet, energy density (overall final energy consumption / gross domestic product) fell 25% since year 2000 (IEA, 2021). The primary cause of this improvement, alongside the structural changes in the economy and industries, is the investments into energy efficiency in end-user industries (SHURA, 2020).

Since 1980s energy efficiency has been a priority of Turkey, and been an issue of focus in every energy and environment strategy embraced by the nation. The leading drivers of this tendency include the diversity of energy efficiency technologies and solutions, the relatively low costs involved, and the fact that the savings in energy are often coupled with many economic, environmental and social benefits as well. In addition, for countries like Turkey, which face a rapid increase in energy needs, the implementation of new power plant, industrial plant, and building investments in ways to make efficient use of energy from a technical perspective is much easier (SHURA, 2020). To be able to achieve the goals undertaken for the fight against climate change, it is imperative to engage in rapid action on the energy efficiency front. In this area, there are a wealth of options and best practices for policy makers. The potential for energy savings to be achieved through energy efficiency projects to draw interest through slogans such as "energy efficiency is the first fuel, which you don't need to expend." based on efficiency's definition as a source of energy, is substantial. The costs involved, in turn, are low compared to the cost of building new power plants and generating energy there. It is necessary to increase the demand for this first fuel, and policy actions should focus on increasing that demand through encouragements and incentives in the form of appropriate strategies (IEA, 2019).

Following the EU Energy Efficiency Directive of 2012, in 2017 Turkey developed its National Energy Efficiency Action Plan (NEEAP). NEEAP is set to be implemented in the period 2017-2023, and defined 55 distinct actions in a total of 6 categories – buildings and services, energy, transportation, industry and technology, agriculture, and cross-cutting areas–. These actions aim to achieve a reduction of 14% in Turkey's primary energy consumption by the year 2023, compared to the base scenario. According to the plan, cumulative savings by the year 2023 should reach 23.9 Mtep, which would be achieved through US$ 10.9 billion in investments. The total financial savings figure envisaged by the plan, in the period 2017-2023, in turn, is set at US$ 8.4 billion (ETKB, 2022). The Ministry of Energy and Natural Resources (MENR) announced that, cumulative energy savings amounting to 2.74 Mtep, corresponding to US$ 960 million were achieved in the period 2017-2019 through action within the framework of NEEAP. It is also noted that the investments in energy efficiency in year 2019 amounted to US$ 1.18 billion, bringing about 858 thousand Tep savings in primary energy, corresponding to USD 300 million (MENR, 2020). Among the cross-cutting areas defined in NEEAP, "Y2. Develop national financing mechanism for energy efficiency", "Y3. Support energy efficiency projects through energy efficiency contest", "Y5. Develop registration, database and reporting systems for energy efficiency activities", "Y6. Improve the facilities and effectiveness, ensure coordination and control of the

international energy efficiency financing schemes", "Y7. Strengthen the administrative and institutional structure", and "Y11. Establish an obligation programme for energy distribution or retail companies" are the actions to benefit from the outcomes of this study.

The study titled "The Most Economic Solution for Turkey's Power System: Energy Efficiency and Business Models" published by SHURA in October 2020 was prepared on the basis of a review of the whole electricity system value chain (21 end user industries and more than 100 technologies) with a view to assessing the technical and economic potential of energy efficiency in Turkey in the period to 2030, beyond NEEAP's timeline of 2017-2023, identifying the business, policy and financing models required to realize this potential, and analysing the commercialization potential of such models.

The analysis was carried out over two main scenarios called the Baseline scenario and SHURA scenario in which the extent deployment of energy efficiency technologies differ. In contrast to the Baseline scenario based on the "Turkey's Electricity Demand Projections Report" prepared by MENR, the SHURA scenario envisages net savings in electricity demand amounting to 42.3 TWh by year 2030, through investments. SHURA scenario analyzes the whole electricity value chain, and investigates 21 electricity end use areas, leading to total savings of 48.9 TWh in electricity, and 6.6 TWh increase due to electrification of end uses.

The analysis suggests that one third of the said net savings figure can be achieved through market-based policy mechanisms. Market-based policy mechanism tools should be implemented immediately to achieve low-cost and effective technology practices in a manner to support existing detailed and comprehensive energy efficiency regulatory practices Turkey has, and any updates in those practices.

In environment economics literature, the term "market-based policy mechanisms" refers especially to the policies "making use of market forces" to achieve environment-related goals (Stavins, 2003). Put in another way, it refers to the tools setting the goal (e.g. energy efficiency) to be achieved by market players, without establishing a policy framework and stipulating measures to be utilized (IPEEC, 2016). Market-based policy mechanisms enable increasing the efficiency of currently energy consuming processes, as well as preference for more energy efficient devices and practices in new investments, on the basis of minimum energy performance standards. Such tools cover elements such as energy efficiency obligations, energy efficiency auctions, and energy efficiency networks. This study focuses particularly on the energy efficiency obligations and energy efficiency auctions.

Energy efficiency obligations require the parties subject to obligations, such as power distribution or supply firms, to achieve expected levels of energy savings, while leaving the choice of best practices to be applied to the obligated parties, subject to certain options.

Energy efficiency auctions allow the actors in the market to bid for the financing of energy efficiency projects, with reference to a pre-determined budget. Competition among the bidders can increase cost effectiveness, and enable affordable prices through the auctions.

Energy efficiency obligations and auctions reward savings beyond the minimum energy performance levels set based on the standards, and thus encourage embracing more efficient technologies (Sunderland et al., 2020).

The scope and aim of SHURA study on "designing market-based policy mechanisms to accelerate energy transition in Turkey, through energy efficiency"

The primary aim of this study is to develop policy recommendations for infrastructure, design, and implementation, regarding the Energy Efficiency Obligations Schemes and Energy Efficiency Auctions as part of Turkey's primary energy efficiency policies, which are deemed to contribute substantially to Turkey's energy transition. Four primary aims set in this context are as follows:

- Aim 1: Reviewing design features and financing mechanisms taken into account during the development of "energy efficiency obligations" and "energy efficiency auctions" in the international arena, with specific reference to electrical energy industry.
- Aim 2: Identifying the key factors, design features, and financing mechanisms regarding the implementation of "energy efficiency obligations" and "energy efficiency auctions" in Turkey.
- Aim 3: Developing policy proposals and creating a road map for "energy efficiency obligations" and "energy efficiency auctions".
- Aim 4: Evaluating synergy potential for implementation of "energy efficiency obligations" and "energy efficiency auctions".

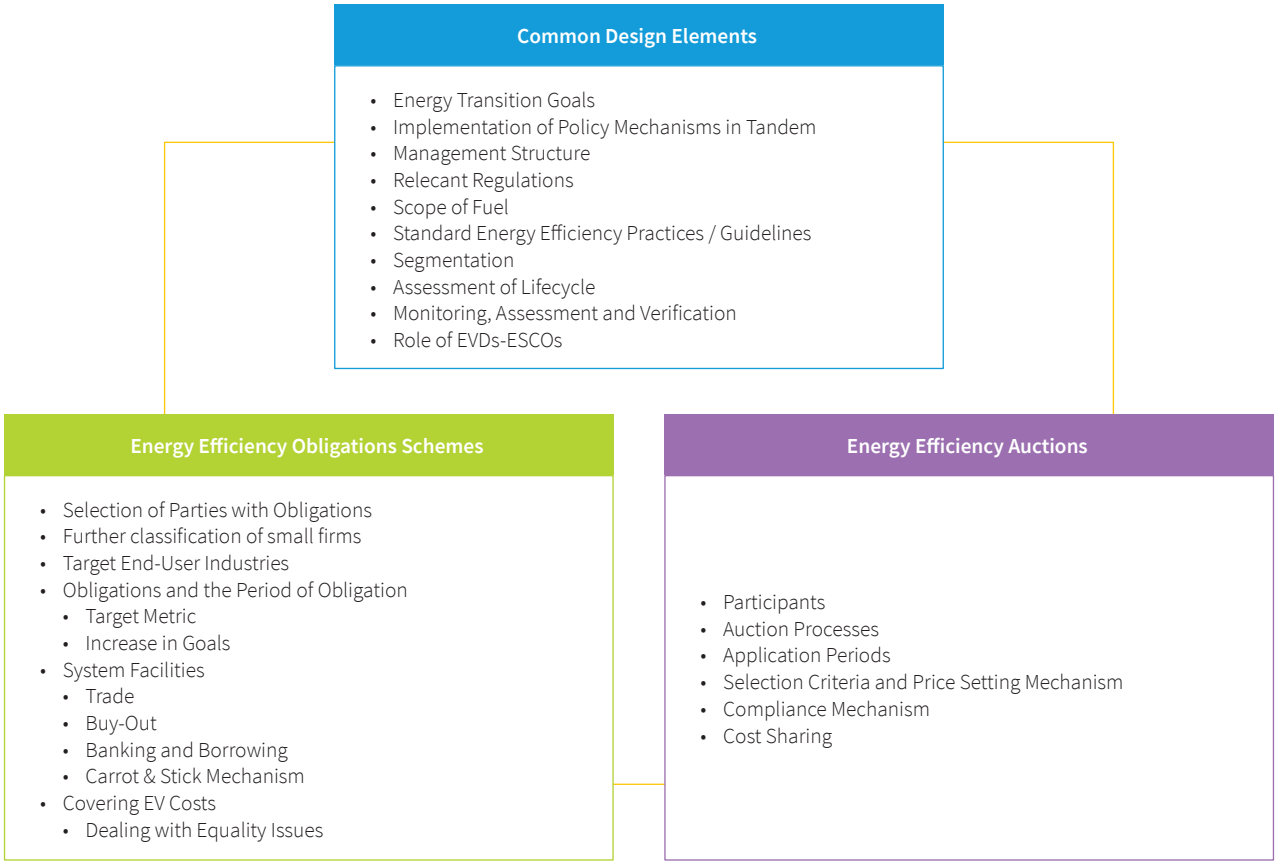
Today, on average 450 grams (g) of CO_2 is emitted to generate one kWh of electricity. A coal-based power plant of average efficiency can emit twice the amount of this figure per kWh (SHURA, 2020). This study focuses on the electricity industry which is a crucial field in terms of external dependence and carbon emissions, and which is also marked by established and diversified market structure and actors.

Methodology

Within the framework of the present study aiming to assess the applicability of energy efficiency obligations schemes and energy efficiency auctions among the market-based policy mechanisms in Turkey, a multi-step methodology was embraced, involving the following elements:

Design elements: Identifying 12 distinct and 10 shared design elements of policy mechanisms (Figure 1).

Figure 1: *Market-based policy mechanisms' identified design elementsunsurları*



Analysis of international experience: A review of international existing cases and best practices in terms of design elements employed and the financing alternatives available

Analysis of national experience: A review of the developments and regulations regarding the mechanisms in question at the national level, and the analysis of the electricity market and the actors involved

Benchmarking study: Benchmarking the international and the national experience, with the aim of determining the gaps and areas of improvement

Stakeholder interviews: Carrying out semi-structured interviews with stakeholder groups comprised of participants from potential obligated parties, end users and end-user associations, financial institutions, energy efficiency consulting firms and relevant associations, and the central government institutions, analyzing the interviews, sharing the draft results through a workshop with stakeholders as well as online, and improving the results through the collected feedback

Road map: Assessing the structures and policy mechanisms within the framework of design elements and in terms of their applicability in Turkey, and preparing the relevant road map.

Key messages

- **During the design of Energy Efficiency Obligations Schemes and Energy Efficiency Auctions policy mechanisms current climate change and carbon emission reduction targets should be taken into account.** Attaching priority to energy efficiency practices in the context of carbon emission reduction targets will make sure that the relevant regulations contain shared objectives and that the financial subsidies can be shared and used in an efficient manner.

- The **management structure** needed to design and implement Energy Efficiency Obligations Schemes and Energy Efficiency Auctions policy mechanisms should be defined as a part of a **comprehensive structure to provide coordination** required for all energy efficiency and energy transition practices, instead of being dedicated solely to these mechanisms.

- **Benefits should be defined for all stakeholders involved in the policy mechanisms** to encourage and to ensure the acceptance and sustainability of Energy Efficiency Obligations Schemes and Energy Efficiency Auctions.

- Energy Efficiency Obligations and Energy Efficiency Auctions should be designed to improve and support the **energy services market,** Energy Efficiency Consulting (EVD) firms and/or ESCOs, and Energy Performance Contracts (EPS).

- The “assessment and verification (O&D) expert pool” proposed for Energy Efficiency Obligations and Energy Efficiency Auctions should support all energy efficiency practices of the public and the private sector, meet the national and international criteria.

NOTES

NOTES

NOTES

About Istanbul Policy Center at the Sabancı University

Istanbul Policy Center (IPC) is a global policy research institution that specializes in key social and political issues ranging from democratization to climate change, transatlantic relations to conflict resolution and mediation. IPC organizes and conducts its research under three main clusters: The Istanbul Policy Center–Sabancı University–Stiftung Mercator Initiative, Democratization and Institutional Reform, and Conflict Resolution and Mediation. Since 2001, IPC has provided decision makers, opinion leaders, and other major stakeholders with objective analyses and innovative policy recommendations.

About European Climate Foundation

The European Climate Foundation (ECF) was established as a major philanthropic initiative to help Europe foster the development of a low-carbon society and play an even stronger international leadership role to mitigate climate change. The ECF seeks to address the "how" of the low-carbon transition in a non-ideological manner. In collaboration with its partners, the ECF contributes to the debate by highlighting key path dependencies and the implications of different options in this transition.

About Agora Energiewende

Agora Energiewende develops evidence-based and politically viable strategies for ensuring the success of the clean energy transition in Germany, Europe and the rest of the world. As a think tank and policy laboratory, Agora aims to share knowledge with stakeholders in the worlds of politics, business and academia while enabling a productive exchange of ideas. As a non-profit foundation primarily financed through philanthropic donations, Agora is not beholden to narrow corporate or political interests, but rather to its commitment to confronting climate change.



SHURA
Energy Transition Center

Bankalar Caddesi,
Minerva Han, No:2, Kat:3
34420 Karaköy / İstanbul
Tel: +90 212 292 49 51
E-mail: info@shura.org.tr
www.shura.org.tr

SHURA is founded by

İPM | IPC İSTANBUL POLİTİKALAR MERKEZİ
SABANCI ÜNİVERSİTESİ KAMPUSU
İSTANBUL POLICY CENTER
AT SABANCI UNIVERSITY

European Climate Foundation

Agora Energiewende

/company/shura @shuraedm SHURAEDM