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PERSPECTIVE

The new government took office during the scorching heat of August, and now more than ever, it requires robust energy diplomacy and significant foreign investments in this sector. The fourteenth administration needs to know that resolving the energy imbalance issue, particularly in residential and industrial sectors, demands strategic planning and investment in energy fields. This includes developing gas fields, increasing power plant capacity, adopting renewable energy sources, and employing modern technologies for energy consumption optimization and resource efficiency.

On July 22, Mostafa Rajabi-Mashhadi, the CEO of Tavanir Company stated that the heatwave in some Iranian cities has been unprecedented in 50 years, causing a substantial increase in electricity consumption, reaching critical levels. He said that for every one-degree increase in temperature, electricity consumption rises by about 2,000 megawatts. Consequently, over 4,000 megawatts of additional power demand have been recorded due to the extreme heat. To supply electricity to people, many industrial and manufacturing sectors have had to shut down during working hours.

Energy Ministry analyzing ways to solve electricity shortage challenges

Power plants' nameplate capacity and electricity consumption

As of late July, Iran's installed power generation capacity reached 93,000 megawatts, with an annual production of 380 billion kilowatt-hours. Of this, 84% comes from thermal power plants, which rely on natural gas for 81% of their fuel. Thus, Iran faces dual energy imbalances in both gas and electricity sectors. Over the past five years, annual electricity consumption has risen from 259 billion kilowatt-hours in the

Iranian year of 1397 (ended March 20, 2019) to 333 billion kilowatt-hours in the last year which ended March 19, 2024, marking a 28% increase. Last Iranian year, industrial and residential sectors accounted for 36% and 31% of total consumption, respectively. The highest recorded electricity demands this year reached 77,514 megawatts, and peak daily power usage hit 1.6 billion kilowatt-hours.

Critical conditions

The rising demand for electricity in Iran continues amid serious concerns, as Hassanali Taqizadeh, the chairman of the Power Producers Syndicate of Iran warned of an 18,000-megawatt electricity shortage. "Without solutions in the next five to seven years, significant social and economic crises are expected in Iran," he said on July 18. Taqizadeh blamed flawed policies by the Ministry of Energy and projected that if left unaddressed, this figure could reach

27,000 megawatts, or one-third of the country's electricity consumption, within a decade. The economic loss for industries during last Iranian year was estimated at over 100 trillion tomans (\$1.5 billion), and this year, the figure could exceed 150 trillion tomans (\$2.3 billion). These losses stem from industries halting production, declining efficiency, increased costs, equipment damage, and lost market opportunities.

Future energy deficits

Experts warn that shortages in gasoline, oil, gas, and electricity will likely intensify, potentially turning Iran from an energy exporter into an importer. Despite significant potential for renewable energy, with up to 3,200 hours of sunshine annually and 24 windy regions, Iran has only achieved a meager 2% renewable energy share compared to the global average of 35%, which is projected to rise to 50% by the end of this decade. Currently, 92% of Iran's electricity comes from thermal plants, while renewable energy contributions remain minimal. Although the former Iranian administration aimed to establish 2,600 megawatts of wind and solar power, less than 2% of that target was realized.

Roots of deficit

The roots of Iran's energy crisis trace back several decades. Mismanagement, international sanctions, and inadequate investments in energy infrastructure have exacerbated the situation. During the 1980s and 1990s, priorities centered on rebuilding war-damaged infrastructure, with efforts to expand power generation and gas networks. From the 2000s onward, foreign investments and modern technologies were pursued, yet sanctions and bureaucratic hurdles persisted. The past decade has seen worsening energy deficits amid intensified sanctions, internal policy missteps, and declining oil revenues. While governments tried to boost efficiency and promote renewables, inadequate funding and poor management limited success. Meanwhile, neighbors like Turkey, the UAE, Qatar, Saudi Arabia, and Iraq attracted foreign investment, while flawed domestic policies in Iran foiled similar efforts.



Need for foreign investment

A lack of investment in power generation has led to continued electricity imbalances. On March 30, Robert Beglarian, a former Iranian MP who has served as a member of Iranian Parliament's Energy Committee highlighted that resolving the 12,000 to 15,000-megawatt shortage

would require building 30 combined-cycle power plants (500 MW each) at a total cost of €8-9 billion. Without adequate investment by 2035, Iran could face severe crises affecting both power and gas sectors, including refinery and gas extraction challenges, he warned.

Proposed solutions

- 1 Reforming the energy market structure along with establishing an independent electricity regulator and involving the private sector
- 2 Expanding electricity exchange with neighbors
- 3 Increasing generation capacity by adding 2,000 MW yearly to meet demand
- 4 Upgrading gas power plants by adding 5,000 MW to steam sectors to increase efficiency and reduce environmental impact
- 5 Facilitating private sector electricity exports for off-peak days
- 6 Ramping up renewables with increasing renewable energy share from 1% to 20% within five years and investing in high-voltage direct current (HVDC) transmission technology
- 7 Distributed electricity generation by building plants of 5,000 MW in industrial zones to reduce transmission losses
- 8 Accelerating implementation of agreements between energy and industry ministries for enabling industries to construct power plants and sell excess electricity
- 9 Upgrading distribution networks with replacing aerial wires with self-supporting cables and refurbishing substations
- 10 Promoting efficiency through collaboration with engineering bodies to enhance building and appliance standards
- 11 Installing more smart meters across the network
- 12 Providing accurate and detailed data on power production and limitations

Power stations fuel mix and constraints

Currently, 85% of thermal power stations in Iran use natural gas, 9% use diesel, and 6% use mazut. In contrast, the US utilizes a more diverse energy mix. Iran exports less than 1% and imports under 2% of its total electricity needs.

As electric vehicle presence in Iran grows, an additional 10,000 MW in capacity will be required. This year, consumption management mainly involved limiting industrial usage, causing significant losses to the sector. Iran's electricity consumption per GDP is inefficient, with electricity-intensive peaks for roughly 300 hours annually, demanding reserve power solutions.

