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When it comes to managing energy, optionality is vital

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Dr. Scott Tinker, Director, Bureau of Economic Geology, The University of Texas at Austin, talks about the challenges we face in addressing the multiple and varied needs of energy markets throughout the world and how we need to better understand all the vectors involved if we are going to succeed. He will be delivering the 'Boulos Lecture Series' at the forthcoming International Energy Summit (IES) hosted by the AIEN in Miami from 30 May - 1 June.

Energy and economic diversity results in several realities. First, there are no clean and dirty energy sources; they all have benefits and environmental impacts. Second, not everything can, or should, be electrified. Many of the industrial materials and services required by global economies, such as steel, cement, plastic, ammonia and transoceanic travel, require using molecules or high heat from burning molecules. Third, intermittent sources of electricity such as solar and wind require expensive backup to make them reliable. Finally, secure energy – affordable, reliable and safe – underpins economic health, and provides governments with the ability to invest in the environment, including atmospheric emissions reductions. Recognising these realities sets the framework for a balanced dialog about energy, climate, poverty, and other global issues.

Energy security

Energy security is a primary objective of every global leader, but this depends on affordable, reliable energy sources, which vary from region to region. Europe is probably struggling the most of all, and this is based on policy. It chose not to develop its own natural gas resources, and in 2021 Russian natural gas pipeline and LNG imports accounted for almost 40% of total EU natural gas consumption. With the war in Ukraine, Russia weaponised its gas and left Europe exposed to energy shortages and extortionately high prices for gas and electricity.

Europe and Asia are the two major global regions that do not produce as much oil or gas as they consume. In Europe, where oil and gas production are limited, there is a fervent push to improve energy security via solar, wind, electric vehicles and possibly hydrogen, using climate as motivator for public support. The problem is that this policy requires a lot of investment in global supply chains for solar panels, wind turbines and batteries, which is reliant on metal processing markets, an area dominated by China.

In China, energy security is provided by coal, hydro, solar, wind, batteries and nuclear, since they also have limited oil and gas resources. In much of Latin America, Africa, Southeast Asia and the Middle East, energy poverty is significant, and energy security comes with access to coal, oil and natural gas.

In the US, approaches to energy security vary by region as a function of energy resources and politics, with states opposed to fossil-fuels often importing large amounts of energy and pressing for solar, wind and batteries. In California, for example, policy suggests that gasoline

engines will not be purchased after 2035. The problem with taking hard lines on policy is that you remove 'energy optionality' and, if you start eliminating options by law, markets respond badly. Markets and people like to have options.

The axis of global strength is rapidly shifting

Demographics also play a part in the energy jigsaw and the balance of global power. One third of the world's population now live in either China or India and, although India is now more populous than China, it consumes only one quarter of the energy per person, and has one fifth of the GDP per person. As India's demand for energy grows, and it will, it will be interesting to see whether it turns to China, Russia and the Middle East, or to the West for partners. Its decisions alone have the potential to change energy markets and shift the axis of global strength.

Turning passion and anger into positive action

It is hard for political leaders not to follow their political base. After all, that is what put them, and keeps them, in power. What is really needed is fact-based, unbiased, apolitical education about energy, and how it relates to the economy and the environment. There is a lot of passion and anger from younger generations about the 'climate catastrophe', and they are quick to protest, or say what we should not do. But with six out of eight billion people living in some form of energy poverty, we could turn this passion towards positive action to resolve these economic injustice issues. This would be very powerful, and have measurable positive impacts now. Awareness would grow and solutions would be found. Furthermore, if we can eradicate energy poverty, this will help resolve other issues surrounding women's rights, immigration and migration, and enable investment in the environment.

Understand that everything has an impact

We waste a lot of energy and need to do more with fewer resources, and a focus on efficiency is a vital part of the energy transition. We need to and are building systems that harness energy, but this takes a lot of materials, which will age and need replacing. The problem is that mining and manufacturing are not 'green'. Everything has an impact, and we need to move away from binary thinking and start improving how we use materials and better optimise how we use the energy we generate.

Solar and wind power are good options in some settings. Indeed, one third of Europe's electricity now comes from renewables. However, because they are intermittent, to make them reliable and resilient requires solutions for energy storage or backup, which is expensive to the consumer. In addition, their energy density – the energy contained in a certain volume, weight, or area – is much lower than traditional energies. If we replace coal with natural gas, hydro plants and nuclear power, these provide the energy density we need, and these resources are not intermittent, but instead dispatchable to the grid.

In terms of pricing carbon, offsets and credits have their place, but they do not necessarily get rid of emissions. Carbon capture technology is feasible, but currently expensive and needs to be at a much larger scale if we are going to significantly reduce emissions.

Conclusion

Energy underpins so many of the things that are important in the world, and, at the end of the day, we need to lower emissions without imploding economic systems and putting power into the hands of countries that threaten global security. Different countries have different forms of energy depending on their geography, and different forms of energy do different things. Secure energy underpins healthy economies, and healthy economies allow for environmental investment.

The goal should be to model civil dialogs and critical thinking around specific topics, accept opinions are not the same, and understand why. We are allowed to disagree, and it is from such debate that solutions are found. Don't filter the dialogue or label it as conspiracy or disinformation; be ready to listen, learn and understand how things really are. Seek common ground first. If we can understand the complexity of the 'energy trilemma', we will address the challenges we face.

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