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5 **DECARBONIZATION PATHWAYS IN THE ELECTRICITY SECTOR: TÜRKİYE’S STRATEGIC**
6 **RESPONSE TO THE EUROPEAN GREEN DEAL.**
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9 **Abstract:**

10 *Driven by the European Green Deal and the Carbon Border Adjustment Mechanism (CBAM), decarbonizing the electricity*
11 *sector has become a core priority to safeguard trade competitiveness and achieve net-zero targets. This paper evaluates global*
12 *power sector decarbonization pathways—focusing on renewable energy, nuclear power, energy storage, hydrogen, and carbon*
13 *pricing—and analyzes Türkiye’s strategic policy response. In line with its 2053 Net Zero target and the Green Deal Action Plan,*
14 *Türkiye is rapidly transforming its energy mix. By leveraging its high renewable capacity share (59.49% in 2024), setting*
15 *aggressive 2035 solar and wind targets, and integrating the Akkuyu Nuclear Power Plant as an emission-free baseload, Türkiye*
16 *is shifting from a compliance-oriented trade policy to a holistic national decarbonization strategy. Ultimately, implementing the*
17 *upcoming national Climate Law and a domestic Emissions Trading System (ETS) will be vital to mitigating CBAM risks and*
18 *ensuring a sustainable, low-carbon economic transition.*

19 **Key words:-**

20 *European Green Deal, CBAM, Electricity Decarbonization, Renewable Energy, Türkiye Energy Policy, Net-*
21 *Zero.*
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27 **Introduction:**

28 The European Green Deal (EGD), launched by the European Commission in December 2019, is a comprehensive
29 strategy to transform the European Union (EU) into a climate-neutral economy by 2050. It aims to decouple
30 economic growth from resource consumption while addressing urgent climate change and environmental issues. The
31 EGD includes policy initiatives to reduce greenhouse gas emissions, promote sustainable economic practices, and
32 enhance the EU's economic resilience (Štatiénė, 2023; Leonard et al., 2021; Siddi, 2021). A key goal is to reach net-
33 zero greenhouse gas emissions by 2050, a legally binding target that guides future climate policies. The Green Deal
34 highlights transitioning to renewable energy, boosting energy efficiency, and fostering innovation in clean
35 technologies (Siddi, 2021).

36 The European Green Deal's (EGD) restructuring of global trade dynamics, especially through the implementation of
37 the Carbon Border Adjustment Mechanism (CBAM), has necessitated a direct policy revision by Türkiye, one of the
38 European Union's principal trading partners. In this context, the Türkiye Green Deal Action Plan, published in 2021,
39 initially manifested as a responsive trade and industrial policy measure aimed at safeguarding export
40 competitiveness against the EU's proactive climate initiative, securing its standing within global value chains, and
41 mitigating potential risks associated with carbon leakage and asymmetric cost shocks (T.R. Ministry of Trade,
42 2021). Conceptually, while the EGD presents an innovative framework supported by binding legal frameworks such
43 as the European Climate Law and establishes an internal green growth model, Türkiye's approach signifies a
44 structured compliance process that commenced to protect terms of trade and subsequently evolved into a national
45 decarbonization pathway following the announcement of the 2053 Net Zero target (Aşıcı, 2021). At the intersection
46 of both frameworks, the integration of national Emissions Trading Systems (ETS) and, notably, the reduction of
47 emission intensity within the electricity sector, emerge as primary catalysts for sustainable transformation in both
48 regions.

49 When global greenhouse gas emissions are examined by economic sector, the energy sector's dominant role is clear.
50 The energy sector includes emissions from burning fossil fuels across subsectors such as electricity and heat
51 production, transportation, manufacturing, and construction. Approximately three-quarters (73.2%) of global
52 emissions come from this sector. According to the Turkish Statistical Institute's 2022 greenhouse gas emissions

53 inventory, 558.3 Mt CO₂-equivalent greenhouse gas emissions were calculated. In Turkey, energy-related emissions
54 accounted for the largest share of total CO₂ emissions in 2022, at 71.8%.Electricity and heat production accounted
55 for 32.6% of total CO₂ emissions in 2022. For these reasons, reducing emissions from the electricity sector is
56 critical.

57 **Decarbonization Pathways of the Electricity Sector:**

58 Decarbonizing the electricity sector is central to meeting global climate targets, with a broad consensus that rapid
59 electrification and a substantial shift to low-carbon generation are required (IEA, 2021).

60 **A) Renewables Role:**

61 One of the most effective strategies for reducing greenhouse gas emissions in the electricity sector is integrating
62 renewable energy sources. The widespread adoption of technologies such as solar, wind, hydroelectric, and
63 geothermal energy can significantly reduce reliance on fossil fuels, the primary source of greenhouse gas emissions
64 in electricity generation (Schlömer et al., 2014). For example, a comprehensive life-cycle assessment has shown that
65 shifting to renewable energy sources can significantly reduce operating emissions compared with fossil-fuel-based
66 systems (Hertwich et al., 2015). Furthermore, diversifying the energy mix to include low-carbon technologies is
67 essential to decarbonize the electricity sector and fulfill international climate commitments, such as those outlined in
68 the Paris Agreement (Xu et al., 2022).

69 Decarbonizing electricity relies on shifting to a generation mix that prioritizes high renewables, backed by
70 dependable low-carbon sources, while expanding transmission infrastructure and storage capacity, and encouraging
71 demand-side flexibility. A comprehensive decarbonization strategy integrates supply-side technologies such as
72 renewables, reliable low-carbon options, long-duration energy storage, and carbon management; grid digitization
73 initiatives, including smart grids, market reforms, and carbon-aware dispatch; and demand-side measures such as
74 energy efficiency, electrification with clean energy, and managed charging. Several studies support these insights by
75 examining storage solutions, market structures, sector integration, and their impact on reliability and cost (Ashfaq et
76 al., 2024; Chen et al., 2024; Kang et al., 2024; Kar et al., 2024; Lin et al., 2021; Oke et al., 2024; Pereira et al., 2022;
77 Ratz et al., 2020; Shojaei et al., 2024; Sumner et al., 2023; Xie et al., 2021).

78 Accelerated deployment of wind, solar, and other renewables remains a core strategy across nearly all modeled
79 pathways. Scenarios consistently project large-scale renewable buildouts that displace fossil generation, often paired
80 with complementary storage and transmission investments to maintain reliability (Bistline& Young, 2022; Denholm
81 et al., 2022; Evangelopoulou et al., 2019; Stephenson et al., 2019; Williams et al., 2012).

82 RES is a cornerstone of decarbonizing the electricity system. Numerous studies show that increasing variable
83 renewables, such as solar and wind, cleans up the electricity supply and reduces dependence on fossil fuels
84 (Sepulveda et al., 2018; Agu et al., 2023; Kanugrahan& Hakam, 2023). Furthermore, comparable models in the
85 literature indicate that solar and wind are the primary additions to installed power in transitions across all global
86 regions (Schwerhoff, 2024; Simon et al., 2018; Sepulveda et al., 2018). These findings support the need to increase
87 the share of renewables for energy systems to achieve net-zero targets.

88 In terms of life-cycle and operational emissions, renewable systems have generally been shown to have low
89 operational-phase emissions (particularly hydro, wind, and solar); however, some studies emphasize that system-
90 based life-cycle emissions may exhibit regional variations and that these factors must be considered in planning
91 processes (Sadhukhan, 2022; Zhu et al., 2023; Luderer et al., 2013). This nuance underscores the need for holistic
92 analyses that encompass not only operational emissions but also the facility's production, construction, and
93 maintenance phases. EMF27 scenarios and global models show that the share of renewable energy plays a critical
94 role in long-term energy-reduction strategies and, in some scenarios, is one of the most important long-term

95 reduction options; however, there is also evidence that total costs can be reduced when renewable energy is
96 combined with “firm” low-carbon sources such as biomass, nuclear, and CCS (Luderer et al., 2013).

97 **B) Nuclear Energy:**

98 According to the International Atomic Energy Agency's PRIS (Power Reactor Information System), nuclear energy
99 accounts for 10% of global electricity consumption. Currently, 416 nuclear reactors are in operation across 30
100 countries, positioning nuclear power as the primary source of low-carbon electricity generation in OECD nations.
101 While 63 reactors are currently under construction and an additional 100 are in the planning stage, global capacity is
102 expected to remain relatively stable due to the decommissioning of older reactors (PRIS, 2025).

103 Nuclear energy contributes to reducing carbon dioxide emissions by 1.5 gigatons annually, making it a vital element
104 in climate mitigation strategies. To limit global warming to below 1.5°C, it is imperative that nuclear capacity is
105 tripled to 1,160 GW by 2050. Enhancing the longevity of existing reactors through modernization and maintenance
106 enables nuclear energy to continue reducing carbon emissions, thereby preventing the release of 50 gigatons of CO₂
107 into the atmosphere between 2020 and 2050. Additionally, replacing fossil-fuel-based power generation with nuclear
108 plants could reduce emissions by 23 gigatons over the same timeframe. This development is especially crucial for
109 emerging economies such as China and India, where electricity demand is growing rapidly. Coal remains one of the
110 most carbon-intensive energy sources, yet it is still widely used, particularly outside OECD countries. Nuclear
111 energy presents a cleaner alternative. The International Energy Agency (IEA) reports that excluding nuclear power
112 from the energy transition would add approximately \$1.6 trillion to global costs. As a reliable base-load power
113 source, nuclear energy ensures an uninterrupted electricity supply, unlike intermittent renewable sources like solar
114 and wind, which cannot operate continuously. Countries that have discontinued nuclear energy have often been
115 compelled to revert to coal- and fossil-fuel power plants to prevent power outages, thereby undermining their
116 objectives to reduce carbon emissions (NEA, 2025).

117 One of the most important features of nuclear energy is that it does not emit carbon dioxide into the atmosphere
118 during plant operation. Nuclear reactors generate electricity through nuclear fission reactions, and this process,
119 unlike fossil fuel power plants, does not directly emit carbon dioxide or other greenhouse gases. Therefore, nuclear
120 energy is considered an important tool for achieving the goal of reducing carbon emissions, the root cause of climate
121 change (Demirbaş, 2018).

122 Nuclear energy, together with renewable sources such as wind and solar energy, can play a critical role in achieving
123 the goal of limiting global warming to 1.5°C (Duan et al., 2022).

124 Unlike intermittent sources like solar and wind, nuclear power plants deliver continuous, reliable electricity to the
125 grid, known as base load. This is crucial for maintaining energy supply during periods without wind or sunlight.

126 Nuclear appears as a credible low-carbon firm resource in several deep-decarbonization pathways, providing
127 dispatchable capacity that can reduce the need for long-duration storage or enable cost-effective decarbonization
128 under stringent targets. Its role is highly context-dependent, contingent on capital costs, financing risk, policy
129 incentives, and comparisons with alternative firm low-carbon options (e.g., CCS-enabled generation, BECCS)
130 (Bistline et al., 2023; Murphy et al., 2023; Nian et al., 2022; Smit & Powell, 2023; Waite et al., 2024).

131 Nuclear provides firm capacity that can reduce the need for expensive long-duration storage or rapid ramping from
132 variable renewables, potentially smoothing the transition and reducing capacity adequacy concerns in high-
133 electrification futures. The Murphy et al. An NREL-based assessment emphasizes that nuclear can provide firm
134 zero-carbon electricity, with its role evolving as emissions constraints tighten and as energy revenue streams shift
135 toward capacity revenue under high decarbonization scenarios (Murphy et al., 2023). Sinha et al. likewise show that
136 even in near-cost-optimal pathways, existing nuclear plants can provide a stable backbone, though there may be
137 limited new build unless policies reward firm capacity and decarbonization goals are aggressive (Sinha et al., 2023).

138 **C) Carbon capture, utilization, and storage (CCS) and BECCS:**

139 CCS-enabled power generation and BECCS are frequently modeled as enabling technologies for deep
140 decarbonization, especially in regions with high fossil generation stocks and in scenarios requiring net-zero
141 emissions where residual emissions must be offset (Bistline&Blanford, 2021; Evangelopoulou et al., 2019; Luo et
142 al., 2025; Paltsev et al., 2022).

143 Carbon capture and storage (CCS) technologies are essential for reducing emissions from fossil-fuel-powered
144 electricity plants. CCS captures CO₂ emissions from power stations and stores them underground to prevent their
145 release into the atmosphere. This method is especially effective when combined with natural gas and coal plants,
146 allowing their ongoing operation with reduced environmental harm. However, deploying CCS demands substantial
147 investment and infrastructure, potentially hindering its broad adoption.

148 The International Energy Agency (IEA) reports that in areas with limited nuclear or hydroelectric capacity, natural
149 gas and coal power plants equipped with CCS are among the most affordable, low-carbon options for ensuring grid
150 flexibility and security of supply (IEA, 2020). These plants help prevent power system failures when renewable
151 energy sources are insufficient.

152 Worldwide, particularly in the Asia-Pacific region, there is a massive fleet of fossil-fueled power plants worth
153 trillions of dollars that are still in the early stages of their lifespans. The sudden closure of these plants could lead to
154 severe economic crises and energy shortages, while turning these investments into "stranded assets." At this
155 juncture, CCS technologies can be retrofitted into existing coal and natural gas plants, preventing colossal
156 infrastructure investments from being wasted. By capturing over 90% of the emissions originating from these
157 facilities, CCS ensures a just and economic decarbonization of the energy sector (Rubin et al., 2015).

158 One of the most innovative and critical applications of CCS in the power sector is Bioenergy with Carbon Capture
159 and Storage (BECCS) systems. Plants absorb carbon dioxide from the atmosphere as they grow. When this biomass
160 is burned in power plants to generate electricity, the resulting carbon is captured and stored underground via CCS
161 technology, thus reversing the cycle. The Intergovernmental Panel on Climate Change (IPCC) explicitly states that
162 these systems, which provide a net withdrawal of carbon from the atmosphere while generating electricity, are
163 indispensable for meeting the "negative emission" requirements needed to limit global warming to 1.5°C (IPCC,
164 2022).

165 **D) Gas with carbon removal:**

166 Natural gas-fired generation can play a transitional or complementary role when paired with carbon removal
167 options; some studies find gas can lower system costs under deep decarbonization if CCS or BECCS is available,
168 though wind/solar plus storage eventually dominate in many pathways (Bistline&Blanford, 2021; Bistline& Young,
169 2022).

170 **E) Hydrogen and synthetic fuels:**

171 Hydrogen- or power-to-fuel pathways offer potential for sector coupling and long-term energy storage, supporting
172 decarbonization of hard-to-electrify sectors and providing energy-dense carriers for transport and industry. The role
173 of hydrogen is debated, with considerations of cost, infrastructure, and competition with direct electrification
174 (Bistline et al., 2022; Evangelopoulou et al., 2019; O'Shaughnessey& Shah, 2021).

175 Hydrogen energy storage systems play a transformative and fundamental role in achieving the decarbonization goals
176 of the maritime industry, which accounts for a significant share of global greenhouse gas emissions. The ability to
177 store energy within hydrogen molecules after generating it from renewable sources (solar and wind) is the most
178 critical factor making this clean energy viable, even for extended voyages, particularly thanks to advanced storage

179 technologies such as compressed gas, cryogenic liquid, and solid-state storage. Although hydrogen requires larger
180 storage capacities in vessel design due to its lower energy density compared to conventional fuels, and presents
181 infrastructure and safety challenges, successful storage enables its use in fuel cells, completely eliminating carbon
182 emissions (producing only water vapor) while reducing NOx and particulate matter emissions by over 90%. In short,
183 storage technologies serve as a vital bridge in the maritime sector's transition from fossil fuels to a sustainable, net-
184 zero-emissions future by ensuring that hydrogen functions as a reliable energy carrier (Jayabal, 2025).

185 Hydrogen emerges as a promising energy carrier for green electricity production, storage, and long-term energy
186 retention. Its capacity to be stored at room temperature and converted back into electricity as needed offers
187 significant flexibility, particularly for managing seasonal fluctuations in energy supply and demand. This makes
188 hydrogen a valuable asset for balancing VRE (variable renewable energy) systems (Du et al., 2024; Shiraishi et al.,
189 2024). Numerous studies reinforce hydrogen's potential as a long-term energy storage (LDES) and international
190 energy carrier, such as in Shiraishi et al. (2024). Additionally, deploying hydrogen in industrial sectors beyond
191 electricity generation is vital for advancing sectoral electrification and maintaining cost efficiency (Du et al., 2024).

192 Hydrogen storage-efficiency analysis is seen as an ideal tool for demand-side resilience and regional integration,
193 beyond balancing electricity generation. Shiraishi et al. (2024) and other IAM studies evaluate the role of hydrogen
194 as an LDES and as a regional/interconnected energy carrier; these studies highlight the costs and impacts of
195 hydrogen over time. It has been shown to play a role in increasing reliability (Shiraishi et al., 2024; Fragkos et al.,
196 2023). However, some analyses link the cost-effectiveness of hydrogen as LDES to industry decision variables and
197 argue that cross-sector interactions are important (Shiraishi et al., 2024; Sambodo et al., 2024).

198 **F) Energy Storage:**

199 Energy Storage Systems (ESS) are among the most critical elements for achieving decarbonization goals. The
200 integration of variable renewable energy (VRE) sources, such as wind and solar, can lead to the forced curtailment
201 (wastage) of generated clean energy due to mismatches in supply and demand. Storage systems solve this problem
202 by storing surplus renewable energy and supplying it to the grid when needed, thereby enhancing grid flexibility
203 while significantly reducing system costs and carbon emissions (Shiraishi et al., 2024).

204 Long-duration energy storage (LDES) systems are vital for integrating rapidly increasing renewable energy sources
205 worldwide into the grid and ensuring system stability. Advanced storage technologies, such as High-Temperature
206 Compressed Air Energy Storage (Hi-CAES), are essential for safely integrating intermittent renewable sources, such
207 as wind and solar, into the system. By storing surplus clean energy (or hydrogen) and supplying it back with near-
208 zero emissions when needed, these technologies serve as a fundamental bridge in moving the energy sector away
209 from fossil fuels and achieving global climate targets. Aiming to overcome the limitations of traditional systems,
210 this model highlights the critical role of storage technologies in the transition to clean energy (Yang et al., 2026).

211

212 **G) Flexible Demand**

213 Demand flexibility, or the management of demand, enables the timely and spatial balancing of supply and demand
214 within an electricity system with a high penetration of renewable energy sources (RES). This approach reduces
215 reliance on carbon-intensive energy carriers by enabling consumers to shift their loads to more suitable times or
216 gradually reduce consumption. As a result, it plays a vital role in decarbonizing the electricity sector (Chen et al.,
217 2024; Eyre et al., 2018; Bistline, 2021.)

218 Flexible demand plays a crucial role in balancing highly variable renewable energy (VRE) production with load
219 demands, safeguarding grid security, and lowering cost impacts. It also encourages participation from demand-side
220 actors, such as industries and buildings, in providing grid services, including intermediate reserves, load shifting,

221 and load shaping (Eyre et al., 2018; Williams et al., 2021). By increasing consumption during periods of excess
222 renewable output or reducing it during shortages, flexible demand enhances the efficient use of variable renewable
223 energy sources, thereby decreasing the system's net emissions. This contributes to a higher share of low-emission
224 electricity and less reliance on fossil fuels (Eyre et al., 2018; Bistline, 2021). When combined with market designs,
225 flexible demand reduces costs and bolsters system security. Properly synchronizing storage and flexibility options—
226 such as batteries, Power-to-Hydrogen (PtH), and hydrogen storage—with flexible demand ensures more effective
227 investment decisions and lowers decarbonization costs (Taylor et al., 2022; Chen et al., 2024; Eyre et al., 2018).

228 **H) Carbon Pricing:**

229 CBAM intends to impose a carbon price on importers that reflects the embedded emissions in their products,
230 aligning these imported costs with EU domestic carbon prices under the ETS. Its purpose is to prevent carbon
231 leakage and ensure a level playing field by equalizing costs between EU producers and foreign suppliers who face
232 weaker carbon pricing (McDonald et al., 2024; Hancock & Wollersheim, 2021; Morchid et al., 2024; Guterres, 2022;
233 Kiss-Dobronyi & Fazekas, 2022; Sun et al., 2024). The policy outlines transitional and long-term phases, with a
234 gradual expansion of scope to include more sectors such as electricity and hydrogen, as detailed in various policy
235 summaries and analyses (McDonald et al., 2024; Bassi et al., 2024; Kiss-Dobronyi & Fazekas, 2022; Smith et al.,
236 2023).

237 The EU ETS prices carbon domestically through allowance allocation, while CBAM complements this by
238 accounting for embodied emissions in imports. This extension effectively applies carbon pricing to trade partners
239 and discourages emissions-intensive production abroad that could otherwise undercut EU industry (McDonald et al.,
240 2024; Morchid et al., 2024; Bassi et al., 2024; Kiss-Dobronyi & Fazekas, 2022; Sun et al., 2024).

241 Several studies highlight the importance of CBAM in preventing leakage during ETS tightening. They also
242 emphasize its role in maintaining incentives for domestic decarbonization as trade partners face increasing costs on
243 carbon-intensive goods (McDonald et al., 2024; Horowitz, 2026; Bassi et al., 2024; Kiss-Dobronyi & Fazekas, 2022;
244 Smith et al., 2023).

245 The ETS sets a direct price on CO₂ emissions from power generation within the EU, encouraging a shift from high-
246 carbon fossil fuels to low-carbon sources such as renewables, nuclear, and, in the longer term, gas with CCS or
247 hydrogen pathways. The effectiveness of the ETS in reducing emissions depends on allocation rules, price
248 trajectories, and sector coverage, which determine the speed of electricity-sector decarbonization (McDonald et al.,
249 2024; Bassi et al., 2024; Rinaldi et al., 2024).

250 CBAM's indirect influence on electricity decarbonization involves applying a carbon price to imports, which
251 discourages switching to high-emission electricity or imports from regions with lower carbon prices. This creates an
252 incentive for domestic electricity providers and trading partners to lower embedded emissions in electricity-related
253 products and inputs. As a result, it promotes a wider decarbonization of electricity supply chains, especially in
254 energy-intensive sectors that depend on electricity, such as steel, cement, and fertilizers (McDonald et al., 2024;
255 Bassi et al., 2024; Kiss-Dobronyi & Fazekas, 2022; Sun et al., 2024; Smith et al., 2023).

256 Sectoral spillovers and technology choices: For sectors that demand significant electricity, such as the final stages of
257 decarbonizing steel with green electricity and hydrogen, CBAM can affect the competitiveness of low-carbon
258 electricity and promote the adoption of low-emission technologies. Models that include CBAM indicate that there
259 could be shifts in investment and plant locations to better align with worldwide carbon pricing regimes, as shown by
260 Rinaldi et al. (2024), Oberthür & Kulovesi (2025), Smith et al. (2023), and Boute (2024).

261 **Decarbonization Pathways of the Electricity Sector of Türkiye:**

262 Türkiye's installed electricity capacity reached 116,265 MW by the end of 2024. In the distribution of this capacity
263 by source, hydroelectric, natural gas, and coal power plants take the lead, while the share of wind and solar energy is
264 rapidly increasing (TEİAŞ, 2026). As of the end of 2024, 59.49% of installed capacity was from renewable energy
265 sources. This ratio has elevated Türkiye to 11th globally and 5th in Europe in terms of installed renewable energy
266 capacity (MENR, 2024).

267 In 2024, Türkiye's total gross electricity generation was approximately 354.5 Terawatt-hours (TWh). According to
268 TEİAŞ (2024), the distribution of this generation by source was as follows: imported coal at 21.25%, hydroelectric
269 power at 21.11%, natural gas at 18.89%, and lignite at 11.98%. Additionally, wind energy accounted for 10.39%,
270 solar power for 8.67%, and geothermal and other sources for the remaining 7.71% of total generation (TEİAŞ,2024).

271 These figures reflect Türkiye's policy to increase resource diversity and the share of domestic resources in electricity
272 generation. The Türkiye National Energy Plan (2022), published by the Ministry of Energy and Natural Resources,
273 has outlined a roadmap through 2035. By 2035, the installed solar energy capacity is targeted to increase to 52.9
274 GW, and wind energy to 29.6 GW. This means the share of renewable resources in total capacity will reach 65%
275 (MENR, 2023b).

276 Renewable Energy Resource Areas (YEKA) tenders have become one of the most important financial instruments
277 for decarbonization, enabling the cost-effective commissioning of large-scale power plants. According to the
278 Turkish Wind Energy Potential Atlas (REPA), Türkiye's technically feasible onshore wind potential is estimated at
279 57.8 GW in areas with average wind speeds exceeding 6.5 m/s at a 100-meter hub height. Additionally, the offshore
280 wind potential is calculated at 20.8 GW for regions with wind speeds over 7.5 m/s and water depths up to 200
281 meters. To tap into this potential, Türkiye has set a strategic target to reach 5 GW of installed offshore wind capacity
282 by 2035. Due to its geographical location, our country possesses significant solar energy potential. According to the
283 Türkiye Solar Energy Potential Atlas (GEPA) prepared MENR, the average annual total sunshine duration is 2,741
284 hours, and the average annual total solar radiation is calculated as 1,527.46 kWh/m². Furthermore, in 2026, the share
285 of installed solar capacity in total installed capacity reached 21.2%, totaling 26,478 megawatts, and investments in
286 wind and solar energy are ongoing (MENR,2026).

287 To prevent intermittent renewable sources (solar/wind) from disrupting system stability during the decarbonization
288 process, Türkiye is integrating nuclear energy as an "emission-free baseload." When Akkuyu NPP is fully
289 operational, the 4,800 MW nuclear power plant is expected to meet approximately 10% of Türkiye's electricity
290 demand, with no carbon emissions (MENR, 2026).

291 Türkiye's "Hydrogen Technologies Strategy and Roadmap" (2023) specifically targets the decarbonization of "hard-
292 to-abate" sectors such as industry and heavy transport (MENR, 2023a). According to the National Energy Plan,
293 electrolyzer capacity is targeted at 2 GW for 2030 and 5 GW for 2035. Storage systems have been mandated for grid
294 integration of renewable energy, and licensing processes in this area have been accelerated (MENR, 2023b).

295 Türkiye is continuing its work on the draft Climate Law to establish its own National Emissions Trading System.

296 CBAM Compliance: To protect trade volumes with the EU, the mechanism aims to reduce the electricity sector's
297 emission intensity through carbon pricing, in accordance with the Carbon Border Adjustment Mechanism (CBAM).

298 The Republic of Türkiye Ministry of Trade plays a leading role in monitoring the European Green Deal (EGD) and
299 other global developments, and in identifying possible steps to be taken. Immediately following the announcement
300 of the EDG, a Working Group was established under the Ministry of Trade's coordination to address the potential
301 impacts of the Green Deal on our exports to the EU and determine the necessary steps.

302 As a result of these efforts, a roadmap for Turkey's adaptation to the European Green Deal was identified, and an
303 action plan was developed with the contributions of relevant institutions. The Presidential Circular No. 2021/15

304 concerning the Working Group and the Green Deal Action Plan was published in the Official Gazette on July 16,
305 2021. Developments in the EU's legislative work to harmonize our legislation with relevant EU legislation within
306 the scope of the Green Deal are being monitored.

307

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