

# Residential Electricity Price Reforms: Are Different Income Groups and Regions Impacted Equally?

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## Instant Insight

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## Introduction

The government of Saudi Arabia has successfully reduced the country's energy intensity, helped by its establishment of the Saudi Energy Efficiency Center (SEEC) and a series of energy price reforms (EPR) that began in 2016. However, how households have responded to the EPR is an important matter that warrants serious consideration. The Electricity and Cogeneration Regulatory Authority's (ECRA's) "Annual Statistical Booklet 2018," released in November 2019, captures post-EPR residential consumption patterns (ECRA 2019). We take this opportunity to explore how residential electricity consumption patterns deviate across the Saudi Electricity Company's operational regions, to provide insights that we hope will be beneficial to policymakers.

## Electricity price subsidies: a double-edged sword

Saudi Arabia's substantial endowment of oil enabled the government to administer energy prices, including electricity prices, at a level below market-driven prices. Subsidies for residential electricity consumption allowed Saudi residents to allocate a smaller part of their income toward electricity bills and more to other goods and services. However, reduced electricity prices over prolonged periods can lead to several adverse outcomes.

First, it is important to note that subsidies represent opportunity costs that grow with higher consumption. The natural resources Saudi Arabia uses to produce electricity could be used for other social and economic projects that produce long-term economic gains, such as human capital development, research and development, and technological enhancement.

Second, continuously administered low electricity prices can incentivize excessive consumption. Over a long period, this can burden suppliers, which would ultimately cost the government even more as it uses more of its natural resources to satisfy this level of consumption. Though subsidies are intended to enhance citizens' quality of life, they can create market distortions, resulting in demand growing faster than would be the case in ideal market conditions.

Third, higher-income groups are more likely to benefit from subsidies than moderate- and low-income groups, because the former consumes more electricity than the latter. This creates a perverse situation in which subsidies benefit wealthier segments of society more than poorer segments that have a higher need for subsidies. In fact, Saudi Arabia's Fiscal Balance Program (FBP), an initiative of Saudi Vision 2030, the Kingdom's masterplan to achieve a sustainable and diverse economy among other targets, suggests that lower-income households benefit from only 30% of the energy subsidies (SV2030 2017). In addition, the wealth received, in the form of subsidies, by higher-income groups may not be injected back into the wider economy. As suggested by economic theory, consumption as a percentage of income varies between different income groups. Thus, lower-income groups are more likely to reinject larger portions of their subsidies back into the economy.

Fourth, reduced electricity prices dampen the demand from households for highly efficient energy products (e.g., LED bulbs). Consequently, lower demand for energy-efficient products does not incentivize businesses to supply these products.

Lastly, increasing electricity consumption is bound to have negative environmental impacts.

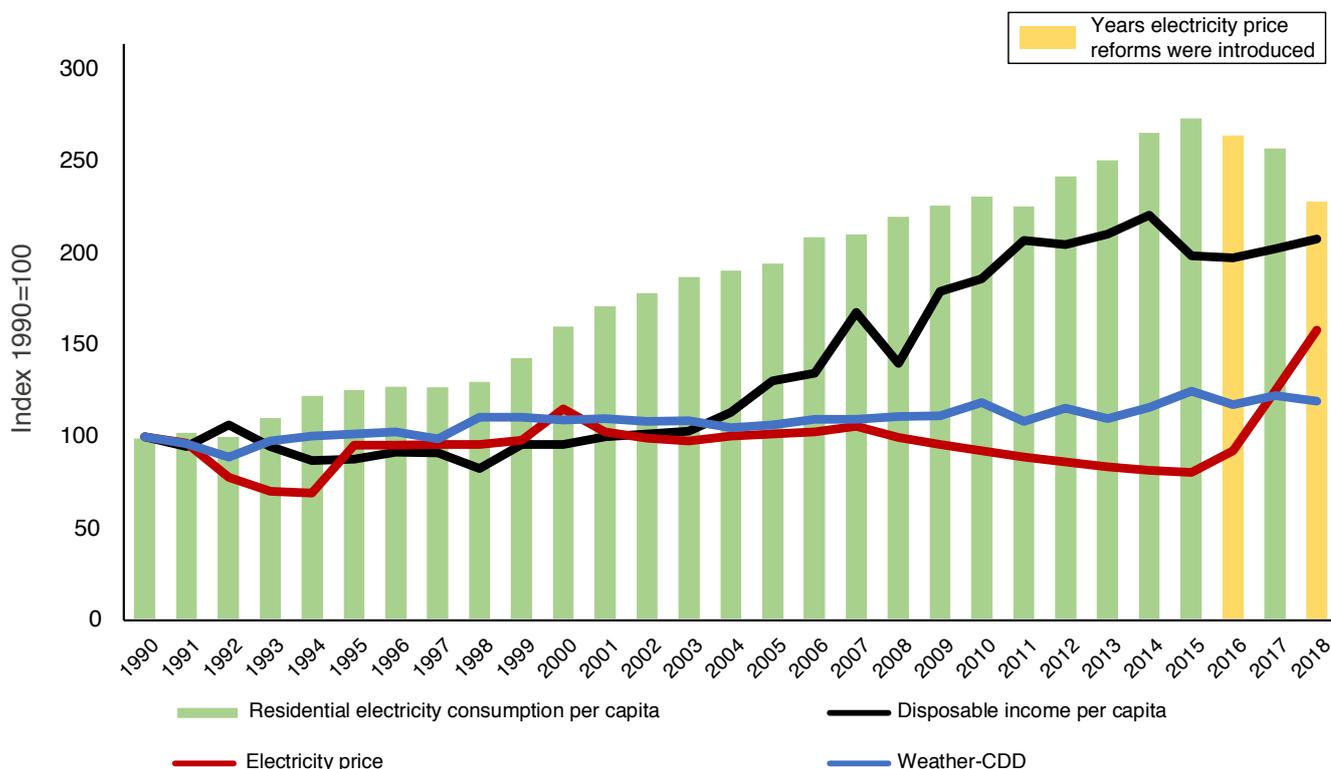
## Electricity price reforms: a policy U-turn

The EPR is an important element of the FBP. The government began gradually removing energy subsidies with the first EPR in 2016, increasing domestic prices for energy products to international reference levels for businesses and households. The government knew that the energy price increase could negatively impact citizens' socio-economic wellbeing, especially those in low-income groups. To mitigate this, it initiated the Citizen's Account Program, a mechanism that directs subsidies to low-income groups (SV2030 2017).

## Where were we, and where do we currently stand?

As discussed previously, continuously low and declining energy prices encourage excessive usage. Figure 1 shows the growth of electricity consumption per capita and its main drivers, such as cooling degree days (CDD), disposable income per capita, and real electricity prices, all indexed to 1990.

**Figure 1.** The growth patterns of electricity consumption and potential drivers, %.

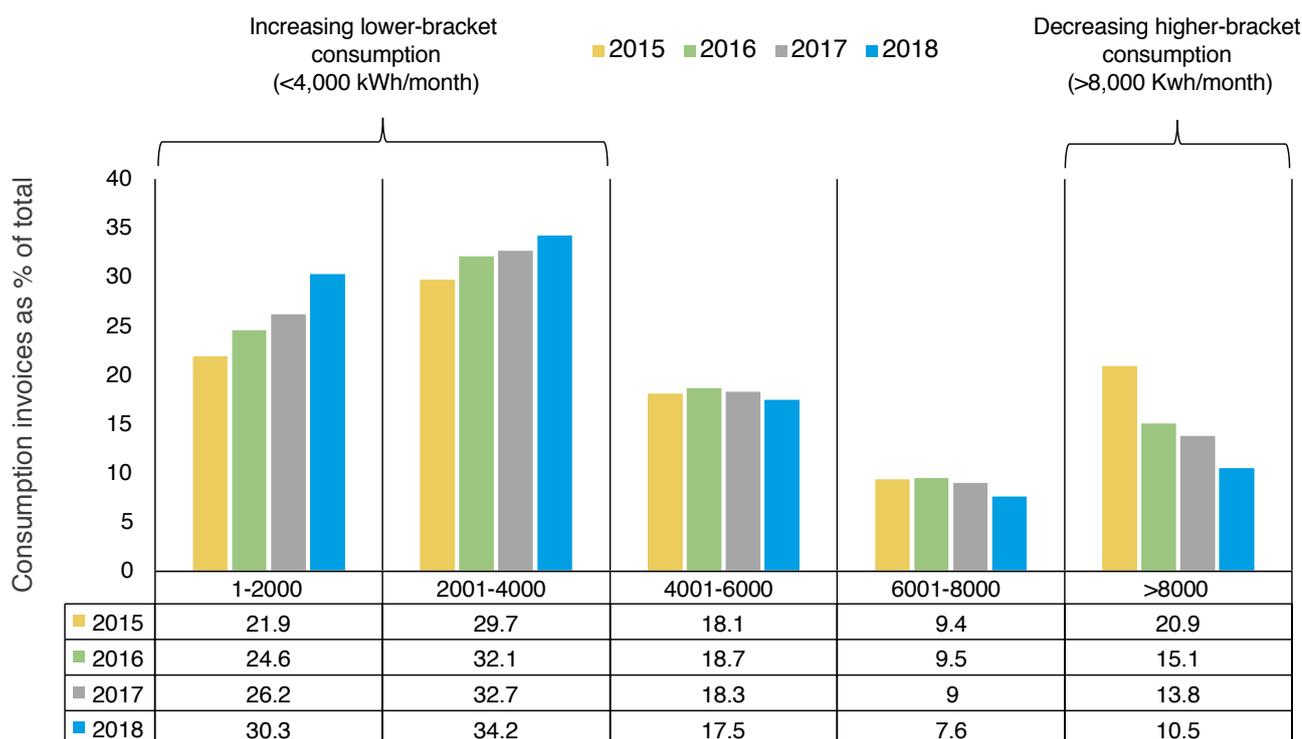


Sources: NCEI-NOAA; SAMA; ECRA.

The figure shows that, from 1990, electricity consumption growth per capita has risen significantly faster than any other indicator. Overall, real electricity prices declined from 1990-2015, before rising in 2016-2018. Due to the EPR and new energy efficiency measures, per capita residential electricity consumption fell by 17% from 2015 to 2018. This implies that the theoretical articulation of price being a determinant of consumption applies to Saudi Arabia and that the EPR was the right measure for the government to take.

The 2016 price reforms only targeted the high-consumption brackets (AlGhamdi 2018), while the reform of 2018 was applied to all consumption brackets. According to data from ECRA, electricity consumption patterns changed since 2016, indicating that the EPR was successful in mitigating the growth in electricity consumption. Moreover, ECRA’s annual reports suggest that the decrease in electricity consumption was a result of high-bracket customers (>8,000 kWh/month) moving to lower consuming brackets (Figure 2). A household energy survey published by the General Authority for Statistics (GaStat) indicates the share of households using electrical power saving devices has risen from 26% in 2017 to 36% in 2019 (GaStat 2017, 2019).

**Figure 2.** Consumption invoices – electricity consumption brackets (kWh/month).



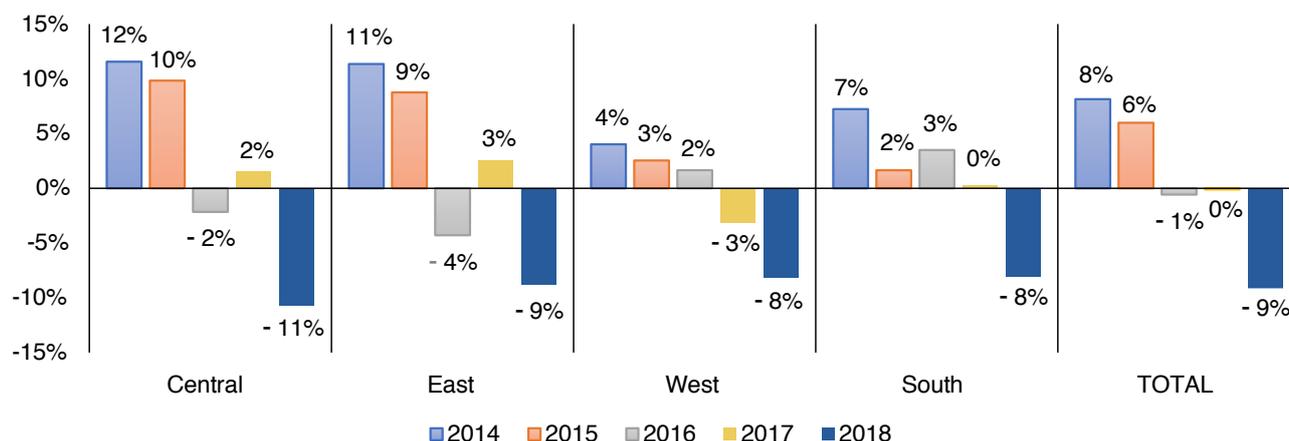
Sources: ECRA (2015, 2016, 2017, 2018).

As Figure 2 shows, the share of households consuming over 8,000 kWh/month dropped significantly from 21% in 2015 to 11% in 2018. Within the same period, a noticeable portion of consumers shifted toward consumption of less than 4,000 kWh/month.

## Are responses homogenous across regions?

In 2016, the aggregate demand in the Kingdom for residential electricity declined by about 1% (Figure 3) as a result of the combined effects of the factors displayed in Figure 1. However, the regional effects of these factors were more diverse.

**Figure 3.** Regional and aggregate annual growth rate (%) of residential electricity consumption in Saudi Arabia.



Source: SAMA.

In 2016, the central and eastern regions decreased their electricity consumption, as expected, because they contain mainly high-income groups, the main target of the EPR in 2016. In contrast, the relatively poorer western and southern regions increased their electricity consumption. This would also have been expected as these regions contain relatively lower-income groups. The differences between electricity consumption between regions are therefore driven by wealth concentrations. GaStat’s “Household Income and Expenditure Survey, 2018” shows that eastern and central regions are most likely to have many more high consumers of electricity than other regions. Thus, the aggregate electricity consumption data may mask the regional responses to the EPR, as different regions behave differently according to their predominant income levels.

The EPR of 2018 resulted in greater price rises than in 2016. However, unlike in 2016, the 2018 EPR targeted every consumption bracket, with residential electricity consumption dropping across all regions, by some 9% in aggregate.

## How could this inform policymaking?

The following points could be useful for policymakers:

- The implementation of EPR with a support package helped induce rational energy consumption and increased fiscal revenues. These additional revenues can be used to support long-term economic growth.
- In the future course of the EPR, the government may wish to consider differentiating price increases and support packages according to income levels, as income groups and, consequently, regions react differently to price changes.

While this insight sheds light on the heterogeneity of residential electricity consumption across regions and income groups, further work is required to understand the response of electricity consumption to price reforms. The KAPSARC Global Energy Macroeconometric Model (KGEMM) team is undertaking this work through investigating regional residential electricity consumption behavior in Saudi Arabia.

## References

- AlGhamdi, Abeer. 2018. "Electricity Tariff Changes in Saudi Arabia." KAPSARC Data Insight. [http://apps.kapsarc.org/insights/home?q=&idx=publications&p=0&dFR%5Bresearchers%5D%5B0%5D=ab-ee-alghamdi&is\\_v=2](http://apps.kapsarc.org/insights/home?q=&idx=publications&p=0&dFR%5Bresearchers%5D%5B0%5D=ab-ee-alghamdi&is_v=2)
- Electricity and Cogeneration Regulatory Authority (ECRA). 2015. "Annual Statistical Booklet for Electricity and Seawater Desalination Industries 2014." [https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory\\_Library/ecra%20sat\\_book\\_14.pdf](https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory_Library/ecra%20sat_book_14.pdf)
- — —. 2016. "Annual Statistical Booklet for Electricity and Seawater Desalination Industries 2015." [https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory\\_Library/ecra%20sat\\_book\\_15.pdf](https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory_Library/ecra%20sat_book_15.pdf)
- — —. 2017 "Annual Statistical Booklet for Electricity and Seawater Desalination Industries 2016." [https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory\\_Library/ecra%20sat\\_book\\_16.pdf](https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory_Library/ecra%20sat_book_16.pdf)
- — —. 2018. "Annual Statistical Booklet for Electricity and Seawater Desalination Industries 2017." [https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory\\_Library/ECRA-Statistical-Booklet-2017.pdf](https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory_Library/ECRA-Statistical-Booklet-2017.pdf)
- — —. 2019. "Annual Statistical Booklet for Electricity and Seawater Desalination Industries 2018." [https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory\\_Library/Statistical\\_Booklet2018.pdf](https://ecra.gov.sa/en-us/MediaCenter/DocLib2/Lists/SubCategory_Library/Statistical_Booklet2018.pdf)
- General Authority For Statistics (GaStat). 2017. "Household Energy Survey." [https://www.stats.gov.sa/sites/default/files/household\\_energy\\_survey\\_2017en\\_1.pdf](https://www.stats.gov.sa/sites/default/files/household_energy_survey_2017en_1.pdf)

———. 2018. “Household Energy Survey.” [https://www.stats.gov.sa/sites/default/files/home\\_energy\\_survey\\_bulletin\\_2018\\_0.pdf](https://www.stats.gov.sa/sites/default/files/home_energy_survey_bulletin_2018_0.pdf)

———. 2018. “Household Income and Expenditure Survey, 2018.” <https://www.stats.gov.sa/en/37>

———. 2019. “Household Energy Survey.” [https://www.stats.gov.sa/sites/default/files/bulletin\\_of\\_household\\_energy\\_survey\\_2019\\_en\\_1.pdf](https://www.stats.gov.sa/sites/default/files/bulletin_of_household_energy_survey_2019_en_1.pdf)

National Centers for Environmental Information (NCEI). Accessed October 28, 2019. <https://www.ncei.noaa.gov/>

Saudi Arabia Monetary Authority (SAMA). 2019. “Annual Statistics 2018.” May 2019 release. <http://www.sama.gov.sa/en-US/EconomicReports/Pages/YearlyStatistics.aspx>

Saudi Vision 2030 (SV2030). 2017. “Fiscal Balance Program.” <https://vision2030.gov.sa/sites/default/files/attachments/Fiscal%20Balance%20Program%202017.pdf>



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