5 SEPTEMBER 2022

**VOLUME 4 ISSUE 3** 

**BİLKENT ENERGY POLICY RESEARCH CENTER NEWSLETTER** 

## Can Electricity Markets Survive This Energy Crisis?

THE OTHER SIDE OF CLIMATE CHANGE: DROUGHT EUROPEAN ACTION AGAINST HIGH ENERGY PRICES

THE SPECTRE OF RECESSION IS HAUNTING EUROPE

SYNERGY 5 SEPTEMBER 2022 VOLUME 4 ISSUE 3 #95

# In This Issue...

### 06 <u>Can Electricity Markets Survive This Energy Crisis?</u>

Yes, they will. The prime example is California. After the 2001 California energy crisis, the electricity market reforms survived in California, but with a twist. This time there are several issues like accommodation and fostering zero marginal cost resources, the shift in demand for services, and a new type of contract...

### 08 The Other Side of Climate Change: Drought

Europe is experiencing the worst drought in 500 years, according to a report published by the European Union's Global Drought Observatory on August 22. Some 64% of the European Union is in danger of drought, while 47% of the continent is on high alert as the soil is drying out, and vegetation shows signs of stress in another 17%...

### 10 European Action Against High Energy Prices

The Russia-Western energy showdowns after the occupation of Ukraine strengthened the approach of "not buying gas from Russia" in EU countries and led to the emergence of new energy sources and the idea of processing them. In addition, the environmentalist transformation-oriented policies of the European Union countries against climate change...

### 13\_\_\_\_\_The Spectre of Recession is Haunting Europe

As the global economy is hit by the energy crisis, distortions of supply chains, and the consequent inflation, the possibility of a global recession is becoming increasingly inevitable. Europe is no exception to that. Increasing prices and the issue of surviving the winter without Russian natural gas are contributing to the expectations of a recession...

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# Weekly Puzzle

### Prepared by Büşra Öztürk



#### Across

 Facility that enables the production of different industrial products such as biochemicals, biomaterials and biofuels

**3.** A device that converts chemical energy directly into electrical energy

**5.** An organization that conducts research on nuclear energy and provides cooperation among member states on this issue

**6.** The abbreviation of the oil pipeline that carries Russian oil to China

**8.** Europe's most carbon-emitting port

**10.** A fission element, a raw material for nuclear energy

**11.** A company that researches and produces crude oil and natural gas internationally

**13.** A machine that converts mechanical energy into electrical energy and provides the continuous supply of electricity for most institutions

**14.** A Russia-based oil and gas pipeline transportation company

**15.** French inventor who produced the world's first parabolic solar collector and converted solar energy into mechanical energy

17. Ukraine's national oil and gas company

18. The name of the explosion on the drilling platform in the Gulf of Mexico and the great environmental disaster caused by the oil spilt into the bay

**19.** One of the countries where TANAP's route passes

#### Down

2. The bill which has been described as the largest investment in the United States so far in the combat against climate change

4. One of the conventional energy sources

 The warming of the world resulting from the trapping of heat from the sun by various gases such as carbon dioxide as a result of industrial production

**9.** The general name called for the places that are under protection due to their natural, ecological and cultural values

**12.** A hydrogen type that is produced from natural gas and supports carbon capture and storage

**14.** A system where heating and cooling can be generated simultaneously with electricity

**16.** A unit of power for measuring the amount of energy saved in megawatts because of efficient consumption

## **Previous Week's**

### **Correct Answers**



#### Across

1. A concept that encloses the borders of Turkey in the Black Sea, Marmara, Aegean and Mediterranean

**3.** The country that generates the most electricity globally overall by using a nuclear power

 The symbol of the silvery metal used mostly in LEDs, semiconductors, and electrical circuits

 The term that expresses the production of usable gas from organic wastes

**13.** A well-known environmentalist and author of the book "Earth in Mind", who operates in many areas of environmental studies and offers educational models for nature conservation

16. The name of the report for the calculation of the possible damages to the environment, the determination of the measures to be taken or the minimization of the planned projects

**18.** The Most common hydrogen fuel produced from fossil fuels, which releases carbon dioxide that cannot be used in the process

**19.** The unit commonly used in electricity billing which expresses the amount of energy produced or consumed per hour.

**20.** The pipeline transferring Azerbaijan gas to Europe via Turkey

#### Down

2. The name of the organization that collects and serves financial and statistical data about energy supply, reserves, production, demand, etc. and carries out statistical and solutionoriented studies under the roof of the US Department of Energy

6. The digital technology of energy networks that allows for two-way communication between suppliers and consumers

7. Russia's largest oil export port

8. A significant greenhouse gas associated with global warming

9. A system of producing heat and electricity simultaneously in order to use energy more effectively

 The property of liquid petroleum with a low density and freely flowing at room temperature
The country which has the largest lithium reserves

**12.** The called name of Volkswagen China's first fully electric flying vehicle

14. The name given to the gas in sedimentary rocks, which can produce oil and gas when heated, because it usually contains organic matter with a fine-grained and layered structure

**15.** An abbreviation of power plants that convert energy particles from sunlight into electrical energy

17. The name of the most important and oldest pipeline transporting Russian oil to Europe

## Can Electricity Markets Survive This Energy Crisis? Barış Sanlı 🛅

Yes, they will. The prime example is California. After the 2001 California energy crisis, the electricity market reforms survived in California, but with a twist. This time there are several issues like accommodation and fostering zero marginal cost resources, the shift in demand for services, and a new type of contract.

The first word to be delved into is a crisis. Is it an energy crisis? From the US view, it is not exactly. Natural gas prices are not at their highest. Oil prices have hiked to a closer level, but we do not consume crude oil but products. The oil product prices have reached record high levels. This was more like a post-covid correction with difficulties in physical allocation. This is a full-blown energy crisis with record high gas prices on the European side. There is a demand for destruction, and there is societal destruction. Two folds increase may be considered as a price level for demand destruction, but ten fold price hike is a much bigger beast to feed into societal disturbances. In detail, there are shifts in demand for the electricity system. The asymmetries in the system have increased, such as winter-summer supply-demand security due to solar. The known unknowns, such as "wind drought," are a major issue. The highest demand for electricity in summer does not correspond to the tightest supply-demand balance because solar has changed the game from demand for supply to demand flexibility.

How about zero marginal cost resources in the market mechanism? The marginal pricing has merits. But just like iPhones operating in certain temperature ranges, orthodox tools are designed for a spectrum of events. Suppose the system perturbs beyond these options, and the effectiveness of tools decreases. That is why the operating reserve marginal curve works in a tight market but not in normal conditions.



There are lots of mechanisms to implement in new age electricity mechanisms. For fossil fuels, it looks as if marginal pricing with hard/soft caps is favorable now. Reform is not easy, and even in California, it took years.

But there are other issues and lessons to be learned from California. As we have seen in the aftermath, traders have exploited every market deficiency with gaming procedures named Star Wars characters. The European gas market is definitely not much different. We will probably see how traders have manipulated the benchmark. Benchmarks are like whales. When the water is shallow, it gets easier to be hunted.

A green electricity market alone is impossible, but a hybrid model is more foreseeable. Electricity markets are even hybrid now because there are real-time operations and promises for real-time. This time, on-demand and on the available market split is much more favorable. But in the inception, data and connectivity have laid the groundwork for electricity market operations. That was in the 1990s. Now we have more sophisticated tools than ever. The markets will shape accordingly.

Canan Özden Schilling's book "The Current Economy: Electricity Markets and Techno-Economics" is a must-read for these times and I am still fascinated by the observations in that book. Electricity markets are a system that glues engineering with economics. They are basically live on data tables and work on copper wires. If a reform happens, it will make the most of the current engineering and economics understanding. But markets are also institutions of accumulated experience, understanding, and conflicts. We have to accept this as a reality humbly.

## The Other Side of Climate Change: Drought Yaren Öztürk

Europe is experiencing the worst drought in 500 years, according to a report published by the European Union's Global Drought Observatory on August 22. Some 64% of the European Union is in danger of drought, while 47% of the continent is on high alert as the soil is drying out, and vegetation shows signs of stress in another 17%. The threat of drought, which has been present since early 2022, is increasing in the region. High temperatures and drying rivers are causing forest fires and drastically reducing crop yields. According to the report, yield forecasts for cereals have fallen 16% below the 5-year average and 15% below the 5-year average for maize. The observatory, which warned in a previous report that almost half of the European Union's territory is at risk of drought, emphasized that drying rivers and dwindling water resources also affect energy production in power plants. In some regions, this situation is expected to continue until November. On the other hand, the situation has worsened in countries such as Italy, Spain, Portugal, France, Germany, the Netherlands, Belgium, Luxembourg, Romania, Hungary, Northern Serbia, Ukraine, Moldova, Ireland, Ireland and the United Kingdom.

For Europeans, drought and water scarcity is a reality they have only recently encountered and are trying to solve. Still, for many countries in the Middle East and Africa, drought

and water scarcity have become part of the ordinary course of life. In this context, it can be said that Turkey and Iran are two countries in the region that have experienced drought and water scarcity deeply. Climate change is reducing precipitation and significantly increasing droughts in both countries. The country's water resources are the first area to be damaged by climate change in Turkey. By 2100, the temperature in Turkey is expected to increase by 2.5-3.5 degrees Celsius and precipitation is expected to decrease by 25-35%. This situation will likely damage Turkey's water budget and increase the country's water stress. In 2014, Turkey experienced its driest year since 1961. While metropolitan municipalities were among the most brutal hit, the country's water supply was compromised, and the agricultural sector suffered significant blows. One of the major concerns is the danger that the meteorological drought in Turkey could lead to hydrological drought and continue to affect water resources in the coming years. On the other hand, the uncontrolled use of groundwater resources in areas of Turkey where surface water is relatively scarce is also a significant problem. Although measures are being taken to prevent the illegal use of well water through legal regulations across the country, inspections and sanctions need to be increased. Groundwater resources are intensively used for agricultural purposes. Therefore, most



of the groundwater resources in the country are in danger of extinction.

In Iran, one of the driest geographies in the world, the data shows that the annual rainfall in Iran in 2017 was 228 mm, which is 6% less than the long-term average of 242 mm/year, has been the average since 1994. One of the major problems is the uneven distribution of rainfall across the country, with the most densely populated areas receiving the least rain. Its current population of 84 million is expected to reach 92 million in the next 28 years. How Iran will be able to sustain its rapidly growing population in terms of food and water and what problems it will face in providing these vital necessities is a question mark. It would not be enough to attribute the reasons for the question marks solely to the semi-arid climate of Iran's geography, markedly decreasing precipitation and climate change. Inefficient and inadequate management of Iran's water resources is one of the biggest reasons for this situation. If this management continues, water scarcity will likely turn into a crisis. Over the past 50 years, Iran has experienced prolonged droughts that have severely threatened almost every sector. Climate change will likely increase the risk of droughts and, in some areas, causing intense flooding.

Both countries must take precautions and adopt solutionoriented approaches to avoid more significant droughts and crises in the future. These solutions can be grouped under three headings: new techniques and incentive programs for farmers, water efficiency studies in cities, and education programs to raise awareness. First, new methods such as sprinkler and drip irrigation should be encouraged for farmers to save water and increase water efficiency. While both countries offer various incentives and tools for farmers and provide economic incentives, such as low-interest loans, for farmers to install modern irrigation systems, supervision and regulation are necessary for the system's proper functioning. Secondly, it is known that in Turkey, 50% of mains water is lost from the source to the household, and to prevent that, old or damaged water networks need to be repaired. In Iran, efforts are required to reduce leakages, reduce urban water demand, standardize water taps and limit the use of drinking water to drinking only. Finally, both countries need to establish programs to raise public awareness of limited water resources and increasing water scarcity. Encouraging the public to conserve water and raising awareness of the importance of water conservation through the involvement of various mass media is an essential step that countries can take for their future.

## European Action Against High Energy Prices Sarper Göksal

The Russia-Western energy showdowns after the occupation of Ukraine strengthened the approach of "not buying gas from Russia" in EU countries and led to the emergence of new energy sources and the idea of processing them. In addition, the environmentalist transformation-oriented policies of the European Union countries against climate change in recent years have been reinforced with the policies for energy supply security, which emerged in the light of the Russian natural gas refusal and the sanctions imposed on Russia. The energy crisis in Europe may cause the resumption of shale gas production, which was shelved in the past due to the great reactions of climate activists.

As European countries change their approach towards coal and nuclear, the shale gas option may come back on the agenda. To clarify, under the leadership of the European Union, European countries had implemented their plans to abandon coal resources since the late 90s. While the coal consumption in the European Union was about 14 exajoules in 1998, this figure has decreased to 7 exajoules

in 2021. However, European countries' tensions with Russia have led to a renewed interest in coal. In 2021, the share of electricity generation from coal rose to 15 percent, and by 2022, the share of coal in EU countries' electricity generation is expected to reach 20 percent; this indicates that European countries such as Germany, France, the UK, Austria, and the UK are preparing coal plans in case of a possible interruption in natural gas supplies from Russia. In addition, the energy supply crisis has considerably changed the perspective of European countries toward nuclear energy. After the leakage at the Fukushima nuclear power plant in Japan in 2011, interest in nuclear power plants began to wane. At the same time, the EU's environmentally friendly policies, environmentalist public pressure, and increased investments in renewable energy sources have initiated the phase-out of nuclear power plants. However, the Russia-Ukraine war has left EU countries in energy difficulties in a difficult situation, leading to a return to nuclear power plants. The start of planning for two new nuclear reactors in the Netherlands, France's announcement of a plan to build



14 new nuclear reactors by 2050, and Germany's efforts to extend the operating periods of 3 nuclear power plants strongly indicate a return to nuclear power.

While European countries are considering every option to solve the energy supply security problem and tackle skyrocketing energy bills, they are also questioning the choices they have made in the past. The possibility of a return to coal and nuclear in shale gas looks pretty likely. In the past, shale gas production in Europe has been shelved due to environmentalist public pressure. The recent rapid rise in energy resources, especially natural gas prices, and the cost of extracting 13.3 trillion cubic meters of shale gas in Europe has fallen to more reasonable levels than supplying it from other countries may allow the energy crisis to be solved. EU Commission Spokesperson Tim McPhie stated that there is no ban on the use of shale gas by EU countries, giving the green light to a return to shale gas. On the other hand, while there was a high-priced period in the middle of the world energy crisis, the increase in natural gas prices in Europe exceeded 400 percent compared to 2021, while electricity prices increased by more than 250 percent. Like many other countries, France is one of the countries that has been affected by rising energy prices. French Prime Minister Jean Castex announced they would provide 100 euros of aid to French citizens whose monthly net income is less than 2,000 euros due to the significant increase in fuel and natural gas prices. However, the big problem with the energy supply, which emerged due to both the increase in energy prices and the lack of use of Russian gas, caused the French people to turn to wood stoves and a demand explosion for sawdust fuel. In France, which started to worry about a significant supply deficit due to high energy demands, the fear of energy shortage three months before the winter led consumers to flock to wood and stock up on wood. In addition, depending on the severe winter and the demand, the French Federation for Combustible Materials, Fuel, and Heating has announced



that it will prioritize its regular customers in selling wood stoves and sawdust. In short, France has made it a mission to switch to new roads before winter comes since it is in question that the electricity price in the country will see 1075 euros per hour/megawatt as of 2023, breaking a historical record due to Russian gas cuts and energy shortages.

In summary, due to the Russian natural gas shortage, countries have tried to substitute different types of energy for natural gas. When natural gas cuts and energy supply are problematic, the return to coal and nuclear has also increased the possibility of a return to shale gas. However, there is a negative public perception of shale gas in European countries because a large amount of water must be mixed with sand and chemicals under high pressure and given to the ground to extract shale gas. This situation causes the region's people to organize violent protests about shale gas. Moreover, the high demand for wood stoves and sawdust is exceptionally normal, but the death of hundreds of people by poisoning from the carbon monoxide gas leaking from the stove is another issue that needs attention. It is very likely that the wood-burning stove and sawdust heating method, which has come to the fore again in France, will spread to many countries. The important thing at this point is that many authorities, especially their countries' energy ministries, should raise their citizens' awareness to use wood stoves and heating correctly and healthily, and even teach proper usage methods before purchasing these stocks, such as cleaning the chimney.

## The Spectre of Recession is Haunting Europe Alperen Ahmet Koçsoy

As the global economy is hit by the energy crisis, distortions of supply chains, and the consequent inflation, the possibility of a global recession is becoming increasingly inevitable. Europe is no exception to that. Increasing prices and the issue of surviving the winter without Russian natural gas are contributing to the expectations of a recession.

A recession is usually defined as two consecutive years of GDP decline. The definition is first created by Julius Shishkin in a 1974 New York Times article and has been a popular indicator of recession. According to this definition, the world's largest economy, the United States, is already in a recession, as the US economy contracted for two quarters in a row. As for the Eurozone, economists say a Eurozone recession is now more likely than not. The same concerns are also valid for China, which experiences slowing growth rates and missed a second-quarter contraction because of Xi Jinping's zero-Covid policy and other problems.

Another accepted definition is created by The National Bureau of Economic Research (NBER), which characterizes

a recession as a significant decline in economic activity that is spread across the economy and lasts more than a few months. This is a more flexible definition, but the probability of a significant decline in economic activity spreading across the economy and lasting more than a few months' still persists for Europe, considering that the global economy is in bad shape and Russia is weaponizing its natural gas exports to Europe.

One expectation became true last Friday. Following the G7 countries agreeing to introduce a price cap on Russian oil exports, Russia's state-owned Gazprom halted the flow of the Nord Stream 1 pipeline indefinitely due to "an oil leak discovered in the main gas turbine at the Portovaya compressor station near St Petersburg, which feeds the line that runs through the Baltic Sea to Germany." Whether Russia would restart the flows of natural gas through Nord Stream 1 or not, it is essential for Europe to be ready for the worst. Recently, International Monetary Fund (IMF) prepared a forecast as to how the potential effects of a full and immediate suspension of natural gas supplies would



hit the European economies. The EU is expected to lose 1.8 percentage points in GDP growth compared to the ongoing course before the gas suspension decision last Friday.

On the supply side, German companies already started to halt production in response to soaring energy prices before the latest gas suspension. As the head of The Federation of German Industries (BDI), Siegfried Russwurm, said, the price of electricity for 2023 had risen to more than €700 per megawatt hour. There are problems on the demand side too. Producers complain about the decrease in the quantity of goods demanded and consequently rising inventories. A decrease on both sides of macroeconomic activity is quintessential to a recession.

#### What can the EU do next?

The European Commission released a decision on May 18 named 'REPowerEU,' which aims to rapidly reduce Russian fossil fuel imports with other sources of energy and fastforward the green transition. The plan targets replacing two-thirds of energy coming from Russian fossil fuels. Other than diversifying the energy sources, there are only limited solutions that might harm the economy.

One solution is to have 85% of natural gas storage full ahead of the incoming winter heating season. The European Union (EU) countries are going at a good pace in fulfilling this target. To cope with the limited energy supply and high prices, another solution is to curb the demand for energy. This solution was put forward on the same day as the REPowerEU plan by the European Commission via 'EU Save Energy Communication.' With behavioral changes, this decision expects to cut gas and oil demand by 5%. The EU countries have already begun to take necessary measures expressed in EU Save Energy Communication and apply additional adjustments.

These measures are necessary to survive the winter but are also inevitably contributors to a recession. The EU policymakers should continue their efforts to diversify the sources of energy. The incoming recession might decrease energy prices in winter, but it is also important to remember that the incoming global recession is mainly rooted in the supply side. In this situation, it is unlikely to experience sharp falls in energy prices. Therefore, the severity of the energy crisis stands firm.

As more and more signs of a recession show up, European countries and European Central Bank (ECB) should make decisions in accordance with this very high possibility. The ECB and the EU governments had been reluctant to respond to the rising inflation for months, but the energy crisis showed that putting emphasis on inflation is essential to cope with the challenges posed by Russia's energy weapon in winter.



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