

# Consumer Attitudes toward Energy Reduction and Changing Energy Consumption Behaviors

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**Abstract:** This editorial paper tackles the issue of the consumer attitudes toward energy reduction and changing energy consumption behaviors. This topic is of special relevance today as Europe faces an unprecedented energy crisis as a result of diverting from Russian supplies of oil and gas due to the war in Ukraine. For many years now, Europe has relied upon cheap and affordable Russian oil and gas (in fact, the European Green Deal and the strategy for the decarbonization of the economy by 2030 were indirectly based on it), but the transition to the renewable future now appears to be jeopardized. As energy prices are soaring globally, it is not yet clear whether this would have an effect on significantly changing consumer behavior and increasing energy efficiency and security as many consumers are reluctant to change their old habits and are used to having their energy on demand and for any possible occasion. However, changing energy consumption behaviors would be beneficial not only for handling the current energy crisis but also for setting the long-term trends with respect to energy saving, which is crucial for fighting global warming and climate change while sustaining economic growth.

**Keywords:** energy consumption; energy conservation; consumer attitudes; economic growth; emission reduction; smart grids



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## 1. Introduction

The war in Ukraine has shaken up energy markets and geopolitics, driving up the price of oil and gas to its highest levels in almost a decade and forcing many countries to reconsider their energy strategies [1,2]. Even as the war carries on, Russian oil and gas continue to flow to Western nations, even though the European Parliament adopted a resolution demanding a full embargo on Russian imports of oil, coal, nuclear fuel, and gas (which might result in Russia searching for new ways to make use of unsold fuel) [3].

For decades, Russia provided a massive inflow of cheap natural gas for the EU. Russia is one of the largest exporters of gas in the world on the global market, with its gas (as well as oil) powering Europe's economy (Europe depends on Russia for about 40% of its gas and 25% of its oil imports), and any disruption would only worsen the ongoing energy crisis that started during the COVID-19 pandemic [4–7]. The situation is especially acute in Germany, which relies on Russia for about half of its gas and coal and more than one-third of its oil [8,9].

The current slump is observed in how global oil prices have reached new heights. Since the war broke out, the global community has been responding to a major shock in prices, particularly in the energy sector [10,11]. Yet policymakers so far have been focusing on lowering energy prices and protecting households and businesses from shocks.

European governments have therefore sought to diversify supplies, buying more liquid natural gas and introducing measures to cut demand and conserve power [12,13]. Russia used to supply roughly 40% of European Union natural gas via pipelines, and these exports have been reduced by 75%; thus, when it has suspended supplies of gas that the continent has used for years to power factories, produce electricity, and heat homes, the outcomes for the European economy might be quite severe [14–16].

However, in spite of all its adverse effects, the current crisis might become a good opportunity for changing the European Union's consumer attitudes to energy reduction and altering their energy consumption behaviors. All of this might have profound implications on the link between energy consumption and economic growth, which are currently one of the most hotly debated topics in the field of energy economics and policy.

## 2. Energy Consumption and Economic Growth

The relationship between energy consumption and economic growth has long been the main focus of a plethora of research papers. For instance, Topolewski [17] analyzed data from 34 European countries (27 of which were European Union Members) during the period from 2008 to 2019 and found that the increase in production would inevitably result in a statistically significant increase in energy consumption both in the short and long run (which the reverse relationship proved to be insignificant).

Furthermore, Androniceanu et al. [18] highlighted the interdependency between economic growth and conventional energy consumption, leading to significant environmental impact. However, they also concluded that the biggest impact in terms of energy efficiency could be reached by increasing energy productivity complemented by more efficient consumption in households (thus speaking in favor of responsible household energy consumption).

In addition, Rokicki et al. [19] applied multivariate data analyses on a sample of all EU Member States between 2004 and 2018 and found that there was a clear general tendency to reduce total energy consumption, including consumption in transportation. Moreover, they found that the reduction in energy consumption in transportation depended on the pace of introducing innovative energy-saving technologies in automotive transport.

At the same time, Polcyn et al. [20] found that there was a statistically significant and positive relationship between the share of renewable energy consumption of total final energy consumption, GDP per capita, and CO<sub>2</sub> emissions per capita in European countries within the period from 2000 to 2018, pointing at the connection between the growth of renewable energy consumption and the country's economic development.

Additionally, Jałowiec and Wojtaszek [21] show that renewable energy is introduced to a greater extent as the demand for energy increases with traditional fossil fuels (especially coal) becoming more expensive with the growing share of renewable energy sources (RESs). However, they also point out that investors are only interested in investing in RESs in highly developed countries, while less wealthy countries might end up in a disadvantageous position.

With regard to the above, Myszczyński and Suproń [22] studied long-term and short-term correlations between CO<sub>2</sub> emissions per capita, energy consumption per capita, and the level of economic growth in the Visegrad group (V4) countries (which include Czech Republic, Hungary, Poland, and Slovakia), and they found long-term interdependencies (that were stronger in the short run between the energy consumption per capita and CO<sub>2</sub> emissions).

Finally, Bajan et al. [23] assessed the use of energy in the food production systems of the V4 countries and the EU-15 countries with regard to the implementation of the EU's energy targets and discovered that the share of food production systems with respect to energy use in the V4 countries was declining, while in the EU-15 countries, it remained at a stable although at lower levels (around 4%). Furthermore, they showed that implementing shares of renewable energy in the energy use of food production systems was slower for the EU-15 countries and faster for the V4 countries.

### 3. Discussion

Overall, in order to alter energy consumption behaviors, researchers need to understand how today's consumers can improve in estimating their energy consumption from various appliances, as well as the amount of energy that could be saved via the implementation of various conservation measures or energy efficiency strategies [24,25]. Continued research into how well consumers could and would estimate the power used by appliances holds some promise for informing consumers' decisions about curtailment implementations and energy efficiency behaviors. Understanding consumers' energy usage and saving perceptions and biases can surely help to inform curtailment and energy efficiency policy development [26,27]. Consumers with more accurate energy use and saving perceptions might better identify actions that conserve more energy, which is the first potential step toward behavioral change and greenhouse gas (GHG) reduction. While feedback on prior energy use patterns, either in absolute terms or relative to peers, does motivate energy conservation, the total effect on behavior is different depending on several design features. Indeed, there might be several pathways to promoting behavioral change, with certain voluntary nudge strategies changing how energy decisions are framed and presented accounting for only a marginal number of energy savings [28].

The key to changing consumers' behavior with regard to energy consumption in our difficult times might be smart grid technologies. These technologies can provide consumers with a variety of options to manage their household energy use, and providing those options in ways that are tailored to their lifestyles will become a top priority [29]. In addition, smart grid technology can help monitor, analyze, and manage energy use on a whole-home basis and for particular appliances, such as a connected thermostat for home air-conditioning units. A smart grid can digitally process the information on energy supply, demand, and usage patterns in order to route electricity effectively from a generation site to an end-user in a grid. It is also capable of learning the unique behaviors of energy-generating resources in order to optimize power generation and automatically maintaining standard voltage, frequency, and capacity factors from inputs at different points on the grid. A smart grid is one way of solving energy efficiency problems that can increase awareness among consumers with respect to the linkages between their electrical usage and the environment. It is about more than utilities and technology but a revolutionary concept that might change the status quo of the energy market [30,31].

With the technology fully deployed, smart grids can make renewable energy sources viable and empower the grid to respond to increasing energy demands that might be particularly relevant in the times of the current energy crisis. Smart grid technologies can also help make sure that power restoration is restored rapidly and strategically following emergencies—routing electricity first to emergency services, for instance. More importantly, these technologies can provide consumers with almost real-time control over their electric bills. By providing real-time energy usage information, smart technology can teach consumers to lower and optimize their energy use [32,33].

### 4. Conclusions

All in all, it appears that influencing consumer attitudes relative to energy saving and changing energy consumption behaviors might significantly impact economic growth, facilitate the wide deployment of renewable energy sources, and help European countries rid themselves of dependence on Russian oil and gas in the long run.

It appears to be important to make sure that current energy industry business models are changed so that consumers are proactively engaged in energy markets. Individual choices and behaviors are a critical consideration when using various policy tools to promote energy use that is sustainable and efficient, both for residential and commercial sectors. Novel energy efficiency policies need to be designed in order to consider the factors that affect consumer behavior, such as technological developments, overall economic conditions, age, social norms, belief systems, cultural traits, and marketing strategies. For instance, if some technologies (that are energy-efficient) are not commercially available,

then options for modifying consumption behavior in material terms are limited accordingly. The aim would be to optimize both comfort and energy conservation but at the same time to still enable consumers in regulating their access to energy according to their preferences.

Difficult times call for difficult decisions, and we are now experiencing an unprecedented energy crisis—in fact the largest one since the 1970s. Separating the price effects of the increasing energy prices and higher electricity bills from the moral support for Ukraine represents an interesting challenge. However, the question is which of these two forces would provide the greatest motivation for Europeans to start conserving energy.

Stakeholders and policymakers (both in the EU and worldwide) need to make sure that the transition to clean and decarbonized energy is not hindered by the current energy crisis. Measures need to be taken, and attitudes need to be changed in order to push today's energy consumers into becoming energy prosumers. In order to survive the energy crisis, changing energy consumption behaviors need to be implemented in order to both sustain economic growth and adhere to climate change goals.

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