

# Chapter 8

## **Expanding the Electrical Sector**

Most people living in industrialized countries can scarcely imagine what life was like before the advent of electricity. In modern Saudi Arabia, there are still those who vividly remember when water was pumped by hand, when illumination was provided by kerosene lamps, and when the many conveniences we associate with a modern society (air conditioning, refrigeration, washing machines) were simply not there.

Until the end of the 1960s, only urban areas in Saudi Arabia had electricity. This began to change when increased revenues enabled the Saudi government to invest heavily in expanding the reach and improving the reliability of electrical power. Ghazi Al-Gosaibi, as minister of industry and electricity, oversaw much of this early expansion, but when he stepped down from the ministry in 1983, the task of bringing electricity to all parts of the country passed to Abdulaziz Al-Zamil, who not only understood the importance of electrification in improving the everyday lives of Saudi citizens but also saw its central importance for the industrialization of the country.

Not surprisingly, as minister of electricity, Al-Zamil worked incessantly to build Saudi Arabia's electrical power system. He recalls, "There was never a dull moment. Problems and new challenges were constantly emerging. Building a supply of electricity spanning the country is a big job by itself, and working as minister for electricity tested me every day." To succeed, Al-Zamil needed to increase capacity, connect networks, improve efficiency, adjust prices, educate consumers, and create systems and processes to ensure uninterrupted electrical service.

## Electricity Comes to Saudi Arabia

Electrification first came to Saudi Arabia in the form of scattered power stations serving small geographic areas. Some businesses generated power for their own use and sold the excess to neighboring houses and streets. In 1949, Saudi businessmen established the Kingdom's first private electricity company in Dammam; in the following years, more than one hundred small commercial companies and cooperative projects popped up.

In the 1950s, electrical power gradually came to the urban centers of the country (such as Mecca, Jeddah, and Ta'if) and to the royal palace in Riyadh, yet the Saudi government still did not consider electricity a public service it was obliged to provide. It left the job of supplying electricity to small private companies and cooperatives that sold power at prices dictated by the costs of production. From time to time, the government intervened to regulate price, but that was all.

In 1961, the Saudi government finally created the Department of Electricity Affairs and made it part of the Ministry of Commerce. Initially, this department's role was largely regulatory—issuing permits and licenses to companies. It also encouraged investment in power generation. However, in the background was a growing realization that Saudi Arabia needed to modernize, and to that end, the government would have to find a way to expand access to low-cost electricity. In November 1963, a policy was instituted that cut the price of electricity to industry and in various cities. To support this changed price structure, the government was compelled to provide subsidies to private power companies.

These modest actions did little to transform the electricity sector into a system that could support the modernization of the country. Voltage was not standardized; coverage was patchy; service was unreliable; and outages were so frequent that hospitals and factories relied on their own generators. The situation led the government to assume an ever greater role. In the early 1970s, it further reduced the price of electricity for industry and ordinary consumers, and it increased subsidies to power companies and guaranteed them a fixed profit of 15 percent. Most important, the government began to acquire shares in various power companies.

From 1975 onward, as part of its huge effort to modernize the country, the Saudi government would assume an increasing role in the electrical power industry and would work to create a uniform, reliable, nationwide electrical power system. In 1976, the Ministry of Industry and Electricity established the General Electricity Corporation (GEC), which set about creating major regional electrification programs. Al-Zamil recalls,

**When the Ministry of Industry and Electricity was created in October 1975, access to electricity was still very spotty, unable to support the Saudi Arabia we envisioned in the future. The cabinet**

**decided it was time for the government to play a larger role. The GEC was formed to bring about a national electrical power system.**

Minister Ghazi Al-Gosaibi selected Mahmoud Taiba, who had served as undersecretary for electricity within the Ministry of Commerce, to head the GEC. Taiba was “one of the most dedicated Saudis in the whole power sector,” remembers Al-Zamil. “I always deferred to him in electricity matters. I very much respected his expertise with regard to electrification and the electrical power industry. With Taiba at the helm of GEC, and with electricity now strongly coupled with industrialization, a far-reaching program of expanding and rationalizing electrical power began to be rolled out.”

The aim was to consolidate the electricity industry under semigovernmental organizations in the eastern, southern, central, and western regions of the country. These organizations in their turn were wings of the Saudi Consolidated Electricity Company (SCECO). Starting in 1976 with the formation of SCECO-East and continuing in 1979 with SCECO-South and subsequently Centre and West, these regional SCECOs were providing electricity to their areas by 1981. The GEC became directly responsible for supplying electricity to “outlying regions,” those rural areas not covered by the consolidated companies. Taiba became chairman of SCECO-East and later SCECO-West.

Al-Zamil believes “the consolidation of fifty-six small companies into four large SCECO operations initiated by Dr. Al-Gosaibi was a very important development.”

**These consolidated entities were created in order to make electricity affordable to everyone. The Ministry of Industry and Electricity realized that small local companies could not bear the burden of the huge investment that expansion entailed. The ministry could barely meet the demand for electricity that existed in 1975, and it could not provide power to the huge industries, the industrial cities, the schools, the medical sector, and so on that were emerging. The minister knew they did not have the capital needed. Only the government could come up with the billions of dollars required for really large power plants, transmission lines, and substations.**

Al-Zamil remembers there was a lot of resistance to the consolidation process:

**The only way to get private companies to merge was to give them a generous offer: three shares in the new company for each share they owned. The acceptance rate was somewhere between 95 and 98 percent. Merging required a great increase in capital, which the government supplied. As a result, the government became the majority owner, holding almost 80 percent of the shares in the consolidated companies.**

The government expanded its role in the electrical power industry in order to tackle the job that the private companies were unwilling or unable to handle. This expansion was not motivated by a desire to limit the involvement of private capital in the power industry, as is indicated by the fact that the government did not nationalize the private electricity companies. Instead, the government underwrote increases in the companies' equity capital so they could expand their capacity to generate electricity to meet growing and anticipated demand. In the process, the government acquired the vast majority of the equity in these firms and transformed them into state-owned entities.

As part of the SCECO consolidation, electricity companies were required to sell electricity far below cost, and in exchange, they were guaranteed a profit and received access to low-cost fuel. Al-Zamil remarks,

**The owners of the electricity companies received a very sweet deal. The government guaranteed them a 15 percent profit. To keep electricity costs low for individuals and businesses, the government had to subsidize the companies. This made up the difference between how much it cost to produce a kilowatt of energy and how much that kilowatt cost the consumer.**

In 1983, subsidies rose considerably, in part to compensate for the high cost of installing diesel generators that provided electricity to isolated rural areas. Increased subsidies also made up for the enormous use of electrical power to irrigate farmland, which the government encouraged in an effort to make Saudi Arabia more self-sufficient in food production.

In 1970, just over two hundred thousand customers in the country were paying for electricity. By 1980, this number had more than quadrupled. Consolidation of the electrical power industry took time, but the establishment of SCECO laid a solid foundation for a reliable supply of electricity to hundreds of towns and villages throughout the country. Government policies

in the 1970s and 1980s made electricity extremely affordable and more accessible. This encouraged industry to grow and enabled more people to benefit from such modern conveniences as air conditioning, television, and kitchen appliances. In 1983, a New York Times writer described how a village of three thousand people only twenty miles from Riyadh had been without electricity until just two years before. “Today, villagers proudly display their televisions, toasters, and other accouterments of an electrified society.”

When Al-Zamil took charge of the Ministry of Industry and Electricity in 1983, the framework for a modern electrical power system was in place. To achieve ambitious national development goals, however, Al-Zamil’s ministry still had much to do. It had to expand the supply of electricity, improve service, increase reliability, and hire and train more Saudis to work in the power sector. Also, in the long run, it had to base the electrical power industry on a sustainable business model. This meant rationalizing spending, adjusting subsidies and rates, encouraging energy conservation, and ultimately setting the stage for greater private investment in the electrical sector. These were the goals that Al-Zamil would focus on over the next twelve years.

## Building Supply

To expand the supply of electricity in Saudi Arabia, Al-Zamil updated existing power plants and commissioned new ones. In 1985, SCECO spent \$333 million to construct a 1,200-megawatt power plant and two 600-megawatt steam-driven turbines at Qurayyah on the Gulf. Expansion in the Jeddah-Madinah-Rabigh triangle was carried out in 1989, with Pakistan’s National Power Construction Company building transmission lines and a Japanese joint venture between Hitachi and Nichimen constructing substations. SCECO-West commissioned a doubling of the capacity of its power station at Rabigh, and SCECO-Central chose Hyundai Engineering to build almost 360 kilometers of transmission lines, linking substations. Such measures made it possible to expand the generation of electricity, which throughout the 1980s grew at a rate of almost 25 percent per year.

In 1990, SCECO added substations at Tihama, Buraidah, Al-Khuff, and Jizan. It expanded power-generation plants at Khaf, Qassim, Riyadh, and Qurayyah. Surprisingly, the Gulf War caused only minor disruption for the power industry. For example, it led Japanese workers to leave the plant in Rabigh, forcing the postponement of a tender for the power plant there.

SCECO implemented a major new scheme in 1991, bringing electricity to some three hundred villages south of Ta'if and along the Yemeni border. The following year, the ministry announced that a huge plant was to be developed between Jizan and Abha, which would have an initial capacity of 1,000 megawatts. SCECO Central began implementing a plan to link substations in Riyadh and Kharj with smaller units north of the capital. By the start of 1994, some seventy-seven plants were producing electricity across the country, and the government was plowing \$5 billion into expansion projects to meet demand.

Such expansion depended upon a parallel increase in manpower. In accordance with Saudi National Development Plans, this meant hiring and training Saudis to work in the electricity sector. Al-Zamil undertook this task with great eagerness, and he carried it out with great success. When he had come to office, there were eighteen thousand workers in the electricity sector. Within a decade, that number had more than doubled, with Saudis making up over 75 percent of the workforce. Al-Zamil notes,

**We had very well-coordinated manpower development training centers in all four regions of the country. We recruited employees from all four to SCECO, which had the ability to provide housing and incentives. SCECO was attractive as an employer: people liked that the jobs were available all over the country, not just in one place, so that they could stay close to their home communities.**

The expansion of capacity and manpower led to a dramatic increase in the supply of electrical power. In 1979, the power generated and sold was still less than 10 billion kilowatt hours, but by 1984, it had risen to 30 billion; it reached 50 billion in 1989 and was 75 billion in 1994. More important, the number of subscribers increased from eight hundred thousand to over three million, and more than 6,500 towns and villages were linked to the power grid. During Al-Zamil's tenure as minister, access to electricity was

made available to almost the entire country. This was truly an astonishing accomplishment.

## Rising Expectations

Much to Al-Zamil's dismay and frustration, the great achievements of the Ministry of Electricity in increasing the supply of electrical power, expanding access, and improving service could not keep pace with the rising expectations of the Saudi public. As a result, the Ministry of Industry and Electricity often found itself on the firing line.

**The electricity sector took about 70 percent of my time as minister. People were always finding fault. If there was a service interruption for a short period of time, they complained. If there was a half-hour outage, you would read about it in all the press, but no one would mention that the ministry had provided electricity the other twenty-three-and-a-half hours of the day.**

**We made impressive strides in improving and expanding service, but this did not gain much attention from the media or the public. We would complete a major project, costing hundreds of millions, providing electricity to an area that had previously been without power. This would go largely unnoticed, but when there were power interruptions in two or three villages, it was all over the newspaper. When people don't have power or if they feel they are paying too much for electricity, they complain.**

Al-Zamil had recruited Abdelaziz Al-Gwaiz to serve as CEO and chairman of SCECO-Central. Diligent in his duties, Al-Gwaiz willingly devoted an enormous amount of time to his post, noting, "When you are given such important responsibility, you must prove yourself worthy of the task." In the end, however, intense public attention to the occasional power failure eventually drove this devoted public servant to opt for a quieter life. "I resigned for the simple reason that the job was absorbing all of my time and attention. I had no time for anything else. There was no escaping the job. When you are

CEO of a national power company, if something goes wrong, the emir calls you at midnight and asks, ‘Why is the power down?’ It was frustrating.”

King Fahd took a particular interest in expanding coverage and improving efficiency. “It was a challenge to deliver power to new territories,” recalls Al-Zamil, “but the king’s words urged me to deliver power to every house.”

**What concerned the king most was attending to the needs of the public and being able to provide services to key sectors at critical times. He always mentioned this. In every cabinet meeting, he strongly emphasized the importance of providing services to the public. He didn’t comment on the industry part of my duties, not even once, because we excelled in this area. We were the source of good news.**

**Luckily, electricity was doing relatively well, much better than other services, such as water, telecommunications, or wastewater. The king was very happy when he knew we were starting to provide electricity to a new rural area, but he was disappointed whenever he received complaints from villages with no power. Once we were on a tour to the villages on the border with Yemen. Those on Yemen’s side were lit up, but the ones on our side weren’t.**

**That was because the government had not agreed to increase rates charged to the public for electrical power, so we did not have the capital needed to expand access to certain areas. When the king learned of this, he instantly gave us 340 million riyals credit to provide power to these villages, and we did provide power, even though there was a downward trend in the economy.**

Every time a major power failure occurred, it was Al-Zamil, as minister of electricity, who had to take responsibility and act. His biggest challenge came in 1989, in the northern city of Sakakah in the Al-Jawf region:

**One of the production units failed, and the city was left with no power. I was on vacation in the south of Arabia, where I have a summer home in the mountains, when I received a call from Governor Taiba, who told me that we had a power outage in Al-Jawf. The whole city had a blackout. There were two generators, and when one went down, the second generator could not handle the load. Al-Jawf went completely dark.**

I arranged to fly out there with Governor Taiba. We stayed in the guesthouse of the power station. It turned out that there was a problem with the rods of the turbine. People were working hard to make repairs, but the only place to get replacement rods was from the company in the Eastern Province. It had spare parts, but transformer cores are extremely heavy, and these rods were about the length of a room. We had to put them on a trailer, and that meant it would take at least twenty-two hours before they reached Al-Jawf.

We kept the king informed the whole time. He was very understanding. “If you need any military aircraft or transportation to carry the parts, you can have it,” he said. We explained we were working on the problem. We spent three days with the technicians, trying to bring power back on line. We also made sure that standby generators at hospitals and other key areas were working. We had to calm people. Through the press, we told them what was happening and why the blackout had occurred. We explained that these things happen, even in places like New York City, where people once went many hours without power.

In part to reduce the possibilities of power failures, the Ministry of Electricity created a power grid that linked all parts of the country. Al-Zamil explains,

The blackout in Al-Jawf really convinced me and Governor Taiba that the time had come to connect all parts of the country with all of the power-producing stations. Because the north was not connected to such a grid, when the station in Al-Jawf went down, the city was totally without power.

After the Al-Jawf failure, we focused on the task of connecting the different regions, something we had wanted to do for over a decade. Creating such a power grid was a major effort. We connected the east with the center; then the central area with the north (Qassim) and with western cities such as Mecca, Jeddah, and Ta’if; then the west with the south.

Like other government ministers, Al-Zamil was committed to rationalizing expenditure.

**Connecting the regions saves a lot of money. If you have four generators in Riyadh, three in the east, and two in the west, you don't need to work all of them all the time. You see where the cost is low, and you only use those generators until peak time (12:00 to 4:00 p.m.). That way, you increase the efficiency of production and reduce your cost.**

Al-Zamil commissioned a feasibility study to examine the merger of all four SCECOs, setting in motion the establishment of the Saudi Electricity Company: today it is Saudi Arabia's major power company. He participated in discussions about connecting the electrical power systems of all the countries of the GCC. This would have saved the government more than \$3 billion annually. In fact, the Sixth Development Plan (1995–2000) called for “a regional integrated network, linking our national network with those of neighboring countries.” This scheme was based on economic agreements that had been reached in 1981 and relied on a study that had been conducted in collaboration with the King Fahd University of Petroleum and Minerals.

## A Better Business Model

An important challenge Al-Zamil faced was devising a sustainable business model for the Saudi electrical power industry. As already noted, the price charged to Saudi consumers for their electricity did not cover the costs of production. This was possible thanks to government subsidies to the electricity companies. As long as the Saudi government enjoyed revenue surpluses, as it did in the second half of the 1970s and in the early 1980s, such subsidies were not very burdensome; but when government revenues fell as they did toward the middle of the 1980s, the practice of subsidizing the electricity sector needed to be reexamined, especially since the demand for electricity continued to grow unabated. Responding to this situation, Al-Zamil initially sought ways to cut costs. He recalls,

**Before I even started thinking about adjusting the rates charged to consumers, I turned my attention to reducing the cost of production and maintenance.**

**The number of workers had been steadily growing; now we looked for ways to cut the workforce. By restructuring, we reduced the number of employees from 37,000 to 27,000. Most of the employees we laid off were foreigners. I reduced some nonessential employee benefits. We identified these by looking at international norms. Of course, employees continued to receive good salaries, housing, and health benefits.**

**We also started buying spare parts and consumables in bulk and storing them, which drove down costs, and we were on a constant quest for improving the efficiency of our distribution.**

A second step that Al-Zamil undertook to reduce costs was to urge consumers to conserve electricity, which was being wasted at an enormous rate. With electricity prices among the world's lowest in the early 1990s, Saudis often left their air-conditioning systems running continuously, even when away on vacation. The waste of electricity was not only prevalent in the private sector but also took place in government offices. Al-Zamil calculated that 30 percent of the electricity being produced was being wasted.

In a government-driven media blitz, Al-Zamil tried to get people to stop wasting electricity. Newspapers carried articles explaining the importance of energy conservation. Factories in Jeddah and Al-Jubail were told to install insulation in their walls and to shut down production for three hours a day; mosques were requested to turn off air conditioning between prayers. Yet the effect of this attempt to raise awareness about the need to conserve was disappointing. As Al-Zamil notes,

**Despite all of our efforts, the value of conserving electricity did not sink in. I was amazed at how supervisory boards were so scrupulous about monitoring public expenditure but didn't really think about the money lost through the waste of electricity. They made a big deal out of an employee not showing up for work, or coming in late, but never said anything if he left the lights on when he went home. Any facility has a normal average of power use, but when**

**you go way over that limit, then there is something wrong: you are wasting power and you are wasting money.**

Of course, Al-Zamil realized that cutting costs and encouraging energy conservation would not, by themselves, reduce the need for government subsidies to the power industry. Sooner or later, rate increases were necessary so that the amount consumers paid for electricity approached actual production costs. However, raising the price of electricity was a tricky political issue. Saudis had become accustomed to having all the appliances, air conditioners, and other electrical devices that were normal in a modern society. Moreover, they had grown accustomed to running all of these wonders of modern living without giving much thought to the cost of the electricity that powered them. Electricity was increasingly viewed as a “basic human need.” It was considered to be like the air we breathe; it was not something that had to be bought; or at least, it was not something that should cost a lot to have.

Persistently, Al-Zamil worked behind the scenes to persuade the government to permit gradual increases in electricity rates:

**In 1984, I created a committee made up of the highest-ranking counselors and consultants. We proved to the king that the rate consumers were paying for electricity only covered 40 percent of the actual cost of the electricity being delivered, and we needed to cover at least 70 percent.**

**We showed that the current electricity rates were not generating the revenue that permitted us to undertake development projects and provide existing service. We needed to increase the rate charged to consumers. However, the king insisted that 60 percent of the public—working-class citizens—should not be affected by any increase. We came up with a compromise. We would only increase the rate charged to customers who were using large amounts of electricity, such as people with large enterprises and stores. This the king accepted, but he would not agree to any rate increase that would affect ordinary citizens.**

**With this compromise, we were able to modestly increase the revenue to electrical companies. Consumers with small houses or apartments were not affected. However, if someone consumed a large amount of electricity, his rate went up so that it approached**

**the actual cost of production and distribution. We felt that people with large incomes, those running shopping malls or hotels, really should pay something approaching cost. It was part of my role as minister to explain rate adjustments. It was always a very sensitive and difficult public issue. But as we were not affecting the common man, it took away some of the political pressure.**

This compromise was reflected in the “basket system” the government introduced in 1984, in which medium and heavy users of electricity were charged more for their service. However, in December 1985, these changes were “substantially reversed.” A hike in prices proposed in 1992 was also shelved. “We are committed to providing every Saudi with a minimum standard of living,” explained Hisham Nazer, then the minister of planning.

After that, Al-Zamil pressed for a “five halala” fund, an idea based on adding five halalas to electricity rates. Income from this would go directly to electricity projects “without going through the bureaucracy of the treasury.”

**It took me more than two years to convince others. I was worried that this bill would not pass, but it did, and it worked perfectly. It brought in fourteen billion riyals, which helped fund projects that altogether cost more than eighteen billion. This solved a major crisis we were facing in funding production plants and distribution networks.**

For the first time in history, however, the government began to charge members of the royal family for their electricity. Al-Zamil recalls how his own son “was shocked when he found out that I paid my electric bills. He said, ‘The minister of electricity pays for electricity?!’” But the matter was clear: “There were no exceptions.” Once there had existed a list of VIPs who did not pay for electricity. Al-Zamil got rid of that list. “I said, ‘Royals don’t need free service. They always pay their bills. They can afford it.’”

At the same time, the Ministry of Industry and Electricity was also improving the system for issuing and collecting of bills. Al-Zamil recounts,

**Some people didn’t even know they had a bill due until their power was cut off. Mistakes were happening all the time, so we worked really hard on organizing this process. We trained the people who**

**were in charge of billing, and we computerized the system. We saw great improvements.**

In 1995, the government at last implemented a significant increase, raising prices for middle and heavy users of electricity and doubling prices for residential users. Commenting on this, Al-Zamil notes,

**I had complete faith in the idea that it is possible to provide citizens with good uninterrupted service and that this can be done in a way that does not burden the state or the national budget. Our efforts at rationalization drove our production costs down. Then, when we negotiated small-increase prices, they had a big impact. It was enough. The idea was that the electricity companies could use profits to start funding their own projects.**

By increasing the price of electricity, the Saudi government sought to raise more than \$500 million to be used to expand the network, finance an additional large power plant, and inaugurate other projects. By raising rates, the government also aimed to slow down the growing demand for electricity.

By then, there were three million customers, and the number was on the rise. Demand for electricity was growing three times faster than the economy. Saudi Arabia's success in petrochemicals had created a supply of raw materials for a range of industries. Land grants and the availability of interest-free financing were also factors generating growing investment in manufacturing, all of which led to an increased demand for electrical power.

Given this, and several blackouts that occurred in 1995, the government finally realized that the electrical power industry needed to function more like a real business. In fact, the rate increase of 1995 was a step toward transforming the power companies into soundly managed, unsubsidized enterprises that could evolve into viable private ventures. This was what Al-Zamil had been working to achieve for twelve years:

**My main long-term objective had always been to convert the electrical sector into a profit-making industry that was no longer dependent upon government subsidies for its survival. In the 1970s, the electricity companies were small and inefficient and were charging a high price for their product—up to sixty halalas per kilowatt—and the service they provided was not reliable. The**

**policies instituted first by Dr. Ghazi Al-Gosaibi, then by me, and eventually by my successor Dr. Hashim Yamani have created an industry that could produce and distribute electricity efficiently. By bringing rates in line with the costs of production, the electric companies could make money.**

In the coming decades, the electrical power industry of Saudi Arabia would undergo further reorganization and expansion. However, Al-Zamil would no longer have a direct role. In 1995, he had to step down as minister of industry and electricity. Taking his place was Hashim Yamani, who would ably build upon Al-Zamil's accomplishments and continue down the path that Abdulaziz had marked.

In 2000, the government instituted another rate increase and consolidated the SCECOs into one state enterprise, the Saudi Electricity Company. In 2009, the company separated horizontally into generation, transmission, and distribution companies. Today, it is operating with a net income of 3.7 billion riyals.

### Mission Accomplished

Looking back on his role in the electricity sector, Al-Zamil says,

**My biggest satisfaction was in going to rural villages that we had recently hooked up to the grid and seeing how a constant supply of electricity had dramatically improved the lives of the people who lived there.**

**Saudi Arabia is over 95 percent electrified. Even houses in the mountains and outlying areas have power. All recognized villages have power. And today, if a turbine or two go off at Qassim, even if the whole station goes off, people won't know it. They are connected to power in Riyadh. If Riyadh loses one-third of its capacity, a major portion, people won't realize it because Riyadh will get power from the east. If problems arise in one area, that area can get electricity from another area. People don't care where their power comes from, as long as they have it.**

As Al-Zamil's colleague Al-Gwaiz points out, "In the electricity sector, much was done during Al-Zamil's tenure. Expanding the network that connected the various parts of the country was a superb achievement. Amazingly, Abdulaziz

did this while also overseeing SABIC and stimulating the development of Saudi Arabia's private industry." Other tasks, such as increasing the use of solar power, Al-Zamil has left for a future generation:

**While I was minister, we talked about solar power every once in a while. We even developed a test facility in Yanbu, but something like this needs a well-structured and ambitious program. Obviously, the sun is available most of the time in Saudi Arabia. Solar power has proven itself all over the world, and our country has to give more attention to renewable energy, solar and wind. We need \$40 billion and twenty years to move to solar energy. The United States spent \$20 billion to get a man on the moon and succeeded. We need to make a similar major financial commitment to solar energy. If we do, we will succeed.**

The evolution of the Kingdom's electricity supply from 1983 to 1995 bears the hallmarks of Al-Zamil's tenacious, thoughtful approach. He prizes the quiet but rigorous implementation of improved thinking to create efficiencies and to deliver better service.

When Al-Zamil stepped down as minister, he had much of which to be proud. The workforce in the electrical sector was nearly 80 percent Saudi, and the number of households and businesses with access to electricity was more than three times greater than when he took office. "I made sure the king knew about progress in the power sector by regularly sending him reports. The greatest honor I received from the king was knowing I had his trust and faith. I never heard a single harsh word from him." He goes on to note,

**Providing electricity as we did was very important for Saudi Arabia. It put us in the ranks of the top nations. Today, the Kingdom is considered a leader in power distribution. Despite our harsh landscape, we deliver power to the vast majority of the country. Saudi Arabia's power system is one of the best in the Middle East in terms of both reach and dependability. Our grid uses the latest technology in generating and transmitting power and in the operation of substations. It is better than the grids in many European countries. Our system is dependable and efficient, and the rates are low.**

**When you build a petrochemical plant or a steel plant, it's not only the gas that matters; it's the infrastructure. Part of that infrastructure is power. Unless you have dependable power, there is no way you can operate a plant. Reliable power requires a very strong power grid. We have provided this to Saudi industry. The electrification of the country was an enormous contribution to its industrialization.**

Enormous progress was made in expanding the capacity of the Saudi power industry from 1970 to 1995. During Al-Zamil's tenure as minister of industry and electricity, power production more than doubled. In 1970, just 344 megawatts were installed, but by 1983, there were 4,000 megawatts installed. By 1995, a whopping 9,000 megawatts had been installed, showing a huge increase in output.

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