ENERGY CRISIS AND TRANSITION

(Observations from 2019-2022)

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Prologue

I would like to dedicate this open book to Hakan Berument for his inclusion of me in Bilkent EPRC work and Gökberk Bilgin for his “Synergy”. I need to thank other EPRC staff, directors including Erinç Yeldan and Refet Gürkaynak. I am also thankful to Bilkent University.

The writings here are written in the period between 2019-2022. Lots of interesting events happened during that period. These writings show my quest for ideas in that era of crises and transformation.

So it is more like a weekly diary of my observations. I hope you enjoy this journey

Barış Sanlı
24 March 2024

Are Algorithms The Next Gas Guzzlers?

9 September 2019

First, trains arrived then the cars. Mobility completely changed civilization, and the way energy is used. There were horses before, afterward engines, oil companies, price volatilities, mechanization of war and soon, just as the cars pushed the human race into an era of dramatic change, algorithms may be the next “cars” or “mobility” in terms of energy usage, dramatic change and the power to shape the future. But like cars, they may be substantial energy consumers. A research claims training a single artificial intelligence (AI) system can be as five-times more polluting as the lifetime emissions of an average vehicle.

Algorithms are no stranger to us. By definition, an algorithm is “a list of rules to follow to solve a problem.” Its original roots extend to 9th-century scholar Khwarizmi from Central Asia. Today the algorithms are closely associated with computers. From video files to messaging platforms and servers, the whole internet is powered by algorithms. It is expected that by the year 2025, the communication industry alone will consume 20% of world electricity.

In the past, algorithms were mostly synonymous with efficiency, compression, and processing. But not all the algorithms were the same. Some algorithms just do not simplify life, and they sacrifice efficiency for other goals, such as anonymity, networking, or pattern recognition. The best example of such an algorithm is a hashing algorithm that is powering the Bitcoin and other blockchain protocols. Bitcoin alone is responsible for 66.7 terawatt-hours of global energy consumption. It is nearly 22% of Turkey’s electricity consumption.

Bitcoin algorithm is a poster child example of how algorithms can turn into energy hogs in a brief period. The core algorithm is used for solving a puzzle. When the first solver is granted with virtual mints, it becomes a race against time. As the software is run on the millions of computers and terahashers, the scale transforms the innocent algorithms into energy guzzlers.

The story is not limited to blockchain or hashers. Recent AI algorithms consume increasing amounts of energy. According to the chief executive of Applied Materials, data centers’ AI workloads could account for 10% of world electricity consumption by 2025 if no innovation or efficient designs appear. Strangely enough, AI can also cut energy usages by cutting the cooling bill by 40% for data centers.

Just as the cars changed the wars performed, AI is changing not only the entertainment and financial sectors but defense and surveillance. This part of the story is not as transparent as the other parts. The massive surveillance networks, automated weapons, autonomous technologies should also be accounted as essential energy consumers. The face recognition systems, continually optimizing surveillance algorithms, navigation systems are the known ones.

Algorithms do not only compete with cars or other sectors, but they became rising energy consumers. Recently published research claims that as vehicles become more autonomous,

their energy consumption will increase. The estimate claims 10% range reduction on a highway and 30% range reduction in a city. The more autonomous cars begin to appear in the cities, 30% higher gas or electricity bills are not a far fetched reality.

Optimist narrative of the story is that: There is still room for improvement. Recently the biggest carbon nanotube chip has reached 14000 transistors. In theory, these chips can be ten times more efficient. There are also improvements in the way AI algorithms work.

Is there any room for efficiency? Jevons paradox claims as the efficiency increase, the consumption also increases. A particular example is mobile phones. The more efficient the algorithms and chips became, more power and features are embedded in these devices. So will it be the same for algorithms?

A World in Turmoil

16 September 2019

In the recent World Energy Congress in Abu Dhabi, there were mixed messages. Climate change was as important as ever. There was not a single dissident message. The aims were closer, but the pathways were ambiguous.

One of the underlying themes was the future of hydrocarbons and especially oil. The geopoli tical implications of oil demand weakness in the long run, was disturbing for the oil-producing countries. Renewables and natural gas were the resources for the future. Hydrog en has the potential to be the common energy carrier for new applications.

Digitalization is the future as it was 20 years ago with a pitch on artificial intelligence and new market models. As the ether of the modern industrial world, digitalization powered by the sensors and software with processors is doomed to change the energy landscape forever.

The customer will be empowered by all the digital tools, distributed generation, solarpanels, and electric cars. The future is bright, and the rise of the “new” customer is unstoppable. So what is wrong?

For one thing, there is an optimist world view and a world we live in. Coal consumption today is higher than 20-30 years ago, emissions are increasing despite cheap panels and Tesla revolution. Yellowjackets were on the street to protest environmental tax regulations. Meanwhile, the EU may impose minimum tax levels for energy commodities, and consumers are expected to welcome these new regulations with joy.

And there are deep currents. They are harder to see, but the flow and the tensions are there. Low oil prices and the implications are a big question for the oil producers. The sustainability of the shale revolution is a much less important one.

The perpetual regulation machines of the energy world are under investigation. In “What kind of regulation” the complexity and cutting the red tape was discussed.. The regulation school may have reached its limits, and a contraction may be indispensable.

But the harder question was the main question. The theme of the conference was “Energy for Prosperity.” A prosperous world in climate constrained environment with ever-increasing taxes and regulation is questionable for the consumers. Everyone wants to save the planet, but the burden to achieve the aim is an orphan.

Energy transition will not be cheap. Climate change efforts may never be enough. Regulations may not slow down. So who will tell the consumers those bad news? A Mary Poppins song may give a hint: “a spoonful of sugar helps the medicine go down”... So what is the sugar?

From a realist point of view, there is no sugar or at least a sugar that the whole world can reach easily. The aim is precise, but the road ahead may be the hardest of all. A global pilgrimage to a cleaner energy world may not be secure, cheap, or straight forward.

The voyage has started. The concerns are not about the targets but the social, economic,and structural changes waiting for us. There will be losers and winners. Unfortunately, the anxiety for being a possible loser may stress the players more than before. They may end up with the wrong moves.

But all these concerns are minute compared to our aim to leave our children a betterworld. It is not unreachable, but we need to do more

Energy Security in the Post Abqaiq World

23 September 2019

Last week, one of the most important crude oil facilities in the world has been attacked. The initial reaction of markets to the event was a 20% hike, later settling to much lower figures. The coincidence of such a big event with a world economy in dim outlook has saved the day for now. But the echoes of this event will change the energy security question forever, again.

It is hard to predict the full extend of energy crises in the near term. Flow of the information dominates the public mindset and with each bit of information the event is again decyrpted. The initialy we are at the “understanding” stage of what has happened? This understanding can only turn into policies and strategies with a certain delay. For the Abqaiq event, we are in the “understanding” stage. Our minds are occupied by the price hikes, pictures and statements. But as the details became crystal clear, it will change institutional, organizational and strategic views about energy security in years to come.

On the 24th Feb 2006, Al Qaeda has attacked the same facility with two vehicles with explosives. There were terrorists involved in the attack. It was the first direct attack by Al-Qaeda on a Saudi oil installation. But it wasn’t successful. 13 years later the same facility has been attacked by 18 drones and 7 cruise missiles, basically with no human on the field. This time the attack has made the damage to the facilities and the world markets.

The main question is the power of innovation on the threat side. Innovation has been generally associated with all the good and bright things like renewable energy, electric cars, digitalization, consumers. As states accelerate the innovative processess, technology may pave the way for a better world. But what if state actors choose to innovate on the darker side? Can they dismantle the welfare and progress we made so far? And what should be the new energy security perspective in the age of innovative technologies and weapons.

The energy security has been related and sometimes synonymous with diversity in the past. It reminds a basic portfolio theory. Don’t put all the eggs in the same basket. These eggs were generally geographically seperated actors or suppliers or routes. But when innovation diminish the effect of geographic boundaries, can we surely assume that diversifying is a safe bet?

Unfortunately diversifying may not be enough although it is still relevant. In an integrated world of energy markets, no one can escape from the costs of substantial risks. These risks may translate into domestic risks or economics malaises.

The history shows that when whale oil prices were increased, the quest for the next resource was accelerated. Practically, so called energy transition has gained momentum.As the transition to the crude oil economy evolved then diversification of the resource, routes and geographies made sense. But from whale oil to crude oil, diversification was not the main problem. The main security solution was transition to another kind of technology and energy economy.

Some may think that this transition is another diversification. This is a fair argument.But transitioning to a different energy economy and buying from another supplier are far apart arguments. They may look similar, but a progress and portfolio formation are hardly same. Are the recent attacks such important? Probably yes and the importance will increase as time passes by. Because this is a new energy world with Asia in dominance, USA in retreat, world is fragmented. State sponsored innovative threats can easily be replicated with lower costs. Geographic diversification can only be a short term physical remedy. Every new technology hailed as game changer is a “threat changer”. As the threat factors move like startups, preventive and security mechanisms are as fast as the big organizational structures -like states- resisting change.

Energy security concepts of the 20th century is tested by the innovative new threats in the 21st century. Diversification is still relevant. However it is a weaker solution then before. Innovation and energy transition can be the only viable options for the foreseeable future. As we settle with the energy economy of digital, clean tech and etc, then a new energy security concept will be the zeitgeist of that age.

Can Markets Save the World?

30 September 2019

In his book “The Idea of Justice,” Nobel Laureate Amartya Sen gives an example of a flute and three kids. One of them is the best flute player, the other one is poor and he has no toys. The third one is the maker of the flute. All three of them want the flute. The question is how to decide on such an issue? The answer would be mostly a personal opinion.

During the 2008 oil price hike, there was a discussion about whether high prices may lead to new resources and a different kind of economy. The answer was mixed. Higher rates made the shale revolution possible. However, when you trace the origins of the shale revolution, it goes back to 70s and 90s. A lot has been accumulated to make the shale revolution possible. High prices of 2008 became a catalyst. It created a different kind of energy environment in the US with new players in shale.

During the 2008 oil price hike (147$/barrel), markets saved the world by crashing. If the economies were moving in full speed, there is no doubt that 200$/bbl could be seen. Shale may have a finger in the post-2008 world, but the innovation has started with government subsidies, a long time ago. Do high prices lead to new resources? The answer is again complicated. Electric cars, solar panels as well as shale resources, have become hot topics. But which one affected our energy world most? Shale or solar panels/Evs?

My aim is not to create a classical dichotomy over fossil fuel resources or green energytechnologies. Solely, the question is how it happened in the past: why and how? Does itrhyme with ‘today’s arguments?

Climate crises is not a new challenge, but can not be solved overnight with a few regulations. From the governments' perspectives, renewables are excellent if you do not care about the security of supply. Security of supply is not a mere technical term but the jargon to define consumer expectation. Anytime, any how the energy should be there.
The modern energy system, just like other advanced systems, aims to save a human from the forces of nature. And any service provided by energy systems is entirely against nature. Even fire is a destroyer of life. Mobility, lighting, pipelines, heating systems, microwave... All these energies and relevant technologies are blasphemy to nature.
For years, the energy system evolved to protect human kind from nature's forces. Protect her from darkness, coldness, draught, tiredness, labor, and so. It takes control of the forces from the earth and hands it to the human with powerful fossil resources from hell such as the hot, stinky stones like coal. We paid a small amount for these services, but nature seemed to pay the hefty price.
This 'month's California Public Utility Commission newsletter has a line that politicians fail to acknowledge to the masses : "And we will need to spend considerable sums to decarbonize our grid, which will be made somewhat easier by sharp declines in costs over the past decade in clean energy resources such as solar photovoltaics (80 percent), wind (50 percent), and battery storage (74 percent). All these investments are important, but they will also add to the financial burden of millions of Californians".
The main problem is whether the masses are ready for the financial burden of the energy transition. If oil prices increase, the responsibility will be diminished, you may say. However, as oil prices rise, coal consumption may increase too. Coal is the most diverse and accessible hydrocarbon resource on earth.
The second problem is governments highly regulate electricity sector investments worldwide. Costs are not decreasing. Governments can push for more regulation. But they fear the payment day will come and take its toll on the political parties.
The third problem is the markets. Are markets ready for competitive, spot renewable markets? Forward prices, risk hedging mechanisms, creative destruction? Unfortunately not yet. We have a renewable market based on the tenders from the early 90s and long term agreements those nothing to do with innovation and trying to protect investors from the market forces.
So who should have the flute for climate crises? All of them is the most straightforward answer. Energy businesses, markets, governments, disadvantaged groups all have the stake. But the biggest problem of all is the markets do not have the tools, and they are not ready to push for the transition. Since markets are not prepared, banks do not provide enough financial support. They cut fossil investments. However, no surge in energy transition financing can be seen. When markets and banks are not ready, investors do not foresee what will happen. The first step should be to fix the markets beyond carbon pricing.

No Good News For Energy Demand

Oct 7 , 2019

The good news is rare these days. The global economy is slowing down for sure. OECD's leading indicator CLI shows that India, China, Germany, and OECD as a whole are heading for tough autumn. CLI may signal the downturn for another three months. What can be the implications for energy markets?

If everyone is pretty sure that a downturn is inevitable and we are entering into a recession, then there is less to worry. But as the geopolitical uncertainties combined with climate emergency and increasing unemployment in the developing countries is like a perfect storm waiting for food prices to rise.

The question now is the timing of the global recession and the duration of it. Already the energy investments are not in their best shape. A prolonged slowdown or lower than average growth may impact producer countries, especially in the MENA region.

What is more worrying is, the economic order of the day for the developed countries is set to change. Whether it is Brexit, tariffs, or industrial growth, the world is in the transition to a much more complex environment.

On the crude oil side, OPEC cuts may not be enough, and OPEC countries may not have deep pockets to survive in a prolonged downturn. Like China, increasing employment may be hard to sustain. OPEC discipline may suffer from domestic pressures. The timing of all these events will be necessary. A recession or a crisis in autumn and winter is different than a crisis in spring or summer.

On the gas side, lots of FIDs have been closed for LNG. That translates to new investments for the next 2-4 years as Sohbet Karbuz claims in our podcast. Asian economies may be the primary destination for LNG demand growth. But having all these future economic troubles may hit the LNG sector hard. History hints us that the diminishing returns will increase efficiency. That may result in lower costs in the capital and operational expenditures in the midterm. But not now.

One troubling question is the inter fuel competition and coupling. Instead of curtailing renewables, can we convert the electrons into gas with power to gas projects? Can hydrogen be a new energy carrier, for real this time? This coupling may tie the fate of renewables and natural gas together and even their prices. Can there be any TTF based renewable contracts in the future? It may be an exciting thought exercise...

But one troubling question remains. What will happen if another recession strikes economies? One thing for sure. The priorities will change. Investments will be hard hit again. The producer countries will try to balance their budgets. Unemployment will be a significant concern. The stability of the current energy system will be questioned not because of climate emergencies but because of fundamental shifts.

This whole story is not new or unprecedented in world energy history. The question is, who will be the winners and losers this time? How there winners and losers will affect consumers globally? My understanding is that we are heading for a downturn and then with plenty of upward volatility to follow. If I may be mistaken, a brief recession or stability with the regrowing world economy is carrying just one significant risk. That is the undersupply resulting from underinvestments in the last 3-5 years.

There is one big possibility that energy demand may have slowed down forever with increasing electrification and renewable investments. Can energy demand peak, or are we again falling under the influence of “end of growth” narratives?

There is a lot to speculate on. For now, we should keep our eyes on economic growth.

Energy Poverty Puzzle

Oct 21, 2019
“It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their self-interest,” claims Adams Smith. The same logic may be applied to the other areas if you think this is a correct statement. It may not be from the benevolence or climate awareness of the banks or green collars that they support green projects. It is all down to self-interest.

Climate change will affect the poor in two ways. The mitigation and disaster costs will be substantial for low-income groups. But the policy costs will further increase the burden on specific segments of these income groups. In Africa, solar pas-as-you-go services may bring some relief and energy services for those in need. But in developing and developed countries, there are still questions to be asked.

According to Austrian regulator EControl’s Household Energy Price Index for Europe, Household Energy Price Index’s electricity prices excluding taxes have risen in the past ten years. The rise is unusual since gas prices have a cyclic behavior, and they are 5% below 2015 and %3 below 2019 levels. But with more “cheaper than fossil” prices of renewables, the cost of electricity for households kept increasing where natural gas prices have dropped. The primary issue is not the policies or government guarantees for clean energy but how the masses will cope with the results of these policies and financial burdens. If the poor will be impacted by climate change and measures twice (both as a result of climate events and policy costs), they will be the ultimate loser.

If one part of the society will be affected by such adverse processes, someone must be on the winning side. One side loses twice, and then some other party must be winning. Who is that winning side? Who is the new rentier class of energy transition?

In Cato Institute’s analysis from 2002, Patrick Micheals’s article “Why Enron wants global warming?” is an exciting piece. Enron, one of the biggest corporate frauds and bankruptcy in the energy industry, was pushing for a cap on carbon emissions, so that they may profit from the results. Just like big oil companies, the other energy companies have nothing to do with benevolence or saving the world. If extracting minerals are not profitable, new policies may always be a source of profit. Enron was openly against global warming policies, but they see the light and enlightened by it if you believe so.

So someone has to take the energy poverty problem more seriously. One specific example is about how such policies will hit coal-producing regions. Suppose you invested all your life savings into a house in one of these regions where you live with your family.You may even take some bank credit to open a small business there. Overnight your house’s value will

depreciate, and some government policy will dim your business prospects. Then a new training policy will try to teach you new tricks, and hopefully, you will have a new job. Hopelessly you may lose all your life's savings, experience, and investments.

This week Nobel Prize has been awarded to three scientists "for their experimental approach to alleviating global poverty." One of the important results of their work is regarding randomized control trials. Why this is important for this article is when it comes to energy poverty or poverty resulting from energy transitions, there may not be ready solutions but trials to find effective interventions.

One example can be how energy subsidies and supports affect children's health and infant mortality. What is the best way to eradicate illnesses and problems because of insufficient access to energy and heating?

As the companies -whether green or black- have no benevolence for saving the world, they have no motivation to keep the poor. As long as there are predictable cash flows and investment environment, self-interest does its job. As energy prices increase, there are better profits or incomes for most of them, including governments. With the poor paying the costs for climate change twice and companies profiting twice, a world with Morlocks and Elois of climate change is not a distant reality.

There are ways to improve the situation. First of all, we have to look at energy poverty from a climate change perspective. A carbon tax or green tax should be allocated to poverty policies with an energy transition in mind. Companies should be incentivized to design creative programs to mitigate such poverty issues in their sustainability projects. Most of all, whether for electric cars or renewable energy or efficiency, priority should be given to low-income groups. Otherwise, the new rentier class of energy transition will be too busy with their self-interests to lend a hand to a social disturbance in the making.

Early Electricity Developments in the Turkish Republic

Oct 28, 2019

On the 29th of October 1923, Turkiye, as a republic, has been founded by Mustafa Kemal Atatürk and his friends. There was a separate parliament established in 1920, but now it was time to change the regime of the country. This regime change has brought rapid industrialization and consequent changes in the Anatolia and Tracia. One of the significant changes was how electricity policy has evolved.

Ottomans were not less innovative. But it was a little too late and a bit too narrow. The early innovative edge of the Ottomans was Imperial Navy. From the records, we can see that there was an "electricity factory" in the Navy. Since power competition was much visible across the seas, the Navy had to adopt. Records show that despite using relativelymodern equipment, they could not build a domestic boiler for the ships.

The history of electricity in Anatolia has been claimed to start in 1902 with a small hydro turbine in Tarsus. It is to be challenged in IETT's book "Electricity in Istanbul." The book

claims Yıldız Palace has some electric installations and appliances. The electrical workforce during that time was primarily based on telegraph technicians. The generators and other equipment were mostly imported from some other countries. The major engineers were educated abroad. This tradition was visible in the early managers of EİEİ (Electricity Survey and Development Administration) up until the 1950s.

The primary power plant of the Republic was Silahtarağa close to the Golden Horn. During the Ottoman time, this region was known with shipyard and coal depots. In his booklet "Electrified Turkey" Hasan Halet used the picture of Silahtarağa on the cover page as a symbol. On the next page, there are maps of electricity plants across Turkiye for several years or intervals. You can see the pace increasing after 1924. But the interconnection of all the power plants took several decades.

Electricity as a service has started in the form of concessions. Ottoman or Turkish public electricity companies were the concession holders. In that sense, Kayseri's electricity company is unique and the only company that survives to this date. From what we understand so far, these concessions can either be given to foreigners or entrepreneurs. The concession regime was not enough for the early republic. Most of the investors were aiming for petroleum based generators to produce electricity. It was not sustainable in the long run. During that time, there were municipality power plants, industrial power plants, and others. All these separate facilities were an inefficient way to supply electricity. There needs to be coordination and centralization.

First of all, the domestic resources of the country have to be mobilized. The primary local resource of the time was the hard coal of Zonguldak. But there are lots of resources to be found and utilized. I believe the significant change came with the establishment of several institutions in 1935. EİEİ, MTA(GD for Mineral Research and Exploration), and Etibank were the early energy institutions that shaped our contemporary energy institutions. The logic was straightforward. There were domestic resources like coal and hydro. MTA will find the mining reserves, EİEİ will survey hydro reserves, prepare and implement the electrification projects. Etibank will provide finance for such projects. Later on, these roles were mutated with the addition of DSİ (State Water Works) in 1953.

The crown jewel of these institutions is Keban Dam. Keban Dam may be the first major grand project of the Republic. Starting with surveys in the late 1930s, it was not an easyway. But one can see how late Ottoman thinking became a youthful, dynamic Turkish development. The fear of grand projects, the fear of failing has been gradually turned into a thirst for major projects and grand development.

One of my favorite questions about the early development of the Turkish Republic is "what has changed?". The first engineers of the young Republic were Ottoman citizens, educated in the old regime. They were well aware of the need to electrify the country. When they became Turkish citizens, the development pace has increased enormously.

It is the point we see the genius of Mustafa Kemal Atatürk. The first difference is the determination of direction. The whole state structure has been rotated to rapid modernization and industrialization. They thought the survival of the regime does not rest

on the life of a person or his family but economic and industrial independence. The second one was dynamism and self-correction of the regime. When concessions were not enough for the development aims, new institutions, new regimes have been implemented. The third one was how arts and science have pushed to the front lines of the development agenda. The laws of that time were not heavy with legal jargon but carry a pragmatism of an engineering state and the room for improvisation if things do not abide by the plans.

Today, we are thankful to our founding fathers for the modernization efforts they envisage and coordinate. What makes them different is hard to understand from today'sperspective. But at that time, the only victory was the establishment of the Republic. Building the pillars of the young republic on industrialization and economic growth enabled rapid electrifications in major cities. When this wasn't enough, a centralized policy has been established. It was a progressive journey in the right direction with well-aimed destinations. As time passes by, we understand this more deeply.

EPRC Farewells It's Captan and Welcomes The New Captain

Nov 18, 2019

Energy Policy Research Center has farewelled its energetic and successful captain Professor Hakan Berument as of last week. Berument has been the head of the center for over 20 months and achieved so much during his tenure that it is hard to summarizein a few paragraphs.

Berument has gathered a team of young researchers as well as industry professionals to boost the center's position and balance. EPRC's original contents and research questions were reflecting the policy agenda of Turkey and global energy issues. With over 70 studies, including Bilkent energy Notes, projects, presentations, podcasts, and meetings,Berument has been the captain of the armada.

The journey began with the economics course ECON318 (Seminar in Energy Economics) that Hakan Berument and Serkan Şahin taught together where students worked on a particular project that has the potential to solve Turkey's one of the energy problems in a specific area. The outcome of the studies was highly promising, and the students had a chance to present their projects in the World Energy Council. Later the Ministery of Energy and Natural Resources of Turkey invited the project teams, and the undergraduate students this time presented their projects to Minister Fatih Dönmez himself in a private meeting and received his feedback. Up to now, the course created seven different projects, and it will continue to generate solutions for energy problems.

Furthermore, Berument initiated the policy paper series named Bilkent Energy Notes to develop solutions for the challenges that Turkey faces. With the support from graduate and undergraduate students from various disciplines, universities, and countries, Bilkent Energy Policy Research Center managed to publish 30 different Bilkent Energy Notes in2 0 months. These studies also helped students to develop their networks and conduct studies with professionals in the energy sector. Many well-respected specialists and scholars from the

Ministery, international companies, and other universities participated. Fifty-seven students had a chance to work on the projects of the EPRC in the summer term.

Other than the Bilkent Energy Notes, EPRC began publishing a weekly newsletter, Synergy, where the students and professionals in the energy sector write articles together. We also have a podcast channel where the specialists discuss the current energy issues.

These accomplishments can not be attributed to the hard work of a single man. But his dedication to team sport and brilliance of motivating EPRC personnel will be remembered. So for all his commitment, time, and intelligence, we would like to say a farewell to our captain Prof. Hakan Berument.

Our new captain is no stranger to EPRC, and he is the founding director of EPRC, a well-known economist and a successful scholar. Professor Erinç Yeldan has taken over the position as of last week. He is a very well-known environmental economist and has several studies on green energy. With his leadership and vision, EPRC will sail to the new horizons. We wish our best for Professor Hakan Berument for the rest of his life and best of luck to Professor Erinç Yeldan on developing Energy Policy Research Center as a world wide recognized think-tank institution.

A Power Grid Overstretched for the Future

Nov 18, 2019

The power grid is named as one of the most complex, interconnected, and biggest machine human ingenuity has ever achieved. It works in real-time. The whole machine is designed to incorporate the uncertainty of humankind's request for ad-hoc energy needs and the failures of machines as well as cables. The tools, algorithms, engineering challenges are all accumulated in this backbone of the modern economy.

Now, the power grid faces at least twin challenges from climate change and renewables.Both seem to interconnect in the political agenda. But the grid never appears as an issue. There is just this "smartening" of this backbone, which has no unified definition. More and more technologies and communication systems will be integrated, and with a little bit of magic, there is the future grid. Then the platform and market place will be revolutionized with the grid transformation. It is the whole story.

But the reality is far from these narratives. Recently wildfires in California have been a challenge for the future of grid discussions. In short, last year, power lines caused wildfires in California. This year the company implemented systematic blackouts to avoid any fires caused by power lines in the driest dates. The exciting part of the story is the company's efforts to instrument consumers resisted preventive line outages, and then next, or a few days later, fires erupted last year. Then the customers filed cases against the company for the wildfire damages. The company then applied for bankruptcy protection. This year, the company didn't leave any room for chance or customer resistance and started preventive outages. It affected 2.5 million people in California.

The increasing frequency of wildfires may be due to the warming of the climate. But we see an increase in the number and scale of disasters. The power grid is the most fragile part of this new equation. But to prevent climate change, more renewables had to be utilized. Then we came to the story of (South) Australian blackouts and UK power cut. For both cases, the renewables have contributed to the power disturbances.

Then the disasters and disaster preparedness enters the scene. According to Itron's "Disaster Preparedness 2019 Edition", after 1970, the natural disasters "quadrupled to 400 a year". For the US, the losses amount to $1 trillion. The surveys are done in the US. 87% of customers are saying they have been impacted by one in the last five years. 53% of utility executives say they are very or extremely concerned about the likelihood of a disaster in the next five years. For the consumers, the same sentiment is at 40%.

We are sure that renewables are the way to go. The disasters are expected to increase. Electricity's share in overall energy consumption to climb up — customers' requests for cheaper electricity services to escalate. Then everyone's right to produce his electricity to be the norm. It is such a complicated optimization problem to be solved.

One interesting strategy to solve this puzzle or optimization problem is to have a hybrid grid. The hybrid grid should have "micro or mezzo grids" connected with the mega grid. It should also have a silent and reliable operation as well as a smart mode. The topology should be as hard as the wires and poles, but it should be dynamically rerouted with algorithms and autonomous processes.

But today's grid is not there yet. More research and studies had to be carried out to findthe way forward. For most of the customers, the network is intrinsic and natural.However, the future demands a more living and cosmopolite grid.

Electricity Market Challenges In A Low-Emission World

Nov 25,2019

Electricity markets around the world are having difficulty incorporating policy objectives to market mechanisms. It is not a new issue. Since the opening of electricity markets, everyone had a suspicion that the markets favor natural gas. There were several reasons for this phenomenon. The most important one was the efficiency of fuel conversion. But this has to change…

The rise of natural gas in power markets or power systems may be traced the to late 1970s. In 1978, the Public Utility Regulatory Policies Act of 1978 of the USA had a definition called QF, qualifying facilities. These facilities are either small power production renewable facilities or cogeneration plants. Initial sunk costs, stranded asset discussions were started with this QF definition. As cogeneration became a bigger market, the technology improved. It also forced the system to accept new players with their small or cogeneration plants.

The early roots of the standard market model merited low-cost production. Low-cost production in a fossil fuel world can only be satisfied by either efficiency or low fuel cost.

The reflection of this in economics is marginal cost. So, the system works on the competition of marginal costs. The more efficient and less variable costs lead to an ever cost-effective system.

As things move forward, natural gas has become the natural winner of the market system. Whenever the market liberalized, natural gas has become the star. The clean, efficient, flexible primary fuel system is an essential asset in power markets. But natural gas has one Achilles heel that is the oil-linked pricing of natural gas. The electricity prices were a shadow derivative of oil prices in most places.

During the early stages, the most visible problem was missing money problem. The competitors in the power market can earn their marginal costs, but the mechanism doesn't guarantee their capital expenditures or investment costs and the security of supply. Therefore capacity mechanisms were invented as a necessary evil to solve investment returns problems.

This corrected, and the working mechanism creates a competition based on efficiency. But how about renewables? Think this way; we have a joke about 100 solar panels. If we have 100 solar panels and need –let's say- 60 of them, which ones should be dispatched, which ones should not be dispatched? There is not an easy solution for such a mechanism to solve the renewable dispatch solution.

Some researchers proposed "on-demand" and "on available" market mechanisms. Some other offered flexibility mechanisms. There may be baseload power markets, as suggested in the Japanese market reform or separate fossil and renewable markets. But the main question remains: What is the competition criteria? If it is efficiency, how should we price efficiency within the renewable world? There is an easy solution; the most efficient renewable resource is the one closest to the source. But then this contradicts the inherent economies of scale of the power sector.

I think that the marginal cost paradigm is not the central pillar of renewable power markets. The competition among renewables should be based on the opportunity cost of not getting dispatched. It requires a complementary flexibility market. Current balancing markets may evolve into flexibility markets. Then there is the question of opportunity cost. Pricing an opportunity cost with zero marginal cost resources will be hard. Some may claim that it is LCOE, levelised cost of energy. But then you guarantee everyone their investments at least. Markets are the main instruments of power system operations. If they can not handle price costs and policies correctly, the whole procedure will be inefficient, and it will be aburden to the customer. Long term contracts are a temporary remedy. Competitive renewable energy markets are the new challenge of the energy markets.

Engineering the Narrative and Hiding the Reality

Dec 2, 2019

For the past couple of weeks, I am following British ESO Control Room (@NGControlRoom) accounts tweets. They are publishing the percentages of low-carbon energy resources in the British electricity. Nowadays, when you add up wind and solar, it doesn't add up to 15%. Gas is on the rise again.

IEA has published some estimated costs regarding renewable gas. Hydrogen costs 12-25$/mmbtu and biomethane around 10-22$/mmbtu. In countries like Turkey, biomethane costs may be lower due to cheap feedstock. Another graph from the same page (WEO2019), shows the amount of permitted hydrogen in the gas grid by countries.France has the highest limit with 6%, Germany's limit is 2%. Under certain circumstances, it gets to 8%.

One other interesting story was from Georgetown, Texas. The city achieved 100% renewable energy by 2017. But last year customer bills increased and now the people don't look happy. The reason is not so simple. One explanation claims that the city over contracted its energy needs and had to sell excess energy in the spot market. Low natural gas prices in Texas caused losses when excess generation from low carbon contracts was sold in the spot. Al Gore also hailed the city.

The renewable success of Texas can be attributed to George W Bush. His support for wind generation has paved the way for more wind generation in Texas. On the other hand, Barack Obama has hailed himself as the enabler for shale gas and oil.

What is the biggest threat to the rise of renewables? It is a technology that enables us to recover resources from shale and tight rocks. Fracking has lowered oil and gas prices worldwide. The lower oil and gas prices are rendering all alternative options in clean energy to unfeasible for the time being.

Varun Sivaram, in his book "Taming the Sun" gives examples of how cheap Chinese solar panels destroyed alternative solar technologies. Startups crashed, new photovoltaic technologies came to a halt.

Three years ago, China was hailed as scrapping 100 coal projects. But in the last two years, it installed 43000 MW new coal plants. Recently there are political narratives that fuse coal and energy security back again in China. On the other hand, there is a significant slowdown in solar. This will impact world renewable and solar growth too. Back to coal and retreating from solar will hamper the climate change efforts.

In all these examples, what I see is the beauty of a narrative that captivates us with numbers but numbers are not matching those narratives. The future, like everything else, is a mixed picture. Britain is not producing 100% clean electricity, green gas is not cheaper, 100% renewable cities are seeing backlash from higher bills, not only low oil and gas prices are a problem for clean energy tech but also cheap clean tech is problem for innovation, China's energy picture is not what it looks like….

Practically no economist has seen the 2008 economic crises as coming. Despite all these models and genius in the field, forecasting is difficult. But this trauma of past failure is causing economists to overpredict the next crises. I fear that this sentiment is infecting the climate change discussion as well. This pushes the private entities to engineer their narratives and statistics as if they are the greenest of all. This creates a veil that hides the ongoing reality.

The next wave of cleantech will rise with increasing oil and gas prices, that is for sure. But R&D and financing are not where it should be. Political pressure is not helping. European targets are getting determined on a broader horizon (20-30 years instead of 5-10), so practically postponing the significant changes to the next governments. The engineering of narratives to create an illusional “change” is getting short of the reality we are facing.

Rabbit and Tortoise

Dec 16, 2019

For some time, Saudi Aramco was on the headlines. Now Aramco is the most valuable company in the World. After years of digital companies’ reign, energy companies are still struggling to stay at the top. However, there is a hitch.

Probably at the top of the valuable list, there are two sorts of companies: the activity mediators and activity enablers. Mediators are like digital companies, and enablers are like energy, automobile companies. The value produced by mediators looks enormous. But as the creative destruction is faster on the bit level than atomic level, mediators and their rankings are subject to a lot of change. The enablers are more into fundamental activities, and despite value deflations, they persist for a longer time horizon like the rabbit and tortoise. Therefore enablers happen to be more successful in the long term transitions. You may think about Nokia and Shell.

The first problem with energy companies was low oil prices. The expectation of lower oil prices for a more extended period due to shale oil also added insult to the injury. These events are pushing the fossil fuel companies to be more competitive, more efficient, more relevant. The high oil price era was a golden age for producers where everyone and every business decision was deemed successful. Like all good things, this era has ended for now. It will come back, but until then, the urge for transformation is upon them. The early signs are here with write-downs and IPOs.

Chevron announced this week that the expected write-downs for some of its costly assets. It was expected from a climate change viewpoint. But Chevron’s depreciation was due to low oil prices and fossil fuel gluts. The stranded asset discussion was fundamentally centered on the fossil fuel and infrastructure that will not be utilized or produced due to climate change policies to limit emissions. But the real stranded asset discussion hit the headlines due to lower oil prices.

At this point, we have to pause and think about the energy transformation that is said to be happening. On the one side, there is the climate emergency, COPs, Green Deals, but rising emissions. On the other hand, we see an increasingly challenging environment for fossil fuel producers due to low oil prices. For now, the latter pressure is more significant than the former to change the way energy is utilized.

Compared to the past, this is alarming. While renewable energy companies are not transforming but trying to fix their returns with long-duration contracts, the oil companies are trying all sorts of ways to stay profitable. They face a more real and destructive force than climate change: low oil prices.

One person who worked on the IPO for nearly four years talked to a news agency claiming "the royal palace panicked thinking oil prices were about to crash." The low oil prices whipped a national oil company to rush to an IPO. Whether it is trade wars or shale oil, the pressure on the national oil companies is quite high. Therefore Aramco IPO and its aftermath will be vital for OPEC countries.

Aramco IPO has the potential to be very transformative for national oil companies. Despite all the pressure from New York and London bankers, the company achieved a $2 trillion valuation. It may be due to the Saudi strategy to increase demand for Aramco shares. But behind this IPO, there was the logic to transform the Saudi economy. It is the dream of all middle eastern oil producers. A small step in this direction will open the doors for other oil producers.

Looking into the future, the tortoise always looks like the loser, but due to its urge to transform he still has a chance. Despite not having the charm of a rabbit, it is working more meticulously on the new ways to survive. These new methods will be contagious to other similar companies. Think about what will happen with lower natural gas prices for a longer time...

Projecting 2020

Dec 23, 2019

2019 is coming to an end. It was an interesting year with geopolitical events, economic growth concerns, OPEC meetings, climate change discussions, and renewable momentum. When it comes to 2020, we have to think about which ones of these will continue their gradual change and which ones have the risk of disrupting the system.

For one thing, climate change discussions will continue their gradual increase. If the past is a prologue, then the only major inhibitor can be an economic slowdown. On the EU side, we may further move for a green development agenda. The critical points will be the definitions and trade relations. With border adjustment tax, the EU is also signaling its way of protectionist measures. It will be an interesting development to watch.

The economic growth for China, India, and Germany will be critical. Apart from India, the other economies are having a better time than in 2019. What will be the significant impact

of an Indian slowdown? It is a critical question. The early signs show a less than moderate effect on the world. China, on the other hand, can speed up its economic engine, but with more challenges, there will be more questions on the sustainability of economic growth.

US elections and its results may do what OPEC failed to do. A democratic candidate with a significant climate change agenda may affect the shale gas development in the US. The markets will probably price the elections result before the election day. There are two credible scenarios. Either the de-regulation policies continue, or heavy-handed regulations returns. The most significant risk is for consumers around the world. But risk also brings its bounties. In the case of a moratorium on new shale developments, major oil producers will profit handsomely. The climate taxes will be just a peanut. Therefore for “big oil,” a moratorium may do what OPEC failed to achieve. It will be disruptive.

Specifically, about climate change, we will see more publicity but less action probably because there are more far far away targets but less medium-term checkpoints. So there will be less motivation to act now. But there will be more efforts to put substance to climate discussions. If economies are in good shape, this substance may scale up the efforts. There will be more tenders, record low prices, and the early signs of industrial transformation. However, the reverse may happen. Still, there will be an opportunity window to do a Keynesian Green Deal.

Oil prices are a hot topic for 2020. The best guess for oil prices is the “status quo.” That is to stay that oil prices will continue their pattern just like in 2019. Oil prices respond to trade wars more than the stock levels nowadays. OPEC+ observe the US elections, and until November, they may not break current consensus. Most of the OPEC+ members value this agreement, and there are reasons to expect the continuation.

The only enemy of the gas is the warm weather. In 2020, the warm weather may sustain the gas prices at their current levels. Just like in 2019, the polar vortex affecting both China and Europe can affect prices. But for the rest of the year, with more LNG coming, the prices will probably average more or less 2019. The US elections may distort this equation. The developments in the Australian energy and climate discussions are also worth a look.

The disruptive changes are hard to guess. As always, a major problem in the Middle East is the biggest concern. Another one is an increasing discontent in Asia. There may be a significant cyber attack since their intensity is increasing every year. Volcano eruptions are my favorite unforecastable events.

Nevertheless, the world is moving into a new protectionist and nationalistic plane.Energy policies may not have too much space for romanticism. The realities may sink in.The most significant fact will be the cost of the transformation

Forecasts from Our Coronavirus Study

Feb 16, 2020

This week we published a study on “A Virus to Kill Energy Demand: Coronavirus’ Impact” where we discussed how the virus effected the energy markets and what would happen in the future. The document is available in our website. Here we share the forecasts section.

One of the most important questions is “when the virus could peak?”. According to leading Chinese epidemiologist Zhong Nanshan, the virus may peak in the last half of February. [43] He also says, “I hope this outbreak or this event may be over in something like April.” The most important line from the interview is perhaps his assessment about the unknowns of the epidemic: “We don’t know why it’s so contagious, so that’s a big problem.” In terms of oil price forecasts, Oxford Economics has revised its number downwards by $6/b for the first half of 2020, but for the rest of the year, and they expect a normal trend.

The biggest short term question is how this epidemic will affect regional countries and Asian growth. Already there are signs of its impact on Japan, South Korea, Indonesia,and others. So the slowdown is contagious, just like the virus itself.

However, the story may not be that simple. The impact of the epidemic is complicated and not fully understood as of now. In the very general terms, we may summarize the impacts as follows:

- The world economy will slow for the Q12020 for sure, and 2020 growth will be most probably lower than expected,

- Import and export-oriented economies will be impacted differently. South Korea and Japan’s economic growth will be hit, but countries like Turkey may see an increase in economic growth.

- Oil, jet fuel, gasoline, and diesel demand will be down for Q12020 and most probably H12020. This fully depends on when the epidemic will peak. However, the airline industry problems should be watched carefully.

- Passenger car sales are down 20% year-on-year in China. This will impact the whole supply chain in automotive production. German auto manufacturers are quite active in the Chinese market, and the slowdown may reduce the earnings and sales of German car makers.

- Transportation bottlenecks and logistic problems are a major part of the problem that is not easy to quantify, but Chinese import and exports as well as retail sales will be lower.

- Coal prices have been quite different than other commodity prices, since China closed its mines due to work restrictions and increased imports. The prices between China and Europe diverged and Chinese coal prices have risen. For the rest of the year, coal stocks will be impacted and coal may remain higher than expected if economic activity rebounds.

- LNG oversupply will persist. Prices may not rebound until Q3.

- Solar panel manufacturers will have difficulty for the first half of 2020, and this will be reflected in the prices. The important question is whether regional targets in China will be revised downward or not. If not, solar costs will increase.

- The wind manufacturers' position is mixed. Their Chinese operations and sales will disrupt their balance sheets and deliveries.

- Electric cars may not be having a good year. As Chinese producers face tough times,the slump in the automotive market will impact everyone.

As the last point, I believe there is one final graph to be considered, and that is wholesale food prices. Wholesale food prices are important because unemployment and high food prices do not mix well. The Chinese epidemic is already increasing wholesale food prices. This will have an effect on middle-class budgets.

The lower Chinese economic activity may mean lower energy and commodity prices for the global economy. This may increase economic activity in other countries. But US elections and US oil&gas producers are important. The further slipping of oil prices may have negative effects.

In summary, the evidence so far shows us that this epidemic is much bigger than the previous ones. The impacts are not limited to fossil fuel industry like 2003 but also impacting the on going energy transition. Interestingly enough, while oil and gas prices drop, coal and solar panel prices may go up. Still we need to see the peaking of virus to make better assessments.

Nudging Energy Behaviour

Mar 2, 2020

Energy efficiency is always preferable energy fuel. From negawatts to low hanging fruit,lots of tags are attached to it. On a macro level, energy efficiency can happen by either technological improvement or behavior change. As we talk more about the smartness of our energy system and digitalization, we have to understand the human instinct that interacts with the smart-digital system. Can these systems nudge the user for a more energy-efficient realm?

Nudging energy behavior is not a new thing, during the 70s and 80s, there were lots of advertisements, government programs for energy efficiency. However, we are coming to a dark reality about behavior change, does the consumer only react to price hikes?

During 2007, I was part of the project to explore sustainability options for energy policies. The project group was composed of well educated, activist, informed sector professionals. One of the transition during that period was switching from the light bulb to CFL (compact fluorescent lamps). I tried it myself and changed all my bulbs with CFL and reported the

decrease in my bill. Some people from the group didn't concur with me and emphasized the adverse health effects of CFLs. Some also correctly mentioned how some cheap CFLs could be harmful to the grid through harmonic generation.

While walking back home, it was easy to spot houses with bulbs and CFLs, since bulbs produce a yellowish light and CFLs blue-white. A big CFL manufacturer also produced pamphlets and was distributing those in the biggest supermarkets to inform customers. But the lights from the houses were still yellow. After price hikes, this all changed.

Suddenly white light was victorious. The health hazards are forgotten, and the good old eye-friendly yellow incandescent light is damned. Today in most of the shops, you can not even find a yellow LED light because the customer prefers white light to be yellow, contrary to the social hesitation against white light 13 years ago.

There may be lots of reasons for the change. The availability, quality, design, price, and unavailability of incandescent light are all factors. But the shift is interesting.

Today consumers are more environmentally conscious. However, cars are getting bigger and bigger. In a diesel country like Turkey, environmental groups didn't mention diesel scandal once. The ecologically conscious consumers didn't bother it as well. Despite substantial technological improvements, smart houses are not the norm but still testbeds in terms of energy consumption.

Therefore we have to be very careful about revealed and declared preferences of consumers. There are environmentally conscious consumers, but the services for them may not be available. There may be millions of energy efficiency savvy people, but their preferences are hardly known.

Why a social media technology or platform like Facebook was used to manipulate the elections but not increase energy efficiency? That is probably because of the nature of the information. The information does not convey the truth most of the time. In recent times, information is much more about opinion than facts. So what is the public opinion on energy efficiency? "Good," and that is it.

What is the way forward? A combination of smart technologies, social media, new forms of media, and behavioral methods can be a good starting point. The first step should be to dissect consumer groups according to their revealed preferences, not declared ones. The second step is to design the services and make them accessible to these groups. However, to nudge the groups to the services, facts generally do not matter. That is very unfortunate, but opinion matters more. Data and facts are always relevant, but truth decay is a reality.

When opinions are essential, what the person believes in or identity becomes critical. For example, in a smart home experiment in the UK, males tend to use these technologies better than female members. That irritates the female members since the complicated nature of the system leads to discomfort. Therefore a smart energy-efficient house system should always account for a female opinion before male opinion.

Also, just like selecting videos from online services, most of the consumers do not read the details or lengthy texts. They just make their choices based on visual images. For the same results, it may be better to warn about emissions for environmentally conscious groups and inform about the savings for the cost-conscious ones.

The other issue is how to make efficiency stick to our daily lives. The rebound effect is real, and we are lazy. If technology does all the efficiency things in the background, that is great. If not so, technology can nudge consumers with enjoyable animations and information. That may work better than numbers. In an experiment, a polar bear on melting ice visuals on a showerhead screen has pushed some consumers for less hot water usage.

Although it may sound controversial, the consumers may not be interested in numbers, facts, or scientific explanations. The opinion matters more, and we can not change it in favor of facts. Therefore the technology should help energy efficiency in the opinion realm. While doing this, we should remember identity, behavior, and relations affect energy demand probably more than government campaigns.

Good and Bad News: Oil price war

Mar 9, 2020

During one of our analysis, we found a weak relation to negative price movements after OPEC meetings. Initially, we thought it was too political and risky to claim that OPEC meetings are generally succeeded by price decreases. From a rational point of view, a commodity market cartel's meetings should be to stabilize or increase prices. However, this one was quite a lesson for all oil watchers…

Why? Because after the meeting, there may be no agreement, and the cartel may go with its ongoing cuts. However, the dispute between Russia and Saudi Arabi turned into a price war. Saudi's has carried out price attacks before. So it is not unprecedented. But the effect is enormous. Oil prices have seen the biggest drop since 1991.

It was not so obvious that such a move may happen. Our common sense tells us that the price of war is bad for everyone. Recent reports are giving clues that such an act was in the development at least since February. WSJ claims King Selman called Putin, but Putin made him unavailable for talk. Later he talked to King and rejected oil production cuts.

Ali Al-Naimi, the famous Saudi Oil Minister, has initiated a price war to hit shale oil's increasing market share. This cost him his job in 2016. In the last days of the OPEC+ era, we were hit by a demand shock (although some experts name it as a supply shock) caused by Coronavirus. After this demand shock, a supply glut is like a perfect storm.

On Friday, we talked with Cüneyt Kazokoğlu in our podcast about Coronavirus's impact on oil markets. I made a forecast claiming that Saudi's will defend the price since that was the market sentiment. Neither options markets nor future markets was giving a sign of price war. But we mentioned about Bob McNally's 26$/b forecast too. Now, the price war is a reality, and the riskiest move has been made.

Why? There may be several reasons, but we do not have information on the details. But if such a move is a very big event, it should be a cross-cutting move aiming to achieve several objectives. One of them is about Russia-Saudi-US trilateral relations, and the other one may be about Saudi succession. Continuous weak oil demand may be another motivator. Shale bankruptcies and the consolidation of shale assets in the hands of big oil companies maybe another dimension. But these are all conspiracies.

The reporters claimed Saudis are looking for 80$, Russia was giving the message that he is adjusted the budget for 40$/b. Shale oil is looking for 50$/b. How about the others? Most of the OPEC members will be hard hit by any price below 60$/b. From the developing countries' perspective, this is good news from a distance. But coronavirus panic on steroids with an oil price war may not look suitable for anyone.

So what may happen? In terms of pure speculation, the first question is the possible duration of such a price war. Since it is very sharp, the duration can not be too long. This is the reference scenario. The alternative one is that it will last 18 months or so until demand picks up strongly. Sometimes I resemble energy demand to giant metal gear. It takes quite a lot of effort to make it move, and it takes more effort to slow it down.

One possible narrative may be the repeat of previous events. A third party OPEC member may broker a new deal between Saudis and Russia. Previously Noureddine Boutarfa brokered such a deal bringing Russia and OPEC inline because third countries suffer from these wars more than the warring countries.

What is the message in this price war? The obvious one is market share. But there must be some other messages to justify such a sharp message. It will be revealed slowly, I guess. This is good news for consumers, bad news for shale, OPEC, and other oil producers. Another good news for natural gas demand and commodity consumers. Now we have to look at food prices. The revenues of oil producers will drop, but the subsidies for their domestic food supplies will continue until they feel the pain.

There may be other questions and answers, but the biggest question is still Saudi Arabia.

Oil Price War and China

Mar 16, 2020

When it comes to lower oil prices, China is well-positioned to take advantage of decreasing import deficits and consumer toll. However, for the last decade, it was custom to hear that "World's economic gravity is shifting to Asia or East." In such an environment, China is not just a simple consumer paying for the oil bill, but it has broader implications beyond its borders.

Starting from the most apparent result of low prices, China will benefit. By increasing imports and stock levels, it has a degree of control on the slippage of price. Oil is also related to other commodity prices. Lowering of these commodity prices in the short run mixed with government support for the economy is a kick for the virus hit economy.

China is also one of the biggest oil producers. It is producing close to 3.8 million barrels/day. We are not sure how much the Coronavirus hit that production. However, China was producing 4.3 mb/d in 2015, and its production has been recently stabilized. The problem with this production is its cost. Rystad energy vice president claims the cost for Chinese production is 41$/b.

Oil-producing countries subsidize their essential services(like food) through oil revenues. Both oil consuming and producing countries generally lend a helping hand to their oil and gas industry during these low oil prices. So with low oil prices, the Party has to help upstream state-owned enterprises.

Sinopec, PetroChina, and Cnooc are expected to increase spending despite losses. According to Bloomberg, China's biggest three oil producers raised their spending %18, but PetroChina's shares fell 20% when Asia Energy Index rose %6. It is just plain economics. Low prices hit the high-cost producers first.

Chinese President Xi Jinping, like any other developing country, is aiming for energy and hence oil self-sufficiency. Price war will hit self-sufficiency targets, national oil companies, and high-cost production fields. Assuming prices stay low for some time, its impact may be more structural. It may also delay the Chinese shale revolution to come for some time.

The other problem is the secondary effects of Chinese expansion. China has given resource backed loans to some prominent resource-rich countries. Venezuela, Brazil, Angola, DRC, and the Republic of Congo are the receivers of such credits, according to The Chinafrica Project. These repayments of these loans are now on the riskier side than before.

Regarding natural gas prices, the effects are complicated. Most of the US shale production was producing associate gas. Well closure and decreasing oil production will support gas prices. Low oil prices will impact LNG and long term contracts differently. IGU report does not provide details about Chinese contract space, but oil-backed contracts are still relevant. Thinking about US-China trade deal and removal of Chinese tariffs on US LNG, if Henry Hub prices increase, LNG cost is expected to increase. Overall the result will be mixed.

The biggest problem is regarding the third countries. Wall Street Journal published a story regarding why Coronavirus has hard hit the Qum city in Iran. They claim it on close Chinese collaboration and Chinese projects around that region. If low oil prices hit the already struggling oil-exporting economies, most of the Chinese projects may need a rethink.

Another interesting development was about freight rates. After Saudis cut the crude prices, there was a rush in demand for tankers. At the very least, in a contango market, you store oil until prices increase. China's biggest oil trader Unipec is trying to cancel some cargoes due to spike in freight rates. Tanker charter costs nearly tripled with the Saudi price attack.

Therefore the whole situation is mixed. China may recover earlier than western economies. The stimulus package may bring back demand faster than anticipated. But China is not an island anymore; it is very close to the heart of the global system and has connections with

the whole world. Just a simple oil price import calculation will be an underestimation of broader impacts.

In a country dominated by state-owned enterprises, the effects of low oil prices fromthe governmental level to consumer level has varying results. But the primary impact assessment should be made regarding Belt and Road Initiative and its future.

Oil Price War: What has happened so far?

Mar 23, 2020

Oil prices crashed on March 9, 2020. The chain of events leading to March 9th and the following days are historical. We lived a very rare moment in the oil price(Brent price for this article) movements. What will happen tomorrow? Understanding tomorrow deserves a more careful examination of yesterday. How the dynamics developed, when the covid19 effect kicked in? These are important questions.

The signals for a volatile year were there in January, but not to this extend. The opening of the year was 2.6% higher oil prices at a level of 68$. That was the highest since May 2019. But the second week didn't end well as well as the start of the third week. There was an expectation that there may be a military confrontation between Iran and the US. As this scenario faded away, gains were lost.

IEA's Oil Market Report from January 16th reads "Our global demand growth forecasts for 2019 and 2020 remain unchanged, at 1 mb/d and 1.2 mb/d". So the expectations were 2020 will be a better year than 2019. Meanwhile Covid-19 was spreading.

During that time, no coronavirus effect on prices was observed. The world growth was a little bit better, and expectations were on the positive side. On January 23, the Chinese government locked down Wuhan. This news pushed oil prices lower as Brent moved below 60$ the next day.

The slide continued till February 10. Oil price has found some relief and climbed upwards from the low of 10th at 53$ as its lowest level in a year. The primary reason at that point became Covid-19. The second reason was Russian reluctance to an OPEC+ plan. On February 4, Russian Energy Minister Alexander Novak said that he is not sure about tightening output further. From 4-6th February, the Joint Technical Committee was having their meeting on cuts.

At that time, OPEC+ was cutting supply by 1.7 million bpd. There are also supply cuts due to sanctions. Venezuela, Iran, Libya's civil war, and UEA's output fall by 0.3 mb/dwere the deficits on the supply side.

On the 8th, OPEC published a press release following the extraordinary meeting of the Joint Technical Committee (JTC) in Vienna. The press release states the adverse effects of the coronavirus epidemic mostly limited to China. So there were no worries of a global crises at that point.

JTC recommended current cuts to last till the end of 2020, which is 1.7 mb/d. In addition to that, advised on further cuts till the end of the 2nd quarter of 2020. But the Russian side has already given the signals that no more additional cuts will be supported.

If we rewind a little bit to December, Russia has achieved to exclude condensates from production data regarding OPEC+ targets. Gazprom and Novatek's growing gas production and hence condensate production of 7-8% of oil output was excluded.

On February 13, IEA published its monthly report. The agency downgraded the global demand growth forecast to 0.82mb/d. In a typical year, this should be 1-1.5 mb/d.

By the end of February, it was already apparent that Covid-19 was something much bigger than initially thought. On the 27th and 28th February, the Brent slid to the boundary of 50$. At that point, additional OPEC+ cuts were nearly for sure.

On March 4, Goldman Sachs slashed its estimates and mumbled possibility of 45$ by April. Their research note was also considering additional OPEC+ cuts. Novak arrived in Vienna for talks. Iranian oil minister stated that the Russian side was reluctant, and OPEC has no plan B.

The next day OPEC advised 1.5 mb/d cuts on top of the already going on cuts of 1.7 mb/d. But Novak flew to Moscow to talk with Putin. That was strange since he may call Putin, but instead, he made a round trip and returned to Vienna on Friday. During his visit, OPEC ministers met and decided to cut 1.5 mb/d more if Russia and everyone join.

By Friday (March 6), there was no agreement. Novak said to the press, "From April 1 neither OPEC nor non-OPEC have restrictions," and everyone will pump at will. Saudi Minister was asked about what will happen next, and he said: "I will keep you wondering." Oil tumbled to 45.6$ on that Friday.

The drama has not ended. On Saturday, March 7, Saudi Aramco cut April prices to Asia by 4-6$ and US by 7$ by email before midnight in Saudi time. But the most significant cut was to Europe by 6-8$. Aramco's Arab light has been discounted to Brent by 10.25$.Saudis vow to increase their production up to 13 mb/d.

On Monday(9th), the Saudi price attack has contributed to the market panic due to Covid-19. US President Trump tweeted, "oil price drop is good for the consumer."

Prices dropped to $35 by Monday. The drop was so large, and some thought there was a mistake in the data. Price crash reached 30% as the Asian trading started. Prices gained close to 1.3$ on Tuesday. However, on Thursday(12th) due to covid-19, as well as Saudi and UAE's plans to increase production, prices dropped again to $31.05.

The next Monday, due to economic concerns, prices slipped further to 28$. Now it looksa s if no one can hold the price. But by Wednesday, March 18 the prices dropped below 25$, the lowest level in 17 years. It was like a perfect storm, supply glut meeting demand destruction. On the same day, Russia admitted: "recent crash meant it would run a budget deficit."

The next day, Thursday, March 19, Trump said, “At the appropriate time, I will get involved, yes.” to a question about intervention in the oil price war between Saudi Arabia and Russia. Prices moved up a little bit. By Friday, prices tumbled again as Russia rejected Trump’s intervention.

In this perspective, the price crash of 2020 was not short of a soap opera. But if we stepback and read a paragraph of a speech from October 24 2019, things may get a bit more interesting. “While at the previous forums in Verona we named three “regulators” on the global oil market, Russia, Saudi Arabia, and the USA, now we have only one market regulator -the USA, and we have to accept it.”… These were the words of Igor Sechin

Another Kind of Beast- COVID

Mar 30, 2020

Every crisis is different. This saying is also true for the current turmoil. There are similar things compared to the past, but unique dynamics are developing within this crisis. How it will shape the energy landscape is not certain yet, but economies will not prosper from it.

The first question is regarding the demand. It is two folds. The first one is whether demand is like a light bulb; you can just switch it on or off. The alternative is whether demand has inertia like a big truck. Demand takes time to slow down, and it takes time to ramp up. The consumer side may hit the brake, but the slowing down is not an instantaneous event but a process. This process will probably create new kinds of behaviors and attitudes on the consumer side. It will take time for the consumer to forget this trauma-induced learned behaviors.

The second question is the definition. That is not a financial crisis or a banking crisis. But it may have elements borrowed from both. At the most basic level, the building tensions point to a “cash flow crisis.” If there is no certainty in cash flow, consumer confidence will be hurt dearly. The whole problem is a pandemic induced government-controlled economic suppression that may lead to a cash flow crisis. Whether the oil price war was triggered by the fear of an upcoming demand drop or not is a question demanding an answer.

The third question is the status of expertise. You can watch and read all sorts of experts,but they can not help themselves, and the best idea that may come out of them is not something new. Experts are the experts of a particular domain. During disruptive events like these, they can not extend their domain knowledge easily or say something other than what they studied in the past. If we concur that these crises are something different, experts are also victims of these crises. In layman terms, their expertise collapses.

The fourth question is how responsibilities shift. The modern state is a beast in between a scapegoat and leviathan. Nevertheless, it is a collective mechanism that provides and carries the responsibility to provide essential services or to assure basic services are provided. It can handle extreme events. This intense event is way beyond a state’s carrying capacity, whether it is China, the US, or Italy. So it calls the citizens to take their responsibilities to run current carrying capacity without collapsing basic services effectively. Contrary to the sentiment of state dominance, coordination and enforcement become the significant issues.

The fifth question is the need for coordination and resolving information asymmetries. In all crises, the most common pattern is the need for information. In fact, in most of the past energy crises, we see the creation of new information or statistical data warehouses or processes. Since a crisis hits all sides of civilization and responsibilities fall back to the people, everyone has to have the same information to act effectively. States' information awareness is not enough; everyone should be informed.

The six question is the complexity of the solutions. Since expertise collapse and information vacuums had to be filled, a new kind of expertise and knowledge has to be built quickly. Even with the urgency, it always takes time to find solutions. The system that the crises shook is tuned for years of studies and intensive testing to come up with a solution. So there is the inertia of "information building." Therefore quick and easy expectations are nothing more than a mirage.

The seventh question is the dynamics of extreme events. Like the double pendulum in physics, this is chaotic. Extreme events generate chaotic futures.

The oscillation of economy changes. Human activity attached to economic changes. The expectations attached to human activity changes. All three arms of this global pendulum are now oscillating detached from past patterns. So future projections need a different vision and methodology like more risk management than risk forecasting.

As there may be more questions, the reader needs answers too. I am not an expert on the whole economy, and even if I am an expert on something, this writing may have taught you that my expertise is also no use for the current event.

Energy demand slump globally will persist for some time. The inertia of energy demand is significant, and it takes time to stop. This energy crisis -or energy industry crisis - is a mixture of past events, but cash flow is also an essential part of the energy industry, which is very capital intensive. So if this a global cash flow crisis, oil and gas sectors will be hit hard, more cash injections, if done by government programs, may mean fewer markets. The market brutality, as seen from the collapse of OPEC+ is severe, and there will be a call and push for regulation or regulatory mechanism.

Oil crises created emergency stocks for OECD countries, and these crises may create a different kind of obligatory stock -maybe cash or renewable equipment?- for an emergency because emergency and stock planning are brothers in arms.

New kinds of institutions like OPEC+Texas may not look like a possibility, but there are always different paths to the same results. Public expectations from renewables and clean technologies will change. To become mainstream, they have to carry as much weight as the fossil fuel industry. So we will probably see maturation in clean energy.

The energy events to follow Covid19 may continue for 3-5 years. Examining past events, such extreme situations generally trigger different things in different parts of the world,and they happen with random delays. If an oil market regulation comes before these events, we may be safe to talk about a price band. Otherwise, there are no limits to imagination.

Most importantly, a new energy landscape is formed. The biggest question for me is whether a “Green Development” plan is more feasible or less likely. Employment wise these crises strengthen the position of coal. The fear factor in all crises makes it harder to move forward initially despite the increased urgency for new policies. The solutions for a green future has to adapt to the Covid19, and that will take time. Because priorities will shift from “closing” or “shutting down” to “increasing employment,” the narratives of the past may fall on deaf ears. If effective roadmaps and innovative policies find their ways to the parliaments around the world, not in the short run but the long term, another energy transition will be gaining more steam than pre Covid19 world

Fooled by A different universe of extremes in energy systems

Apr 6, 2020

It is interesting that we were discussing climate-related risks a few months ago, and now the problem we are facing has become the dominant discussion. Although epidemics are nothing new and we have examples like Sars or other flu types, there are hardly any articles about a possible epidemic’s effect on energy demand and energy supply.

During events like these, it is useful to look back a little bit and see why we missed it. One of the best journals in the energy area, Nature Energy journal, has a dedicated February 2020 issue to “Extremes in Energy Systems.” Before Coronavirus, the whole “extremes” debate was on climate change. Are we so much into the climate risks such that we missed the other “existential risks”?

We have to be fair to the energy modelers. You generally project the possible vision derived from current data and information. A pandemic at the current stage has not been a major issue for energy, leaving aside airline companies during Sars. In the article “Energy modelers should explore extremes more systematically in scenarios” written by D.L.McCollum et al., there are three types of categories of extremes. They are:

- Category 1: Transient Events like subprime mortgage (maybe anticipated but not planned for)
- Category 2: Disruptive drivers like mass automation
- Category 3: Unexpected outcomes are “not even on the radar.”

So there is a categorization, an abstraction in the journal. Transient events can be part of the models and may have a raison d’etre since there are lots of historical events. Disruptive events are available from TEDx evangelists. Unexpected outcomes are hard toexpect, and since they change the historic trends, the direction of new trends are hard to grasp. Major events create such a captive narrative that our mental mindset gets stuck with such events and fails to think outside this universe. Energywise, we even thought about volcano events, hurricanes but not pandemics. Because for the current generations, it didn’t create a captive narrative until now.

Interestingly enough article does not mention pandemics or epidemics once. The rest of the articles in that issue is oriented toward climate change, climate change finance risks, other

extreme events. Coal bankruptcies, company filings on the risks, and stranded assets are well mentioned but not pandemics. If you think politicians are not ready for such a huge event, guess what the best minds were working on: climate change and related risks. But not other risks.

It is not to belittle the climate change debate, but the dominance of this issue on the political and scientific sphere leaves us vulnerable to other risks. But this is not without reason. Climate change teams have a model and have credible forecasts for a possible future. They were relying on these models. They produced agreements, cooperations, institutions, and economic outcomes. This positive feedback created even more climate change discussions.

On the other hand, pandemics do not even have these professional models, and they do not have strong institutions and solution sets for the next events. The forecast is completely random, and no one has any idea about when the next pandemic will hit, but it will hit. Incorporating such a vague issue in models and calculations is a very hard job. Even if I write here, “there will be another pandemic affecting energy demand and supply, I may act as a perfect forecaster in the next 30 years without giving a timing.” It is how undefined these events are.

If we think about what has motivated Nature Energy for an issue on extremes in energy systems, it was probably last summer’s wildfires in California and its effect on electricity supply as well as the bankruptcy of PG&E. Practically we can conclude that the issue was more about the lessons from past events.

Futurewise, there was no expectation of pandemics since

a- no close pandemics happened,
b- it was not a US issue. That concludes us to the geopolitical meaning of“extremes.”

The difficult issue is how to add “extreme forecasts” to our current energy modeling practices. We probably have to look at the issue in the tandem view. The first one is the standard modeling that is based on normal economic growth and energy demands. The second one should be a different regime than the first one. If we try to explain the “extremes,” there will be thousands of such events in this connected world. It is better to define normal forecasts as boundary and then change the regime to “beyond normality boundaries” modeling for risk purposes.

Even if our models correctly predict extremes like – 20% drop in world oil demand in a matter of months- there is little to do in terms of modeling practice. The timing, geography, and vector of these extremes are important. But we can create buffers for such hard hits. Also, there is an ever interconnecting constant across each extreme event, energy prices, and the effects on consumers and producers as well as a consumer-producer effect on energy prices.

Modeling is an exercise to simplify complex events into a bunch of mathematical and logical relations. It is a mental model of the real world. While simplifying the real world,we may miss a lot. But extremes are not limited to climate change or weather, yet we are not sure

what to expect. The modeling practice for “unknown unknowns” does not exist, but we are living inside one of them. We should better learn to look in more abstract terms and beyond normality claims to have better models

Energy Demand After Covid19

Apr 13, 2020

The effects of Covid19 are not over, and it may be deemed too early to talk about energy demand effects. Energy demand projections before the virus have become obsolete. We have to build new models reflecting the new dynamics of the post covid19 world. But what are these dynamics?

During our podcasts with Cüneyt Kazokoğlu from FGE, we discussed how airline traffic was affected after 9/11. There are also studies on SARS disease’s impact. These are two folds. After 9/11, fear factor dominated, and air travel never reached the same volume for several years. In the case of SARS, the return of air travel has become much more quick and persistent. We have to judge the fear factor and regional effects.

The fear factor from a terrorist attack fundamentally changed consumer behavior and airline operation. The terror events after 9/11 and the hunt for Bin Laden took some time to settle. SARS disease, however, can be identified and eradicated in a matter of months. We should think whether the fear factor will force another change in consumer behavior.

The second important thing we discussed was the passenger car miles. During the previous pandemics, there was a visible increase in car usage as well as purchases. People may not prefer public transport due to their concerns about hygiene. Buying a car might become a priority. Car sharing may lose its popularity. The sharing economy may face a real challenge. The disruptive – startup ideas before and after the covid19 period may look very different.

According to some statistics, commuting to the work consumes 8 mb/d of world oil demand of 100 mb/d. Currently, this demand drop is visible. The gasoline demand has fallen flat around the world, and diesel is still resistant. The results are evident in crack spreads. Jet and gasoline have become much cheaper. This may be the end of diesel as Cuneyt puts it “as a passenger car engine.” Industrial wise, the diesel engine is still competitive.

When it comes to electricity demand, the house becomes the center of life again. In most of the developed and developing worlds, most of the time spent was outside the home, excluding sleep. Now, people may develop more attachment to their homes and spent more time improving living conditions than going outside for a change. For the developing world, this may increase air condition sales and demand.

A more digital world may increase the share of ICT(Information and Communication technologies) share in electricity consumption. Now the world sees a drop in electricity demand. But if we have had the data for ICT consumption, we may see a bigger share of ICT. From video conferencing to online lectures, the demand has shifted from classrooms, meeting halls to fiber optics, and radio waves. This may improve economies of scale for some businesses, and some of this behaviour will stick with us.

Natural gas demand is probably the luckiest. Prices are very low, and the coal mining sector has been affected. But there are limits to natural gas demand in a crumbling global economy. When market share is in danger, the players try to bite each other's shares. So with natural gas, the main question is about its impact on the competition between LNG and pipeline.

Smart and autonomous technologies may become a more integral part of our life, but contrary to the narrative, they may not bring much more efficiency. As Nature Energy's latest March issue discusses, people may use these technologies to maximize their comfort. For example, a family may be shutting down its gas boiler as they sleep and starting it early in the morning after they wake up. Digital technologies may help them to start the boiler 1 hour before they wake up.

One of my favorite trends is how people became more interested in home cooking. The videos, recipes are widespread. The real question here is whether this will stick with them. Due to hygiene awareness, this trend may stay with us. The services sector and transportation will be negatively affected, but household energy consumption will grow.Competition wise, more competitive retail tariffs may become a new trend.

What to expect then? Jet demand may not come back to certain regions because of fear factors. Gasoline demand will dip in the short term but recover not very quickly but will be very strong in the medium term. Electricity demand will drop 10-15% for some time and then recover back to where it loses its momentum. Intra natural gas market wars will be much more important than intra fuel competition at least for some time. The sharing economy may not be as popular as before, but flexible working with flexible social security structures may be with us for some time to come.

Oil Market after Black April

Apr 20, 2020

Roughly two weeks ago, most of the analysts and we anticipated another wave of price fluctuations. We called this "the second wave." However, most of the timing was limited between mid-May and mid-June. The rationale was simple. When the storages are full, oil prices will be hit again. As of today, the so-called "second wave" has started earlier than expected. Now, the question remains whether there will be a Third Wave?

The oil market was never precisely a domestic animal. It was a beast under control. As the control gets loose, the chaos triumphs. This chaos hits from micro to macro level. Last week we read news about Norway's Oil Fund manager's expenses as well as Singapore oil trader Hin Leong Trading's hiding of 800million dollars of losses. Surely there will be more scandals to come, but these are backgrounds to the main show.

IEA April report was a big blow to oil markets as Fatih Birol referred to April as Black April. He previously saw Abqaiq attacks as a "heart attack" and the spat between Saudi Arabia and Russia as a "Russian roulette in oil markets." When we look back to the past six months, it is not an exaggeration to claim that the oil markets are in a new kind of chaos. This chaos will

not settle soon; that is what everybody is saying. But the main question is whether this new generation of chaos will breed new disturbances.

One simple example is probably the delay in the OPEC report last Thursday. It was scheduled for the morning then noon. It was perhaps delayed three times and finally published. I can feel the stress they are under to convey the right message -politically -. OPEC and IEA reports were hugely different in demand predictions Year-on-Year:

- For 2020 (all year), OPEC -6.8 mb/d ; IEA -9.3 mb/d
- For 2020Q2, OPEC: -12mb/d; IEA -23.1 mb/d
- For April 2020, OPEC: ?; IEA -29mb/d

In every energy crisis, same message has prevailed: the importance of data and reporting. Two major organizations are relying on the same data but came up with different results, which is normal. IEA has said to use satellite data for storage numbers.But floating storage numbers are mere predictions. That ambiguity may define the shape of the third Wave.

Fast forwarding a little bit, let's assume that by the end of July, most of the consumer demand is back. Air travel may need more time. The data tells us that from 5 May to mid June there may be wild fluctuations in oil prices due to rolling of contracts and close to full storage levels. Meanwhile markets are reporting an influx of money to June contracts. May-June will be a volatile period, but end of July may most likely be positive.

There is another facade of May-June period. These prices set the oil-linked natural gas prices for the winter. The lowest prices in oil may create another shock for natural gas producers, this will be tested as we move forward.

One important parameter to watch is the result of US elections. If May-June is the first joint in our forecast, second joint should be US elections.

Then we have to create our scenarios for the timeline beyond June. One of the most critical scenarios will be geopolitics, the second will be economics, and probably the third will be "the second wave -in pandemic-". The geopolitics scenario should capture the disturbances in oil-producing economies and the effect of their lost revenues on other countries.

Economics scenario should be based on whether "new initiatives" or "deals" can push the world forward. The creative destruction takes time, therefore most of the politicians will first try to resurrect the status quo. Then this status quo may move into the new direction. Second Wave in the Covid19 pandemic is a possibility. The Second Wave of this pandemic may not be as effective. Governments will probably be more informed and ready to act and coordinate.

The world will change. This was true before covid19 and it will be true after covid19. If you look at the oil demand graph from the 1960s to present, you may well see two separate trends in oil demand growth. The first one was the stable and high growth up until oil crises 1973-74 and 79-80. The long term growth trend was broken and slowed. When you check the aftermath of Covid19, long term oil demand growth may have been broken once again.

That doesn't mean oil prices will be lower forever. Most probably, the government initiatives and plans will try to stimulate the economy, and the middle class will buy more cars due to avoid public transport. But renewable and tech R&D has earned a valuable break to come up with more market-based solutions. If governments put the money in the right baskets, long term oil demand growth will be broken for the third time.

The Anatomy of Negative Oil Prices

Apr 27, 2020

Last week was a historic week for oil prices. We have seen negative oil prices for the WTI future prices. It wasn't the first negative oil price, there were some marginal crude blends seeing negative numbers. On the products side, there were some occurences of negative valuations. Before giving conclusions, we have to understand what has happened at the technical level.

On April 8th, 2020 CME Group has published an advisory notice titled "CME Clearing Plan to Address the Potential of a Negative Underlying in Certain Energy Optons Contracts". The notice summary includes a part with "if major energy prices continue to fall towards zero in the coming months…". So if someone has the right to claim an advance foresight of negative oil prices, it should be CME Group.

According to CME's "Crude Oil Futures Calendar" the settlement date for the May contract is 21st April 2020. For those of you expecting another wave of negative prices, the next settlement is on 19th May 2020. The options contract settle on the 14th May 2020. Future contract's delivery procedure states that "Delivery shall be made free-on-board (F.O.B.) at any pipeline or storage facility in Cushing". That leads to "physical delivery" obligation of the contract if you do not roll.

In the most basic level, on the last day of the settlement of May 2020 WTI oil futures contract, the final contracts of that day fall to negative territory. There may be several reasons. The foremost of it is due to physical settlement nature of the contracts. When you do not want a physical settlement and you can not find a counterparty to buy your contract, the price of the contract further aways from the physical oil price and reflects storage costs of that time.

We get used to abundance and scarcity of oil and relevant oil prices. But we have never seen the scarcity of "storage space" before. Although the storages were not full, they were booked. There is always the possibility of storage owners' intention to squeeze the market. Scarcity may pave the way for exercising market power, whether it is oil or storage it does not matter.

So there is a coupling of oil market with storage at the last day of then settlement. Then comes the next question. Can we conclude that there was a market manipulation or malfunctioning computer algorithms? This may not be easily concluded. On CNBC, CMEGroup chief Terry Duff says there were around 154000 contracts on Monday, less than 80 of them settled at zero price, 10% settled at negative prices. Duff asks "why the oil

industry didn't buy this negatively priced oils if it worth more?". This legitimate question brings us to the main question.

Duff puts a simple logic : "why did it go below zero? because no one was willing to step up and take that product at the price of zero because they knew their costs would be higher than that".

The second issue is about US Oil Fund. The fund has already rolled its May presence before the historic Monday. The fund was a heavy weight in the market with a share of 20-27% of futures oil contracts. Their departure from May contract may have dried up the liquidity for May contracts but USO publishes its movements beforehand.

After the historic crash, on the 23rd April, CME has imposed new position limits on the contracts. USO's positions in June contracts most probably was over that limit. And within a week they changed their positions 2 times and reported to SEC. As of today, USO has filed another 8K to the Securities and Exchanges Commission about their position limits. This time the contract diversity included even June 2021. The new portfolio is July 30%, August-September-October-November-December 10% each and July 2021 10%. The new position will be rolled into within these 3 days: 27-28-29 April. The next three days will be shaky too. But then some stability from the ETFs side will be provided. We will see the bare force of fundamentals then.

After these position moves, we will see whether negative prices will repeat or not. According to CME group negative prices are always a possibility and part of market functioning. The negative prices will be determined by two things: the hedge positions of the producers and storage costs or storage limits of the next month. If oil production was flexible enough we may not have seen negative prices.

The main message from last week was how pricing regimes work and at which boundaries these regimes couple with other markets. As in the oil prices, specifically about a physical settlement contract, after a certain range prices should reflect storage costs. That is not a surprise, however if the other coupled market -storage/pipeline/tankers – is in scarcity that may show symptoms of manipulation through exercising market power.

One last issue is probably the amateur investors, who were not aware of the physical settlement of the contracts. According to Bloomberg, some Chinese investors woke up with obligation to pay over their contracts after Monday's negative prices. Some brokage firms has declared losses. Trafigura and Carl Icahn has declared that they bought some of this negatively priced oil. The most famous professional oil trader Pierre Andurand find these times "very dangerous".

The leading academic expert on the financial sides of oil markets, Dr Bahattin Büyükşahin has told us some important conclusions from previous episodes. The herding is real, these markets are for price discovery they may not reflect real prices. And during times like these, these effects may amplify and may go astray. 20th April 2020 may be a historic moment but will not be an exception.

Life after negative oil prices

May 4, 2020

Negative oil price was not a surprise to some. The event itself is historical, but the missing analysis in the aftermath of this historic event is the developments it may trigger.In this comment, a brief impact assessment of this historic event will be explored.

We know for sure that some regional oil prices have dropped below zero before 20th April. Therefore having a zero oil price is not the historic event by itself. What can be deemed historic has two parts. Firstly, a benchmark oil price has dropped below zero. The second one is the magnitude of the negative price was enormous.

The financial aspect is prominent. However, the role of manipulation, algorithms, and rules are not that obvious. It will take time to unfold the details. The causality of the event should be understood correctly. Sometimes investors jump into such funds as if a small opportunity window has opened for a limited time. In Türkiye, for example, we are hearing rumors that people are betting that this can be the lowest oil price ever and taking long positions. One danger is the possibility of another negative price and margin calls. As CEO of CMEGroup states, in the futures market, they may be unlimited losses. Do not think that you are as clever as Mexico in oil hedging, as Pierre Andurand underlines, “it is a dangerous game now.”

WTI as a benchmark has the effect of triggering multiple events in other oil prices. There are at least dozens of oil pricing regimes based on WTI. Until 20th April, no one thought that oil prices could be negative. But all WTI-based contracts and oil blends have the risk of seeing negative prices. All risk assessments have been changed.

The fear of negative prices has dried up liquidity in the futures market. A more liquid futures market was the guaranteer of healthy price discovery. Now price discovery (notforecast) will be more costly and more shallow. This may create further volatility.

The other important discussion is about the “benchmark” discussion. There are several ways forward. The WTI benchmark may change assessment or may add further assessment procedures. The recently discussed one is about Houston delivery. The landlocked version of WTI is not the right tool for a massive producer like the US, maybe. It is for sure that Cushing is an excellent point for storage and pricing a WTI for US, but an international WTI needs updates.

There is also the bloodbath. Starting from small investors, there are losses spread across the world. Most retail investors look as if they were unaware of the physical delivery settlement. Interactive Brokers has posted USD 88 million provisional losses. Compared to open contracts, this may look like a big loss.

According to WSJ, oil-linked products caused Chinese investors to lose about USD1.3billion. The promised “bao”(treasure) of crude oil products has left lots fo small investors with losses they may not have imagined.

For the CME Group, their negative pricing has also caused international concerns.Reuters has published a story about Bank of China's request from CME Group to investigate 'abnormal fluctuations.

Shale oil producers are no different. Harold Hamm of Continental Resources has sent a letter to Commodity Futures Trading Commission (CFTC) to investigate "possible market manipulation, failed systems or computer programming failures" on the CME. Therefore China and some shale producers are at least on the same page when it comes to oil market dynamics.

The crises have the habit of slowly revealing their full impact. A negative price is a surprising event and a headline maker. However, it is just a trigger. Without creating more mystery, I would like to speculate on what may happen.

WTI as a benchmark is likely to evolve; the early signs have started from CME. WTI Houston Crude Oil Futures is a likely candidate. This will change a landlocked WTI to a waterborne one. The carnage of negative prices will pressure the CME Group on pricing rules. We expect more statements from CME to mitigate liquidity drain and fear of negative prices. The banking sector is probably shocked by the negative prices, and crude oil products will be impacted. The Mexican hedge will be more costly. Hedging itself turns a more risky business than fundamental market forces. But 20th April is only the start of such an event. Another wave of benchmark discussions may be waiting for us.

Energy Transition in a Fragmented World

May 12, 2020

There are several scenarios about having a "green takeoff" after the depression. So more investments in green and renewable investments will increase jobs and stimulate growth. The rationale is simple. But this scenario was not necessitated by the crisis, but it was a well-known narrative before the crises. Change is the motto for everything nowadays.

Everything has to change, and the change is imminent, etc. For the covid19 crisis, we are pretty sure that there will be changes in our lives. Despite all this change literature, there is one thing that doesn't change, and it is the expert's ideas. If this change has not changed your ideas in any way and if you are still singing the old lullabies, it may be a possibility that you are getting it wrong.

The wave of green deals is not new. Just during the 2008 crisis, UNEP Executive Director proposed the "Global Green New Deal" to foster green development and to stop climate change. There are numerous green deals in between. Then came the US senator Alexandria Ocasio Cortez's Green New Deal. Then Europe revealed a "European Green Deal." All these ideas are the product of Keynesian templates with technology pulls. But naming all these "deals" in the same way shows us the shallowness of the options we have so far.

European Green Deal, in this sense, is also aiming for a Carbon-based Border Adjustment Tax. So when you put artificial limits on your trade with other partners, it is for sure that

your costs will increase. But at what cost? Europe thinks local industry and job creation worths this economically inefficient choice.

Then we have the growing disarray between the US and China. The question, of course, is the speed of energy transition where China is no longer the favorite production and supply hub. The solar technology owes its cost decreases to scale. If the markets get fragmented, the global scale will be divided into several parts. India is an alternative to balance China, sure. But alternative can be fractured as well, including several mid-sized countries.

Assume that, EU has pushed for more renewables and battery storage. That means it will also apply border taxes(“green deal” is implemented). Therefore, they will have an internal green industrial engine. So when they want to sell their products abroad, the border tax will be a problem because of reciprocity. Since the EU industry is protected by border taxes, China may gain a better share of the world’s renewable industry. As the discrepancy increases, the companies will make a choice.

A Chinese-American dispute is no different in terms of results. The US may have no intention to have a “green” energy transition, but maybe a natural gas substitution is more likely. China also needs natural gas, and US production is important. For green industries, if there will be border taxes, then China has to produce more cheaply. Cheaper renewable production will kill more innovation in the pipeline. The car industry, battery storage, you name it. Anything seen strategically by the Chinese will be subsidized until they runout of money.

So the innovation engine will be broken, global scaling of new technologies will be damaged. Fragmented markets, more taxes, the urgency to bring back growth at all costs will create a more chaotic world. Along the lines, LNG is the only product that will not get affected by this new age of “border-trade barriers,” yet. In the world of scared global companies, it will take time to have the courage to change completely before the eye of risk-aware investors.

In conclusion, a leap to renewables -globally- is harder than before. Gas(with hydrogen) and renewables are much more likely to accompany each other. Border taxes, other green deals, and asset purchase programs are not new. What is new is our blindfolded march to a new reality by singing “change” rhymes. Welcome to the more fragmented, less innovative, and more adventurous world.

California's Problem With Electricity

Sep 28, 2020

New technologies recreate the markets. Electricity markets are in the midst of a big change. We already said bye to the 100-year-old light bulbs. Then there are electric cars, massive renewable inflows, storage, prosumer… It seems as if we never run out of new concepts in the electricity business. But are the markets correctly pricing the value and effect of these technologies?

As new technologies penetrate the existing system, the whole operation of the system is disturbed. For example, autonomous cars will change tax, insurance, traffic, licensing, and others. There is no way you can put the genie in the bottle in such transformations. So, especially in electricity, disruptive change has to deal with sluggish development in knowledge, mechanisms, and rules.

The acquiring of new knowledge, skills, and experience accelerates with crises. Hence crises are a creative process. Disruptive changes push the rules, mechanisms, and understandings through crises. From my perspective, California's problem is not about renewables but the naïve assumptions for the limits of renewable energy.

We know that you can not cold start a coal plant to full capacity in 5 minutes, neither 5 hours. So our rules and optimizations are designed around these technical limits. You can not rely on hydros for 24/7 generation. The markets should price these limits correctly.

Two years ago, FERC rejected California's proposal for capacity markets. The initiation for the process starts with a gas power plant's request for cost recovery. Wind and solar generation supported by out of market mechanisms have destroyed the value-price relation in the markets. Capacity markets, on the other hand, are very political. It is as if you are trying to put a price on avoiding future blackouts. If you price it correctly, no blackouts should happen.

The first California crisis was also due to the naïve belief that markets will work as-is. Stephen Littlechild from the UK has inspired early developments in California. The problem then was four folds: bad design, lack of reliability framework, natural gas and emission markets, monitoring. It ended badly. Now the green revolution of California is facing similar problems. It may derail targets in California and may affect renewable sentiment around the world.

To avoid it, we have to look problem carefully. First of all, reliability should be priced correctly. The demand side and other consumer-side tools are not coming as expected. The problem should be solved on the supply side. And on the supply side, the key element for the operation of the system is reliability. Pricing should reflect the emergency and value.

Texas's and operating reserve demand curve is an attractive choice. The problem is the political nature of high prices. In California's example, the state is facing drought and needs the fossil capacities to make up for hydro. But these plants had to earn enough money to provide reliability figures like 1 hour of blackout for every 10 years. Especially the systems

with large hydros are vulnerable to drought and extreme drought periods. These events may happen more frequently in the future. So hydros turn into another vulnerable resource. And then, there is the virtual inertia problem with inverter-based systems. The problem is huge.

Why energy transitions take 50 or more years? Not because capitalists block the development of new resources and technologies. New technologies change the techno-economic systems built in years. These systems are a crystallized accumulation of past experience, problems, and knowledge.

A good starting point should be pricing reliability more accurately. To weather the high prices, paper products for hedging or establishing a reliability fund to insure against these events can be important.

California was very ambitious before the first energy crisis, but the ambitions have been hit due to crises. Now we have this second crisis falsely related to renewable energy. We should not let the green ambitions to be wounded again. We should design the markets to match our ambitions.

Energy Poverty As the Covid-19 Winter Approaches

Oct 5, 2020

Last winter, we were barely aware of Covid-19 and what it may cause. For the last nine months, we gradually changed our lives and work routines to contain contagion. We hope that this will be temporary, and our lives will turn back to normal in a couple of months as vaccine studies will come to rescue us. Hope is a good thing, but there is a rough road ahead.

One of the most problematic subjects is energy poverty. For some, it is defined by the disproportionate share of energy expenditures in a household's income. Given a threshold for this share, households can be classified by their energy expenditures. Energy poverty is a reality, so does the covid19 and the unemployment and limits of monetary expansion.

Last month, the UK's Energy Helpline publicized the results of their study on utility bills for this winter. Since most of the home workers and their kids, practically all family, will spend their weekdays at home, the natural gas and electricity bills will increase. This is the case for poor workers, too. Some may have to be physically present at their workplaces, but their kids and extended family is probably spent most of their time at home. According to Energy Helpline, this will cost 2 billion pounds to British consumers. This will add an extra of 21.44 pounds (1 day a week home working) to 107.18 pounds(5 days a week) for the utility bills.

The same initiative has another study claiming "45% of homeowners from the poorest background are aware of" greenhouse grants. The same can be said for other countries. The poorest part of the society is less informed about efficiency, energy consumption, and

government grants than the rest. But most of the time, they pay a higher proportion of their salaries to utility companies.

In the past, Türkiye experimented with an “energy-efficient light bulb.” handovers to school kids. Some of the bulbs were crashed for fear of listening devices, and it is not a joke (“Dinleme cihazı var diye ampülleri kırdılar”, Milliyet, 6 January 2009). There are also rumors like the “other light”(LED, CFL) is harming eyesight and even make you cancer. There is a certain truth about the harmful effect of the blue part of the light. But when you go to a store, if white lights are three shelves, yellow is one shelf. In a simple example like light bulbs, people resist changing their light bulbs, and even if they change, they predominantly opt for the wrong choice.

Generally, the winter period is where the hefty part of heating bills are paid. With little daytime and sunlight, we rely more on artificial light. Most of the people are unaware of the effect of the appliance on their bills. When raging against utility bills, some claim, “they just switch on/off the light and watch TV.” Having all these effects merged into a Covid19 Winter will be detrimental for consumers. Especially poor segments of the energy consumers are in dire need of regulatory mechanisms.

So what has to be done? The first step is to accepting and carrying out an impact assessment. How much does the house occupancy change energy consumption? For each homeworking day, it may add up to 7 hours of boiler energy consumption and electricity consumption attached to it. Then there comes the TV, computers, and lightning. Also, we should not forget about home lunching and hot drinks. This may increase the bills more than any other winter we have seen before.

The second step is to find the poverty line. By contributing 1 kWh electricity or 1 m3 of gas on these people’s budgets should make a health, wealth impact, and increase educational achievement. This is not a solid-red line, but it has to be drawn. The third step, I believe, is the regulatory mechanisms for installing the bills up until a year.

The fourth step is information campaigns. The fifth step is community solidarity.

There is no easy way to mitigate energy poverty. As covid19 will hit the energy-poor worse this winter, we need a better policy framework for the poor and informational awareness for the rest

A Rough Road Ahead for Energy Transition

Oct 12, 2020

Energy systems are large, techno-economic systems. We are lucky to witness the transition of one of these systems, or should we say three? Electric, natural gas, and oil systems will change forever, as forecasted by some experts in a few decades. A clean and more renewable energy system is good for everyone. But we have an engineering problem, and this may lead to the replay of the late 70s.

The simplistic logic for energy transition is straightforward. More renewables, end coal, more efficiency, more grids, and hydrogen, then you achieve the energy transition in one sentence. The story is like one of these too good to be true stories. Then you have to dig down for details. And details are not that positive.

Whenever we talk about the “coming hydrogen future” with well-known experts, they say “cross your fingers.” One expert claimed, “when I entered this business, hydrogen was the fuel of the future, after many years, hydrogen is still the fuel of the future.” Michael Liebreich also points to failed attempts about hydrogen in his article “Separating Hype from Hydrogen” at BNEF.

What if hydrogen fails again? Then we still have solar but no inter-seasonal storage. Storage solutions are promising, and scaling these solutions in a timely manner may happen. Emerging solar technologies are also well in the pipeline. But last week, during a web conference at CFR, Daniel Yergin claims all these (solar, wind, storage) technologies are like 50 years old, and the newest energy disrupter is shale technology like 30 years or so.

Therefore we have to think about the innovation cycle of new technologies. We are focusing more on the supply side, but energy transition requires a change in the demand side technologies as well. We have one demonstration plant for green steel. And this is just one plant and production. Then we have to think about all the steel manufacturers, then cement and other industrial materials. Can electrification solve these problems efficiently? Not sure either.

You can find new plans to accelerate innovation. As more money will pour into targeted innovations, new technologies will pop up. This is likely, but commercializing these technologies may take a long time. After the commercialization, widespread usage will take more time.

My primary concern is cost. What if too ambitious policies push for the wrong technologies. Then the result will be massive failures and backlash. We have seen US synthetic liquid fuels program in various periods to be failed. As the cost of new technologies is understood to be too high, more oil drilling continued. This time the world is going towards a climate apocalypse, but during that time, it was an oil apocalypse. Most probably, alerts do not work.

So what should be done? The first step is to create a nimble market for these technologies in blend with existing technologies. Therefore hydrogen blending is an excellent option for

the transition. But then we have to make ready the standards and workforce with training. This will take at least a generation. But the biggest problem is on the demand side. How to change all burning technologies to hydrogen, or are we ready for electrification of heat?

There is also one more problem regarding energy transition. To replace other resources, you have to install much more solar and wind. But they age like different types of equipment and may need to be replaced every 15-20 years. It creates a perpetual investment cycle. So it needs credit. Credit is cheaper in developed countries than in developing countries. Renewable credit rates should be fixed worldwide.

The single biggest step to achieve this mission is to start today. One step at a time will produce better results than ambitious targets. Cost controls will cement the rise of new energy technologies. Alarmism never helps. Tesla(EV), solar cost reductions are not happening because of alarmism but cool, calculated steps forward. We need more of these now. Otherwise, we may be left alone with geoengineering.

If Solar Will Be the King, Future is...

Oct 19, 2020

Last week IEA published its annual report on global energy markets and developments. There were lots of good points to discuss, but I would like to focus on the promise of solar. If solar will be the king of world's electricity markets, what should electricity markets look like?

The first point is the role of the consumer. Every single electricity future report claim that the consumer is the key. The consumer is the key for sure. The whole electricity system was designed around the consumer. Consumer demand was the most important player in the whole electricity system to be forecasted every day until the mass penetration of renewables. The system responds to consumers, but consumers do not respond to the system effectively.

For some time, we are discussing the competition. But competition is bifacial. If there is competition on the supply side, there should be some competition or rationality on the consumer side. In the past consumer was the key since the whole system was a servant to the consumer. Now the consumer is the key to bring some flexibility to the system.

Then we have the smart grid discussions. Smart is a concept that has been a byproduct of a technocratic age. It is no longer just-unjust, efficient, effective, well planned, or lean grid, but a "smart grid" offering answers to our questions. No more dumb grids but smart grids. In that sense, attributing solutions to smartness is a bit of generalization and an escape route from more fundamental discussions.

Then comes the merit order problem. Further, we move upwards in the meritocratic cost curve, the control function of any resource increases. The lower end is more like a less controllable technologies' territory, where the higher end is the kingdom of highly controllable resources, such as the demand side.

Then we bring solar into the picture. With solar comes great responsibilities. But what if the whole picture is redesigned with solar in the center. In the past, thermal resources were at the center of the supply picture. The consumer was generally unrestrained. Now the consumer is to be a flexibility supplier.

We still can not answer how solar generation may compete since competition should be at the center of electricity markets. Now there are more needs for localized services and real-time analysis. The grid is not the solution to all ills, whether it is smart or dumb. Therefore putting solar at the heart of electricity markets will be tough. Like veins in the heart, it may be connected to heating elements with hydrogen or to the system through storage. So how should be the real-time valuation of the solar generation? Probably local elements will be important this time.

This is not the first time we discuss such issues. The value of a hydro generation plant or hourly hydro generation is well investigated. The solar is, in some sense, like hydroelectricity. But the hydro generation generally benefits from higher-cost thermal generation.

To understand solar's future role in our electricity markets, we have to understand what kind of electricity market we will need in the future. If decarbonization moves from hydrogen to full electrification, the solution will be simpler. More demand load may provide more flexibility. Still, we may be sure that there is no solar future without wasting solar, whether it is hydrogen or storage. As the throne is transferred from king coal to king solar, we may need to overbuild. Overbuilding requires less competition. But does it matter if the costs of the solar is in a downward spiral?

Oil Prices in the Short Term

Oct 26, 2020

Predicting or even trying to predict oil prices is a nightmare for experts. Oil prices are interesting values that incorporate numerous information in a single, mostly two digit number. The compression of various geopolitical, economic, technical developments and expectations to such a number is chaotic, but predicting it is beyond chaos.

US elections are important. Some parts of Gallup polls are available online. The recent surveys show that Americans those "very satisfied" (%13) and "somewhat satisfied" (%31) are the highest since 2004. This is with a Trump administration. One other important source was Dallas Fed's energy surveys and studies. The number of "bankruptcies in the oil patch" is lower than 2019 2nd half and 2020 1st half. These two different numbers give us a different feeling of what has been going on.

The Dallas Fed survey is interesting. I personally enjoy comments at the end of each section. There are around 66% of the respondents believing that US oil production has peaked. The top 3 biggest concerns from E&P firms maintain production, grow production and reduce debt. Then on the fourth one, we see "find additional sources of capital."

On the comment side, 50$/barrel looks like the new shale environment. The main theme is with these prices supply can not grow, and if demand recovers, there will be some kind of problem with supply-demand balance.

There are political comments and expectations. But you can feel that the oil sector in Texas is in pains, and prospects are not the brightest. But in the background, there are cost cutting-lean management going on. The shale is just like any other technology and has the potential to improve its cost curve. The biggest problem is the decline rate.

Therefore the election is not a done deal, and cost-cutting measures are working on the shale part. For the last two weeks, we see positive signs from rig numbers.

On the OPEC side, there is some kind of a settled balance between Russia and Saudi Arabia. This is assumed to last until mid-2021. But again, OPEC is full of surprises. The developments in Nigeria can be important. There is an increased fragility in OPEC countries with low oil prices. Adding to the injury, world food prices are expected to increase. This will lead us to another chaos in the making.

However, there are technical ways to provide some insight. Oil prices in the short term were hoovering around “magnetic 40$/bbl”. If you remember, the forward curves generally point to 60$/bbl in the long term, but for the last weeks, 40 was the game in town. Now, this has been changed.

The seasonality of the oil prices points to a downward spiral in the fourth quarter. The prices may at least lose 5$/bbl in the short term absent geopolitical turmoils. From 2021 January to 2021 June, a positive trend is to be expected, depending on Covid19 developments. The main question is how steep will be this upward trend.

For Brent, 38$/bbl is a safe bet for the 4th quarter of 2020. If Biden is elected, we may see a recovery in oil prices. But for 2021 April-August, there are no safe bets. My biggest concern is food prices. With growing food prices and diminished financing capacity, the Middle East and Africa may attract more of our attention.

40$/bbl Consensus

Nov 9, 2020

We are moving into a divergent world. On the US side, a 180-degree turn on energy policies is expected. In Europe, the lockdown is back. In Asia, growth is more or less back on track. So we see a three tier response to a very big crisis. But oil prices are still around the magnetic 40$. Will it stay so?

No, lower in the Q4, higher in the 2021Q1 and Q2. This is the short answer. The long answer is, you know, complicated. Therefore it is better to keep track of 3 benchmark prices across the globe. In Europe, TTF futures are losing steam in the front end. This front end will be heavily influenced by weather patterns. Henry Hub prices are more or less stuck at the current levels. Coal prices are unusually dipping below their seasonal levels.

This will further accelerate coal to gas switching in the US. If states implement carbon prices, this will be amplified. US coal losing ground will have implications for the Asian world. This may also dampen the gas demand growth(not demand bu demand growth) in the short and medium-term. In Europe, gas switching is inevitable. But there is one glitch about whether more renewables be harder to manage.

Will China increase the speed of energy transition? Or which energy transition we should say. Regional governments may strive to keep employment. The change in China is slow, and state policies -as always- will be important. China's progress is an interesting topic. But progress never guarantees results. The main item to watch on that front is whether the shale revolution/or "golden gas age" will have a Chinese version.

US presidential election results will impact this energy world. But how? That is the question. Most of the efforts are on the transition team or related developments. The presidents may have an agenda, but they are not all that powerful figures to shape these agendas. Generally, historical developments shape presidential terms. How the presidents respond to these developments is their legacy.

As we see a replay of "All of the above Deal"s, we have to be careful about their successes. The original "New Deal" was always hailed as a success. But there are other ideas such as the 2nd world war was another stimulus that may be comparable to New Deal. This may be a sideshow. But progress in renewables may not come from "Deal"s but from another aspect. I can't define this, but it will surely emerge from the need for growth.

The biggest hurdle is our lack of understanding of innovation. Not the necessity of it, but how to achieve the targeted innovation with commercialization targets. Efficiency is the buzzword for every crisis. Innovation is like a sibling of efficiency. But whether these two will save the lower-middle-income group from deep unemployment is doubtful. They are necessary.

By 2020Q2, the 40$/bbl consensus will be long gone, and we will be discussing much higher prices. But the new norm created by the Covid19 has not been settled yet. It sowed the seeds of new instability: The end of 40$/bbl consensus.

Energy Markets After Vaccine

Nov 16, 2020

The celebration of the COVID-19 vaccine has cheered up the usual grim mode in the energy industry. Although the short term is complicated, the long term should be better than radical uncertainty created by the COVID-19 pandemic. Nevertheless, we should never forget that energy markets are addicted to uncertainty.

In the short term, a greater possibility is the higher prices for fossil fuels in the first half of 2021. My primary concern, as I mentioned in other comments, is food prices. Chinese and Indian import strategies may create food-related problems. As commodity prices surge, we should expect all to increase. But this may not even save the lowest cost producers; as today's FT has mentioned, even Saudi Aramco is looking for loans.

One important aspect is how digitization has evolved due to pandemic. One tweet claims, not CEO or CTO, but COVID-19 has completely transformed the pace of digitization. Enron was one of the first companies to digitize energy trade. They created products and initiated new ways to trade, but they were a disaster. But having these ways internalized and normalized took a long time. And then, it created the medium for further speculation.

My take on this story is that COVID-19 has radically increased the penetration of new methods in our conventional way of doing business. We will have more digital customers and services. These services will need new enablers to work. From this digitalperspective, we may move toward more human-less energy services. But with an increased number of services.

Coal may see some record growth increases next year. The sudden drop in fossil fuel consumption was due to economic activity. Even a vaccine can be invented in 2 years, but a non-fossil economic activity growth will take years. The renewables' victory was due to non-market-based guaranteed contracts; the pandemic didn't test them with market prices.

Natural gas is emerging as a bridge fuel, whatever anyone says. We may see a record increase in FIDs for LNG projects by 2021. The real cost cuts in LNG projects has not been achieved yet. More modular projects can create a solar moment for LNG projects. This will further improve coal to gas switching in major economies.

But the only problems of the energy world are energy transition and climate change. This creates a comfort zone as if we are all happy with dealing with these problems. The 2020s very much look like the 1970s. And 1970s were very turbulent. The growth in green movements around the world has lost its momentum due to the oil crisis. Therefore we have to be careful there.

The certainty a vaccine brings will lift the veil on other problems. The world has lost close to 1 year in struggling with a pandemic. Energy markets lost a year in terms of investments, cash flows, and sustainability. This will be reflected in the post COVID-19 era by favoring lean structures. With more AI and digitization, the employment prospects will shift. But we should be careful about the unexpected events that may still wait for us.

Shades of Energiewende

Nov 23, 2020

The origins of Energiewende is very different from what we understand today. Today German Supreme Court rules against the villagers who want to stop coal field extension.100-year-old churches may be demolished for coal. Angela Merkel may not be the Climate Chancellor that most foreigners think. Nevertheless, Energiewende, the energy transformation is moving ahead in different colors.

German EEG's 2021 version updates will include some important changes. All electricityc onsumed or generated in Germany should be GHG neutral by 2050. This impacts not only generation but imports and exports as well. The real implementation may have hiccups, but a local law gives a signal to a much wider community.

The capacity expansions are also very ambitious. Onshore wind is expected to jump 3-4.5 GW and reach 5.4 GW by 2029. Offshore wind will still struggle below 1 GWs. Solar is the powerhouse of renewable extension. Starting from 4.6 GW, it will reach 5.6 GW by 2029. According to CleanEnergyWire(CEW), "500-850 MW per year will be tendered in so-called 'innovation auctions'.

Germany has an early comer advantage, but this also results in the early expiration of renewables fees. Sub 100kW solar installations will not be benefiting from the FIT by 2020. Therefore an interim price "market value minus marketing costs" will be given. But there are at least 16GWs of onshore wind turbines to be decommissioned by 2025.

Energy-intensive industries will continue to be exempted from the renewables surge if they have been facing negativities because of global competition. This part is important because we are talking about an industrial strategy or a climate strategy. Its current shape shows us that it has to be a mixture.

One interesting discussion was acceptance problems. Renewable energy has more acceptance problems than natural gas power plants. To solve that problem, the wind farms will pay 0.2 cents/kWh for 20 years to local communities. In a country where renewable levies are close to 6.5 cents/kWh, 0.2 cents/kWh may not do the job.

The new law also pushes above the 500kW PV projects to tender. And in terms of green hydrogen, they will be exempted from renewables surcharge.

The most pressing issue in the whole bill is there is no "green growth" in the near term. The biggest growths are pushed to the post 2023s. This is one of the disappointments. The other is how Energiewende needs more and more government intervention. It looks as if, Energiewende is a product of the Soviets.

The original Energiewende FITs were inspired by the US's PURPA act. The qualifying facilities (QF) of the PURPA act has changed the electricity systems with the help of natural gas turbines. As a matter of accident, this inspired the solar boom of Germany, despite aimed for small hydros.

Now the times are changing, but the renewable transition is getting more and more complicated. The US can be another example, but with the loss of the Senate majority, it will take time. China, on the other hand, has promised carbon neutrality, but the devil is in the detail. There is progress everywhere, but it is not uniform, and maybe we should not expect it to be uniform.

But from the new German law, we can not see inspiration or a green growth that has been promised by the EU. Yes, it is a way forward, but is it really progress?

One reason for this can be our inexperience with energy transitions. The previous transitions have happened without government regulations. But now we are trying to push an energy transition by government intervention, and we don't know what should be the efficient government intervention look like?

Why the Oil Prices Went Negative on April 20?

Nov 30, 2020

Hedging is not a piece of cake. It may be a very dangerous tool since the biggest determinant is a future no one knows. Mexico's hacienda hedge is world-famous, but the rest is not well known. We are not discussing how much refineries or airlines have lost in these contracts with covid19. We have the most powerful data, computers, and algorithms, but the risk is still a wild beast.

Commodity Futures Trading Commission (CFTC) has published an interim report on the negative WTI crude oil prices on April 20, 2020. Practically the slide started from 14:08 until 14:30. The report has not satisfied anyone, but it is a good read. I have not been able to correctly decipher all the technical parts. The message I get was, "small investors should not think of oil futures as just another investment."

The biggest question was, who let the prices go negative? The simple answer is lack of liquidity and storage. The report underlines the signals before April 20. They also cite NYMEX warnings on negative prices. But "animal spirits" of investors thought that they are buying WTI cheap. In China, some of these investors had to pay banks money to settle their accounts.

The negative prices are not unique or not happening the first time. The report references an event at Texas: "natural gas dropped below zero in March 2019 as increased supply outstripped pipeline capacity near the Waha hub in the Permian Basin of Western Texas.". In electricity, it cites the European power market.

Sometimes when I talk about oil pricing, I refer to it as a social construct. We define how the price forms, and it is not occurring naturally. The biggest clue we have is "under the NYMEX rule, and the May contract (and all months other than the designated active month of June) would settle on April 20, based upon the VWAP of the accumulated calendar spread transactions occurring between 2:28 p.m. and 2:30 p.m. ET" from the report. That specific time period is the key to settlement for the May contract.

There are circuit brakers, and they were triggered consequently. But there is a technical bit about which contract is coined “active contract.” During that transactions, the June contract was the active contract. So circuit breakers didn’t halt the non-active contract -May- transactions. The other important parameter is the amount of open interest volume at that time. There were larger than usual OI volumes in the market, that means there were more contracts traded for May, but while approaching settlement there were lots of not settled- or rolled contract.

The report underlines this fact with the sentence: “May Contract’s OI at the start of theApril 20 trading session was 108,593 contracts, approximately 69.4% higher than the trailing 12-month average penultimate day OI of 64,101 contracts”.

Then comes the most technical part that involves “non-reportable.” These are not usual, well-established investors but small investors or their representatives. Nonreportable’ position has been discussed in detail with graphs. When liquidity dried, these investors -some do not know that this contract was physically delivered- think they are buying oil cheap. If they could have stored the oil for one or two months, it will be a very profitable business, depending on storage prices. But storage and the landlocked location of Cushing were not the best place to find storage or transfer during a market panic.

My main message is two folds. The first one is how powerful these contracts are and how dangerous they can be. The second one is “the technical details are essential for the hedging instruments.” It was the lowest oil price in years, but many small investors who were thinking “they are buying cheap to sell in the future” have lost money. Oil price looks simple, and we all seem to know what it means. We have to recheck our assumptions.

Complexity of Energy Efficiency

Dec 7, 2020

IEA has published Energy Efficiency 2020 report, and it is full of bad news. The energy intensity progress has slowed down, investments dampened. IEA’s sustainable development scenario requires renewables and efficiency to provide a hefty drop in emissions. Efficiency has a 42% role in this scenario. But it requires a 3% improvement each year. Now it will be less than 0.8%.

Energy efficiency is one of the main pillars of energy policies across the world. When a crisis happens, the first energy policy you will hear is energy efficiency. Yet, we may be underestimating the complexity of energy efficiency.

It may sound provocative or pessimistic to think that technological improvements will just do fine without any energy policy for efficiency. The LED lighting and electric car penetration may be an example of such viewpoints. As the technology is available, accessible, and affordable, then the efficiency shows up. But how about behavioral change and other dimensions? It is dubious.

The IEA report underlines major points like how energy-intensive industries gained strength after most crises, which slows the efficiency. Chinese push for more energy-intensive

industries is one example. About retrofitting, the contractors couldn't access the premises due to Covid. Another vivid example is the smart meter deployment in the UK and its decline.

Maybe one interesting point is the digitalization of the processes. According to the report, an increase in data transfer didn't yield a lot of energy consumption increase. It was actually nearly the same. Netflix and other streaming services on mobile devices can be a magnitude more energy-efficient than television.

Transportation is one of the hardest-hit sectors. Rail and air traffic is one of the hardest-hit subsectors. It is a chance to replace old airplanes or push for more rail travel or no travel at all. But very few governments tied the rescue schemes to efficiency. Then there is the rise of personal mobility but with support for cycling. The results are mixed.

The biggest attraction of energy efficiency is its job appeal. "Energy efficiency is a job-creation machine," and it can create up to 15 jobs per million $ spent. But most of the energy efficiency spending will be done by the EU. The renovation will surpass new building spending. But for the rest of the world, it is not a big deal.

So it puzzles me a lot. Why can such a logical, rational policy not be improved further? My theory is energy efficiency; in reality, it is more complex than the power sector. Growth-based resources are easy to understand and manage. You have to increase it from X to Y with an investment of such and such dollars. But degrowth resources like energy efficiency look simple on paper but actually more complex for our mindset. For an amount of million dollars, we get degrowth, and it sounds nonsense.

Therefore energy efficiency is hard to manage despite its appeal. We are used to growth dynamics. Creating jobs, investments, sectors for reducing activity footprints, energy consumptions can not be managed by state authorities. At its best, efficiency policies are designed to boost some SME's and their markets.

Just like the distribution business, energy efficiency should be one of the regulated segments of electricity markets. The deregulated or pseudo-deregulated energy efficiency policies don't work. Behavioral change is not sticky in favor of efficiency. If we want results and quickly, utilities should play a key role, and we should be honest about behavioral change. Minimalism is not a populist sport.

The Case for Historical Responsibility: Border Adjustment Tax

Dec 21, 2020

Climate change is an existential threat. Period. But we didn't come to this point because China became richer. The CO2 levels in the atmosphere were below 250 ppm in the pre-industrial age. Until 1990 it reached 350 ppm. It is now around 420 ppm. The level of CO2 is essential for our planet's health, but the world didn't get invented in 1990.

There are numerous net-zero targets across the world. Net-zero targets are essential, and all countries have to submit a net-zero pathway. But how will this impact their wealth? A new investment wave should push "green incentives." While in the global south, these projects' interest rates are much higher than the developed north.

Think this way, a sub 1% interest rate for a specific green project costs 10-12% more than the original cost. But a solar project finding credit at 7% has to pay double the price in ten years. Since most developing countries' risk premium is higher, all these countries have to pay at least 1.5 times what the developed countries pay. Lower construction and labor costs can be an advantage. But overall, developing countries can not achieve these green developments with the savings they do not have. They need cheaper credit than developed nations.

So how should they finance their renewable and green projects cheaply? The best way is to find them cheap capital. I think we are in a dark tunnel where globalization will not be the way it used to be. The borders will be more important as well as the industrial production amid the automation and digitalization wave. Employment and regular salaries have weaker prospects.

The developed countries are developed based on carbon, not Facebook. The 150 years of the so-called industrial revolution are fuelled by carbon and machines that use carbon. Why? Carbon-based fuels were concentrated sunlight and has much higher energy densities than traditional fuels. It created a pseudo workforce with the help of machines.And this development has accumulated 70 ppm of CO2 in the atmosphere until 1990.

To provide climate justice and the right for the rest of the countries to develop cleanly, we have to bring everyone to the same level. It will not happen by consuming more coal or using more ICE than electric cars. It has to be done by providing cheaper equity to the developing countries' green incentives. This will at least reduce the risk premium of rates for developing economies.

Therefore a "Historic Responsibility Border Adjustment Tax"(HR-BAT) will help developing economies prosper in greenways. This will increase the prices in these countries, but at the end of the day, more red meat, more air travel more consumption will never help. All of us have to reduce our consumption. This HR-BAT will foster the energy transitions in the developing countries and compensate for the pre-1990s emissions from the developed countries. An existential threat can never be solved with arbitrary starting points or with climate injustice. Everyone should have the same playing ground for green growth.

Should We Expect a Battery Revolution?

Dec 28, 2020

When moving forward into 2021, we are all interested in new revolutionary technologies. There may be perovskite solar panels with high efficiencies, or there may be new revolutionary batteries. They are all welcomed to the age of clean energy transition.

QuantumScape's latest lithium solid-state battery is one interesting example.
The memories of Envia's failure and fraud are still fresh in my memories. As a Bay Area startup, they promised a 400 W/kg battery for 125$/kW in 2012. Later on, there were lots of disputes about it, and Envia has collapsed.

Solyndra manufacturer of solar cells, has also lost more than 500 million $s of US government loan and bankrupted in 2011. It was said that they couldn't compete with cheap Chinese PV manufacturing. But there were also disputes about their promises and numbers.

Therefore it took a long time to trust new startups with revolutionary technologies.There was also an academic side to this. In solar, for example, you hear about record efficiencies. But most of these papers rarely mention durability and stability.

But what is the big energy revolution for clean energy technologies? Tesla's latest investor presentation has some tips about what to expect from a revolution. In battery chemistry, it is not easy to make giant leaps. Rather you either tune the materials or the processes. Tesla seems to do both. They have incremental progress in battery technology. But their biggest leap comes from battery manufacturing.

While thinking about an incremental revolution on the battery side, OxfordPV breaks the news for efficient solar cells. Their claim is bold, "35 kg of perovskite generates the same amount of power as 7 tons of silicon". Using them with silicon can give us a theoretical efficiency limit of 43%. Can we spray our energy generators? With perovskites, this looks possible.

We can also hardly forget about Nikola Motors, an electric and hydrogen fuel cell truck company. A report titled "dozens of lies" accused the company of fraud and resulted in its CEO Trevor Milton's resignation. A January 2018 video of Nikola's semi-truck in motion was a fraud. It was just a non-working prototype rolled down a hill. The company is still valuable, but the damage has been done.

Here come QuantumScape's claims that quadruple their value in a month. Unlike traditional batteries, they do not have a new anode manufacturing. The revolutionary part is not the exotic materials but a solid-state separator that separates the cathode active and lithium ions after getting charged. Their youtube videos show the innovative part at the 13th minute. This technology achieves %80 percent charge in 15 minutes and north of 400 W/kg energy density.

Yet, the battery needs at least 2-3 years to enter commercial manufacturing. Volkswagen is one of the investors as well as Bill Gates. But they have the independent tests for their batteries, and the manufacturing process seems not too challenging. Scaling can be an issue. The short future of battery and PV technologies look increasingly like perovskites and solid batteries. What will be their effect is a deeper question? For one thing, what happens if we see 100,000$/MW solar systems? The whole fossil ecosystem may find it hard to survive in such an environment.

The road is not an easy one. In the clean energy ecosystem, fraud and deception are no different. But the radical claims by the battery, solar companies make us wonder whether they are the next Envia, Solyndra, or Nikola. Independent verification of these technologies is as important as fossil reserve verifications.

But what if QuantumScape's tech is the right battery revolution? What if the age of solid-state batteries is starting? Then we will enter into a new realm. Electric cars will be the future for sure. That is probably why Apple announced its intentions.

What about the electric systems? Then we have to think about whether batteries become part of household electric equipment just like meters. This changes the definition of a blackout, market operation, and electricity services. Personally, I think a battery revolution is coming.

Climate Change in the Post-COVID World

Jan 4, 2021

Resembling our current period to the 1970s sometimes gives us some comfort. We eliminate uncertainties and dream of the predictable chain of events to take us out of this crisis. We are all waiting for the vaccinations to return to our normal life. What if our normal life no longer exists?

The latest reported mutation of Covid is not good news for anyone. It is much more contagious, and this makes it much more problematic. There will be vaccinations, but there are no guarantees for a third or fourth version super covid. What if the crisis persists into 2022?

There is too much hope that the Biden administration will push for climate diplomacy. But generally, presidents do not shape their era, but the crisis of that era shape presidency. The latest incentive act is not enough to even kickstart renewable acceleration. There are words, but deeds are too little.

The worst thing that happened to climate change can be long term targets. Previously it was like 5-10 year targets and checks. Now you can postpone everything post-2030.This may increase emissions faster in the short term. After 2030? No one knows.

Previously, China has overcome the economic slowdown through energy-intensive industries. Now the commodities boom gives us a hint that it is coming with avengeance. The sustainability of such energy-intensive growth is questionable. But the reality is obvious.

The developing countries have an urge to create employment, growth, and create wealth. But they do not know how to dematerialize growth. There is this “Degrowth” of version 4.0 or 5.0 since Malthus, but what will the impact of this on a normal guy.

It is not all that gloomy. The new clean technologies are accelerating, and they can catch up to be the new normal. There are new companies, better technologies. But again, the learning curve works for both renewables, lithium batteries, and shale gas, as well as mining.

Good scenarios are well known. Instead, let's talk about a darker scenario. As 2021 progresses, vaccinations continue. But the recent variant of the virus becomes a much bigger problem. The lockdowns force first in OECD and then in China and India to curb demand. The lower oil and gas prices continue.

The increasing food prices add to the injury. Now, some OPEC countries find it very hard to sustain their subsidies. A more nationalistic stance follows in the developing world. The covid year of 2020 creates its own imbalances around the world. The vaccination regimes are criticized, and more inequality discussions follow.

The energy sector gets to the end of 2021 with quite a bit of hardship for two reasons. Since banks are scared of the performance of energy companies and the cash flows are seriously disturbed. The investments come to a halt, and energy efficiency does not improve. Meanwhile, taxing the consumer for carbon becomes much more difficult.

The emissions increase for 2021, but for 2022 the outlook is not any better. Still, the governments nod to the climate targets, but the fossil regime continues its reign. The social stresses in OPEC countries begin to pop up. The higher prices in the 2nd and 3rd quarters will push renewable investments further but create another burden to the consumer bills. As renewables share increase more anti-renewable gatherings as well as red tapes increase, mainly due to land use.

The clean energy revolution is in the making. But what if covid does not end, and what if the emissions increase due to the urge to grow? Then we can really find ourselves in the 70s, with one crisis triggering another one. Climate change will be the biggest threat to humanity, but not in deeds but in politicians' speeches.

The Schizophrenia of Energy Systems

Jan 11, 2021

The “schizophrenia of electricity prices” was a term coined in one of the power economics texts. It was a very interesting phenomenon to have very low prices for months and suddenly experiencing very high prices. It is as if electricity prices have bipolar mood swings. This winter, this analogy can be applied to LNG, grids, coal, and other commodities.

Commodities are having a bull year. My concern, as I previously stated, is the food prices. High food prices and low oil prices do not mix well in the Middle East. But we were not contemplating a pre-2008 like bull run either. Now the central banks are printing money like never seen before, and China is growing like 2005-2007 as if there are no covid related problems. So there are two diverging, very diverging trends. This generally collapses.

As we talked about Black Lives Matter movements and ramifications, we have seen the Capitol raid by white supremacists. A world in balance is a very rare thing. One imbalance triggers another one, and that one triggers another one. Covid, unemployment, Trump all created a new dynamically erratic order. It is not likely to settle soon. Out of nowhere, we have seen Whatsapp assaulting individual freedoms nearly overnight. It seems like the end of an era.

The energy system is a mirror of human activity and livelihood. These tides have created disturbances in investment, protectionist policies, change in the status quo. China blocking Australian coal exports caused power outages in China, and coal price hikes around the world. Gas prices suddenly increased due to other problems. LNG prices have seen an unprecedented 30+$/mmbtu. Japan has panicked, Europe is about to undergo a cold period.

Last Friday, a split system event in Europe was even a more disturbing thing. The demand is not as strong before. The covid wounds are not healed yet. My fear is the underinvestment of electricity generators due to collapsing prices. This may create systemic risks that can not be predicted easily.

A few months ago, we talked about negative oil prices, never to rise again LNG price levels—no final investment decisions in LNG projects due to low prices. France is rejecting US LNG on the grounds of emissions. OPEC+ blunder that we thought prices would never rise again. Now, Saudi Arabia is unilaterally cutting one mb/d to sustain theOPEC+ agreement. It looks as if the political instabilities and sudden changes are infecting the energy realm.

Where from now on? Growth is a priority, but growth needs predictability. Predictability is lost, and the disturbances started. I do not think volatilities or system problems will end soon. Our fossil energy system was built on the predictability that fossil fuels provide. We have to depart from that. We have to create a new predictable realm based on renewables. Moving from one stable point to another future stable point is mostly chaotic. The energy transition is such a journey.

We have to be ready for more disturbances and have to adapt to this unstable environment. The biggest concern is energy consumption. Yes, markets and systems can act in completely unpredictable moods, but consumers get confused easily and may be harmed. Better to inform and protect the customer about what energy transition and coming age means.

An Exceptional LNG Winter

Jan 18, 2021

LNG prices have reached sky-high prices and approached 40$/mmbtu. This was completely unexpected, but so does the weather. The covid part of the story has an unusual twist. But

LNG markets are bizarre, and it has highly seasonal characteristics, as well as a global commodity in the making, is happening.

The cold weather in North-East Asia is the major culprit of this event. Then comes the covid, and then the panicking. There is so much detail in the whole story that interacts with Panama channel slots and defaulted cargos for late February and a hidden ban on Australian coal.

In Japan, due to covid precautions, the open window policy has increased heating demand. Having a very cold winter period exasperated the demand. In China, due to political strain with Australia, Australian coal has been unofficially banned. The ban started in October and then extended. This changed the flow of coal trade and coal support prices around the world. China bought Colombian and South African coal with higher shipping costs. Covid also delayed and diminished coal production and imports from Mongolia.

Trade data suggests that Japanese companies didn't expect such intense cold weather. But 3 out of 33 reactors are totaling 2960 MW of nuclear capacity online. Before the Fukushima disaster, there were 54 reactors. Most of the reactors are going through re-licensing. The increase in electricity demand was more than expected, and it created a surge in LNG demand. The price spikes in LNG has fed into electricity prices. Electricity prices spiked to 2000$/MWh, which was the government-administered cap for the market.

But as the cold continues, the demand for LNG has continued its surge. The shipping rates reached a record 350,000$/day. The cargos for "the rest" have been defaulted. Nearly all cargos were diverted to North-East Asia, and most probably Japan. Generally, the shipping rates peak to 150,000 $, but during the normal season, the prices hover around 20,000-60,000$.

The chokepoints around the world also contributed to this bonanza. The delays or limited slots at the Panama channel limited the number of ships to Asia from the US. This problem is expected to continue until March. On the Russian side, Novatek is testing to use the Northern Sea Route for January-February voyages through the Arctic. It is extremely difficult during this season, but two tankers are testing the route as of 5-6 January.

When we experience high prices in any commodity, we see an increase in that commodity's supply side dynamics. An accelerated nuclear re-licensing period in Japan may be one of these dynamics. Another one is the restarting of some idle LNG plants, such as Prelude LNG. New investments are also coming, such as Driftwood LNG.

Now another LNG cycle will dominate in the coming years. From relations between Australia and China to Arctic voyages, nuclear re-licensing to Panama channel, shipping rates to coal switching, it looks like an interesting period to watch. Like negative oil prices, record LNG prices are not the norm but a hidden puzzle to be solved. We will check trading house statements in the next quarter for clues.

What the Present of Tech Tells About the Future of Energy

Jan 25, 2021

Once upon a time, there was Napster. The decentralized file-sharing system was revolutionary. It transformed the music industry and created what we called the "streaming industry". But the whole process was not without hurdles. The creation of new models and their implementation took a long time. Now we have prosumers and then what?

The people of the energy business think that the "prosumer" concept is revolutionary. So does decarbonization and digitalization. But if you look at the 3D printers and the Maker movements, you see another prosumer movement. The basic logic is simple, and the tech should give people more freedom. It should foster their creativity and contribution to society. 3D printing technology has yet to transform our industrial world. It has started, but it will need some time to be the main stream.

The Maker society of the 3D printing world quite resembles our "prosumer society." It didn't crash any industrial mogul yet, but who knows what will happen.

The internet's progress from central servers to VPN or more privately owned spaces is also another similar example. It looks like the microgrids of the energy landscape have a sibling from the internet world. Are the VPNs or microgrids future of our world? We hope not. Microgrids are useful, but we may not want to live in a federated microgrids' world…

Now the electricity system is likely to dominate mobility and other areas. Just like the electrification of our energy system, digitization is also expanding like never before.

Just like switching from cassettes and videotapes to streaming services, we are moving from thermal and steam-based systems to more solid-state like systems such as powerelectronics, solar systems, inverters, and hopefully to solid-state batteries.

There are limits to how tech and energy inspire each other. For example, years ago, Facebook was a prime example of how energy companies should move forward.However, now, no energy company wants to be like Facebook.

The telecom has also moved from landlines to cell phones, but we couldn't see that either in energy. Centralized energy is more or less the dominant power. The invention of automobiles has replaced most railway travel. We couldn't see that in energy, too.

However, the future of energy still looks to tech for inspiration. Whether it is AI or digitalization, the interaction is inescapable. Therefore we may use the current trends in tech to forecast future energy systems.

The biggest tech innovations are merging with energy in the field of clean energy. But the privacy concern is creating new discussions. These discussions will be carried to the energy realm. Like the tech companies becoming more powerful than the governments, renewables may shift the power balance in favor of companies. Electric cars may not be the private spaces that diesel cars provide. Contrary to what is believed,tech didn't bring the freedom we imagined. So energy transition may not be too different.

Consumer wise, there will be more options in the clean energy world. But all of these options will carry the risks of privacy concerns and the control of the consumer side.The future of energy will see more privacy discussions.

A New Era for Energy Market Speculation

Feb 1, 2021

Gamespot's share value has stirred up a controversy in the financial markets and politics of regulation. Now we have seen that retail investors can beat the hedge funds. Short positions can be a matter of greater risk for institutional investors. The consequences will be felt in the energy markets and policies as well. The rise of the rest in the financial markets may create more chaos than stability for the already unstable energy markets.

We saw negative prices in the WTI markets last year. Also, record LNG prices and charter rates. If we look back further, we may also remember the speculation that led to the record rise in oil prices in 2008. The congress testimonies, academic writings didn't project a crystal clear picture. But we know for sure that there is an interaction between financial instruments and physical products, and that is all.

In each of these cases, there were fundamentals and interpretations of these fundamentals. The institutional investors bet on the rise of commodity prices due to the rise of China and Asia. Everyone has thought that there was a never-ending appetite for fossil and mineral resources. Now the times are changed, but the early signs of 2021 point to another commodities bull market. This time, the game is not confined to institutional investors, but retail investors may change or amplify the effect.

The closest example is the "Crude oil treasure" of the Bank of China. Just as everyone thought that oil reached its lowest price, individual investors started buying oil contracts through "Crude oil treasure." They couldn't get out of the physically settled contract before liquidity dried up. The losses were massive. The CFTC didn't publish a satisfying report. We still do not know whether London trading circles have a part in this trouble. Still, "the treasure" became a nightmare for small investors in China.

Gamestop or a company share is one thing, but the commodity world is another thing. The retail investors powered by Robinhood or other new trading platforms, with knowledge of sophisticated financial instruments, are already moving into silver and energy companies. They will not stop there and move into other energy arenas. Lots of individual investors can already buy crude contracts. But options were not that popular. This is a different game.

The negative prices in WTI was a complicated matter to understand. But some investors'have used a technical issue called Trading at Settlement (TaS) to their advantage. A much more technical tool called "options" is a different beast. Although the Mexican Government's Hacienda hedge involves options, Mexicans are the only ones to have a consistent process and gain success. More retail investors in the options world will shake energy markets.

Now the bigger question is how the energy market speculation with retail investors will look like? The simplest answer will be more volatility. The negative prices were the product of financial mechanisms. The retail investors will increase the extreme price levels we have seen. They may target fossil fuel companies for activist purposes; who knows? But unlike

Gamestop, the rise in silver prices will affect the clean energy market. So these new trader groups may affect oil companies as well as clean energy transitions. The risks are higher now.

But the biggest worry is not financial markets. This is a continuation of the anti-elitist movement to the financial world. Soon it will infect the internet, energy, and climate change, too. The clash is no more between left and right. There are no holy grails to fight for, but the joy of shaking established elites or institutions. This will shape our energy policies, too. Especially climate change...

Can Europe Lead In Climate Change?

Feb 8, 2021

Europe can transform the world for better or worse. Climate change and consumer rights can be one of these transformational areas. Still, we never know whether Europe can lead in climate change. It looks as if there are lots of publicity, publications but no solid action. There are incremental solutions, but nothing like the world needs in its energy transformation.

In terms of market size, Europe is big. The import and export markets amplify its influence even further. But it is also a technocratic citadel. More rules, more strategy plans, more commitments are always widely available. Sometimes it looks like a printinghouse than a governing entity. When you look to the world as a whole, Europe's efforts and rank in clean energy technologies are not synchronous. The big clean utilities, if I may say so, owe all their greatness to EU subsidies. Not even one of them has an innovative technology that the world knows. Balance sheets and innovation capacities are not matched.

Recently, hydrogen strategy has also faced European treatment. First, they pledged for only green hydrogen, and then they published an ambitious hydrogen strategy with blue hydrogen. The interesting thing is the missing references to the EU's hydrogen-related strategies during the 2000s. Now German carmakers are against hydrogen. German state minister does not think hydrogen will be part of residential heating. Then what is the point of having an ambitious hydrogen strategy? A simple hydrogen strategy may do the job.

Comparing the EU and US is just a cheap trick. It is not geographies that matter in energy transitions. The volume of published documents also doesn't guarantee success. Rationality is essential, just like Tesla.Tesla's secret strategy is straightforward. "Aim the high-end market with premium, as you scale and earn a profit, move to the lower end ofthe market." This became a much better strategy than all the other technocratic designs.

Lithium-ion batteries and hybrid cars are the results of R&D done by US oil companies. The shock of the oil crisis pushed oil companies to inventions. But the Carter administration was thinking that synthetic fuels were a much better option. It was "the obvious solution" for years. Despite higher budgetary allocation, the thing didn't work. In the long run, the state's plans failed, but oil companies' inventions paved the way.

Maybe innovation and especially disruptive innovation is not an outcome of a technocratic state. The innovation is the result of an entrepreneurial entity, and you may call it a state. Just as the world needs more innovation to deal with climate crises, the EU is not an entrepreneurial state. Worse, it is turning into another lobbying network. Do you think that the handmade European electrolyzers can decrease the cost of producing hydrogen? No way. This perspective will strengthen Chinese manufacturers' position in Europe further, but not the European technology base.

Europe can create the scale for energy transitions. Already high prices can support this. The technology base in Europe is good but not a bonus for the energy transition. First and foremost, European companies do not believe in the energy transition. The leaders are not

pushing these companies hard enough. There are no disruptive technology ecosystems. But plenty of ambitious targets.

My lesson from this story is to simplify the problem. Start with a simple progressive lean strategy, support more private-sector R&D, a specific fund for disruptive technology candidates, fewer rules, less technocracy, more sandboxing, less ambition but more frequent action.

The world has not come out of any crisis with more ambition, rules, and strategies. Creativity is the key. Innovation should be part of our lives, the whole of government so that we all can search for solutions. The high-level design for energy transition is not working, and it merely serves to fund lobbying companies to their likings. The emissions are not going down. The disruptive technologies are late. We have to move from a technocratic state to an innovative state.

What Texas' Blackouts Mean for Electricity Markets?

Feb 15, 2021

The latest Arctic cold pushing Texas power prices to record levels such as 9000$/MWh is going to start a new discussion on capacity mechanisms, renewables, and pricing in wholesale electricity markets. We can not be sure how the whole discussion will evolve, but it will get deeper.

Two years ago, we were talking about Abqaiq attacks and their importance for oil markets. The most critical part of the Middle Eastern oil is hit from the heart. But Texas is just as important and critical for gas and oil production. The weather events in Texas can be felt around the world. Today oil prices increased, gas prices will also follow.

In such freezing temperatures, oil wells and productions are getting affected. The flows will be disrupted. That can further increase the stress on the energy system. Surely, the fossil production and transmission system is hit by Arctic cold. But not to the extent of electricity since there are storage possibilities on the fossil side.

The cold weather in Texas will leave the region in a matter of days. But the discussions will remain. One of the most important of all is the freezing of wind turbines. The blades of wind turbines are covered with ice. This weight change can harm the blades and the overall operation. There are examples of wind turbines shutting down to protect their blades and equipment, but this concurred with the highest demand and coldest weather in Texas. 12000 MWs of wind turbines were shut by Sunday morning.

But the biggest news was the record high 9000$/MWh electricity prices. Because electricity demand is expected to surpass possible generation. This is the crucial part of the whole discussion. Prices are record high, but consumers are not reacting. The wholesale part is giving a response. One wholesaler is offering 100$ for its customers to stop buying electricity from them.

You can price anything at any price. Electricity is another one of these commodities. It is a public good. You can create the mechanism and price it accordingly. Electricity markets are social constructs, and there are many ways to invent electricity markets.

But that one wholesaler is giving a signal of what is possible and what is not. It can knock on the doors of consumers or call them to consume less. But it prefers to pay cash for customers to leave. Converting consumers to active participants of the electricity system is a tireless effort with zero results. Instead, paying handsome money to get rid of the consumer looks like a better option.

The second important discussion is regarding capacity mechanisms. Should we all pay an hourly amount for the whole year as insurance for such extreme events, or should we just pay the maximum amount when these events happen? The PJM market prefers the former, Texas-ERCOT prefers the latter. It all boils down to market structure and perception of electricity prices.

If electricity prices are highly political items, then you design the market in the PJM way, or like Europe, high prices come and go. In Texas, however, the prices may persist for some time. The important point is the transmission of these costs to consumers.

There are other possibilities like matching Texas like mechanisms with hedging instruments to manage such events' financial impact. Therefore extreme markets need solid hedging instruments to help their players manage their risks. Otherwise, high prices can be highly dangerous.

What did these high prices mean for the rest of the electricity markets? Capacity mechanisms are here to stay and flourish. But there is not a single winner of such schemes. The security of supply should be managed by both physical and financial contracts or mechanisms. The risk stemming from major events can not be managed by wholesalers alone. Consumers should be dragged into the game.

But it is harder to achieve. The only way forward is electronic control systems embeddedin everyday appliances. EU is not pushing hard for forcing appliance makers to automate demand response. The US doesn't have it on the agenda. But we should think as the consumer as not the human agent but the electronic appliances to solve this problem. The automated transactions between the appliances and system operators without the consumer huff and puff are probably the only way forward.

The Aftermath of Texas Energy Crisis

Feb 22, 2021

Texas energy crisis is over for now. But its repercussions will be felt for a long time. We do not know how these discussions will evolve. But like all crises, the waves of the disturbance will take some time to reach the shores. Most importantly, the consumer bills will be a major headache for policymakers.

There are poisonous things in life like MBA, Econ 101, or conspiracy theories. Once you grab or fall into that reality, the world is shaped around these materialities. Econ 101 is a dangerous animal. Supply and demand intersect, and there is the price. If not, there are caps. For some of us, electricity markets are just another market with different dynamics.

However, there is a political economy of electricity markets, even in the most liberal markets.

In the Texas crisis, like in all crises, there are winners and losers. The economy as a science or an invention should provide us a fairer distribution of benefits and burdens than otherwise. So in a crisis, if a market design is punishing the poor more than the rich, should we accept that there is a problem in the design?

According to FT, Australian Macquarie is one of the winners of the high prices in Texas. As one of the biggest traders of gas and power in the US, the crisis boosted its profit by 300 million Australian dollars. Macquarie has also invested in Griddy Energy. The company sells electricity to Texan consumers with varying tariffs, including a floating rate tariff.

In the last couple of days, some Griddy Energy consumers have complained that their 100-150 $/month bills have soared to 5000$/month. It is nearly a 40-fold increase in consumer bills. From a liberal perspective, one may claim that the consumers should not be consuming recklessly in such a crisis environment. But is it fair to charge consumers with such high 40-fold bills? What if the bills were just five fold of their normal times?

Is this something that we should expect from a fair market design, that consumers should be protected at the time of crisis? That is a long discussion, but Texas will discuss it for some time.

One of the Texas electricity market designers, Bill Hogan, claimed that no market structure could withstand such stress with such extreme weather events. So he is approaching from an "extreme event" perspective. In extreme events, no market design can work. Then what is the most important part of the system that should be protected during these extreme events? We know that market will not survive.

Last week, there was an analysis about electric cars-EVs. It is claiming that EVs are more software than hardware. Therefore the mindset has to be different. That may be the reason why traditional car manufacturers find it hard to deal with EVs. You may still think that automotive consumers are hungry for gas guzzlers. The whole company strategy may evolve around it. But in the real world, the desired vehicle is a different product than what your skills can achieve with honesty and hard work.

The Texas energy crisis is a similar example of this change. The world and electricity system are changing. Climate is changing. Our designs and systems for ever more electricity supply and demand should change. We may be the kings of the past glories, but the beast waiting for our works differently in the future. As it approaches, it does tear apart our systems, rules, regulations.

Therefore, the Texas debate is expected to evolve into several discussions. One is certainly capacity markets.

The rationale for capacity markets is simple, and it is insurance for the capacity deficit. For generators, this is basic. But who protects the consumers? What is their insurance? Isn't this whole market idea is designed to serve consumers? Therefore there should be new tools for consumers to insure them against high prices. A similar consumer product should match the capacity market for generators. Otherwise, Econ 101 or Econ 401 doesn't matter.

The second one is the security of supply based on renewables. Is it possible to provide security with renewables? We do not know. We know that every electricity generation unit helps during these difficult times. But can the electricity of nature's forces counter nature itself? If not, can we tweak our systems to protect consumers during those times?

The third one is markets and systems in extreme weather events. The fourth one is the consumer bills. The fifth one is the interaction of electricity markets with gas. So there is no end to different discussions.

As Keynes claims, " The difficulty lies not so much in developing new ideas as in escaping from old ones." The traditional car manufacturers are not in a deficit of wisdom or knowledge. They are exceptionally brilliant minds. But the world is changing. These minds are useless in the new realm.

The electricity system and market are brilliant inventions, but the world is different with solar, wind, and extreme weather. The change needs steps and institutions to settle. Redefining the security of supply, the economics of electricity markets, the political economy of electricity prices, and creating new mechanisms for consumer protection and benefits can be a better way. Otherwise, there is no guarantee that the crisis ends up with well-informed discussions with beneficial results. There is no guarantee that it will end well.

The Narrowing Options for OPEC+

Mar 1, 2020

OPEC may outlast the age of oil. The joy and chaos it brings to energy news streams are exceptional. The oil itself has the elements of a drama. It makes riches and wars. It creates winners and losers, erupts protests, changes governments. We sometimes personify oil like a man with evil deeds and riches. However, it may be no different than a simple power game.

This week OPEC JMMC and later OPEC+ will gather to tweak production targets. The problem lies in the data. Is the world getting back to normal, is the demand finally taking off? Or is it still too early to increase production? Or the price levels are a gift for shale producers?

The oil price volatility is generally calmed if some entity has control over oil markets. Otherwise, the normal tendency of prices is a little bit less than chaotic. Trump previously brokered or helped to broker an agreement between Russia and Saudi Arabia. OPEC+ and a US president have brought long stability to the oil prices for better or worse. Now, will it last?

One of the important elements of this equation is the stock levels. These stock levels, especially US oil stocks, were targeted by the OPEC decision-making. If stock levels are lower than average, it is obvious that demand is higher than the supply provided. But it also means that stockpiles have to be filled again at some time in the future.

This may be important for data-wise transparent US oil stockpiles. But the Chinese stock levels are not accurately known. China is estimated to have over 1 billion barrels of stocks. China has become an important balancing piece of the whole oil conundrum. Not only for what it consumes but also for what it can store.

The New US administration is also shifting the focus from oil to the energy transition. It will take time, but the ship has started maneuvering. The oil consumption itself has inertia, but the electric car frenzy has started. These kinds of policy shifts hardly happen in one go. But once it started, it will strengthen and then weaken and then strengthen further. There is no linear path.

The most curious question is related to shale production. Will there be capital discipline, or are we going to see the same drama of keep pumping. I am not sure about capital discipline, and if there is profit to be made, it will materialize, unfortunately, with a time shift.

OPEC is in a fallen angel's dilemma. It still has the control and prospects for oil markets. But it is eroding, and it can not be undone. Only a few geopolitical chaoses may turn the tide. For the March meeting, it will be a game between Saudi Arabia and Russia. If Saudi Arabia values US relations, it can not be close to Russia anymore. But it can not increase production too much to bankrupt shale. Russia has to push for more production such that the oil and

gas prices should not bring new players to the already crowded game. Low prices are not desired. The options are limited and darker for everyone.

On the other side, the usual Sunday bombing of some ships in the Middle East and rocketing Saudi cities keep increasing. Geopolitical instability is the major reason for a price rise. There are limits to such tensions.

The roles of MbS and Putin are very different than the Trump era. This will certainly reshape with every step the US takes. Once, the best option for OPEC was to let everyone produce as much as possible to destroy shale. This was Ali al-Naimi's original plan which resulted in his sacking. The other option was targeting stock levels and price levels. Basically, there are not too many options.

Now OPEC is slowly guiding oil to its final endgame. There will be more drama, more exchange of words, more rockets, drones, explosions. There will be more volatility—the drama peaks toward the final curtain. The oil market is harder to control than before. Energy transition will make it more of a beast.

Carbon Geopolitics

Mar 22, 2021

Climate change requires actions on multiple fronts. Government, finance, technology, innovation, law, insurance... You name it, and it should be ready for the crisis. This is a prevalent idea we hear in social media. But if this is a real crisis, it needs prioritization. The divergence of actionable areas lowers the concentration for successful actions. I believe climate change is an engineering problem at its heart. Finance will enable the engineering solutions, and the government should support these two.

Last week, US Climate Envoy John Kerry visited European capitals and talked about the upcoming COP26. There are lots of expectations from the new US administration, and obviously, it will be harder to fulfill these expectations as more action plans are revealed. One of the very interesting talks was about CBAM - carbon border adjustment mechanisms. Kerry politely rejected some part of the EU proposals, but it is interesting how the EU thinks about its carbon mechanisms.

From the EU’s perspective, the internal carbon market and mechanisms are fantastic creations. The word does not belong to me; that is their definition. They have so much belief in their carbon market that they believe California, China, the US, and any carbon pricing should follow European footsteps. That is not the bigger issue. The big problem is whether taxation will solve the climate crisis.

In Türkiye, the tax on diesel and gasoline is around 50%. What if we renamed it as the carbon tax and directed all income to green projects. Will it stop gasoline consumption or stop fossil cars? Unfortunately, the tax couldn’t stop the demand for fossil fuels. It may dampen the growth a little bit. Therefore we call these financial measures complementary measures.

CBAM is aiming to stop leakage in the EU market. The argument is simple, should you decarbonize by transforming your sectors or importing services that these sectors provide? Border adjustments are not without merit. They may work. But not in the world of free allowances. If there will be free allowances in parallel with such policies, it may disturb trade differently. China can distribute free allowances to its certain industries and put a custom price to protect its market.

EU market, in that sense, can stop leakage. But compared to the cost advantages of foreign countries, the barrier should be quite high.

China is also running its carbon market. It will be the largest globally, and it may include some ASEAN countries in the future, too. It may tweak its custom rules and calculations for a better creative market setting with such a gross market. On the other hand, India is already complaining about high oil prices, and there are political issues to be settled.

So Europe has the perfect carbon market, and now a carbon border mechanism is expected. The US wants to move forward, but taxing is a very big political issue to implement. The divergence of local politics makes it harder to settle. China's market size may dwarf all the carbon efforts around the world. VAT in Saudi Arabia already caused inflation. For the rest of the MENA, more taxes are not easy to work with. India is very sensitive to high energy and agriculture prices. And Africa should be exempted from all kinds of taxes?

The arithmetics of carbon taxing and pricing is also complicated. With more creative maths from the finance side, the targets are already reached, or targets are just junk promises to be sorted out by the genius accountants. The sensible thing is to look at this emergency as an engineering problem and act accordingly. Otherwise, we will sign documents, promise pledges, create certificates, have activist board members, implement international barriers, tax the producers, and hence consume more, but emissions will not slow a bit.

New Green Imperialism

Apr 5, 2021

Climate change is one of the most critical problems we face. If we cannot reduce CO2 emissions quickly, living conditions in the world will be much more difficult. The root of the problem is our ever-increasing appetite for commodities and energy. The solutions presented are nothing more than a battle of strife for the chance to win world domination and tax others. Green concepts may seem innocent, but when politicized, nothing can preserve their innocence.

A huge transformation awaits us. Our energy system, agricultural system, lifestyle must change. Unilateral actions will not be enough. It is imperative to take coordinated steps. This coordination problem cannot be solved overnight. However, some political blocs try to market their policies to others as "the only way," threatening others with complex trade rules to force others to follow their leadership or to "get them on track."

In the Covid crisis, which is perhaps a rehearsal of the climate crisis, we have once again seen that these complex rule systems and the fight against the crisis do not work like the EU's own covid vaccination problems. Neither could they reach the pace of other countries in vaccination. On the contrary, they created trade barriers with vaccine protection, and they had to start closing again with endless meetings behind the rules. They have transformed what seemed like solutions into barbed wires that encapsulate deadlocks.

Another interesting aspect of the work is that the advocates of the ideas of establishing "climate clubs" within the developed countries are also political blocs with egalitarian and justice discourses; However, it is very significant that these ideas are not accepted. Although neither China, the USA, Russia, nor any other country in the near geography accepts these ideas. This scheme turned into a green complex of winning the appreciation of the white masters who always prevail in geographies where copy-paste culture is dominant.

As China claims, most developed countries already peaked in their emissions years ago. In other words, their conversion from the highest emissions to zero can be done in 30 years. However, the energy demand of developing countries has not stopped. But they have to make the same transformation in the same period. While a developed country citizen moves from a diesel SUV vehicle to an electric SUV, many Asian motorcycles will continue to pollute the world with their transportation facilities. Do you think this situation is fair?

Large budgets are needed to finance the energy transformation. Each of the developed countries reveal the amount of investments larger than the GDP of many developing countries. To achieve the goals, you need to invest in new infrastructure, new skills, innovation, and tax breaks. However, most of the world does not have these deep budgets. Since there is no economic situation to print money for their investment, every investment will be a burden to their citizens. A citizen of a developed country may see a small effect, but this effect will be much higher for the rest of the world. A 10% increase in an EU citizen's bill is the difference between life and death in Asia and Africa. These increases can even block access to energy in these poor countries.

Because developing countries are riskier than others, financing costs are higher. This increases investment costs and costs shared by citizens. Being a developing country means you have to pay the developed world for equipment and interest, commission, consultancy fees. So we have to ask who is the winner, who is the loser.

For example, suppose the transition to a hydrogen-based economy is aimed. In this case,some countries have the finance to spend enormous amounts of money on electrolyzers,infrastructure, new equipment, and fuel cells. What about a developing country? It cannot finance them. An international organization will charge a higher interest rate for the loan than developed countries, the rich country will sell the equipment, its engineers will be consulted, and the poor country will be the user and payer of this energy transformation.

In addition to all these burdens, the developing country has to pay extra taxes if it cannot manage this unfair energy transition anyway. Most of the developing world needs money and finance to grow. The main source of this money is export. When you tax the exports of

these countries, you destroy the wages of workers, the source of the extra investment costs that industries need to transform, and the general well-being of these countries. The developed countries win, and the rest lose as planned.

Only green tyrants can defend such a transition. He taxes the poor and gives to the rich.It forces the poor for rapid "green development" and bills for interest, technology, and advice. In short, the whole system finances the New Green Imperialism.

Advocated green policies will make banks richer than ever. The poor will pay for the green, but developed countries with advanced accounting systems will be green in everything with a few certificates based on fake calculations. More rules and green bureaucracy will result in encircled state institutions and institutions that developing countries could never be a part of except to watch. They will pay for standards, certificates, technologies, but they will be poorer than ever. The new green imperialism cannot go beyond an illusion that will ensure that the rich richer the poor remain poorer in the current world order. Although puppets play games of justice, equality, and freedom, it is always the puppet master who collects the money at the end of the show

Not a Comfortable 2021 So Far

Apr 12, 2021

Yesterday, Israel news sources claimed a cyberattack on Iran's Natanz nuclear facilities. Iran declared the event nuclear terrorism. Following the events, Houthis attacked Saudi oil facilities with limited damage. Oil prices barely moved positively because there are still cards in the deck.

During the Trump era, the US was against high prices and was also against low prices. Trump even pushed OPEC+ to reconcile after a spat between Muhammed bin Salman- MbS and Putin. The Biden era will be different. The first sign was the call between US Energy Secretary and Saudi Energy Minister. The emphasis was on the word "affordable." After the OPEC+ decision, the US and Iran indirect talks have restarted. It is most likely planned weeks in advance. But the phone call may also include bits of these upcoming talks. There are still signs of the US position softening on Iran and Venezuela. This will put a cap on the price hikes.

There are also invisible yet effective parameters such as the exact volume of Chinese crude oil stocks. OPEC+ is targeting OECD stocks to balance the market. But China is all about storing commodities this year. You name it, and it is in their shopping list: crude oil, copper, nickel, cobalt, wheat, barley, corn... This creates enormous stress on world food prices. But also creates suspicions on the level of crude oil stocks around the world.

So far, Chinese Premier Li Keqing has listened to the entrepreneurs and has given the signal that China will further strengthen its control over raw materials. Chinese growth is not a green take-off but energy-intensive and gradual. Coal, raw materials, and other agricultural products and their security are even more essential now than before. When you consider the Chinese diplomatic spat with other countries, very few countries remained spared from Chinese criticisms.

If you are one of these “in net-zero, we believe” kind of person, the net and zero part of this belief system is highly eroded by finance communities’ abracadabra accounting practices. “Avoided emissions” became a life jacket for most industries, and lots of them claiming their net-zero achievements. However, things are getting messier in detail. This is a major problem, which may end up with all companies being net-zero and increasing emissions.

One fundamental problem is the split between the communities. There is a group of people trying to save the world, and there is an increasing number of people trying to survive. The decrease in middle-income groups is a wake-up call for everyone, especially degrowthism. The rise in food prices is worrisome. On the one hand, you have fewer jobs, more poverty. On the other hand, you have booming food inflation and tax regimes.

China and the US are expected to continue their growth trajectory. At the same time, Europe may be a laggard. Germany may end up closing for another number of weeks. The vaccination speed is one parameter, but the minimum share of population's to be vaccinated is another important point.

In this digital age, measles has been resurrected due to conspiracy theories spread over the digital platforms. More parents refrain from vaccinating their toddlers. When it comes to covid19, the success of US vaccination may need more time and people. If an important share of adults rejects inoculations, herd immunity may never happen. In addition to that, Ugur Sahin, founder of BioNTech, believes there may be third doses and more doses for every 12-18 months. This thing will not disappear anytime soon.

So the reference scenario becomes the Covid19 to last until 2022-2023. The regular outbreaks may prolong energy demand stagnation in emerging countries. Probably we will have five months of higher activity and five months of covid related restricted activity periods. Inflation is not a good thing for the already punched-down middle class.US looks like trying to balance OPEC+ decisions with more oil supply coming out of sanctions. The lower oil prices are already affecting Middle Eastern countries.

The picture does not look bright. But the digital transformation that has been accelerated in the past couple of months may further speed up. Post Ramadan period in the Middle East has to be watched carefully. Drone-based attacks on Saudi Arabia will probably evolve into the next stage. I may call 75 $/barrel as the July-August price for oil, but the Biden administration may open Iran and Venezuela's gates and let it stay below 45-55$/barrel. I bet on neither. However, one question remains open. Middle class citizens were the faithful consumers of energy products and the source of demand growth. Who will save the middle class from the extended crisis?

2021 As A Rebound Year For Fossil Fuels

Apr 26, 2021

This week we will see oil companies’ quarterly results. Just like the record losses during 2020, we may see a jump in profits and free cash flows. Then there will be comparison charts between oil companies and new energy technology companies. In summary, we may see Covid19 as a reinforcer of fossil fuel dominance.

Change does not happen overnight. The effects of the 1970s energy crises have been felt in the short term and the long term. It changed investment decisions, paved the way for Feed-in tariffs, natural gas liberalization in the US, the strengthening of trading companies. Hybrid cars, lithium batteries are all products of that era. From the 1970s to the 2000s, it took 30 years to have mature technologies. AI and numerical methods may accelerate this time to 10-20 years.

But the short term is not that rosy. IEA's latest report on global energy trends shows a rebound of fossil fuels. The only big hiccup is India for now. Emissions are expected to increase 5%, coal demand to rebound by 4.5%, natural gas to bounce by 3%. These are gains from 2020. If we compare these numbers to pre-covid 2019 levels, the increases are limited. It might be much bigger if covid was sorted out.

Electricity demand is estimated to grow by 4.5%, where renewables will rise by 8%. The only missing piece is the aviation sector. Qatar Airways is not optimistic about a reboundin aviation demand. But domestic flights in the US and UK may return to normal. Just like the security procedures after 9/11 became a norm for airport travel, the covid procedures are expected to stick for a long time.

The growth of fossil fuels is mostly from emerging countries. Coal is a beast that is harder to manage in developing economies. It is interconnected with regional economies, power balances, and industries. It took more than 40 years for the UK to get rid of coal and its power alliances. In developing countries, it may take longer due to theweakness of institutions.

Electric cars are increasing Europe at an unprecedented rate. The trend is expected to persist. Norway is the leader in EV sales, and the share of EV sales has surpassed 50%. But there is a hitch. Norway's officials claim that EVs are the most popular second car in the country. That is to say that if households have two or more cars, the primary vehicle is still gasoline. The one on the bench is electric. According to Statistics Norway, total oil product sales dropped 7.2% from 2019 to 2020. Gasoline is decreased by 5.6%, and auto diesel is down 5.2%. But EV sales are 50% of all sales. It is worthy of thinking once more.

The Chinese coal market is the future warzone for coal demand and emissions. The Chinese leadership is showing a desire to limit coal growth but after 2025. The 14th five-year plan was not that hopeful, but we heard promises of more aggressive targets for the 15th five-year plan.

We hear that "it is our last chance to reverse the course on climate change" with attached urgent timelines. Climate policies have shifted the whole urgency to crisis status. In Covid19, we are experiencing people being bored and getting angry with crisis chorus from politicians to doctors. Climate will be no different. The low-hanging fruit can easily be reached with more solar, wind, and electric cars. The rest will take some time.

The rebound in emissions, fossil fuels, and oil companies in 2021 should teach us a key lesson in a major crisis. You are either a marathon runner or a sprinter. For a big crisis, you should better be a marathon runner. Because as the challenge grows, so does the number of obstacles and their endurance.

A Looming Asian Energy Crisis

Oct 4, 2021

The energy crises were a concept mostly associated with the West and developed world in our recent history. The developing world has always been vulnerable to energy crises.But an Asian energy crisis is a new thing; therefore, its consequences will be different.

The mother of all energy crises is the first oil crisis of 1973-1974 because of the Arab-Israeli conflict. In his book "Red Gas," Per Högselius explains how an oil crisis has created tensions in the European gas system. Dutch threatened others with gas if oil was not shared. At the end of that crisis, new institutions such as International Energy Agency emerged. Such events have big effects on countries and force them to act together.

In recent events, there are multiple stories. First of all, regional differences are obvious. While Europe and the US have succeeded in mass vaccination, Asia is still laggards. While the holiday season was strong in the West, Asia was struggling with Covid19 closures. This created asynchronous regional growth momentums—a complicating factor for analysis.

The core of the issue is natural gas and coal. Asia is susceptible to panicking more in scarcity periods. One of the patterns we keep seeing in Asia is the same panic for "trying to secure supply at all costs." That further feeds gas into the fire. The fundamentals, seasonality, the AI models can not forecast that. The premium associated with this panic spreads to other regions and feeds into a global panic.

One worrying factor we have recently is the record low level of Indian coal stocks. According to FT, "more than half the country's power plants have less than three days of supplies remaining." India's coal-fired plants are producing 66% of the nation's electricity. It is a worrying case since once the panic starts, the demand also gyrates unpredictably.

This is what we experienced in Britain. Most of the time, satisfying demand looks like enough for managing an energy crisis. But as the news spread, consumers tried to stock more than their normal demand. Whether it is toilet paper or gasoline, the same trend is observable everywhere. But gasoline gets you to work, where an economic activity creates other economic activities.

The Chinese situation is also worrying. More than 20 provinces of 34 Chinese provinces are struggling with power cuts. The issue can be traced back to the Chinese spat with Australia. Last year, the situation was less alarming. Before last year, the Chinese "Blue Sky" project also affected coal consumption. There are lots of reasons for the recent cuts. Coal mine accidents, surging coal prices, low tariffs, local governments' maneuvers to reach their end-year targets, drought, and other factors are all part of the problem.

The high coal prices and electricity cuts also created shortages for solar panels, chip production, and other industrial sectors. A coal product, coke is generally used for panel grade silicon. The gasoline crisis in Britain is to be solved by military assistance. In China and India, we have to see how things evolve, but an energy crisis in Asia will not be a regional event. This will be the first time such an event at this scale happens.

Whether Asian countries can contain such a crisis is irrelevant for what is to come next. The damage has been done, and policymakers have seen and felt the fear of such a scenario. Will this create new prospects for Asian energy institutions? Is creating common institutions the Asian way to deal with the problem? Is it the price, supply, or rationing the demand, or a mixture of all of them that will lead the Asian efforts? Maybe just like Europe, the industrial sector will give up steaming its engines and rest until problems become manageable.

Revisiting Electricity Prices

Oct 19, 2021

As the world moves towards a cleaner energy system, electrification is at the heart of this transformation. Hydrogen is still a laggard, and carbon capture technologies may need higher prices or more innovation, which will take time. The easiest route to decarbonization looks like electrification.

The current electricity pricing mechanisms are archaic at their best. The capacity markets are forming a split between the baseload and the rest. Ever-increasing zero marginal cost resources are distorting the price signals. Electricity is a uniform product for some or a combination of different services for others. So what does that single kWh price means for the markets?

The main question for electricity prices is “If we had ten days of electricity storage capacity in our service, will the market design be the same?”. I may simplify the question further and ask if one day of storage will be enough to radically change the market structure. The main problem with electricity is you can not store it in scale. Interseasonal storage is a bigger problem. We designed the current market systems to cover up the shortage problem.

In contrast, the oil market does not have the capacity or balancing markets. In a mature commodity, market storage makes redundant all these market mechanisms. But storage technology is in between hydrogen and renewable electricity in terms of progress.

Most of the consultancy companies can’t run oil price or gas, price models. They are either pattern recognizing and repeating mathematical complexities which modelers hardly grasp how they work or simple trend-following forecasts. Electricity prices are determined by the fiction created by regulatory mechanisms. We do not really know what the real electricity prices will be if consumers and producers were to trade with each other freely.

Then there is the consumer price problem. Electricity infrastructure is more detailed and complex than natural gas or coal infrastructure. Therefore infrastructure costs, whether smart or digital, are clearly visible in the bills. But there are other levies on electricity costs. If electrification is the path forward, electricity bills should be simpler, and the natural gas bill should be more expensive. This is what some thinkers and policymakers around the world are discussing.

The consequences of lower electricity costs compared to natural gas will shift heating demand to electricity. EVs are not a big problem, but heating with electricity certainly requires firm electric power. If the discussions are leading us to electrification, practically a mini nuclear age is coming unless another nuclear accident happens.

The whole pricing structure of the electricity markets from wholesale to consumers is about to change. But it is too frightening to disturb the status quo for an essential commodity like electricity. Consumer expectations for electricity quality are very high. Our economy is centred around secure electricity. If electrification reaches 50% of total final consumption at some point, price stability will be the key. The stability requires new mechanisms from wholesale to final consumer prices. But price disparity between natural gas and electricity may reach its end of life.

Energy Security 3.0: Has Anything Really Changed?

Dec 8, 2021

Many definitions can be made about the energy security. But probably the shortest and most revealing would be the "temporal and spatial control over energy". The concept of security and the word security can be thought of not only as a measure against current threats but also as a resilience and ability to respond to all kinds of threats to come. Therefore, the threat is uncertain. In short, preserving the original state of the system would be a logical but challenging description.

According to the definition above, "Is energy security already established?" the answer will always be ambiguous because the threat or many events that would disrupt the original stability of the system did not occur. This is even more visible in the electricity sector where there is no storage. The “perfect” interruptions caused by Egyptian Vultures in Turkey's first 420 kW lines are one of the interesting events that have been the subject of academic publications.

However, everything is not so uncertain. It is an engineer's approach to consider the scientific projection of uncertainty as probability and to use probabilistic methods. We can think that probabilistic approaches with methods such as advanced computer technology and artificial intelligence will go a long way with big data. Looking at current technical advances, greater progress is expected in the next 10 years than in the past 100 years. This will also have some consequences.

How did the concept of energy security take shape in the past?

Energy security can be divided into three periods. If we could give a keyword to each of these periods:

1. First period: Diversification
2. Second period: Institutionalization
3. Third period: Foresight

When we consider these three periods together, foresight can already be seen as the most important part of all processes. Likewise, diversification and institutionalization. However, , there are parts where some things come to the fore, while others lose their importance. Finally, energy is a necessity of human and machine activity. It contains all the methods that humans use to survive.

In the first period, as Daniel Yergin pointed out with reference to Churchill, “variety”, diversification is the main argument. Speaking of diversification, Churchill's switching of ships from coal to oil in England, one of the world's most important coal producing countries, was applauded today, but it was an irrational act at the time. Because coal is well known domestic resource, can be reached at any time and under its control. On the other hand, oil came from Iran and other geographies.

So why did Churchill do this? For one reason: speed. British ships that switched to oil were gaining speed advantage over German ships. Of course, there were additional benefits such as coal storage and boiler burning. So, was it cost effective or cheap? No way.

We can find a projection of this in bringing natural gas to Turkey from Russia. In fact, it would be cheaper if wood was burned. But gas provided a rapid transition to another energy source, where the cleanliness and comfort of the cities were considered. We see the same emphasis on diversification in Turkey's natural gas development. When we look at the whole process, marketing future energy transformations as "cheap" creates obstacles in terms of social acceptance.

In the second period, we can bring it up to the European Coal and Steel Union, perhaps from the European Coal and Steel Union, to OPEC, IEA, IRENA, and perhaps in the last part, the European Union's "Energy Union" idea. So why did I name a special period in energy security as institutionalization? Because diversification brought a geographical dispersion, and this event started to touch many people with similar concerns. Some of them are producers (OPEC, GECF), some are consumers (IEA) and some are mixtures of them (IRENA, IEF etc.).

The main concern during this period is coordination. In institutionalization, it is essential to eliminate the information asymmetry by keeping the records of the knowledge, experience and lessons produced by humanity. Institutions that do not generally publish (like statistical reports, plans, reports of lessons learned) cannot become institutionalized. For this reason, institutions such as the IEA and OPEC have monthly reports that impact the markets. Now the energy sector is huge and information is so fluid. It has to be somehow guided by the exchange of information.

The last period is the “Foresight” period, which started a little later in the 2010s. In many developing countries, institutions are looked upon as gods, i.e. they are tools that can prevent events and make history-altering movements. However, by nature, institutions work ex-post, that is, from behind and act with a foresight. There is a misconception that if there were the "right people" in these institutions, the institutions could have already made the right interventions. I call this the “plane crash paradigm”.

In the plane crash paradigm, we can solve that plane crash by approaching the problem like if a better pilot was there, if plane was better taken care of, the accident wouldn't have happened, then the culprit is the pilot or the airline. This is convenience. Advanced methods look for "systemic offenders" rather than "human offenders". Because institutions that seek criminals do not see the structural problems and they think that everything will work very well when the "troubled person" leaves the system. However, this is a precursor to larger problems. A choice is required between short-term human blame and long-term systems design. For this reason, the last part of the "plane crash documentaries" describes the redesign of the processes and the establishment of structures that the system prevents even if that person makes that mistake.

Likewise, until the 2010s, the energy system was seen as a structure that resisted cyber-attacks and blackouts, and in a way repelled these threats with bullets. But we see that this arrogance has left its place to a modesty. In other words, we are entering a period where the system may somehow move away from its original balance, but how it will return to this balance is the basis of the security phenomenon. For this, it will be useful to look at the developments in electricity. Because almost all of the net zero policies predict that half of the total consumption, that is, our future, will be electricity in 2050.

Canay Özden Schilling's book "The Current Economy Electricity Markets and Techno-Economics" describes the electricity market development through the eyes of an anthropologist, has a different approach to the phases of the electricity market. From biological systems comes a stability approach to an engineering system. Fred C. Schweppe's "Homeostatic Utility Control", whose name we hardly pronounce, is perhaps a further definition of today's smart grid. Because basically we are trying to stabilize this copper-steel and electron mass like a biological system.

Then, with a political intervention in the system, marketization efforts began. In fact, many things were not invented from scratch, although many theories have been available since the 1950s, it was uncertain whether this would apply to the electrical industry. A mechanical price formation actually misleads many people. The price naturally does not occur as designed in the electricity markets

For this reason, many people may think that they understand the pricing issue when they model the electricity market. It can be recommended to try the oil price with similar models. Because oil prices are not determined by a regulation. In this field, which is completely determined by human and machine movements, we can only talk about approaches with financial movements that are getting complicated. For example, issues such as the effects of gamma in options on oil price movements can also be a serious determinant in price formation.

Finally, the electrical system models that were recreated digitally with Excel spreadsheets, then the software, have evolved to a different point with the emphasis on "optimization". At this stage, whole system optimization was one of the most important goals. But it is important to combine optimization and the numerical shadow of physical reality on a macro-large scale.

Creating digital twins, which has been talked about for a long time, will also apply to the grid and the entire energy system. In fact, while the grid and energy system were modelled as digital flows in the 2000s, a world in which physical assets will be digitally twinned to cable connections due to effects such as wind and weather should not be seen as minute challenges in the upcoming period. As image quality improves with satellite technology, it may not be difficult to deal with the already existing topography data, perhaps with a few special flights.

That is, the concept of foresight goes beyond moving complex models beyond time t with the model. Maybe we can divide the new shaping of the concept of foresight into four main headings:
1. Recognizing that threatening events will increase (modest)
2. Advanced and second-to-second weather observation and local scale forecasting
3. Commissioning of new topology and automation-artificial intelligence systems for system balance
4. Reducing the recovery time from full collapse

Because the share of electricity in total energy will increase even more. So our life will become more dependent on electricity. Storage is transformative. But the "storage will end all the problems" approach will also take time. In fact, storage solves the most fundamental problem in energy security: Spatial and temporal control. For this reason, storage is vital in all energy sources. We are following the natural gas levels in Europe this winter, 5 major countries tried to respond to the rising oil prices by removing products from their stocks.

But the cyber security of storage systems will also be important, malicious control of these grid tools, which have rapid spikes and decreases, can crash systems very quickly. Maybe it will be microcontrollers and communications that will be more important. But this still doesn't solve the whole system security issue.

Instead of the conclusion:

In a good article, it is essential that the discussion continues in the mind of the reader when the article is finished. But it may be necessary not to exaggerate. In energy security, artificial intelligence, cyber security, extreme weather events will be important agenda items with their positive or negative effects. Creating pools of ideas today rather than waiting for the future will enrich the discussions. This article is also a contribution to this pool.

Was 2021 Just the Beginning of an Energy Crisis?

Jan 3, 2022

Crises can not be understood by monolithic expertise, because each crisis is a different kind of monster. For this reason, analysis of what was done right or wrong in past crises is more important than crisis expertise. Studying the past provides a toolkit. For this reason, it would be useful to keep the past events and results in the knowledge base.

The mother of all energy crises is the 1973-74 and 1979-80 oil crises. It may be necessary to look at these crises for two reasons. Many experts know very well the establishment of the IEA (International Energy Agency) against the Organization of Petroleum Exporting Countries (OPEC) in the first oil crisis. But EIA (Energy Information Administration), whose name is confused with IEA, dates back to 1974's . With the Federal Energy Management Act, the tasks of “collecting, evaluating, analysing, future reflections” of energy information were determined, and then the Office of Energy Information and Analysis was established in 1976, and then its name was changed as EIA.

Today, the EIA is still the most important single point source of US energy data. So, when we think of a crisis, we think of the lack of a resource or the high price. So how was a "statistics institution" was so important for avoiding crisis? Because the inability to increase oil production in the USA during the oil crisis brought along the arguments that there were errors in the statistics given by the producers and that this caught the USA unprepared.

In times of crisis, data becomes even more important. Because, in the simplest terms, "if you can't measure, you can't manage". Therefore, it would not be wrong to say that in 2022 and beyond, we will enter a period in which data is more important.

So what should we do in crises? The people, the politicians, the technocrats, the markets? People want the price of everything to drop, politicians want to look good for the next election, technocrats want to put into action the plans they already had in their minds before the crisis, and the markets want to make a profit. To make everyone happy, “removing taxes, saying it's not in the hands of politicians, opening and accelerating a necessary season of unnecessary regulation, and keeping prices running pretty high” seems like a paradoxical sufficient condition. Thus, the consumer does not have to cut back on consumption, the politician does not lose votes, the technocrats strengthen their strongholds and the markets provide a rapid return on their investments.

It is useful to look at this situation in the 1979-80 period. Perhaps it is also useful to remember who came at the end of the USA's worst energy crisis in 1981: Ronald Reagan. The previous president, Jimmy Carter, was in trouble with the Iran hostage crisis. But even though Carter prioritized alternative energy systems and he has been innovative enough to put solar panels (water heating) on the roof of the White House and to invest in synthetic fuels, but the election result was anti-regulation Ronald Reagan, who said “let's look for more oil”.

In the recent period, we are talking more about optimization but doing less. The most obvious reason for this is people's preference and action separation. Whether we accept it

or not, it is like a universal law. This distinction between action and discourse is the difference between what people say and what they do. Everyone complains about paying taxes, but no one makes taxes the subject of a referendum. Everyone is an environmentalist, but consumption of red meat, energy, goods and services continues at full speed.

It has been discussed for a long time that the end of oil has come to an end in the last 2008 crisis. Again, it was always on the agenda that this world would not be enough and the resources would run out. One of the most distinctive features of this was the increase in documentaries and groups "preparing for the apocalypse".

According to BP Energy statistics, world energy consumption is 13% higher in 2020 compared to 2008. The climb of oil, natural gas and coal accelerated. The era when the search for a sustainable world was at its peak, also marked the beginning of a new fossil era.

But not everything is so sinful and hypocritical. PURPA law in the USA in the 1970s also became a kind of ancestor of renewable purchase guarantees. Years later, PURPA was also cited in renewable energy support mechanisms in Germany. The way for people to produce their own energies has been opened. This also led to the rise of cogeneration, that is, simultaneous heat-electricity generation technologies and natural gas. In the 2008 crisis, electric car companies such as Tesla also marked the beginning of periods such as automation and scaling in solar panel production.

In short, while the crisis had the opposite effect of what was expected in the near term, it also brought some of the expected effect in the medium-long term.

We should not be surprised if we see more fossil fuel consumption in the exit from this crisis. For this reason, it is necessary to read the energy crises by data.

I wonder if people are more inclined to form common wisdom or madness when they come together? If we look at the past examples here; In times of crisis, human societies lose their way, they cannot find the truth or the the most obvious path, what needs to be done. Both politicians and the public are actually deepening the crisis, just as US President Carter's treatment of synthetic fuels. People were seeing their states as the culprit in the 1973-74 crisis stemming from the Middle East. That destabilize the system even more. Because due to urgency, everyone wants results as soon as possible and there is no time. Maybe it would be right to examine the political transformation in the USA and Italy with the vote preferences of the people after the 2008 financial crisis.

This energy crisis will be no different. In general, resolving crises in the shortest way, fixing prices or supporting the consumer has not increased the approval rate in any of the countries I have studied. Because people see support as a right, hence, their effect is zero. But since the crisis continues in one way or another, the "state" is always responsible. One of the interesting examples of this is now given by England. 21 companies in the UK went bankrupt, but the UK did not provide additional consumer support despite high prices. Although the Macron administration sent inflation checks in France, the rate of those who did not approve the policies is 57% and this rate has been at the same level for the last year. Of course, Covid policies and economy are much more effective in these surveys. However,

it can be claimed that energy supplements did not have a significant effect.This is a very interesting dilemma. While the public complains at the price level, they punish the politician even if they get support. Because whatever the politician does, he is the chief responsible for this crisis. In other words, whatever the current governments do in this energy crisis, their job is difficult. In the European financial crisis, as in the case of Italy, it would not be surprising for the large masses' preference stated in "it would be better if a comedian came".

Why? Crises take us all out of our comfort zone. Energy crises are also dragging us into an area we do not know. Since we do not study the past in detail, we do not hesitate to make the same mistakes over and over again. For this reason, crises are generally prolonged. While the volume of complaints from crises increase, none of us actually know what to do. Just as the world was dragged into an energy crisis from 2005 to 2008, we are still going to that conclusion even though we are merely complaining.

In fact, we have energy efficiency as a very clear tool. But it's more tempting to criticize the inefficiencies of others than to make ourselves productive. Maybe we feel like we did the right thing when we criticize, so we don't need to actually do it. As we have seen in the past global examples, almost no consumer in the world takes action without feeling the crisis. In the USA, people change their vehicle preferences after waiting in long lines in gas lines, and the regulation also has an effect here. In the last Texas energy crisis, it can be said that although consumers were in crisis and knew the prices, they still could not prevent $5000/week bills. But after that, an awareness began. According to some studies, their effects may not last in the long-term. After the 2008 energy crisis, we really saw efficiency in many electric consumption vehicles. Unfortunately, none of them was due to the interest of the consumer, but it was an efficiency enforced by the regulations. This time, we should not expect it to be different.

So, does the world really drift from one end to the other like it did in the 1970s, 80s, and 2008s? It will most likely bounce again. In 1972, "Limits to Growth" study about the discussion that the resources will not be enough, comes back as "degrowth" today. The limitation of fossil resources in the 1980s is always on the agenda. We cannot claim that we have gone too far from the discussions of the 2008s. Even the production of fuel from non-food-cellulosic products promised at that time is not discussed at all. Ethanol production from corn in the USA during the drought period increased from 3.71 billion bushels (8 gallons = 36.4 liters) in 2008 to 5 billion bushels in 2020 .

But this energy crisis will trigger innovation even more. It's unlikely that this innovation - if we look at past patterns - will come from the sun or from electric car batteries. The innovation here has perhaps reached its limits (also with solid-state batteries), and it may need 10-odd years to take the next step. Hydrogen and fusion is on the agenda in every period. There is little chance that new innovation can come from here. But innovation can be expected on the gas, nuclear side. Further digitalization can also be expected in the way we generate and use energy. Another interesting point is that data and human behaviours will become more prominent, and the importance of behavioral approaches in energy policies will be more linked with digitalization. While the acceleration of innovation in materials and production, with artificial intelligence is inevitable, its effects are even more uncertain.

The future will of course be different, every crisis is different. The results and effects will be different. But only by making records to ourselves and to each other we can better understand and analyse crises and learn from each other and from our past reflections. Whether we like it or not, unfortunately, we learn best from our mistakes. We should not be afraid of it.

Decarbonization Shock? Not Yet

Jan 10, 2020

Make no mistakes, climate change is real, and energy transition is happening. But also, there are backlashes to the energy transition. We have seen it before in nuclear. Nuclear energy is again hailed as the climate change-friendly baseload. Every 10 or 15 years or so, we keep talking about a new nuclear age. Alas, we found ourselves in the midst of another nuclear accident. When you look at the age of the nuclear fleet worldwide, technical problems have a higher chance of happening.

The “decarbonization shock,” mentioned by a fund manager in an Financial Times article, is an interesting term. But this is not the decarbonization shock for sure. But as the article goes, it may cause as much pain as in the 1970s. But from what we see so far, 2022 has a higher chance of becoming a mixture of 2008 (high energy prices) and 2011(high food prices). The only way out is the demand destruction, just like all other crises. “Energy crisis only end when demand drops.”

This is not a decarbonization crisis or shock. The decarbonization decisions have not contributed a lot to the deficiency in oil, gas, and coal investments. The only exception is China, where urgent coal reduction targets may have skewed the other commodities and prices. A decarbonization shock will be coming in the following decade.

The major problem about the whole net-zero policy is the naivety for believing that the deficiency created by coal plant closures will be filled by the magical green finger of solar and wind. This is a typical policy failure and will haunt global prices. The required way to do it was to take pledges from countries for firm renewable/solar capacities. A firm solar capacity is a capacity required for substituting the equivalent annual energy production of a closed or to be phase-out fossil plant. That is to say, 1000 MW solar is roughly 250 MW of coal capacity equivalent. We need a metric for that. I am not someone to offer that one, but my humble suggestion is MWbe - MegaWatt baseload equivalent.

Why does “decarbonization shock” make sense? Because we are looking for someone to blame. This year it will most likely be an environmental movement. This is wrong. Their effect has not been fully materialized yet. This shock is about high economic growth, drought, and geopolitical games. Sure, environmental motives have a part, just like anyone.

What is to be done by then? We are just sleepwalking into an energy crisis. Practically there is not too much to be done. The consumer expenditures will drop than the overall demand, and prices will stabilize for some time. The most dangerous thing to do in such a crisis is to increase demand. There are some instruments like block rate tariffs or increasing the

payment period for the bills. But none of them will cheer up the consumer. We have to be honest that there is nothing in sight to increase the morale of consumers.

But what will the decarbonization shock look like? For a proper decarbonization shock, the investment environment should be permanently destroyed. Such as, Saudi Arabia stopped investing in oil and gas wells and reduced employment. The oil majors start proper electricity companies. The employment in the fossil industry must be wiped out. At least for 2 or 3 years, no investments should be made upstream. The current crisis for oil and gas prices is partly a result of low oil and gas prices. The current level will stimulate more fossil investments.

So what shall we call this situation? If you enjoy these attentive terms, maybe a “simulated decarbonization shock” is a better term. The biggest problem is, we are not addressing consumption but production. You can not starve society for energy. Therefore, either these pledges should be renewed with “firm renewable investments,” or fossil fuels will make an even bigger comeback. The tragedy of 2022 has not started because the bills have not arrived at homes around the world. If demand drops quickly, we may see some relief by February. But it is only wishful thinking for now.

2022 Will Be A Confusing Year for Energy

Jan 24, 2022

Even birds need to land somewhere, sometimes. Therefore we can not expect energy prices to go forever higher. But which energy prices and when? These are the fundamental questions we have no idea about. But Eurasian geopolitical risks are higher, and Covid is getting normalized. That is to say, no end to the pandemic is in sight, but it may normalize like flu.

Starting from geopolitical risks, the reserves of the Russian Central Bank are at their highest level. If history is a testament, Russian geopolitical moves coincide with Central Bank reserves peaking. The European gas flows are close to the lowest and the European stock levels. The numbers show preparation for a prolonged geopolitical turmoil.
Will covid be a new kind of flu? This is the question we will find some answers this year. Interestingly, from zero-covid policies to lockdowns, after trying all the strict measures, we end up this way. Pfizer claims that this will be like flu recurring every year (some claims every six months). If, for example, it peaks every six months, the jet fuel demand may struggle.

But we have to understand that we are in a transition period for new stability if it exists. In the post-covid world, stability has not formed yet. Therefore both economy and energy have diverse speeds for different times and geographies. For example, in China, New Year is on the 1st of February, then there will be Beijing Olympics. Coal-burning will be most likely restricted for that period, and gas demand may climb. Before the new year, the oil will increase, and during the new year, it will be mulled. After the winter Olympics, expect China to increase fossil fuel consumption.

COP27 will be in Egypt. And there is a COP calendar. From June to November, the world will see increasing amounts of Africa and global warming news. This year more emphasis will be on Africa. But if Africa is strained with high energy prices, the priorities may get warped. Most of the countries are trying to subsidize energy prices. However, the bigger danger lies with the fertilizer and food prices. Food prices are key to stability, and energy prices are another factor. If the high prices continue, low-income countries may struggle to subsidize both food and energy prices. This will create major risks for mid to low-level oil, gas, minerals(like copper) producer countries.

The biggest problem was the instability created by the covid shock. The prices dropped to unprecedented levels. Remember negative oil prices. Consumer enjoyed it, but nearly in a year, we are from one end of the price spectrum to the other. These are really confusing times. Consumer strongly reflects endowment effect. That is to say, discounts have nearly zero effect on morale, but price hikes are extremely painful. Now think about sub 5000$ per capita per country citizens.

New reform packages not addressing the energy crisis, will create tensions for sure on the EU level. When the prices are sky-high, everyone gets criticized. The blame game always ends at the top. This creates new divisions and urges to react. We should remember how and why the Energy Union idea has been first published in an FT article.

In temporal analysis, there is a standard trend of oil prices as well as gas prices. Oil prices start increasing after Christmas and increase slowly until May. Then starts the July-October period, where oil prices are more positive than negative. November and December is most likely months for oil price declines due to naturally lowering oil demand.

In the gas case, the high levels are mostly seen in winter and summer. Depending on cold or hot weather patterns, the prices can make surprises in October or April. But the term structure is quite known. However, if Europe starts the spring with very low stock levels, this term structure will be distorted. Adding to all this, the Tonga volcano eruption may drop the global temperatures in the coming two months. This will be another effect on the short-term demand and prices.
But let me come to the opening sentence of this article. Even the birds need to land; therefore, energy prices can not go higher forever. The consumer is feeling the pinch. Industrial productions are slowing down. Therefore we may call 2022 an indecisive year with extreme events. The prices will not find stability anytime soon. But fossil fuel investments are earning such profits that the world may be siphoned into another fossil era with lots of solar investments. 2022 will be confusing.

Possibility of a Prolonged Energy Crisis

Jan 31, 2022

Every crisis is different. But practically, all public responses to crisis are the same. Whether a global war or demand/supply shock doesn’t matter for the public. They receive the bill from the local company. That is why it is easy to weaponize energy internationally. At the end of

the day, the crisis actors can be invisible from the local perspective, and all blame is shifted to local actors. It always happens this way will be that way.

But now, there is an interesting political context hard to ignore. West can be simultaneously tested by Russia in Ukraine and China in the Pacific. Meanwhile, Europeans are saving the planet because from their angle, and it is not the West being tested. Some rather see it as a test of the strength of Pax Anglo-Saxon. This explains part of the inertia on the European side.

But there are dimensions to how this crisis may evolve. The first parameter is the duration. From an energy point of view, winter and summer energy prices are more problematic. During the spring and autumn, demand is lower. Therefore, we see price peaks in winter or summer. This is also the most vulnerable period for consumers. The car sales in the western world are more SUVs-bigger vehicles. They may be much more efficient, but they are heavier. The car stock is a product of post-2015 low prices: 50-70$/barrel. Short spikes are not a concern. Sustaining high prices is an invitation for consumer discomfort. And consumer reflects this discontent to the closest authority: Local politicians. US mid-term elections are in November 2022.

The second parameter is the depth of a crisis. Western historical leaders are well studied in the eastern part of the world. It is tragic sometimes these words are referenced more by the rest of the world than their originating countries. One such saying is Churchill's "Never let a good crisis go to waste." We generally assume positively that a crisis is a chance for progress. What if it is otherwise? Like, use a crisis to start and deepen another crisis. But why? Because these things happen very rarely and if you have the information on the future of it then you can play with it with some bruises to yourself too.

Only Russia knows whether it can increase oil production after May, when demand will kick in. China has made huge stocks of various commodities. Also, China has tested domestic market measures on price limitations since last winter. Russian foreign currency reserves are at their highest level. On the other hand, OECD and US stocks are the lowest of the last five years. Numbers show that one side is prepared, the other is completely empty-handed. We have to be careful about how we end up like this. Saudi Arabia and OPEC+ specifically targeted oil stocks in the OECD because they believed this is a major determinant of price.

There is also another story called food prices. Fertilizer prices are even denting western farmers. A drop in agriculture production will impact everyone. So production and producers will have the final say. Is this again lead us to a semi-global recession with high prices?

The third parameter is how the actors will behave. But this may not be the right question. Because there are central actors like the US, EU, Russia, and China, and there are peripheral actors like North Korea Iran. The peripheral actors may also want a victory for themselves in this war with cyber capabilities targeting infrastructure because every virtual/physical victory is a positive moral for their own domestic public and military.

The weaponization of energy is a perfect crime. Global actor shutdowns the tap, but the local public blame local politicians and punish them. Then these local punishments create

more local volatilities. But these local resentments are silenced by some other victories, whether invented or deep-frozen before. Energy is a dangerous game in times of short-sightedness and the age of disinformation wars. Luckily we are not in one of them.

Bunch of Thumb Rules for Energy Crisis

Feb 7, 2022

Energy crises are very rare events. When Bilkent University first approached me for a course on energy, I said straight-ahead, "Energy Crises." We start from 19th century England and see how different crises transform the modern world during that course.

Why are crises important? They focus public interest on a particular subject and educate them. These forces, sometimes, lead an informed public discussion about what to do. Then the next 10-20 years are shaped by that crisis. Therefore, they are the key critical points at the energy transformations.

What makes a crisis? For finding an answer, we start from the biggest crises. In the pre-20th century period, timber crises are important. In the 20th century, the oil crises of 73-74 and 79-80 were monumental. Then there are crises like Ukraine-Russia spats. When you say “unexpected”, some may claim they are anticipated. But since they are rare, most of the time, we forget them. They are outliers, not the norm. Unfortunately, they happen.

The main underlying reason is my “operating point stickiness theory”. The energy system is huge and capital intensive. Generally, this system tries to converge to the most efficient and manageable operating point. This becomes modus operandi, and the workforce is educated this way. Strategy reports demand forecasts are all based on the usual mode of operation with a few alternative scenarios. The crises generally exceed alternative scenarios.

But when an event occurs, the workforce or the mental structure designed and worked efficiently for 20 years first thinks that it is a transitionary glitch. Then as the picture becomes clearer, everyone tries to do something. Just like everything in life, the remedy comes after some trial and error. It is probably the same across the globe.

Therefore, I will very briefly explain part of what I learned so far in those crises?

1. Crisis is a cascaded event, no silver bullets for its solution: A big crisis exceeding anyone's alternative scenarios is most probably a cascade event. That is to say, and it happened because so many things went wrong. So the solution is never a one-sentence answer. Most of the time, the real answer lies in the very minute technical details.

2. Prioritize: You can not save everything in an energy crisis. In the previous oil crisis, the western world tried to save everything but was lost in political turmoil and financial stagnations. Prioritization is a key question in every crisis. What is our first three priority? Everyone will be unhappy in an energy price crisis, but only energy-poor defined by the share of energy expenditures in household income should be saved temporarily.

3. Use maths and measure whatever possible: What has happened forces people to come up with verifiable numbers. There is a very good book on the "Expectation Effect." People

and experts may fall into the "expectation effect." "We told you so" guys are most probably wrong since they just keep saying the same narratives, whatever the crisis is. Numbers guys are critical to understanding crisis.

4. Communication is the key: If the current situation has exceeded the alternative scenario, never be optimistic. Start communicating with numbers and (without request) in regular intervals like every hour, day. The public is focused on the event, trying to build a mental model of the event. Help them by telling the scale of events.

5. Always watch weather: Generally, there should be a trigger point if there are cascade risks. In the energy sector, it is most probably weather events. Weather is the core business of security of supply. Even reserving some staff for weather events and high resolution (minute) weather station data is critical for understanding problems.

6. Learn, document, and teach: I tried to interview people with first-hand knowledge from the previous crisis in my podcasts and my writings. I checked the reports. In my Sabancı University lectures, the students read a report on a case study of an electricity crisis, find key points, and draw maps. Because history is a starting point for what needs to be done. Inventing the wheel again may cost you very precious time.

7. Public pressure is a negative factor: In the previous global crises, public pressure misguided most efforts and let the politicians lose time. You should be attentive to the complaints and be responsive. But, in an emergency landing of a plane, you trust the technical guy called the pilot, not the passenger, even if he sits at the business class or has a loud voice. Otherwise, the trouble deepens. There are various examples of public pressure interrupting the technical scenario and messing up everything—for example, Jimmy Carter's synthetic fuel policy and early 20th century timber crisis when planting more trees was deemed the right answer.

There are others, too. But the modern world is constructed on the generations and generations of accumulated knowledge. Everyone should contribute according to his experiences. That is my part for others to verify, invalidate or improve.

The Dark Side of the Energy Crisis

Feb 21, 2022

During big events, like a crisis, experts and their narratives are amplified to educate the public. Then an informed discussion starts and results in good policies. This is the theory. Reality can not be more different. This is the dark side of the energy crisis.

Generally, an energy crisis creates a very polarized political discussion. Nixon's price controls didn't end up in favour of the free market for the 73-74 crisis. The interventions due to public pressure created a much worse environment until the 79-80 crisis. During that time, environmental movements called for ending the growth, material growth, and population growth. The presidents mostly paved the way for these ideas in a controlled manner. But election winners were not the ones listening to the popular voices, but they were neoliberals.

This is fascinating since the politicians have tried to do whatever the public(or the dominant voices in public), press, and opposition asked them to do. On the other hand, their visions stemmed from the informed-scientific discussions that most electors have not bought. Electors reveal a more realistic side of the polls.

One very important parameter is the loss of purchasing power for all consumers. Inflation is taxation in a hidden way. In the 70s, traders earned a lot, so did the companies. The environmental push then and net-zero push now has helped fossil guys earn "embarrassingly high" profits, in Tellurian Chief Charif Souki’s words. In the 70s, we see the rise of trading houses and Marc Rich. They earned excessive profits and financed an interesting third-world vision.

Mining companies are no different. Due to ESG limitations, mining became ever more profitable. Since there are not too many spots, you can dig for particular materials. If some of them are limited due to host countries' ESG concerns, the rest will be more profitable. This week we will see the mining companies in far-flung parts of the world posting record profits.

So what is happening? The theory is written in good faith. But the loss of purchasing power due to energy and material inflation and foods creates more short-sighted political discussion than informed discussion. Energy and mining are complex subjects. Journalists can not get the big picture easily, so they switch to political narratives with cherry-picked numbers. This is why during the timber famine, instead of switching to new materials public pressed rail companies for more tree planting. And it didn’t work.

The other issue is about how sudden and deep, policies change. The loss of purchasing power increases the labour movements. They have a point, and they are right. The lowest income level is the worst affected group. They rise with concern. But just like the green-statist agenda strengthened the neoliberal-fossil agenda, the rise of workers increases the anti-unionist policies. Such an example is Thatcher's dealing with coal workers.

This time there is a twist. Employers' have automation and artificial intelligence at their disposal. This may be extended with drones or automated driving. The workers' strikes may increase the innovation speed. According to Daron Acemoglu, automation has replaced lots of jobs already. Why not more?

The worst thing to happen to an energy transition is a messy transition, just like Jason Bordoff from Columbia SIPA mentions in an interview. You can lose public support. Automation is another one. The unhealthiest is the pseudo-informed discussion leading to many inferior equilibria. In the past, not the wisdom but the madness of the crowds headed the energy discussion. But this generation is different.

The Steps for a Realistic Green Transformation

Mar 2, 2022

It is never easy. The transformation of something is not just another target to achieve. But it is a terra incognita. The approach is very important. If you assume this new voyage as a pilgrimage to holy lands, well, that isn’t easy either. The expectations will shape the speed of transformation.

The grave mistake is to create an atmosphere of optimism for the green transition. This will echo in the consumers' minds as "a better world" where energy will be cheaper, more abundant, and cleaner. This may not be the intention of the dominant forces, but they are not correcting this skewed expectation. The gratitude of the masses is more important now. But it may backfire.

The biggest hurdle in the green transformation is the growing environmental movement. They have good intentions. But the environmental movement's decisive aim is to leave nature as it is or better than today. Energy is allocating some resources for human development, which may be used for other natural elements. Practically, any energy change in any place is a disturbance for this place, even for solar energy.

Historically, the strengthening of environmental movements has been tamed by price hikes. The high price of energy, shifts the consumer back to realism. Since consumers' original expectation is to have abundant, cheaper, cleaner energy, expensive energy is a big disappointment. It also tames generations in two ways: by teaching conservation and the dangers of dreaming.

The current green shift in energy is due to solar. Germany and China have created and scaled already existing technologies. The same didn't happen with the wind yet. In storage technology, we should wait for solid-state batteries. But practically, we do not have the technologies to have a full-scale transformation economically. We have to be careful. My pillars for the transformation's initial steps are not unprecedented. But here they are:

The first pillar is to reduce the red tape for wind and solar. Governments should put two targets for cutting red tape. The maximum time for solar permissions should be six months.

It should be 18 months for wind. It has to be from a central, specialized dispute resolution mechanism to be solved. Otherwise, no one wants a kindergarten in its backyard. Should we respect this? If I was a fatalist, my answer might be different.

The second pillar is to overbuild these resources. The third one is electromobility. The fourth one is nuclear or other net-zero baseload technologies. Closing coal plants will not work since it will create moral hazards because governments have to pay these plants for closing. It is like paying people to stop dumping waste into the sea. You have to let coal generation be uneconomic. To achieve this, you have plenty of low-cost renewables. This will be less costly.

The other issue is grid strengthening measures. Electrification of the system is not easy. But maybe cheaper than hydrogen networks. This will certainly increase the grid-related costs in consumer bills. The problem is the structure in which the grid institutions are managed. They have the be top-notch drivers of this transformation. State-owned grids are failing. We need new, open-minded, innovative grid institutions.

But the fundamental pillar is telling the truth to the consumer. People do not forget bad memories. If this becomes the first net-zero crisis of the modern world, there may not be a second one. China is probably increasing coal plants in India and the rest of Asia. But they keep publicizing their green targets far away.

There is a new wave of green wailing: put the green targets on the table build more fossil plants under the table. This is pretty easy because most green transformation news is publicized by desk-based research with Google and Excel. So they cut the relation between the internet and the reality on the field.

Friend or foe, everyone is an expectation engineer now; telling the truth has never been harder. But consumers had to know. It is the end of cheap energy for years to come.

Think-Free Approach to Energy Issues

Mar 8, 2022

The term expertise has evolved with the data revolution. There may be experts of 30-50 years of experience. But these experiences are useless without updated data. Whether it is markets, statistics, operation procedures, it doesn’t matter. The only expertise is in the ever updated data. And in the case of energy problems, data is the fabric of reality.

In the past, the expert was someone who had immersed herself in all the details of a specific subject. They were like the walking google engine for these particular subjects. But today, all these data are available even in open sources. Satellite images are far beyond the reach of past experts, and data chunks are more cumbersome than any human brain to deal with. Today the expert is the one who can update, filter, and prioritize.

In these situations, onion is an excellent metaphor to start with. The layers of an onion are one of the ways you built these analyses. So what should be at the core of this analysis? It is either data or direct information. No comments or “assumptions” should be made. This is the think-free approach. You just pick the “real information” and create the core.

One of the challenges of our time is the widely and wildly disseminated comments. Probably for every one sentence of accurate information, we have 100 pages of comments. Some of these comments are extremely attractive. But lies are attractive, too. The reality is generally dull, boring, and colorless. Lies, on the other hand, are seducing, believable and colourful.

In the latest energy crisis, there are zillions of comments about the price rises, the recent hikes, and why this is happening? Most of these comments have few data points and layers of assumptions. We are so addicted to our thinking and ability to solve events like Sherlock Holmes we approach it like Tetris. However, the first rule of all good analysis starts with “question the assumptions.” The most critical assumption is that “price stability is the norm and volatility is an exception.”

In most of the analysis, we are captivated by the interesting connections revealed by the commentator. But what do these interesting comments mean? Like TED talks, they are captivating but have no use, or they may distort the truth. The relevant questions are not there. They hide in boring places, like the price level that can crash consumer demand.

Therefore, the most dangerous thing in the energy business is to attribute a lot of value to your expertise, your tastes for analysts, connections, and knowledge. So, start with first hand knowledge of the event. I spent a lot of time reaching these sources, whether from open sources, satellite images, or data files. This is the kernel of your onion: the solid, comment-free, assumption less, reality mirroring information.

Around the core, build everything with first hand sources numbers until you complete each layer of your analysis. The last part is humility. For initial model is not the correct model. But you may spot the areas of possible mistakes and deviations. The correct analysis informs about the failures of its analysis.

We should not let our great ideas, thoughts, and IQs derail the flux of reality. History is important and is a great toolbox. But every day is a new challenge. Start with a think-free analysis because you will need your thinking for inventing solutions.

Why do Green Transitions Keep Failing?

Mar 15, 2022

My short answer is that because of materials and engineers. Now I will tell you a long story. It is not the first time the green revolution has failed. So, it is not actually a big deal. Just like the failure of Steve Jobs in "Next" staged the next Mac revolution, failure is an integral part of success and development. You only need to understand why it happens.

The first problem is to understand how this green transition is designed. If we look at the oil transition, it started with engineers. They analysed, invented, and designed systems. In gas and LNG, it is the same bottom-up process instead of a top-down one. As far as I know, only one transition happened top-down: France's Messmer Plan for nuclear. In that case, the engineering capacity was there, and the plan created the scale of the project. However, it still took lots of debt and years to switch one resource.

The current "mega transition" is mostly designed by economists, politicians, lawyers. They decided that all four energy resources (oil, coal, gas, and nuclear) should be out of the picture. On the other hand, some of these people were also associated with certain NGOs (Non-Governmental Organizations). These NGOs' incomes were mostly sourced from environmental or climate projects. Hence, a conflict of interest occurred when pushing more for these policies led to increasing rent and income. This eventually caused new policies that lacked public support. In some cases, the public was the only one who did not need to change, transform, and suffer from the adverse effects of transition.

If people need more evidence to be convinced, one can calculate a high enough pollution price that justifies everything for the short, medium, and long term. But at the end of the day, these policies affect people's lives, and their implementations are feedbacked by the harm or benefit of the people's experience. A politician can warn people about the urgent danger, but the near-term benefits outweigh the long-term harms.

The other problem is the paradox of material requirements. You need to have more copper, aluminum, steel, glass, cement for the same amount of TWh/year generation. To meet the demand, you must mine at least some of them. All these operations require huge amounts of energy, whether green or not. In the end, you either choose to consume this energy to produce more materials for renewable systems or not.

The current transition aimed to close all oil, gas, coal production in 30 years by replacing them with more solar and wind. Empirically, renewable investments surge during low oil and gas prices. Since it is cheaper to produce materials and economic activity is generally higher during low energy price periods. It is counterintuitive, but renewable transition speeds up during low energy prices. Thus, closing all fossil investments also increases renewable system costs.

Demand is another big issue. The energy density we consume is huge. A litre of diesel is 10 kWh of energy. You can carry it store it; in the worst-case scenario, you can burn it. However, renewable energy is intermittent. Fossil fuels are like a pond, and renewables are

like water harvesting devices from ambient humid air. Still, we need the reservoirs for our water needs. Water harvesting cannot feed our thirst for water. Still, it is very useful.

Another problem is fatalism. Yes, there is urgency but constantly alarming everyone will lower their risk threshold. It is basic PR. You do not need to read any doomsday news nowadays. The plot is simple, we are all doomed and will die, but our experience shows that you need to make people focus on a few things instead of the whole issue in times of urgency. One step at a time is the best way for stable progress. So, we should also increase renewables as much as possible.

Frankly, we do not have enough economic, mature technology options other than solar and wind due to huge energy systems from cars to factories, electric systems to refineries, gas, electric grid systems. Up to now, oil supply chains are the most complicated machines humans have ever created. The technology of renewable energy systems requires innovation. This takes roughly 20 years, from labs to markets when planned seriously. Talking the talk is cheap but walking the walk needs a lot of effort. R&D budget commitments should surpass other R&D budgets if we perceive the transition as urgent.

We should go back to the drawing board to do all these transitions. We should try to chew one piece at a time. This stability will foster more confidence and create a snowball effect. Ambition is a poison; soberness is the way forward. Yet we should remember that this is a transition to be achieved by engineers. From designs to digital systems, materials to mining, power systems to hydrogen, energy efficiency to nuclear, you either have it or not. As always, their transformation will determine the speed of transition.

The Possibility of an Early Demand Destruction

Apr 13, 2022

We have no tools other than past experiences when trying to survive an energy crisis. There are nuances between crises, but the elements are consumers, prices, and geopolitics at the most basic level. Every time, there are differences from the previous crises, this time is no exception. In this crisis, the most important difference is the availability of data. From Google and Apple, we have aggregated mobility data. These data reveal to us the underlying dynamics of oil usage. So far in the US, we have seen two different data. One of them is the Vehicle Miles Travelled, and the other is gas consumption numbers from Gasbuddy-like platforms.

In VMT, we see a strong base for transportation due to trucks, but other vehicles' have been less utilized. The demand for travel looks a lot weaker. Contrasting to this data with Gasbuddy data, shows an increase in demand.

In very simple terms, are people consuming more gasoline but traveling less? There are contrasting data on this level. US's EPA report on "Automotive Trends" claims real-world emissions and fuel economy have improved for years. Since 2005 the improvements are obvious. But the devil is in the details. The first one is classification. In the US, 4000 pounds

(1800 kg) is the limit to differentiate between car SUVs and truck SUVs. There is a linear relation between CO2 emissions and car weight. The engines are much more efficient. All vehicles are at least 79% more power-packed. Horsepower and emissions are also correlated despite having a lower correlation coefficient than in the 1970s. 0-100km has also dropped 50% since 1978, and we have 50% faster accelerating cars.

So cars are much more efficient, faster, heavier, and clean. But these are machines. We must look at driving habits too. Unfortunately, we do not have widely available reliable data on this. Why does all this matter about our assumptions about demand destruction?

If all the data is correct and real-life proven, the consumer demand for oil should not lose steam until 200$/barrel. The June 2008 price for oil was 147$/barrel(193$/barrel of 2022). But that price record was reached in a much slower way such that consumer has adjusted their consumption gradually. The recent one is much faster. The consumer may panic and act faster.

My theory is baseless. But covid has attached more drivers to their cars. But also the driving habits of drivers are not that efficient. The engine may be efficient, but users are not. They have the most powerful cars of their generation. What is this power for? Just to drive more efficiently.

So, the consumption increased, but travel miles have dropped. We may be much more inefficient than in 2008. Therefore, the gasoline expenditures in the budget may be higher despite lower travel numbers. We may be in a worse situation than in 2008, but this brings hope. The oil demand destruction may happen at much lower prices. We will see.

Energy Crisis: What is Different this Time?

Apr 18, 2022

We may safely claim that we are already inside one of the major energy crises of our generation. Before it loomed over us, the resemblance was the 1970s. Now, however, there are minute but fundamental differences.

The 1970s were the product of producing or oil-exporting countries' policies based on geopolitics. 2008 price peaks were due to China's demand growth. Now there are two parts to the recent events. One is the already continuing commodity market tightening, and the other is the additional effect of a war.

This is easy to understand. But there are other forces. Starting before the Gamestop-Robin Hood events and the rise of options trading, the world has known the Financial Weapons of Mass Destruction. The 2008 crisis was claimed to result from excessive speculation on the financial side. This one is an upgrade to 2008 dynamics.

So the leverage in the markets can be higher than before. But this leverage needs fundamentals to become a destructive machine. For the recent crisis, the major fundamental is the “volatility trap,” as Jeff Currie from Goldman Sachs has labeled it.

The volatility trap is the impossibility of investment in a volatile environment, feeding into more investment deficits and volatility. He offers to use carbon prices than the failed ESG rules. You can print money overnight, but you cannot print oil, gas, copper, or aluminium either.

The current energy transformation brings a big change in the minerals used. Instead of oil, gas, and coal, we are talking more about copper, aluminium, lithium, and other clean tech minerals. Technology is fundamentally different, but the reliance of this technology on minerals is more than ever. This transformation is a big CAPEX (capital expenditure) transformation. Like a bridge, we are traveling from one CAPEX-hungry realm to another. The balance will be difficult.

A geopolitical premium of the whole event had not been realized yet. The food and fertilizer price problems are more fundamental than the energy dynamics. Previously we have seen underdeveloped governments limiting fertilizer imports for the trade deficit, resulting in ever-higher food prices. Food prices are the root cause of all evil instabilities. So this process will be ongoing until 2023 and probably 2024.

What is to happen next? No one knows, probably will never know until we live the day. But every generation has its own problems, tests, crises, mistakes, failings, innovations, and victories. This is the norm of civilizations. The early signs are not optimistic for the next six months. Afterward, the resilience of the world will be the judge. Absent an economic recession, and investments may not realize in 1 or 2 years. This means the volatility trap may last longer than the 2022 crisis. The only way out is more investment in minerals. Financial markets should be ready to reorient their goals to save the world from a different perspective.

Energy Markets: The Tortoise and The Hare

May 9, 2022

If demand is a hare, supply is a tortoise. Of course, energy market narratives cannot be compared to Aesop's stories, but sometimes analogies may help summarize the situation. This time, it is no different. The speed of demand and supply in the energy sector is quite different, and the race between the two looks still inconclusive. But I bet on the tortoise.

In 2008, April Brent price was 109$/barrel, in May, it was 122$/barrel, and in June, it was 132$/barrel. Then in July 2008, it hit 147$/barrel. This was the highest we have seen in nominal terms. In the December of the same year, oil prices have seen 39$/barrel on average. The whole narrative was about China's growth despite the start of a financial crisis. Will this year be a replica of 2008? I do fear that.

However, there are also long-term trends we must be careful about. First of all, a looming electricity crisis may be expected in developing countries. US, France, and other major markets may also face electricity problems. Last year it was drought; this year, it is a mixture of problems such as supply chain issues, nuclear discussions, sanctions, you name it, there is a headline for each of them.

Furthermore, Indian power problems are quite interesting. Everyone was aware of the problem that distribution companies cannot pay in full to generation companies. Indian power system highly subsidizes farmers and individuals against industrial consumers. There is a 5-fold difference between the prices. The critical problem this time is logistics. The coal stocks at the coal plants are the lowest on record. Rail freight is not catching up with the demand, and the heatwave is certainly possible. Yet, railroad issues are the only parameter you can control.

It is amazing that in dreaming of non-fossil fuel world, we end up with so many problems. If it is not mining or supply, it is logistics. If it is not logistics, it is price. So, the wheel of fortune/problems keeps rotating. OPEC+ cannot stick to its promise of increased oil production. Maybe the vantage point should be different.

In climate change, the supply side is fully aware of the problem, and the demand side is completely ignoring the issue in action. In terms of tweets and narratives, demand passes the blame to supply and carries on with an enhanced status quo. More air travel, more A/C units, more meat consumption… Despite high oil prices, oil demand in developing countries is not cooling down.

Supply, however, is like a tortoise. I am neither an ethologist nor an animal psychologist, but the tortoise thinks a lot, moves slowly and can freak out easily. On the other hand, Hare may stop and run suddenly and can also freak out easily but does not disappear. It merely changes the direction. If a tortoise is a philosopher, a hare is the master of earth that doesn't like too much thinking. This is not a race between the two. Yet supply is coming too slowly, and demand is unaware of the problems in detail and keeps running. This reminds us of the tale of Aesop. Shifting the blame is not a solution; it hits you back. It is hitting back now. The supply problems will start to hit demand until it slows down. The hare can run as fast as it can, but the tortoise is destined to be ahead of the hare.

How “Resource to Technology Shift” Change Energy Geopolitics?

Jun 6, 2022

In the energy system, there are two major trends. The first one is more renewables, and the second one is more electric. Whether nuclear will create another trend needs more time. But from a very macro point of view, we are shifting from burning underground resources to materializing these resources.

Fossil fuels are concentrated sunlight. It provides an essential service that other resources lack: control. The natural resources are evidently not quite controllable. We are more in the realm of "predicting" them. This prediction and prediction horizon provides us the time span to manage control strategies.

The burning of fossil fuels is a big contributor to global warming. If we are to transition from fossil fuels to renewables, our need for mining will surely increase. Instead of burning them, we will be molding the natural resources into 3D objects like panels, turbines, and overhead lines. The hydrocarbon age is transitioning to the age of metal. But the requirement for metals may be huge. There are enough resources around the world. But their location is fixed. That means some countries will be more advantaged compared to others.

There is also another perspective for it. In the Standard Oil and Rockefeller story, there is an interesting point about the supply chain strategies. Rockefeller didn't bother with oil drilling in the beginning. He controlled the midstream. This control gave him enormous leverage over the drillers and the markets. Today China is using the same strategy as Standard Oil.

The world is shifting from an efficient economy to a resilient economy. Resilience is not cheap. Efficiency was fine with flooding the world PV markets with Chinese PVs. On the other hand, resilience requires diversification, idle capacities, storage, and other "not very efficient" tools. Someone has to pay for these tools, and it is consumers.

Energy resources are a mixture of two major components: Technology and resource. When you have coal, technology need was not the major component of this investment. But when you have solar and wind, it is all about technology. So the share of a resource-technology dilemma varies from fossil to renewable resources. If the technology is more exotic (requiring rare earth materials), resources to materialize that technology becomes critical. There is always a possibility to invent new technologies by changing the structure of carbon atoms or nanotechnology. But reality dictates a new kind of resource dependency.

So there will be a competition between two kinds of resources for the transition period. One is the resources for combustion, and the other is resources for materials and technology. This will also create a competition of geographies. The major tested strategy is to control the midstream for all these resources, whether it is lithium or oil.

Therefore geography is returning with a vengeance. The technological shift can be faster, but bottlenecks are not visible in the Excel sheets or models. They will be more visible as

demand surges. We are creating a new resource dependence on the top of the current dependence. This is what we will discuss in the following decade.

Is the Technology Ready for the Energy Transition?

Jul 4, 2022

No. If you look at the railroads and locomotives from the early 20th century, you may well contemplate high-speed trains then. Trains were invented 150-200 years ago and are widely used, but they do not dominate the mode of transportation in many other countries. Having some sort of steam locomotive is one thing; operating a high-speed rail is another. The knowledge accumulation needed to get from one to another is years.

On the other hand, from mobile phones to smartphones, speed is a much different issue. The distinction lies in the difference between large socio-technological systems essential for modern civilization and quasi-essential information technologies.

If you read "From the Earth to the Moon" by Jules Verne in 1867, you may think the technology is there to achieve a moon landing. You will need a bigger cannon, just like Hitler's super-gun "General Gustov," and you can fly to the moon. The 1910s or 1920s are the right time to forecast moon travel. Maybe in the 1950s, a colony on the moon is feasible if you look from 1867. But we know how the story ended.

Are we becoming a black box society? This means we are just looking at all sorts of systems around us like black boxes. We skip the detail and always try to frame it in terms of inputs and outputs. It is a mental shortcut for understanding complex everyday examples. But in energy transition, we are talking about changing the biggest real-time supply chain in the world: the electricity system. The current system is a packet of crystallized ideas of billions of engineers and scientists. How hard can it be to change this system?

Flash forward to 2007 and 2008. We will see references to the "Green New Deal" from writers to economists. More in 2012, and then in 2019 in the US, followed by the EU, different versions of green deal discussions restarted. Just like business cycles, there are green cycles. Most of these intentions are good and real. But the "black box" understanding of the energy system keeps these ideas falling back into reality. More coal or gas or oil.

There are more pledges now. If you go back and check whether politicians are reviewing their past pledges, you can hardly find any evidence. Unfortunately, Europe may be trapped inside a pledge-more pledge-further pledge-like cycle without moving a bit. I call these “gamblers' energy transitions”. More pledges may sound good. But eventually, if you can not take the rabbit out of the hat, the show is over. The crowding out the investors left with bitter memories is a real threat.

We should go back and understand how all these discussions keep popping up. The first rule is that these discussions initiate with high reserve capacity in fossil systems and low fossil fuel price periods. Afterward, just as prices increase, they intensify. When the prices peak,

the discussions run out of steam since consumers do not enjoy high energy prices. Their priority is to fill their gas tanks as cheaply as possible.

The other issue was about technology. The recent discussions are motivated by solar cost decreases. The technology is not new, just like railroad technology. But the scaling, manufacturing, automation, and efficiency effects are like high-speed rails.

What is needed now is to increase R&D exponentially on the details. Black box thinkers and their oversimplified models may have misled the world. Kodak was one of the early experimenters of digital photography. As of today, you can practically demonstrate every single technology to be deployed in the grid for the next 30 years. Does it mean you need to just scale up? No. Scaling up brings new challenges and technologies that black box philosophers can not even think about. Inventing the digital camera is one thing; getting to an iPhone with a front-face selfie is another. The distance is huge in engineering terms.

Can Electricity Markets Survive This Energy Crisis?

Sep 6, 2022

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 investigated is “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 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 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”s are major issues. 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 after 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 it is a real-time operation and prices with premiums for real-time. This time, on-demand and on the available market split is much more favourable. But at its inception, data and connectivity have laid the groundwork for early 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 living on data tables and working 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

Do We Have the Right Reasons to Reform Electricity Markets?

Oct 3, 2022

A little bit of history saves a lot of trials and words. Therefore, we have to understand how gas generation and the current market model cohabited with each other. After the end of the 1970s, cogeneration with gas turbines has become very popular. This technological innovation has allowed particular consumers to generate their heat and electricity. We can call this the second wave of decentralization.

The idea of competitive electricity markets was based on competition based on short-term marginal costs. It has an unintended effect of a "missing money" problem since most competitors may not fully get their capital investments. In a world of oil, coal, and partial nuclear generation in the 1970s, natural gas generation was the clear winner because of its low costs and ease of operation.

The marginal cost model has fostered this relation to new heights. Any electricity system undergoing market transformation began to experience a massive influx of gas generation. The electricity markets became a fertile ground for gas generation. Especially with the gas turbines, ramping up or down was much easier than coal and incumbent generation technologies.

Therefore the current market model is inherently coupled with gas markets. The decoupling of gas from power markets is an attempt to slash the 40 years of the symbiotic relationship between electricity markets and gas. Can it be done? Of course, electricity markets are social constructs. You can always create them with new formulas, rules, or regulations.

Currently, our problem is not in the electricity market. Electricity markets are just reflecting underlying fundamentals. Severing this fundamental relation will practically dismantle the mechanics of power markets. We may have a day ahead market not reflecting marginal gas, renewable, or hydro opportunity costs. From another point, what if gas prices fall suddenly? Then, will there be a reason to talk about problems in the electricity markets?

The European market problem is in the benchmark gas price, namely TTF. Without solving the gas pricing mechanism, reforming on the electricity side will avalanche the difficulties. Electricity markets might work as intended if the gas price was 1/5th of the current value.

That doesn't mean that there is no need for electricity market reform. But reform has to be done for the right reasons. These reasons are obvious enough for market observers: A valuation mechanism for zero marginal cost resources and flexibility in the market.

Is electricity a homogenous product? I view electricity generation as a bundled service. There is an electron (electric field) generation and a time-shifting ability of this electron generation. So there is a commodity and stock service bundled as generation services. A coal/gas generation is electron plus stock so it can be time-shifted within certain limits. Renewable electricity is just an electron generation, with no stock services. Therefore, the underlying market should value time-shifting abilities better.

Is it the right time for an electricity market reform? I believe not. We are in the midst of an energy crisis. The root cause of this crisis is gas prices. If we cannot address that problem correctly, electricity markets may be broken for some time.

Why is Energy Efficiency Not Realized?

Oct 18, 2022

Energy efficiency is the first fuel for some. The low-hanging fruit of the energy tree, efficiency is the solution to all evils. The consumer will pay less and have better leverage with energy efficiency. Yet, energy efficiency is not accelerating. Why?

I used to suggest a conference titled "Why Energy Efficiency is not happening?". Sometimes it is better to analyse the mistakes and obstacles than triumphing a rosy future. The power of negative thinking is useful in scientific cases to make a positive start. Therefore, we have to understand why it is not happening.

In the energy efficiency reports, we are seeing spending over 250 billion € per year at the global level for efficiency, but the progress is uneven. Most of this spending is in the

developed economies, but still, the demand dynamics are not suppressed, excluding the deindustrialization of Europe. Although not a healthy indicator, energy intensity fluctuations do not match spending. Something is wrong, or the efficient allocation of capital in energy efficiency projects is not happening.

This month, we see a rise in auxiliary or extra heater sales in some European countries. The fear caused by energy crisis discussions has pushed consumers to buy extra heaters. This is one of the classic problems with public policy making. Information campaigns may not lead to the intended results. Also, automotive fuel shortages lead to even more queues outside pumping stations. So where is the energy-efficient consumer?

Energy efficiency is not happening because the consumer thinks he is already efficient to the limit. She has a point. Energy consumption has a recurring pattern. We wash and iron clothes on the same days and dine and wake up at similar hours. We entertain ourselves at the prime times. We are optimizing our energy consumption according to our lifestyle. Having a washing machine starting after 1 o'clock midnight and finishing at 3 o'clock will not always work.

A general pitfall of experts is their relation to their expertise field. Most of the time, they think their expertise field should have precedence over others. If the problem or expertise is energy efficiency, everyone should do it because it is the right and economical thing to do. But creating an energy-efficiency behaviour may create a suboptimal lifestyle. Since we have a recurring energy consumption pattern, changing these patterns or styles needs optimization in other areas.

Therefore, behavioural methods may be used. But the underlying problem with energy efficiency changes (other than technological upgrades) is that our lifestyle is optimized for our needs and desires. Changing this for water usage, internet usage, or fuel consumption will change our optimizations in other parts of our lives. Lots of other optimization changes will create more costs than efficiency gains. That is why we delay all the energy efficiency measures until a crisis finds us.

Therefore, we must push appliance and car manufacturers to design the most energy-efficient devices as the default option. A consumer should have only the most energy-efficient choices in her buying decisions. We cannot optimize the lifestyle of every single consumer for energy efficiency, as experts suggest. We have to optimize the tools, not the people.

Life After the Energy Crisis

Nov 14, 2022

Every energy crisis has an ending. What is left behind are losses and wins. The high prices of 2007-2008 fostered the electric cars, batteries, and solar boom. It didn't end up with the efficiency we expected, but LED lighting has ended the reign of filaments. LED screens replace CRT tubes. More technological developments have arrived. But as Daniel Yergin says, these were the technologies available in the last 50 years. We are seeing technologies taking off now. Heat pumps or hydrogen or both? Floating wind turbines, small modular reactors, maybe fusion, and practically that is it. Electric cars have already taken off. Electric trucks may need some way to go.

There is also a philosophical change during these crises. Like the market structures, new intelligent systems… After every major US power blackout, there is a new trend of systems to avoid blackouts. On the commodities side, the 2007-2008 energy crisis has increased scrutiny of the financial markets' role in commodities. The famous "decoupling of gas prices from electricity prices in this crisis." Also, just like in the Nixon years, "price caps" is the talk of the town. The problem with these proposals is that they serve as a façade to save the desperateness of policymakers. There is a tool; how it will work is unknown, but it will save the future. Or the claim is such.

So what will the energy world look like after this winter? First and foremost, technological innovation will speed up. AI, 3D printing, and automation powered various technologies, and their manufacturing will improve faster. The permitting processes will definitely drop and will morph into more e-permitting systems. The satellite photos and integration of big data may ease a lot.

Environmental movements are always wounded in high-price environments. So, do not think this is the end of environmental or climate change policies. Climate emergency will probably be replaced with more rational and sangfroid terms. Environmental policy will lose its mandate over other policies, but it will survive. Air quality, a clean environment, and water are necessary rights, and they will have a longer life.

Markets, on the other hand, may evolve for better or worse. One example is the California power market. The basic problem was data invisibility, which created big problems. In every energy crisis, the data returns with a vengeance. The current philosophy is about price controls, not market needs. It is a trial for consumer-centric design. For a true consumer-centric design, the consumer side's technology must change, including meters, bills, appliances, and interaction. Ever-optimizing markets have to penetrate the consumer side. Electric cars are already part of the discussion of the interactive consumer model. There is a need for more.

Great Divergence between Modelling and Reality in Energy Supply-Demand

Nov 21, 2022

Are numbers a sealed guarantee for arguments to be scientific? Are math and equations a predictor of the future, or is it an abstract language to communicate rational choices? Recently we are more into selling future energy supply-demand visions through numbers that can be confused as scientific facts. These are products of thousands of human assumptions; therefore, they are simulation instruments. On the other hand, science is not fact per se but a never-ending quest to find the truth. There are no full stops in science, even for gravity.

Climate models are atmospheric models, and global warming has a scientific and proven basis. There are several issues with radiance or other minute parts. But this is a physical phenomenon model, like 3D structural simulations. Energy supply-demand modeling is a different beast. Our subject is the latter model.

Recently we have seen a stall in the energy transition. The root problem is the way our world works. We have two realities, bits and atoms. Bits are the currency of electronically produced information of all sorts. Atoms are, on the other hand, the tangible and physical assets we encounter. You can change the design and test a wind turbine digitally in a few days, but the new turbine manufacturing process and implementation will still take months. The only positive part of this energy transition is solar panels, but this is thanks to China's aggressive industrial and export policies. The world depends on China for solar panels much more than OPEC+ for oil.

The time multiplier between bits and atoms is, unfortunately, huge. For example, training people and engineers for new technologies will take years. A permit takes 4-10 years for clean energy technologies. The infrastructure takes up to 16 years in developed countries. But in a computer simulation, it is a matter of minutes. The solution is easy, integrating physical realities into simulations.

For example, creating digital twins is a good way to have more realistic numerical models. However, most of the energy future models, even the most famous peer-reviewed ones, do not consider permitting times, standard requirements, time to train human beings, and financing issues in developing countries like the quadrupled cost of capital for new investments. These models look as if they first have the cart and try to find the horse.

Like social media acting as a medium for the rapid transmission of disinformation rather than the immediate broadcasting of the truth, the modeling world is more about ideas reflected as numbers than numbers reflecting reality. This is not wrong, and I am not against this. I have seen future scenarios on energy where academicians have no idea how an investment is made or why wind companies are suffering from major losses or a China scenario where clean energy manufacturing prices may rise.

This great divergence between modeling and reality is creating a pseudo-scientific debate about energy futures. These 1000 GWs of investments, those millions of EV cars, behavioral changes that can decrease energy consumption like 20%, water and electricity poor Africa exporting rich countries hydrogen with limited water resources are ideas, not science or reality. We need more of these ideas. But we should understand that these are not facts, the science of laws but ideas and imaginations decorated with numbers and equations.

We are dreamers. One theory says that our dreams are alternative scenarios our brains run when we disconnect from consciousness. Models are more about abstract realities constructed by numbers, and equations pushed into alternative scenarios. We have to dream and use our imagination to the end. But confusing this with reality is not the way to go.

Energy transition needs more technology, engineers, technicians, financing, and infrastructure than we can ever encounter. For models, this is a number tied to an equation fed by some assumptions. This is a long journey for the real world, requiring lots of experimentation, backlashes, and probably the greatest challenge we have seen. We are just scratching the surface.