What is the most burning and urgent single energy challenge in today’s world and how do you think governments and businesses should effectively address them?

The difficulty of creating a balanced energy policy and solution ways

The energy trilemma is that improving policy framework which mutually reinforces secure, affordable and environmentally energy. Energy trilemma which is crucial for economic and social development of countries has three significant components which are energy security, energy equity, and environmental sustainability.

But, it is very difficult to balance these dimensions of energy trilemma for many countries. No single form of energy meets all three of these criteria. For instance, even though fossil fuels having negative effects for environment, they have more advantages than renewable forms of energy in terms of both affordability and reliability. Although solar and wind power are much cleaner, but still operate interruptedly and continue to be more expensive than conventional energy. On a global scale, we can array the reasons of these challenges:

- **The uncertainty on the target profile of a future energy system on a global level:**

  There is no agreement with respect to global climate framework. Creating effective policy is complicated without a regional or global consensus on climate change. For example, inappropriate pricing and policy regulations for carbon emissions, and technologies like carbon capture and storage, there is the risk adding costs and decreasing energy efficiency.

- **Developing energy policy that predicts the changing energy supply and demand:**

  Economically feasible energy resources and recent technological advancements cause important changes on the energy supply and demand. Many countries are promoting substantial alterations in generation and distribution models for more diverse energy supply and a different energy system. For instance, drilling and gas production technologies have greatly raised the world’s reserves of natural gas and changed the forecasts regarding fossil fuel fired electricity generation; and carbon capture and storage which is very vital for reducing carbon emissions could play a key role in the future. While dramatic changes realize in energy sector, foreseeing of the energy future and creating a master plan are increasingly complex.

- **The difficulties in implementing national policies:**

  To promote sustainable energy policies, countries should improve a coordinated master plan including national energy policies and national industrial, financial, environmental, transportation, and agricultural goals and policies. This process requires collaboration and coordination between different governmental agencies so as to apply of the actual regulations.

  Nonetheless, creating a well-balanced energy policy is not impossible. Thanks to some measures, important advancements can be provided. In order to reach this aim, there is no only one way.
As each country has different features in terms of energy resource mix, geopolitical position, economic and social development, countries should take their own precautions. For example, developing countries can improve environmentally and affordable energy resources (like hydropower and other renewable energy sources) to promote their industrialisation and their populations’ access to energy. The countries which mostly use fossil fuels can manage the environmental effect of their secure and affordable energy services.

Other important factor for sustainable energy policy is that the collaboration between the countries. Sharing of information and experiences in the improvement of policies, regulation, research and technology can contribute to achieving energy sustainability aims like reducing carbon emissions, and enhancing the share of renewables.

Some developed countries which mainly use low or zero carbon energy resources and support energy efficiency policies are better in balancing all three dimensions of energy trilemma. They reduce their greenhouse gas emissions and raise the share of renewables in their electricity mix and provide their energy security by setting and implementing realistic, specific aims. I think renewable energy and nuclear power play an important role in reducing the environmental influence of electricity generation and promoting energy security by decreasing energy imports and increasing the diversification of energy sources.

We can array some solution ways helping to create a balanced energy policy:

**Energy security and environmental sustainability:**

Even though energy security is defined as the uninterrupted availability of energy sources at an affordable price, identifying of energy security should not be limited to securing energy supplies. Energy security should be considered with other important factors such as low-carbon technologies and affordable energy resources.

Climate change, as a result of increasing greenhouse gas emissions, threatens the stability of the world’s climate, economy and population. The most effective ways of creating sustainable environment policy are to encourage the utilization of low carbon energy resources such as renewable and nuclear and to support low carbon technologies.

Carbon Capture and Storage (CCS) also plays an important role in achieving decarbonizing of world’s low carbon future. CCS provides continuing role for flexible fossil fuel capacity and contributes to diversity and security of supply.

In addition to exploring new energy supply and technologies, we should reduce the dependency of fossil fuels which are finite. In recent years, renewable energy resources like wind, solar, geothermal have been the significant solution. Renewable energy is described as energy that comes from resources which are naturally renewed such as sunlight, wind, rain, tides, waves and geothermal heat. Renewable energy shifts conventional fuels in four areas: electricity generation, hot water/space heating, motor fuels, and rural energy services. Today, even though about 20% of the world’s energy consumption is met by renewable sources like hydropower, wind, this case does not reduce the importance of renewable supply. Renewable energy has a key role to play in reducing carbon emissions and achieving security of supply by diversifying the electricity mix. For example; wind power, as an alternative to fossil fuels, is plentiful, renewable, affordable, widely distributed, clean, produces no carbon emissions. The environmental impacts are generally less harmful than other energy sources. 83 countries around the world are using wind power to supply the electricity grid. Wind power capacity has expanded swiftly to 336 GW in June 2014, and wind energy generation is about 4% of total worldwide electricity consumption. Denmark is producing more than a third of its electricity from wind. The other country which achieved important advance in wind energy is China. The producing capacity from wind power has introduced an annual growth rate of
more than 100% from 2005 to 2009. The government has explained its policy to improve its previous target of 30 GW of installed capacity by 2020 to 100 GW. What is more, China has encouraged technology transfers in large wind turbine technology and imposed obligations related to the use of locally made wind turbines. Germany, Spain and U.S are the leading countries generating electricity from wind energy. Although other renewable energy sources (except from hydro) have not huge potential power, utilization of those sources should be encouraged, due to their features which are mentioned above.

Other substantial alternative is nuclear power for generating energy. Nuclear power is a sustainable energy source that reduces carbon emissions and increases energy security by mitigating dependence on imported energy sources such as oil, gas. Unlike fossil fuel power plants, nuclear power generates no air pollution and greenhouse gases. The risks of storing waste are not big and can be decreased by using the latest technology in reactors, and the operational safety is perfect when compared to the other major kinds of power plants. Nuclear power is efficient at transforming into electricity. Uranium which is used as an energy resource in nuclear power plants is abundant. Even though nuclear has higher costs because of safety, emergency, containment, radioactive waste, and storage systems, it should be preferred due to tremendous energy generating capacity and other advantages. Today, 31 countries benefit from nuclear power stations. China has 28 new reactors under construction, and there are also a considerable number of new reactors being built in South Korea, India, and Russia. Nuclear power is the primary energy resource in only France, Belgium and Slovakia, though a lot of other countries have an important nuclear power production capacity. Due to the fact that nuclear power issue is very complex and includes multidimensional debates (especially potential environmental risks and bad experiences like Fukushima), many countries may suspect nuclear power for a long time. But, using of this energy resource will be inevitable for the countries importing fossil fuels.

**Economic Efficiency:**

There are some methods for reducing energy demand. Energy efficiency is one of the most cost effective ways to enhance security of energy supply, and to reduce emissions of greenhouse gases and other pollutants.

Industry, transportation and building are the main sectors for realizing the influential implementations of energy efficiency. In industry field, there are many measures providing cost savings. For instance, energy efficient lighting is practical solution to lower energy bills. High performance lighting system can be optimized by choosing appropriate energy-efficient lamp technology, control equipment and other components. Replacing of inefficient motors with efficient motors causes substantial energy savings, productivity and reliability. Other important issue in industrial energy efficiency is that controlling air compressor’s energy consumption and well-designed heating, ventilation and air conditioning system. As for building sector, buildings can be designed to provide an important reduction for the energy need for heating and cooling. This can be promoted thanks to some measures like cavity wall and roof insulation, windows and double glazing, low-emissivity glass, air infiltration. Less energy can be used in transport sector by improving vehicle technology, changing driver behaviour to use less fuel, reducing the distances travelled per vehicle and choosing the most sustainable modes of transport.

Combined heat and power (CHP) is another way for energy efficiency. By generating heat and power simultaneously, CHP can mitigate carbon emissions by up to 30%. For many organisations, CHP is the significant opportunity to reduce energy costs and to promote environmental performance with existing users of CHP typically saving around 20% of their
energy costs. Combined heat and power has more advantages such as reducing of transmission and distribution losses and increasing of fuel supply security.

Energy management in organizations is also crucial issue, due to the increasing need to save energy and reduce carbon emissions worldwide. Because of the fact that global energy need affects energy prices and carbon emissions targets, energy management plays a key role to saving energy in organizations. Energy management enables to reduce costs, carbon emissions, environmental damage and potential risks. Increasing energy demand brings together some risks such as increasing of energy prices, supply shortages which could impact profitability. Thanks to energy management, organizations can reduce this risk by mitigating their demand for energy and by controlling it in order to make it more predictable. Energy management promotes an approach for integrating energy issues into current management systems for continuous improvement. Efficient components can provide efficiency benefits in the range of 2-5%. System optimization precautions can cause average system efficiency gains of 20-30%.

Murat ÇETİN
T: +905373851065
T: +903122038127
e-mail: mmcmctn@gmail.com