Iran Chamber of Commerce,

Industries, Mines and Agriculture

The Performance of the Renewable Energy Industry in Reducing Carbon Emissions and Upcoming Opportunities

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Energy Commission

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Executive Summary

Iran is pursuing the development of renewable energy at a time of rising electricity demand and a pressing need to reduce the consumption of fossil fuels. Installed renewable power capacity grew from **1,163 MW in 2023** to **6,151 MW in October 2026**, an increase of roughly **429%**. Of the current capacity, about **5,619 MW is solar** and **372 MW is wind**. The country's medium-term target is to raise renewable capacity to **30,000 MW**. If this trend continues, it can help meet electricity demand, reduce the share of fossil-fuel generation and contribute to climate change goals.

The most important climate impact of renewables is the reduction of emissions from fossil-fuel electricity generation. The more solar and wind electricity is delivered to the grid and displaces thermal power plants, the greater the potential to reduce fuel consumption and greenhouse gas emissions. Lower air pollution and, depending on the type of power plant displaced, lower water consumption are further benefits of this transition. From the perspective of the COP conference, the importance of Iran's renewable development is not limited to power plant capacity: the country's contribution to reducing power-sector emissions delivers a benefit that extends beyond national borders.

The estimated investment needed to reach the **30,000 MW** target is about **USD 24 billion**; taking existing capacity into account, the remaining investment requirement is estimated at about **USD 19 billion**. The development programme combines large solar and wind projects, small-scale power plants and a range of financing mechanisms. In capacity planning, **10,500 MW** is envisaged for projects reliant on foreign financing, comprising **8,000 MW of solar** and **2,500 MW of wind**. These figures indicate the scale of the investment opportunity; they do not represent completed capacity or firm financial commitments.

Demand for renewable electricity is not limited to power purchase policies. Industries with electricity consumption above one megawatt are required to raise the share of renewable electricity in their supply from **one percent** to **at least five percent** by the end of the fifth year. The renewable electricity share required of executive bodies has also been raised from **20% to 40%**. As a result, supplying industrial electricity, building self-supply power plants and selling clean power directly, alongside guaranteed-purchase contracts, have become important segments of the market.

Sales and financing mechanisms differ by project type. Options include a **20-year** guaranteed-purchase contract for some power plants, foreign-currency guaranteed-sale contracts for larger projects, industrial self-supply, and sales on the Green Board of the Energy Exchange. In many of the months reviewed, the dollar price of electricity on the

Green Board was about **6 US cents per kWh**, rising above **10 cents** in the warm months. The economic calculations presented, based on specified investment and electricity-sale assumptions, show an **internal rate of return of 22.6%**, a **net present value of about USD 3.35 million**, and simple and discounted payback periods of **4.6 and 5.8 years** respectively. These indicators are useful for assessing the market opportunity, but the profitability of any individual investment depends on contract terms, financing, actual generation and grid-connection costs.

Capacity expansion creates significant demand for equipment. For the development of about **24,000 MW** of new capacity, comprising **16,000 MW of solar** and **8,000 MW of wind**, the import requirement, after deducting domestic production capacity, is estimated at the panels and inverters needed for **14,000 MW of solar capacity** and the turbines needed for **7,000 MW of wind capacity**. Cooperation opportunities are not limited to equipment sales; they also include engineering services, installation, operation, maintenance, equipment testing and supply-chain development.

Alongside capacity expansion, grid management has become more important. Planning for about **500 MWh of energy storage**, and attention to storage in the licensing of large power plants, respond to the variability of solar and wind output. New capital-raising instruments, including a project fund aiming to develop **500 MW** through **106 power plants in 9 provinces**, also show an effort to diversify financing channels. Advancing these programmes requires coordination among power plant investment, grid-connection capacity and operating infrastructure.

Financing and money-transfer restrictions, difficulty accessing equipment and after-sales services, currency and contractual risks, and limited grid capacity are slowing project delivery. In these circumstances, international cooperation has the greatest impact when it addresses practical needs: **transfer of design and operating know-how, training of skilled personnel, preparation of investable projects, exchange of experience on grid integration and storage, and the creation of clear, regulation-compliant channels for supplying equipment and technical services**.

Renewable development in Iran is a shared opportunity for investment, for strengthening electricity supply security and for reducing carbon emissions. Turning this opportunity into a climate achievement depends on actually constructing the power plants and generating clean electricity on a sustained basis. This is an area in which practical cooperation with Iran's private sector can create value for the country and for the global community.

1. Introduction

The renewable energy industry has recently grown significantly: total installed renewable capacity rose from 1,163 MW in 2023 to 6,151 MW in October 2026, a 429% increase in three years. In line with the overarching goals of Iran's energy sector, the government's work programme also includes expanding renewable capacity to 30,000 MW in the medium term. This figure reflects the attention that decision-makers and private-sector actors have dedicated to the energy transition and, if achieved, would place Iran among the countries that make a meaningful contribution to clean energy generation and give due weight to global environmental considerations in power generation.

This report first analyses the current status and capacities of the renewable industry. This section also projects the performance of renewable power plants in reducing carbon emissions and the contribution the industry can make to meeting Iran's commitments through 2030. The second part explains the most important existing laws for investors and examines their effect on projected trends in the electricity market. The final part presents opportunities for attracting foreign investment to build power plants or supply power plant equipment, together with expectations of the global community.

2. Statistical Analysis of the Current Status of Iran's Renewable Industry

2.1. Geographic Potential for Renewable Power plant Development

2.1.1. Solar energy potential

Solar potential is assessed using indicators such as global horizontal irradiation (GHI), the specific yield of photovoltaic systems, and the seasonal stability of generation. According to the data in Figure 1 and Chart 1, the specific yield in the top 10% of Iran's most favourable areas exceeds 5.28 kWh per kWp per day, compared with 4.98 and 5.11 kWh/kWp/day reported for China and the United States, respectively. Global horizontal irradiation in Iran's best areas also exceeds 6.03 kWh/m² per day, against 4.89 and 5.47 kWh/m² per day for China and the United States, indicating a comparative advantage in the radiation resources of the country's most favourable regions.

In terms of seasonal stability, the ratio of minimum to maximum monthly specific yield is reported at 0.66 for Iran and 0.6 for China and the United States. Assuming the same calculation method and statistical period, the higher ratio for Iran indicates comparatively smaller seasonal fluctuations in solar electricity generation. The chart comparing global horizontal irradiation and specific yield also shows Iran's favourable position on both indicators among the selected countries. Overall, good radiation resources, high specific

yield and relatively stable generation confirm the favourable capacity of the country's most promising regions for developing photovoltaic power plants. Nevertheless, setting investment priorities and determining the feasibility of a power plant in any given region requires simultaneous consideration of temperature conditions, system losses, grid-connection constraints and capital costs.

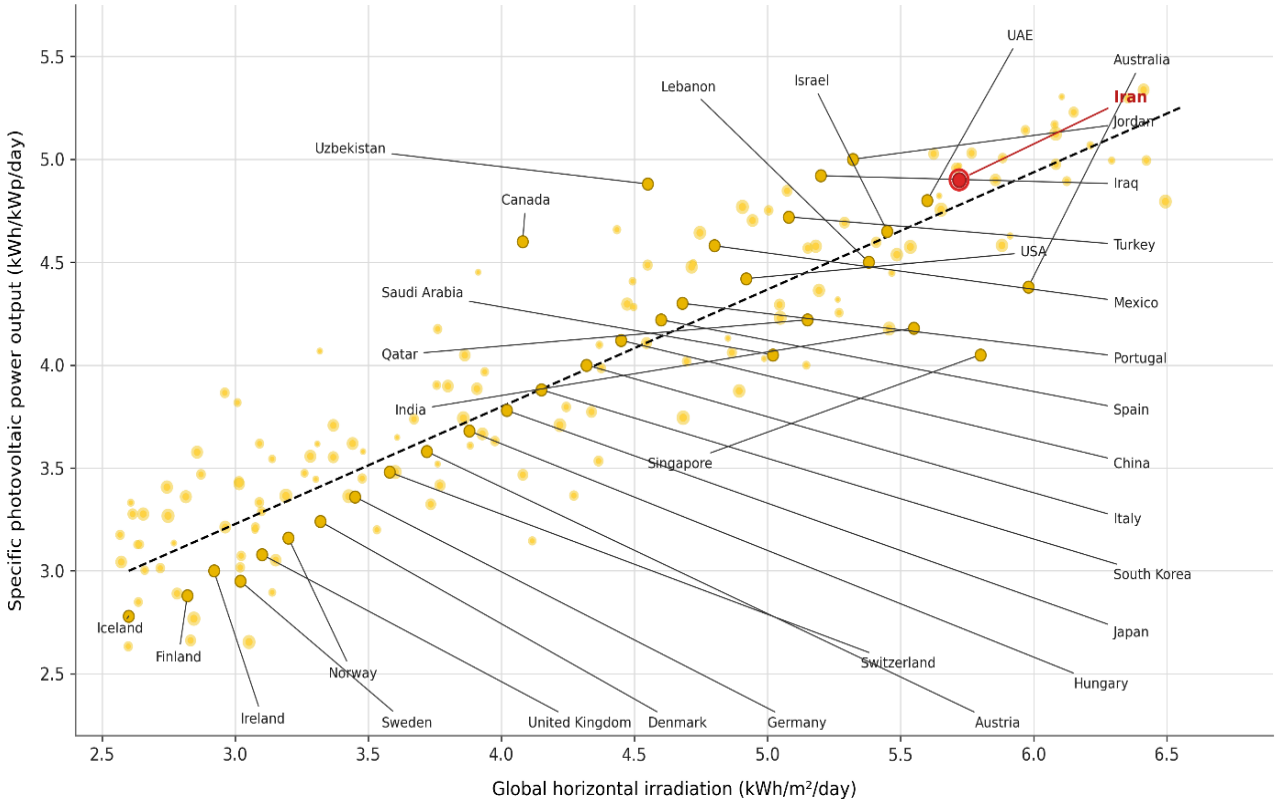


Chart 1. Comparison of global horizontal irradiation and specific yield of photovoltaic systems in selected countries

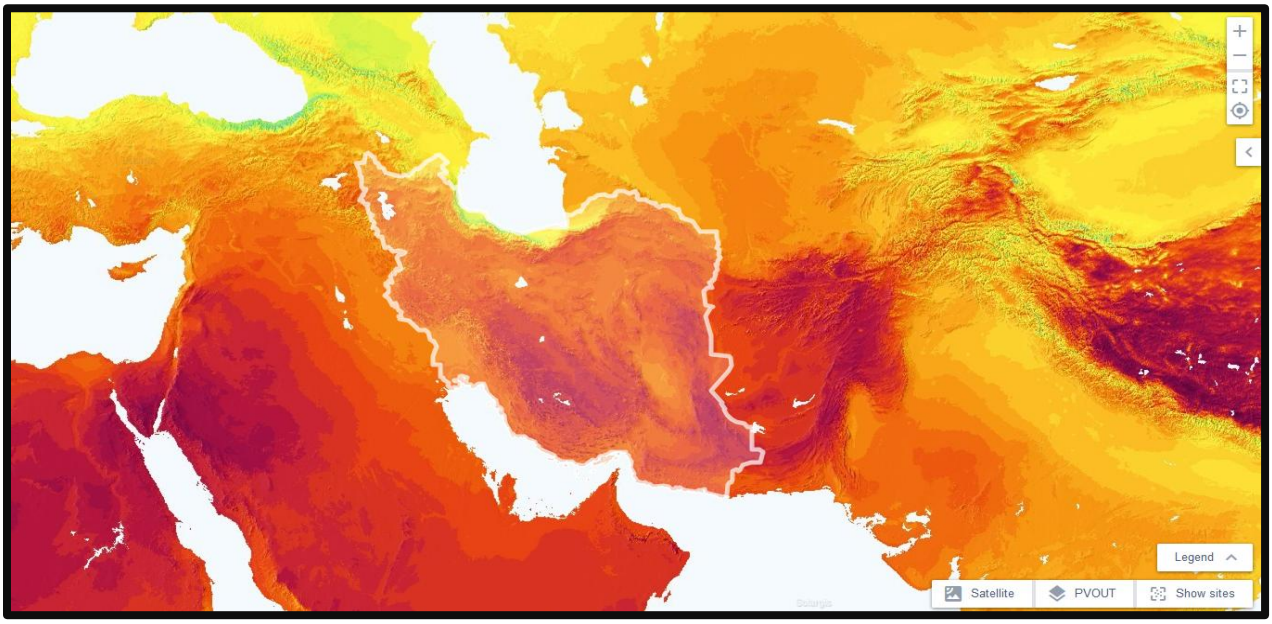


Figure 1. Solar energy potential in Iran and neighbouring countries

2.1.2. Wind energy potential

Wind potential is assessed using wind speed and wind power density. According to the data in Figure 2 and Chart 2, wind speed in the top 10% of Iran's most favourable areas is about 7.9 m/s, compared with 8.61 and 8.31 m/s reported for China and the United States, respectively. Wind power density in Iran's best areas exceeds 682 W/m², which is higher than the corresponding value for China (651 W/m²) and lower than that reported for the United States (895 W/m²). This comparison shows that, although the wind speed reported for Iran is lower than in the other two countries, the country's most favourable areas have suitable potential for wind power development in terms of power density.

Chart 2, comparing wind speed and wind power density, also shows Iran's position in wind resources among the selected countries. However, these two indicators alone are not sufficient to determine a power plant's electricity output and economic viability, because the statistical distribution of wind speed, hub height, turbine specifications and power curve, generation losses and grid-connection costs also affect the recoverable energy and the levelised cost of electricity (LCOE). Identifying and prioritising suitable areas for wind power plants therefore requires site-specific wind measurement studies

and technical-economic assessment

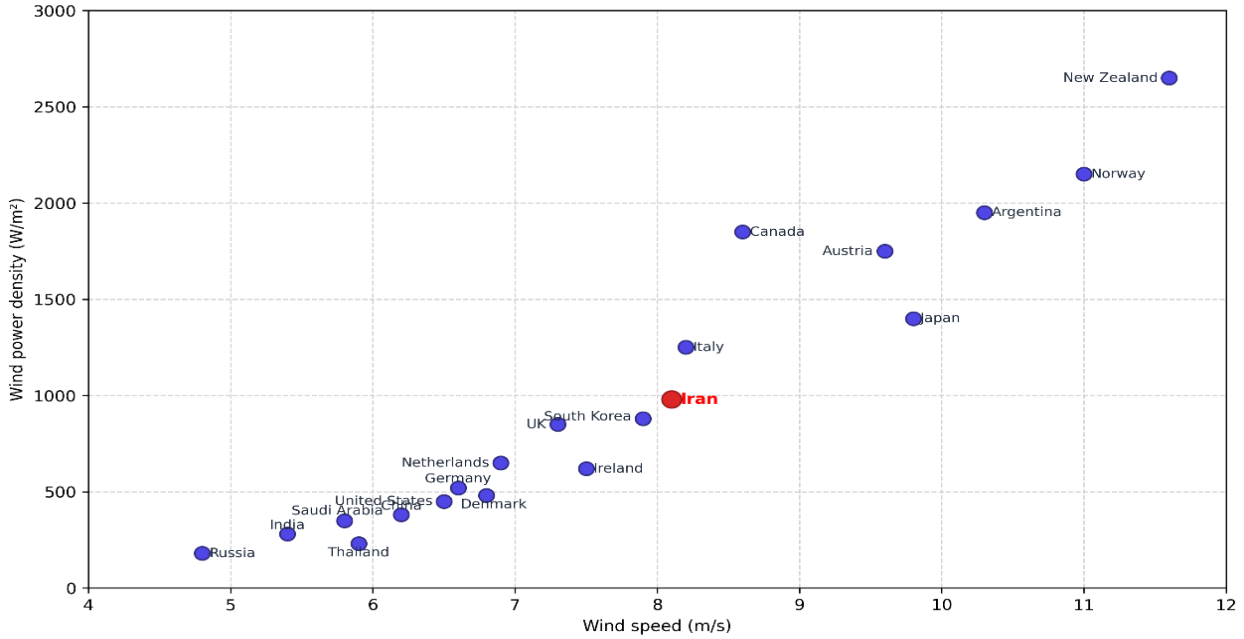


Chart 2. Comparison of wind speed and wind power density in selected countries

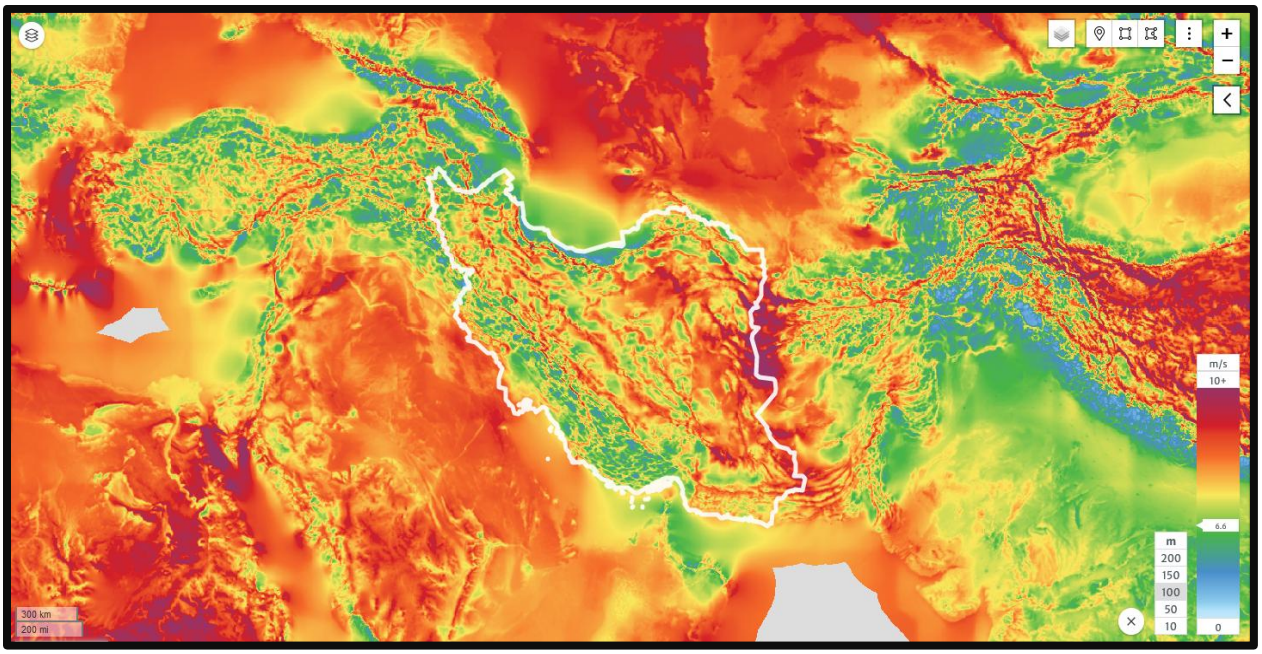


Figure 2. Wind energy potential in Iran

2.1.3. Solar and wind potential indicators: Iran and regional countries

A comparative review of solar and wind potential indicators for Iran and regional countries, based on Tables 1 and 2 below, indicates that Iran has promising capacity for developing renewable power plants. In solar energy, the country's average daily photovoltaic output is 4.99 kWh per kW of installed capacity, placing Iran fourth among the countries reviewed, after Oman, Saudi Arabia and the UAE, in the "High" potential class. In wind energy, a wind speed of 8.41 m/s and a wind power density of 744 W/m² place the country in the "Excellent" wind class; on power density, Iran ranks second among the countries reviewed, after Afghanistan. Overall, these indicators confirm the country's considerable capacity to exploit both solar and wind resources and its relatively stronger position in wind power density.

Table 1. Solar energy potential in Iran and neighbouring countries

Rank	Country	Average daily PV output (kWh/kWp)	Solar class
1	Oman	5.18	High
2	Saudi Arabia	5.17	High
3	UAE	5.02	High
4	**Iran**	**4.99**	**High**
5	Afghanistan	4.97	High
6	Qatar	4.91	High
7	Syria	4.89	High
8	Lebanon	4.79	High
9	Iraq	4.78	High
10	Pakistan	4.67	High
11	Turkmenistan	4.36	Moderate
12	Turkey	4.27	Moderate
13	Armenia	4.05	Moderate
14	Azerbaijan	3.8	Moderate

Table 2. Wind energy potential in Iran and neighbouring countries

Rank	Country	Wind speed (m/s)	Wind power density (W/m²)	Wind class
1	Afghanistan	9.47	953	Excellent
2	**Iran**	**8.41**	**744**	**Excellent**
3	Azerbaijan	7.8	702	Excellent
4	Armenia	7.77	677	Excellent
5	Turkmenistan	8.48	664	Excellent
6	Syria	8.37	641	Excellent
7	Oman	8.5	614	Excellent
8	Pakistan	7.87	606	Excellent
9	Turkey	7.31	535	Very good
10	Lebanon	7.13	522	Very good
11	Iraq	7.88	493	Good
12	Saudi Arabia	7.91	453	Good
13	Qatar	7.11	347	Moderate
14	UAE	6.91	310	Moderate

2.2. Latest Installed Capacity Statistics

Iran's installed renewable capacity by technology is presented in Table 3. According to the latest published assessments, total installed renewable capacity in the country reached about 6,151 MW by October 2026. Solar power plants account for the largest share with 5,619.1 MW, followed by wind power plants with 371.6 MW, small hydro with 112.8 MW, turbo-expanders with 25.6 MW and biomass with 22.13 MW.

Following the attack on Iran by Israel and the United States, disruptions arose in the equipment supply chain, parts imports, international shipping, foreign financing, currency transfers and the performance of technology contracts, and some projects were delayed or faced higher costs. Even so, renewable power plant development did not halt. On the contrary, the strategic importance of diversifying the electricity supply mix, reducing

dependence on fossil fuels, increasing grid resilience and managing the electricity imbalance under sanctions and war made renewable capacity development a more immediate priority. Accordingly, the largest capacity additions took place in this period, and the construction and commissioning of solar and wind power plants accelerated noticeably.

An examination of the development trend shows that from the beginning of 2025 to October 2026, about 4,000 MW was added to the country's renewable capacity. Despite the trade and logistical constraints caused by the war, this trend shows the focus of policymakers and investors on renewable energy sources as a component of national energy security.

Given the direction of the government's macro policies in supporting renewable development, facilitating domestic financing, prioritising equipment supply and strengthening domestic manufacturing capacity, the growth in capacity is expected to continue towards the 30,000 MW target. A review of completed projects also shows that most of the development to date has been in megawatt-scale power plants, particularly grid-connected solar power plants. By contrast, rooftop solar systems and small-scale power plants have expanded more slowly and need more effective support policies, simpler licensing procedures, and micro-financing mechanisms.

Table 3. Installed renewable capacity by technology type, October 2026

Technology	Capacity (MW)
Solar	5,619.1
Wind	371.6
Small hydro	112.8
Turbo-expander	25.6
Biomass	22.13
Total (MW)	**6,151**

Source: SATBA (Renewable Energy and Energy Efficiency Organization)

Chart 3 shows the growth in capacity brought into operation, with an exponential increase evident over the last three years.

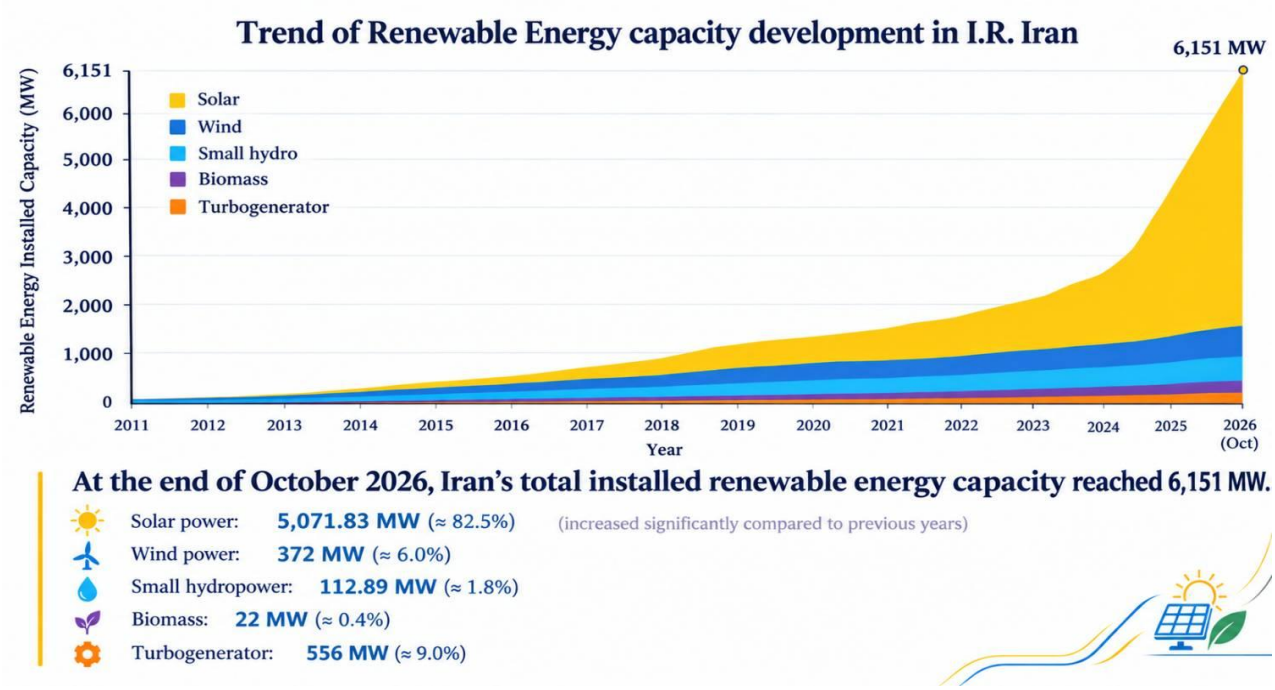


Chart 3. Cumulative capacity of renewable power plants, 2011–2026 (Source: SATBA)

2.2.1 Installed capacity by province

The provincial distribution of installed renewable capacity in Chart 4 shows that a significant share of capacity is concentrated in a few provinces. According to the data provided, Markazi Province ranks first with 1,015.25 MW, followed by Isfahan and Yazd with 687.33 MW and 604.95 MW, respectively. East Azerbaijan, Kerman and Razavi Khorasan follow with 415.10 MW, 379.69 MW and 368.32 MW, respectively. By contrast, Ilam, Mazandaran, Kermanshah and Lorestan have the lowest installed capacity among the country's provinces. This difference indicates an unbalanced distribution of renewable capacity across the country; explaining its causes and assessing the potential for development in lower-capacity provinces, however, requires examining energy resource conditions, grid infrastructure and the investment situation in each province.

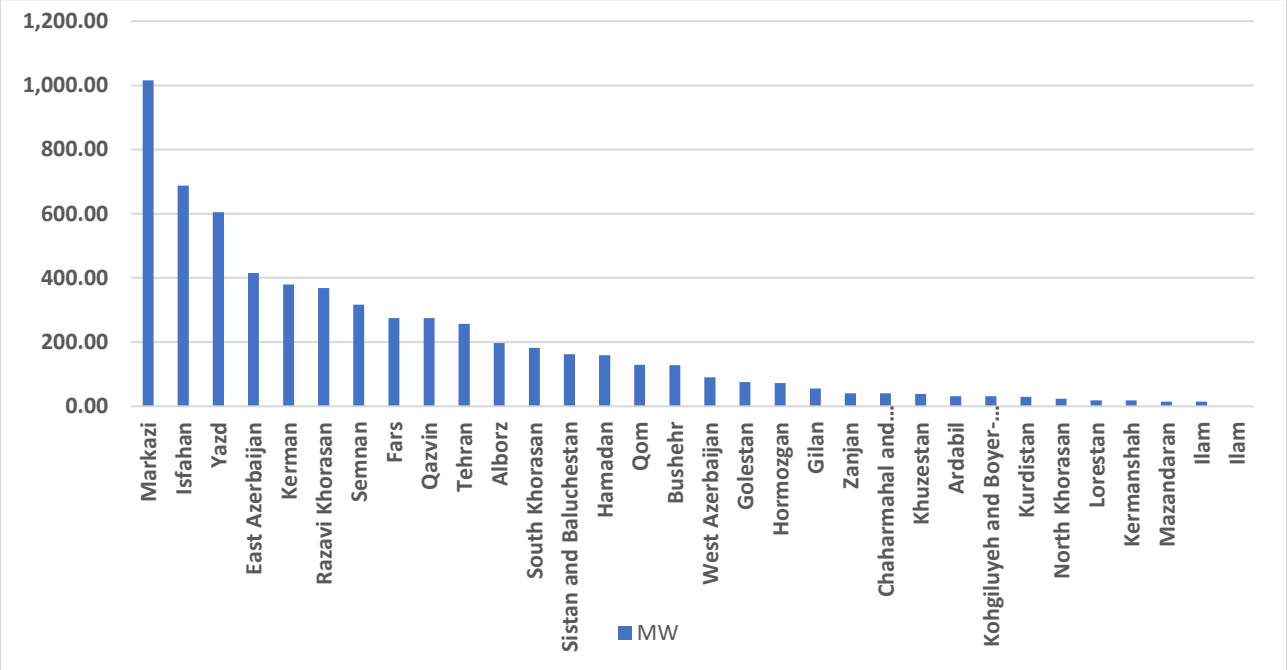


Chart 4. Installed renewable capacity in Iran by province (MW)

2.3. The Role of Renewable Energy Development in the Energy Transition and in Reducing Iran's Greenhouse Gas Emissions

Renewable energy development is one of the pillars of diversifying Iran's electricity generation mix and of strengthening the link between energy security and environmental considerations. According to the statistics provided for this report, the country's installed renewable capacity has reached 6,151 MW. This capacity reflects the measures taken to expand electricity generation from renewable sources and can provide a basis for further developing these sources within the country's energy supply structure. Figure 3 gives an overview of the reported achievements and the effects associated with the development of these power plants.

Where renewable generation displaces fossil-fuel generation, it can help reduce fuel consumption and avoid part of the power sector's greenhouse gas emissions. Depending on the technology and the type of power plant displaced, reductions in water consumption and in air pollutant emissions are other potential benefits of this development. However, the extent to which these effects materialise depends on the actual generation of the power plants, operating conditions and how they are integrated into the power grid; installed capacity alone is therefore not a sufficient basis for determining the amount of emissions reduction.

From this perspective, renewable development, in addition to increasing generation capacity, is part of the transition towards a more diversified, lower-emission energy supply structure. Continuing on this path, together with improved energy efficiency and upgraded grid infrastructure, can enable more effective use of the country's solar and wind resources.

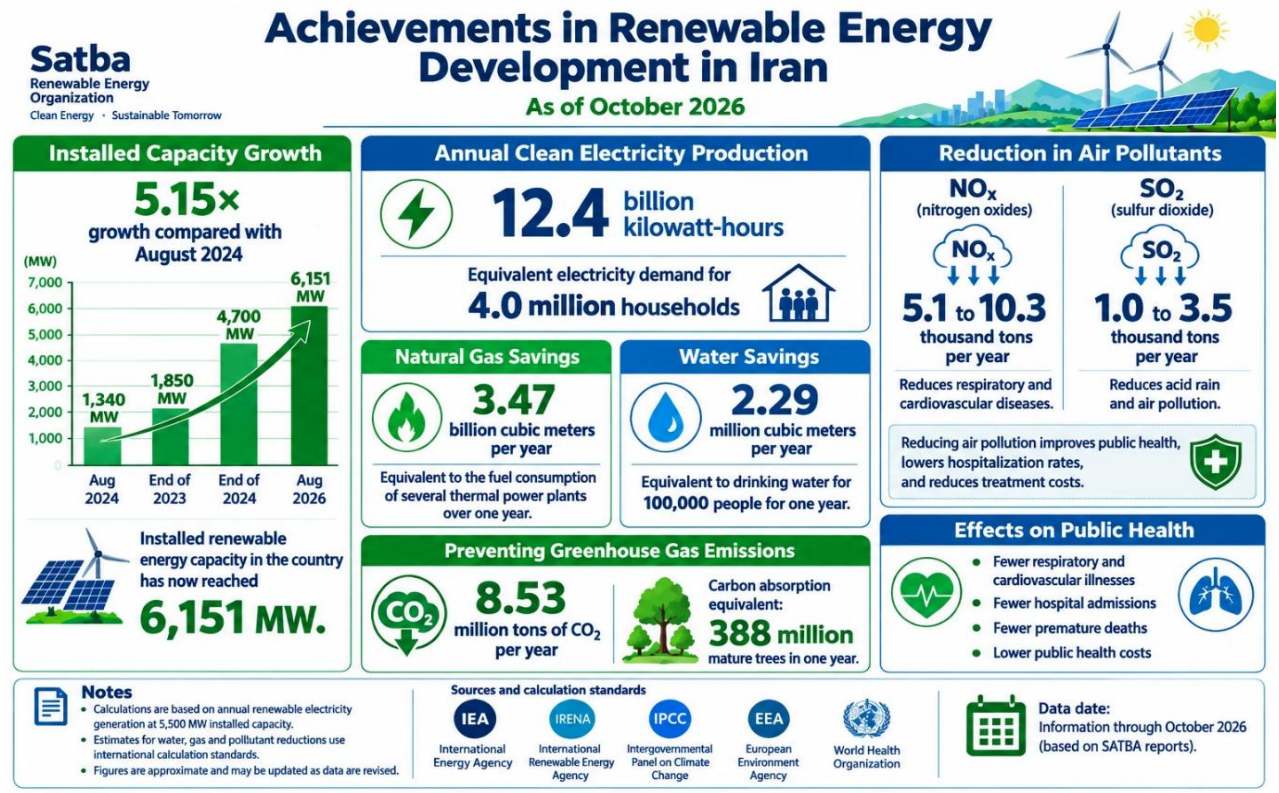


Figure 3. Capacity and environmental achievements of Iran's renewable energy and their role in reducing carbon emissions (October 2026)

3. Renewable Energy Development Policy and Its Impact on the Market

Since 2015 (1394), guaranteed purchase of renewable electricity has been the first incentive policy in the renewable energy market, backed by the Energy Consumption Pattern Reform Law (Article 16). This mechanism was a turning point in the development of the country's renewable power plants and opened the way for domestic and foreign investors at megawatt scale. In the first period, the guaranteed purchase of electricity and incentive tariffs were the main drivers for constructing solar and wind power plants. Gradually, however, as ceilings on allocated budgets tightened, the government's financial capacity for guaranteed purchases declined and the energy imbalance

worsened, the need to redesign the governance and financing model of this sector became increasingly clear.

As the energy imbalance has intensified, the need for stable electricity supply has grown, the need to reduce dependence on fossil fuels has become pressing and greater attention has been paid to environmental considerations, renewable energy policymaking in Iran has entered a new phase. Within this framework, energy governance approaches have gradually moved from a sole focus on expanding generation capacity towards creating a legal foundation, reforming electricity market mechanisms, facilitating private-sector participation and designing diverse financing and investment methods.

This change of approach can be seen in upstream laws and programmes, including the Knowledge-Based Production Leap Law, the Seventh Development Plan Law and regulations related to renewable power plant development. The approval and communication of new regulations in 2026 (1405), including the Regulation on Removing Barriers to Renewable Power plant Construction and the Executive Regulation on Developing Electricity Trading on the Energy Exchange, also reflect efforts to facilitate project implementation, expand trading mechanisms and enable broader investor participation.

In this new environment, renewable energy development is no longer only a technological or environmental matter. It has become one of the pillars linked to energy security, the continuity of economic activity, the management of the electricity imbalance and investment in the country's infrastructure. This importance became even more evident after the attack on Iran by Israel and the United States and the resulting disruption to equipment supply chains, equipment imports, international shipping, foreign financing, money transfers and the performance of technology contracts. Despite these trade and logistical restrictions, renewable power plant development did not stop; rather, the need to increase grid resilience, diversify energy sources and reduce dependence on fossil fuels made the development of this capacity one of the strategic priorities of national energy policy.

On this basis, supportive policies and legal requirements, together with electricity sales mechanisms, contractual models and financial instruments, play a complementary role in the formation of new projects. The shift from guaranteed purchase towards Energy Exchange trading, power purchase contracts with large buyers, the development of self-supply power plants and energy-intensive industries, and the use of private-sector capacity shows that the financing model for renewable development has moved away from sole reliance on the government budget and towards more diverse, market-based models.

Figure 4 presents a conceptual framework of the main drivers of renewable energy development and of investment models in Iran. Two main categories can be distinguished in this framework. The first is supportive laws and incentive policies, which strengthen demand for renewable energy by creating requirements, incentives and new opportunities. The second is investment and project-delivery models, which provide the route for turning this legal and policy capacity into operational projects.

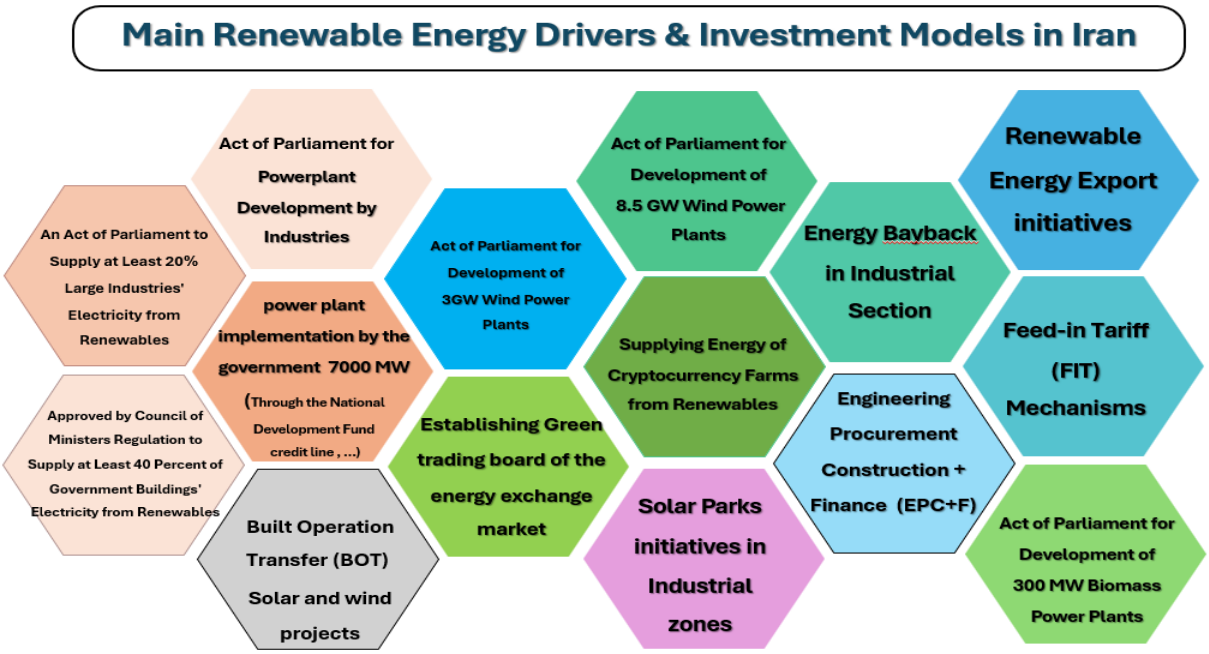


Figure 4. Governance framework, supportive policies and investment models in the development of Iran's renewable energy

3.1. Supportive Laws and Incentive Policies

The supportive laws and incentive policies for renewable energy development in Iran comprise a set of clean-electricity supply requirements, power plant-construction obligations and financial support for project delivery. On the one hand, by creating demand for renewable electricity, this set of measures enables the participation of large consumers and executive bodies; on the other, through capacity-development obligations and financial backing, it drives the delivery of new projects. On this basis, the four main axes reflected in Figure 4 can be examined as: "requiring industries to supply renewable electricity", "renewable electricity supply by executive bodies", "power plant development by industries", and "advancing power plant projects with government support and National Development Fund resources". These axes reflect simultaneous attention to strengthening demand and developing generation capacity.

3.1.1. Requiring industries to supply part of their electricity consumption from renewable sources

Creating statutory demand in the industrial sector is one of the tools for developing Iran's renewable electricity market. Article 16 of the Knowledge-Based Production Leap Law obliges industries with a power demand above one megawatt to supply the equivalent of one percent of their annual electricity requirement by building renewable power plants, with this share rising to at least five percent by the end of the fifth year. Industries subject to the requirement to buy electricity on the Energy Exchange may also meet the prescribed share from renewable electricity offered on that market. If the obligation is not met, the covered share of their electricity consumption is calculated and charged at the renewable electricity tariff. This mechanism provides a legal basis for developing self-supply power plants and increasing industrial demand for renewable electricity.

From an investment perspective, the importance of this requirement lies in linking renewable power plant development to the needs of industrial consumers. Supplying clean electricity, besides fulfilling a legal obligation, can become the basis for defining dedicated projects and commercial relationships between electricity producers and consumers.

3.1.2. Requirement for executive bodies to supply renewable electricity

Expanding the use of renewable electricity in the public sector is another axis of the country's supportive policies. According to the Tehran Electricity Distribution Company, a new resolution of the Supreme Energy Council, communicated on 5 January 2026 (15 Dey 1404), raises the renewable electricity supply share of executive bodies covered by Article 5 of the Civil Service Management Law from 20% to 40%. Under the published explanations of the resolution's implementation, covered bodies must, from the beginning of 1407 (March 2028), supply the equivalent of 40% of their 1406 electricity consumption from renewable sources.

This obligation extends the scope of renewable electricity demand from industry to the public sector and strengthens the basis for planning clean-electricity supply for the buildings and facilities of executive bodies. The role of the public sector in this framework is therefore not limited to policymaking: executive bodies also participate, as consumers, in developing the renewable electricity market.

3.1.3. Obligation of energy-intensive industries to develop power plant capacity

The obligation on industries to build power plants should be distinguished from the requirement for them to supply a percentage of their electricity from renewable sources. Under Article 4 of the Law on Removing Barriers to the Development of the Electricity

Industry, the covered energy-intensive industries are obliged to build, from their own internal resources and by the end of 2025 (1404), at least 9,000 MW of thermal power plants with an efficiency of at least 55% and 1,000 MW of renewable and clean power plants. The scope of this provision is therefore not limited to renewable power plants; it covers the development of a range of electricity generation capacities.

The importance of this provision lies in bringing large industrial consumers into the development of electricity generation infrastructure. In the renewable sector, this obligation can underpin power plant projects with industry participation. However, the capacity set in the law and the deadline for implementation should not be treated as equivalent to capacity actually delivered; assessing the performance of this policy requires examining the actual operating status of projects.

3.1.4. Advancing the programme to build 7,000 MW of solar power plants with National Development Fund support

Alongside the obligations on industry and executive bodies, using National Development Fund resources to support solar power plant development is one of the axes of financial support for the industry. According to the Director General of SATBA's Office of Economic Studies and Financing, speaking in June 2026 (Khordad 1405), the programme to build 7,000 MW of solar power plants is being pursued on the basis of an Economic Council resolution and with the participation of the National Development Fund. Under the announced model, the Fund finances the foreign-currency needs of the project up to 80% of the investment cost, with a minimum of 20% contributed by the applicant.

On this basis, the title "power plant development led by the government with financial support from the National Development Fund" describes this axis more accurately, because delivery of the programme does not simply mean construction and direct state ownership; it also includes the participation of non-government investors and implementers. The 7,000 MW capacity should likewise be presented as the capacity of the supported programme, not as completed or commissioned capacity.

Overall, these axes show that support for renewable energy development in Iran combines requirements on consumers to supply clean electricity, participation by industry in building power plants and financial support for development projects. The effectiveness of this framework depends on coordinated implementation of the obligations, regulatory stability and the availability of operating infrastructure. Investment models and project development mechanisms, as the operational route for using this legal and supportive capacity, are examined next.

3.2. Development of Investment Models

Investment routes in Iran's renewable power plants have diversified, moving away from exclusive reliance on guaranteed electricity purchase, with the expansion of industrial electricity supply methods, electricity trading on the Energy Exchange and fuel-saving-based mechanisms. Alongside guaranteed-purchase contracts under Article 61 of the Energy Consumption Pattern Reform Law, routes such as industrial energy swaps, electricity offered on the Energy Exchange's Green Board, and projects under Article 12 of the Law on Removing Barriers to Competitive Production and Improving the Country's Financial System are now available. This diversity increases the ability to choose a project's economic structure to suit the type of investor, the end consumer and the method of selling electricity.

For a more precise analysis, it is necessary to distinguish three complementary dimensions: "project development and delivery models", "capacity development programmes" and "electricity sales and return-on-investment mechanisms". The combinability of methods is particularly important in this framework: a power plant can be delivered under one specific model while using a different mechanism to sell its electricity or secure its return on investment.

A) Project development and delivery models

1. Build–Operate–Transfer (BOT)

Under the build–operate–transfer model, the investor takes responsibility for constructing the power plant and, during the contract period, recovers its investment and earns the expected return from operating the project; the asset is then transferred to the designated party in accordance with the contract. In terms of contractual structure, this model links investment, delivery and operation.

When considering this model for solar and wind projects, the operating period, electricity sales arrangements, maintenance responsibility and the terms of asset transfer must be clearly specified. The BOT label alone therefore does not indicate how electricity is purchased or how project revenue is guaranteed; the revenue mechanism must be set out in the relevant contracts.

2. Engineering, Procurement, Construction and Finance (EPC+F)

The EPC+F model combines engineering services, equipment procurement and power plant construction with financing obligations. In this structure, besides technical and delivery responsibilities, arrangements for raising and repaying finance form part of the project's contractual framework. This model must be distinguished from BOT, because

adding finance to a delivery contract does not necessarily mean handing over long-term operation or transferring ownership of the power plant to the contractor.

Assessing this method requires clarifying the investor's equity contribution, the financing terms, repayment guarantees and how the power plant will be handed over. This structure makes sense when its financial obligations are consistent with the revenue stream projected for the project.

B) Capacity development programmes and investment opportunities

3. Wind power plant development programme

The programme to build 3,000 MW of wind power plants has been one of the routes for defining investment projects in this field. According to the Director General of SATBA's Office of Contracts and Legal Affairs in January–February 2025 (Bahman 1403), the programme has Economic Council approval and, in a tender held in 2023 (1402), winners were determined for part of its capacity. This capacity should therefore be presented as a framework for project development and allocation, not as operating capacity or a stand-alone financing model.

Continuing along this path, SATBA announced in September–October 2026 (Mehr 1405) the identification and assessment of investors for about 1,230 MW of wind capacity. In this process, grid-connection feasibility, licences and site requirements are examined, and qualified investors move on to the contracting stage.

4. Solar power plant development programme

In the sources reviewed on projects under Article 12, a total capacity of 8,500 MW is attributed to solar programmes. These programmes provide a framework for defining projects and selecting investors and must be distinguished from the delivery and revenue mechanism of each project. In addition, approved or announced capacity does not in itself indicate that contracts have been signed, financing secured or projects fully commissioned.

5. Biomass power plant development

Biomass power plant development is also part of the renewable investment opportunity set, and for this technology the electricity purchase mechanism and the revision of purchase tariffs have received attention. The programmes in this area target a capacity of 300 MW.

6. Power plant development in industrial towns and zones

Specialized solar towns and zones provide a locational and operational platform for siting projects and aggregating investment demand. According to published explanations of investment models in these towns, routes such as offering electricity on the Green Board, industrial energy swaps and guaranteed purchase under Article 61 are envisaged. Locating in a solar town is therefore not a stand-alone electricity sales model; it can be combined with several economic and contractual mechanisms.

C) Electricity sales and return-on-investment mechanisms

7. Offering electricity on the Energy Exchange Green Board

Building a power plant in order to offer electricity on the Energy Exchange Green Board is one of the market-based investment routes in renewables. Under this method, electricity is sold through market trading and, unlike guaranteed purchase, project revenue depends on supply and demand conditions and trading prices. This route allows an economic link between renewable electricity producers and interested consumers; its assessment, however, must take into account price volatility, settlement conditions and trading-related costs.

8. Supplying electricity to cryptocurrency mining facilities from renewable sources

Supplying electricity to cryptocurrency mining facilities is another proposed use for investment in renewable power plants. In the explanations on solar towns, building power plants to supply such facilities is presented as permitted within the relevant regulations. This route should be examined as a mechanism for supplying electricity to a specific consumer, and its feasibility depends on the licences and rules governing the operation of both the power plant and the consuming facility.

9. Industrial energy swaps and self-supply of electricity

In the industrial energy swap mechanism, investment in a renewable power plant is linked to an industrial unit's electricity needs. According to the published explanations of this method, the electricity generated by the power plant is delivered to the grid, and the industrial unit's electricity is supplied under contractual arrangements and the relevant rules. The power plant therefore does not necessarily have to be built at the point of consumption, and the grid can act as the intermediary for delivering and receiving energy.

The economic value of this method depends, besides electricity generation, on the industry's energy supply conditions and on how the incentives related to demand management are applied. However, swaps or self-supply should not in every case be

regarded as equivalent to a business-to-business transaction, since the power plant owner and the industrial consumer may be a single legal entity.

10. Guaranteed purchase of electricity under Article 61

Guaranteed purchase of renewable electricity under Article 61 of the Energy Consumption Pattern Reform Law remains one of the investment routes in this industry. Under this framework, a power plant's electricity is purchased at approved tariffs and under approved contractual terms. Compared with purely market-based sales, this method allows a clearer estimate of the revenue base; investment appraisal, however, must also take into account rate-adjustment conditions, payment schedules and contractual obligations.

11. Mechanisms based on Article 12 and fuel savings

Projects based on Article 12 of the Law on Removing Barriers to Competitive Production and Improving the Country's Financial System provide another route to support renewable investment. The economic logic of this mechanism is to use the benefits of fuel savings to support the return on investment, and its operational terms depend on the approval and contract of each project. "Tender" or "auction" should therefore be understood as a method of selecting investors or setting competitive terms, not as fully equivalent to the Article 12 mechanism.

12. Investment with a renewable electricity export approach

Renewable electricity exports are also a route for diversifying the sales market of eligible projects. Under the framework announced when the export directive was issued in January–February 2024 (Bahman 1402), exports were envisaged for eight months of the year, with domestic needs supplied during the four hot months. The economic assessment of export-oriented projects should therefore be based on the relevant licences, time restrictions and implementation arrangements, and should not rest on an assumption of unlimited export capacity.

Table 4. presents the main advantages and risks of each contractual model, together with the target group best prepared to benefit from it.

No.	Contractual method	Advantages	Suitable for
1	Contracts under Article 61 of the Energy Consumption Pattern Reform Law	Investors are assured of selling the electricity they produce under a 20-year guaranteed-sale contract.	Individuals
		An adjustment factor reflecting currency growth and inflation is applied, based on the formula in Article 3 of the Executive Regulation of Article 61 of the Energy Consumption Pattern Reform Law.	Small companies and industries
		Producible electricity can be offered on the Energy Exchange, as physical supply or as renewable electricity generation certificates, after obtaining a licence from SATBA (if traded on the exchange, it is not possible to return to the guaranteed-purchase contract).	Companies located in specialised solar towns, industrial estates and on private land
			Projects with a maximum contract capacity of 10 MW
2	Building a power plant using the capacity of Article 12 of the Law on Removing Barriers to Competitive Production and Improving the Country's Financial System	A foreign-currency guaranteed-sale contract at a viable rate.	Legal entities with high investment capacity
		Guaranteed payback of 4 to 6 years.	
		A greater chance of obtaining foreign-currency facilities.	
		Deliverable at large capacities.	
3	Building a renewable power plant by self-supplying industries	Greater scope for financing from domestic sources.	Large industries
		Covers the obligation under Article 16 of the Knowledge-Based Production Leap Law and avoids penalty payments.	Industrial towns

No.	Contractual method	Advantages	Suitable for
	(industrial energy swap)	Receipt of smoothed (firm) electricity.	
		Access to the benefits of Article 4 of the Law on Removing Barriers to the Development of the Electricity Industry (subject to issuance of the directive under clause 9 of the Executive Regulation of Article 4).	
		Where industries build a power plant and connecting into the grid, consumption owned by the investor that built the power plant is exempt from demand management during periods of generation–consumption imbalance, in proportion to the energy supplied to the grid and using the factor stated in Resolution No. 133654 dated 09/10/1403.	
		Regarding other small industries: customers subject to consumption management during imbalance periods are exempt if they build and operate a power plant with a capacity equal to their total consumption demand (50% of the demand of single-shift units, 65% for two-shift units and 80% for three-shift units) or equivalent to 35% of monthly energy consumption.	
		An aggregated power plant can be built by a holding company to meet obligations and to deliver smoothed electricity to other industries within the holding, and a power plant can be built by several industries in the form of an economic partnership group.	
4	Offering renewable electricity on the Green Board	The sale price of electricity is received in cash.	Individuals and companies with medium investment capacity
		High electricity prices on the Energy Exchange Green Board, especially in the four months of the	Minimum power plant capacity able to offer

No.	Contractual method	Advantages	Suitable for
		year when solar and wind generation is at its highest.	electricity on the Green Board: 100 kW
		Assurance that electricity traded on the exchange is uninterruptible (not subject to cuts).	
		SATBA issues a renewable certificate in proportion to the energy generated, net of the electricity sold on the board, if all or part of the electricity offered is not sold physically by the power plant.	
		Electricity offered but not sold physically is priced, in whole or in part, at 70% of the average board price in the month of generation and paid to the supplier, before a mechanism for issuing and trading renewable certificates is established.	
		Financing is possible under a participation model with the National Development Fund.	
		SATBA's imported equipment can be used.	

Source: Iran Renewable Energy Association (2025/1404)

3.3. SATBA's vision for 2031 (1410 in the Iranian calendar)

SATBA[1]'s vision for 2031 is to raise the share of renewable energy to at least 15% of the country's installed electricity capacity, equivalent to 30,000 MW. SATBA's mission is to increase the production and use of renewable energy in the power sector through policymaking, regulation, facilitation, and management of the implementation of related projects.

[1] The Renewable Energy and Energy Efficiency Organization (SATBA), established in 2016 to improve energy efficiency and make greater use of renewable and clean sources by providing the necessary infrastructure, increasing the efficiency of energy supply and reducing losses in energy transmission, distribution and consumption, and by using renewable and clean electricity generation method.

3.4. Institutional, Financial and Social Innovations in Renewable Energy Development

Developments in renewable energy in Iran, besides the reform of laws and the diversification of investment models, have been accompanied by new market instruments, the expansion of electronic services and increased social participation. What these measures have in common is an effort to link the development of clean electricity with better administrative processes, capital attraction and the spread of its economic benefits among different groups in society. Within this framework, innovation is not limited to electricity generation technology; it also covers financing mechanisms, service delivery, and the economic empowerment of households. The launch of an energy-saving certificate market, the introduction of the "Noor" project fund, and the implementation of solar schemes for beneficiaries of the Imam Khomeini Relief Committee are examples of this approach.

A) Developing market instruments for clean electricity and energy consumption optimisation

The launch of the Energy Exchange Green Board was one of the institutional innovations in creating a dedicated market for the supply of and demand for renewable electricity. Alongside existing contractual mechanisms, this platform provides another route for selling power plant electricity and for consumers to take part in clean energy development.

In demand management, the start of energy-saving certificate trading in November–December 2024 (Azar 1403) made it possible to use capital market instruments to support consumption-optimisation projects. These certificates, which in the international literature are associated with the concept of "white certificates", differ in function from renewable electricity trading: the Green Board focuses on supplying clean electricity, whereas the savings certificate makes the economic benefits of verified consumption reductions tradable. The two instruments can therefore be seen as complementary in developing clean supply and improving energy efficiency.

B) Digitalizing the development process for small-scale power plants

The creation of "Mehrsan", the national platform for managing renewable power plants, is one of the measures taken to organize services in this field electronically. The platform provides a means of registering and tracking applications, uploading documents, and carrying out part of the processes related to renewable power plant development. The importance of such infrastructure, particularly for small-scale and rooftop power plants, lies in the ability to handle a large number of applications and to create a more coherent procedure for applicants' dealings with the responsible bodies.

Building on this approach, connecting online service platforms to the installation, financing and maintenance of household solar systems and high-efficiency equipment can be raised as a complementary axis of service development. In assessing this measure, a distinction must be drawn between services already provided and capabilities under development, since creating an electronic portal alone does not mean the service chain is fully integrated.

C) Linking solar power plant development with the empowerment of low-income households

One of the social dimensions of renewable energy development in Iran is the use of small-scale solar power plants to generate supplementary income for households supported by welfare institutions, including the Imam Khomeini Relief Committee. In these schemes, an eligible household takes part in electricity generation, and the income from selling the electricity can help support its livelihood. Published reports on the implementation of these schemes present the guaranteed purchase of the electricity produced as the basis for generating income for beneficiaries.

Besides individual power plants, a model of beneficiary participation and shareholding in larger power plants has also been proposed. In August–September 2026 (Shahrivar 1405), the head of the Relief Committee announced that a programme to build 5,000 MW of solar power plants was being pursued, with the aim of creating income for supported households and using their shareholding capacity. This programme should be presented as a future development path, not as realised capacity; even so, from the standpoint of social policy design, it reflects an effort to move from purely livelihood support towards participation in productive economic activity.

Extending this approach to other groups, including farmers and schools, could be examined within specific programmes. However, the objectives and mechanisms of these schemes must be kept distinct: providing household income, supplying electricity for agricultural activity and educational use of solar systems in schools do not serve the same function, and each requires its own appropriate evaluation indicators.

D) Broadening investor participation through the Noor project fund

The introduction of the "Noor" project fund is an example of using capital market instruments to develop solar power plants. According to information announced at the fund's launch ceremony in July–August 2026 (Mordad 1405), its project portfolio comprised 106 solar power plants in 9 provinces with a combined capacity of 500 MW. The Iran Energy Exchange also announced, in August–September of that year (Shahrivar), that the fund had been granted an admission certificate.

The importance of this instrument lies in providing a framework for pooling resources and for investors to participate in a portfolio of power plant projects. However, admission of the fund, the start of unit subscription, completion of financing, and commissioning of all projects are distinct stages, and reporting on its performance should be structured to separate these stages.

E) Developing the competency assessment system and specialized industry services

Integrated competency assessment of consultants and contractors for the design, equipment supply and construction of solar and wind power plants is one of the axes that can be raised to complete the industry's institutional infrastructure. In presenting this axis, the focus should be on the criteria for establishing competency, the scope of services covered, and how the performance of service providers is supervised, rather than simply compiling a list of active companies.

Support for businesses related to equipment testing and quality-control services can likewise be presented as another part of developing the specialized service chain. To reflect these measures in the report, the name of each programme, the implementing body, the scope of the tests and the operational status of the relevant centers need to be specified, so that a distinction is maintained between "supportive orientation" and "implementation achievement".

F) Bringing energy storage into the renewables development programme

The entry of storage systems into the power plant development programme is one of the technical developments proposed to improve the usability of renewable electricity. According to the head of SATBA's solar power plant development in July–August 2026 (Mordad 1405), implementation of a programme of about 500 MWh of storage was on the agenda, and a requirement to use storage in the grid-connection licences of large-scale power plants was also mentioned. This information reflects announced plans and requirements and, without operating reports, should not be presented as installed capacity.

At the same time, the development of household solar systems equipped with hybrid inverters and batteries has also been raised in SATBA's announced programmes. This direction reflects greater attention to the link between generation capacity development, storage and grid resilience.

Overall, innovations in this field can be classified along four axes: "developing market instruments", "digitalizing services", "expanding financial and social participation" and "upgrading technical infrastructure". Presented together, these measures give a picture that goes beyond growth in installed capacity and show that renewable development also depends on creating institutions, services and forms of participation suited to the expansion of the industry.

4. Investment Opportunities in Iran's Renewable Market

Iran's renewable power plant development programme offers significant opportunities for attracting capital in power plant construction and related services. Based on the estimates in Table 5, the financing corresponding to the 30,000 MW target capacity is estimated, on this report's cost assumptions, at about USD 24 billion; taking existing installed capacity into account, about USD 19 billion is needed to complete the path to this target. These figures depend on the mix of technologies, unit construction costs and the scope of costs included in the table, and should be interpreted within the assumptions of this report.

To make an initial assessment of the investment's economic attractiveness, two indicators are examined: the dollar-equivalent price of electricity traded on the Energy Exchange Green Board, and the payback period of a sample 10 MW power plant. The first provides a picture of the trading value of renewable electricity over the study period; the second shows the relationship between investment cost, revenue and operating costs for the sample project. The results of this assessment depend on the project's technical and economic assumptions and should not be generalised directly to all power plants.

Chart 5 shows the dollar-equivalent price of electricity trades on the Green Board over the period studied. The Green Board is one of the market-based routes for selling renewable electricity and for commercial links between producers and consumers. Legal requirements to

supply renewable electricity can support demand in this market; however, trading prices depend on supply and demand conditions, and their continuation or increase in the future is not certain. The economic assessment of the sample power plant should therefore be carried out under different scenarios for the electricity sale price, the exchange rate, construction costs and financing conditions.

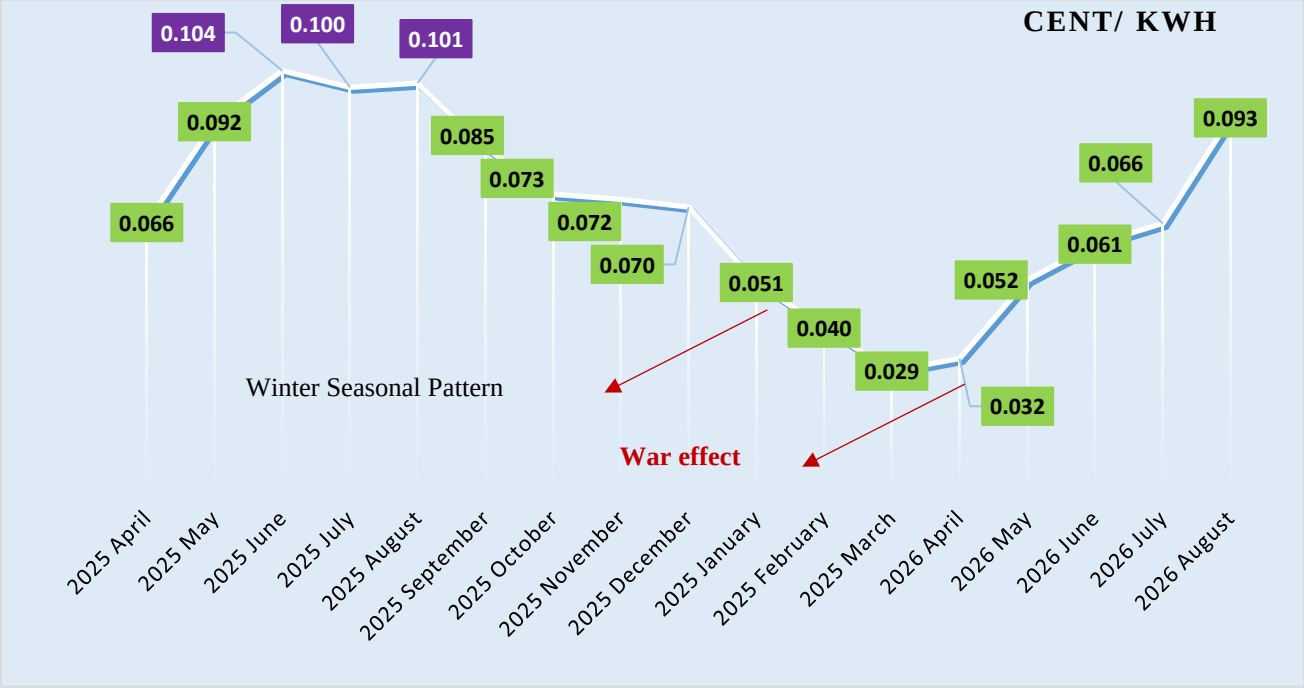


Chart 5. Dollar price of electricity sales on the Energy Exchange Green Board (Source: Energy Exchange and calculations by the Iran Renewable Energy Association)

As Chart 5 shows, except for the three-month period in which US attacks began and the second wave of Israeli attacks against Iran took place in March 2025, the dollar price on the Energy Exchange Green Board was around 6 US cents in all months and rose above 10 cents in the hot months. In the period after the war, despite reduced demand caused by damage to industrial units and lower industrial electricity demand, the price quickly returned to its upward path. Allowing for price differences arising from the effect of seasonal patterns on demand and price, these statistics still indicate an attractive market for selling renewable electricity in Iran.

The second indicator is the payback calculation for a sample 10 MW solar power plant, which reflects the attractiveness of this investment. The economic feasibility results for a 10 MW solar power plant show:

Table 6. *10 MW SOLAR POWER PLANT IN IRAN*

10 MW SOLAR POWER PLANT

PROJECT ECONOMIC & TECHNICAL SUMMARY | IRAN

A proposal-ready summary of the project assumptions and headline financial indicators shown in the source infographic.

1. KEY ECONOMIC RESULTS

IRR	NPV	Static Payback	Dynamic Payback
22.6%	**USD 3,348,263**	**4.6 years**	**5.8 years**

2. CORE PROJECT PARAMETERS

Parameter	Value	Parameter	Value
Installed capacity	**10 MW**	Capital cost	**USD 400/kW**
Debt financing	**75%**	Interest rate	**8%**
Loan repayment period	**5 years**	Construction period	**1 year**
Tax exemption period	**5 years**	Tax rate	**25%**
Annual O&M cost	**USD 80,000/year**	Capacity factor	**20%**
Project lifetime	**25 years**	Degradation / performance figure*	**99.3%**
Equity discount rate	**15%**	Project discount rate	**9.75%**
Exchange rate	**1,500,000 Rials/USD**	Feed-in tariff	**USD 0.068/kWh**

3. CASH FLOW & PROJECT VALUE

The source infographic presents a 25-year cash-flow profile: an initial negative investment followed by progressively increasing positive annual cash flows. Exact annual cash-flow values are not legible/provided in the source image and are therefore not reproduced here.

4. EXPECTED PROJECT BENEFITS

Clean energy
Generation of electricity from solar resources.

Lower emissions
Contribution to reducing emissions compared with fossil-based generation.

Energy security
Diversification of the electricity supply mix.

Economic growth
Support for investment, project development and associated economic activity.

Alongside the favourable environment for attracting foreign capital to build renewable power plants, the import needs for renewable equipment along Iran's transition path also create a market for international renewable equipment manufacturers. The estimated size of this market is given in Table 7.

Table 7. ESTIMATED IMPORT REQUIREMENTS IN IRAN

ESTIMATED IMPORT REQUIREMENTS

FOR RENEWABLE ENERGY EQUIPMENT IN IRAN

Planning basis: development of 24,000 MW of renewable energy capacity

1. EQUIPMENT REQUIREMENTS BY TECHNOLOGY

Equipment category	Associated generation capacity	Technology
Solar PV modules	**14,000 MW**	Solar
Solar inverters	**14,000 MW**	Solar
Wind turbines	**7,000 MW**	Wind

Interpretation: The capacities above describe the renewable generation capacity associated with each equipment category, as stated in the infographic; they are not equipment quantities or monetary import values.

2. ESTIMATED REMAINING CAPACITY AND MEDIUM-TERM ALLOCATION

Total remaining capacity	Medium-term solar allocation
24,000 MW	**16,000 MW**
Solar: 16,000 MW	**Wind: 8,000 MW**

In calculating the figures in the table, domestic equipment production capacity has been deducted from total equipment needs for developing 24,000 MW of renewable power plants

5. Expectations of International Organizations and the Global Community

Despite Iran's high solar and wind potential, renewable energy development faces obstacles such as limited access to technology, difficulty obtaining equipment and capital, and technical challenges in grid connection. From the private sector's perspective, what is expected of international organizations and the global community is less general promises or large, impracticable programmes than **specific forms of cooperation that help power plants to be built and operated better**.

The first proposal is to launch regular programmes for **transferring practical knowledge and experience**. These could be run with the participation of Iranian developers, equipment manufacturers and international experts, and could cover topics such as power plant design, selecting equipment suited to Iran's climate, reducing generation losses, maintenance and power plant performance management. Technical visits to successful projects, training of Iranian instructors, and publication of practical guidelines in Persian and English would be more effective than public conferences.

The second proposal is cooperation on **preparing several investable pilot projects**. For example, an international body could work alongside private Iranian companies to prepare or review technical studies, risk assessments, financial models and standard contract documents for several specific solar and wind power plants. The result of this cooperation should be

projects on which an investor or equipment supplier can make a decision, not merely reports that never reach implementation.

The third proposal is to form technical working groups on **connecting power plants to the grid**. Sharing experience in forecasting solar and wind generation, managing generation variability, the economic use of storage and grid-connection standards can help solve real project problems. Cooperation on equipment testing and certification and on after-sales service training would also improve the quality of domestic production and extend the useful life of power plants.

On equipment supply and finance, international organizations can also be required to help identify **transparent, regulation-compliant channels** for cooperation between Iranian and foreign companies, including clarifying contractual requirements, equipment warranties, technical services and permitted payments. Transparency in this area is more useful to companies on both sides than vague financial promises.

Finally, renewable energy development and carbon emission reduction **know no borders**. Reducing dependence on fossil fuels and expanding clean electricity generation in Iran form part of the shared global benefit of tackling climate change. Practical cooperation with Iran's private sector in this field should therefore not be regarded as merely a domestic matter; it is an opportunity to achieve a goal whose positive effects reach all countries.

6. The Long History of Renewable Energy in Iran

For thousands of years, Iran has created early examples of renewable technologies through the ingenious use of water, wind and sun, from the water mills of Shushtar and the windmills of Nashtifan to the qanats and wind catchers of Yazd. Below, each case is given a paragraph, a title and an image.

6.1. The Shushtar water mills — about 1,500 years ago

The historical hydraulic system of Shushtar in Khuzestan is one of the most brilliant examples of harnessing the kinetic energy of water in Iran's history. With a dam, tunnels, canals, and artificial waterfalls, the system channelled water from the Karun River to turn the wheels of mills and produce flour, an application similar to the idea used today in hydroelectric power plants to convert water energy into electricity. Its roots go back to the Achaemenid period and Darius the Great in the fifth century BC, and its present form was largely completed in the Sasanian period; the site is inscribed on UNESCO's World Heritage List.

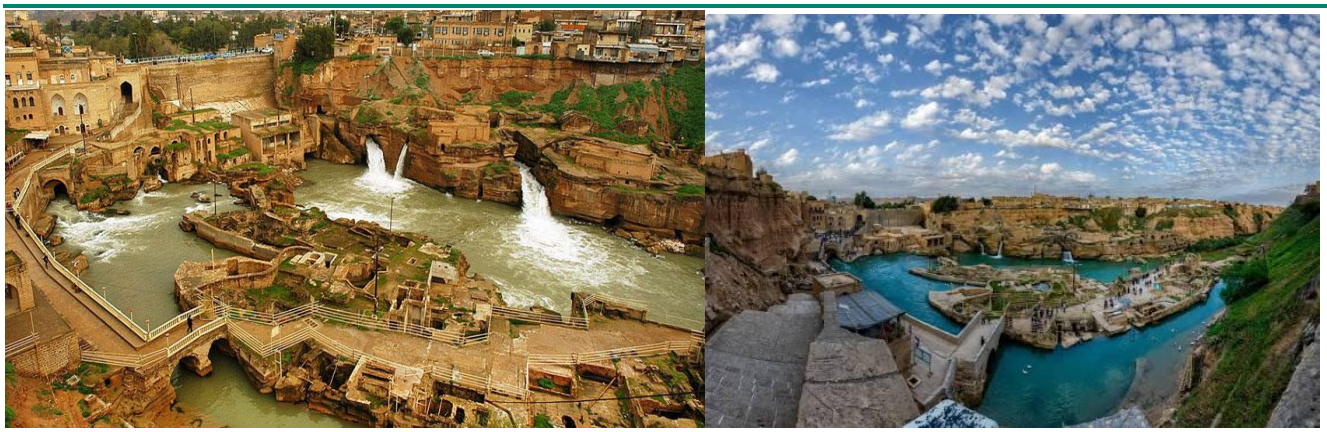


Figure 6.1. The historical water mills and hydraulic system of Shushtar

6.2. The Nashtifan windmills (Asbads) — the early Islamic centuries

The Asbads of Nashtifan in South Khorasan are among the oldest known windmills in the world and a living example of converting wind energy into mechanical work. Unlike European windmills, these mills have a vertical axis, and their wooden and reed-matting blades turned millstones to grind grain in the region's strong winds. Their design is generally attributed to the early Islamic centuries, around 500 to 900 CE, and some of these mills remained in operation until recent times.



Figure 6.2 The traditional windmills (Asbads) of Nashtifan

6.3. Qanats — sustainable water management underground

The qanat is an indigenous Iranian technology for accessing groundwater: gently sloping channels that use gravity to bring water from underground aquifers to the surface and to agricultural areas, without pumps or fossil-fuel energy. The system spread from Iran to many arid and semi-arid regions of the Middle East and the Mediterranean and is recognised as a sustainable, low-consumption technology. The qanats of Yazd are also part of the city's historical water supply system and contributed to the World Heritage listing of the historic city of Yazd.



Figure 6.3. The underground channel of a qanat in Iran

6.4. The wind catchers of Yazd — ventilation and cooling with wind energy

Wind catchers are towers that direct airflow into a building and draw hot air out, providing natural ventilation and indirect cooling without electricity or air conditioning. The oldest wind catchers of Yazd date to the fourteenth century CE, but the origin of this architecture is attributed to about 2,500 years ago and the Achaemenid Empire. Wind catchers often worked together with qanats so that air passing over water would be cooled further, an ingenious combination of wind energy and water management.



Figure 6.4. Traditional wind catchers in the historic fabric of Yazd

6.5. The Parthian battery — a controversial example of ancient electrochemistry

The "Parthian battery", or Baghdad battery, refers to a set of clay jars containing an iron rod and a copper cylinder, found in Mesopotamia in a period close to the Parthian era. If an acidic solution such as vinegar or grape juice had been placed inside them, they could have produced a weak voltage; whether they were actually used as an electrical source, however, has no definitive historical proof, and some researchers consider their use to have been more for preserving objects or for ritual purposes. It is therefore better to present it as "a possible and controversial example of ancient electrochemical technology", not as a proven precursor of today's batteries.



Figure 6.5. The Parthian Battery.

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