

RELATIONSHIP BETWEEN ENERGY TRANSACTIONS AND PRICING MECHANISM: ISSUES AND CHALLENGES

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Abstract

With increasing demand for fossil fuels and electricity, and decreasing production, due to its non-renewable character, there are rising concerns of energy security. Unsuccessful exploitation of renewable sources due to huge capital and infrastructural constraints has led to further imbalance in the energy supply and demand cycle. With the introduction of new energy transactions methods and trading of energy commodities, the market volatility is increasing ever since. Other factors like political turmoil, natural disasters and climate conditions have led to an imbalance in the supply of the energy commodities. There are many factors that determine the prices of energy commodities which in turn affect the overall demand. This research paper aims to determine the relationship between different types of energy transactions and pricing mechanisms of energy commodities in order to analyse the market structure by looking at various aspects affecting the energy commodity which lead to price escalation. The research methodology adopted is doctrinal, including gathering of significant resources from primary as well as secondary data which comprises research articles, textbooks, reference books and

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internet sources. This paper also throws light on the issues and challenges of the energy pricing market and accordingly, endorses the need to organise it at the international level in order to provide seamless exchange of energy commodities around the world.

Keywords: Energy Commodities, Energy Transactions, Energy Security, Pricing Mechanism and Relationship.

Introduction

“We are like tenant farmers chopping down the fence around our house for fuel when we should be using nature’s inexhaustible sources of energy – sun, wind and tide.... I would put my money on the sun and solar energy. What a source of power! I hope we donot have to wait until oil and coal run out before we tackle that.”¹

People have, since time immemorial, used energy to get their work done. Today people use energy for almost every day-to-day activity that they do. This energy is generated from numerous sources like, petroleum, solar energy, natural gas, electricity, wind energy etc. Energy makes our life simple and without any doubt makes it better. There is a huge demand for energy since every country is not self-sufficient in producing energy commodities themselves and therefore, energy is bought and sold to meet the demands.

¹ Thomas Edison is quoted as saying in a 1931 conversation with auto industry magnate Henry Ford in “*Life with Thomas Edison, Henry Ford, Harvey Firestone, Alexis Carrel & Charles Lindbergh*” by James Newton, 31 (1987).

Energy transaction is the business of energy involving the selling, buying and trading of energy commodities in the international energy market. It covers the whole of energy industry, all traditional energy sources (non-renewable), *like*, oil, gas, coal and electricity produced by such sources as well as non-traditional energy technologies and sources (renewable), *like*, hydro-electricity, solar, nuclear and biomass. It basically deals with the business-related aspects of energy sector.

Every energy commodity has a different pricing mechanism in order to determine its value in the consumer market. The end value of an energy product is determined by various factors *like*, pricing strategies and mechanism, the type of transactions followed in order to procure the commodity, supply and demand, geo-political scenarios etc. In order to determine the relationship between energy transactions and pricing mechanisms, all these factors need to be analyzed. This relationship needs to be scrutinized to know the market structure of energy commodities. It helps in regulating the market players and energy prices accordingly for both regional and international players. By analysing the relationship between the two, one can interpret the trends in the energy market, which helps the countries to forecast future prices and gain energy security. Moreover, it is high time

that countries address the issue of energy security separately at an international level.

Energy Transactions

Energy transactions can be either physical or financial transactions. Physical transactions include buying and selling of physical energy commodities while financial transactions include trading. Every industry in the energy sector has its own types of transactions. The contractual frameworks of oil transaction market can be divided into four categories, *i.e.*, transfer deals, term contracts (long- and short-term contracts), spot and forward market and derivatives market (futures and options).² The contractual framework of gas transaction market can also be divided into three categories *i.e.*, term contracts (long- and short-term contracts), spot and forward market and derivatives market (futures and options).³ The transactions in the power sector can be divided into two categories *i.e.*, long term agreements (power purchase agreements) and short-term trading (spot market). Energy trading is separate from financial trading, and take place partially on exchanges. It is an anonymous exchange where sellers and buyers do not need to know one another.

Pricing Mechanisms

Pricing mechanism corresponds to the system where the demand and supply powers determine consumer prices and

² Energy Charter Secretariat, *Putting a price on Energy: International Pricing Mechanisms for Oil & Gas*, 54 (2007).

³ *Id.*

modifications therein. It answers the question, “How prices are determined for energy goods and services?” Buyers and sellers are the ones that ultimately determine a commodity’s price. It defines the process by which millions of customer and business decisions interact to decide the distribution of scarce resources to competing uses.

Pricing mechanisms for every single energy good or service is different and depends on a variety of factors including climate, geopolitical conflicts, demand and supply of the energy good or service, conditions in the trade market etc. The factor which is most relevant is the trading market as most of the transactions of energy goods and services are done in the financial market rather than the physical or paper market. By observing the demand and supply factors in the international trading market, the prices are reported by the Price Reporting Agencies (*hereinafter* referred to as the PRA) on a daily basis for energy goods or services.

Oil

Organization of the Petroleum Exporting Countries (*hereinafter* referred to as the OPEC) failure in 1986-1988 led to a new period of pricing where power to control prices moved from the OPEC to the trading market. After 1986, crude oil has become a global commodity market with trading and pricing processes

similar to a global commodity because of the growth of oil industry. The collapse of the system of concession due to nationalization distorted the supply of oil to foreign industries which laid down the principle of arm's length transactions between the players of oil market. It also established exchanges which had transactions apart from multinationals that were involved in a horizontal and vertical transaction. The arrival of suppliers and buyers apart from OPEC countries also facilitated the popularity of transactions which were concluded on an arm's length basis. These circumstances gave rise to a complicated system of interconnected oil markets which at present consists of physical and financial markets.

The physical markets are also called paper markets because they include long term agreements. The financial markets include spot markets, futures markets, options markets and forward markets. Exchanges, PRAs and National Oil Companies (*hereinafter* referred to as the NOC) contribute to a worldwide dynamic crude oil pricing network. West Texas Intermediate (*hereinafter* referred to as the WTI) crude futures traded on the Chicago Mercantile Exchange-New York Mercantile Exchange (*hereinafter* referred to as the CME-NYMEX) and Brent crude futures traded on the Intercontinental Exchange (*hereinafter* referred to as the ICE) are the world's two leading crude

benchmarks.⁴ In the Middle East, the Dubai Mercantile Exchange (*hereinafter* referred to as the DME) trades crude futures in Oman, which along with Dubai crude also serves as a significant regional marker which is not exchanged on exchange but has sufficient liquidity in what are known as ‘Over the Counter’ (*hereinafter* referred to as the OTC) that are cleared via exchanges.⁵

Crude oil pricing is done with the help of formula pricing. Crude oil delivery is organized through spot market or long-term agreements.⁶ Transacting parties use spot market for selling and buying petroleum that is not transacted via long-term agreements, which mostly is applicable to individual transactions. Considering the infrastructural constraints of transportation of oil, spot market cargoes cannot be sent for immediate delivery. Among other items, they determine the formula to be used to determine the crude oil shipment rate. Price negotiations are typically agreed in long-term contracts on the formula pricing method which sets the cargo rate to a market price.⁷ Formula pricing has become the foundation of the mechanism for oil pricing. The origin of crude

⁴ International Crude Oil Pricing, Australian Institute of Petroleum, *available at*: International Crude Oil Pricing | Australian Institute of Petroleum (aip.com.au) (last visited on Dec. 15, 2021).

⁵ About DME, *available at*: About DME (dubaimerc.com) (last visited on Jan. 12, 2022).

⁶ Bassam Fattouh, “An anatomy of the Crude Oil pricing system” *The Oxford Institute for Energy Studies* 20 (2011).

⁷ *Ibid.*

oil has an impact on the yields of refining various types of crude streams which are getting dissimilar prices. Because of the broad range of petroleum, price of specific petroleum oil is typically settled at discount on reference price/ marker/ premium. The references prices are mostly called benchmarks. The formula in long term agreements for pricing oil is: $P_x = P_R \pm D$; where P_x = crude x's price; P_R = benchmark price; and D = price differential.⁸

The differential value may be set by the exporting country or PRAs and is agreed by the buyer when the agreement is being negotiated. Formula pricing refers to all forms of contractual arrangements, be it for a long term or spot or forward transaction. The price differentials among various crude oil types change continuously as per relative demand and supply of the same. This depends on the relative crude oil commodity price. All oil producing countries sets the differential to a benchmark independently. Because the method of determining price differentials require time and relies on old data and information, its value does not always represent the correct market circumstances during delivery of cargo from the initial as well as to the final destination.

In order to apply formula pricing, physical benchmarks have to be identified *such as*, Argus Sour Crude Index (*hereinafter* referred to as the ASCI) price, WTI, dated Brent, Forties, Oseberg, Ekofisk (*hereinafter* referred to as the BFOE) and Dubai

⁸ *Id.*, 21.

benchmark. These prices are fundamental to the pricing of crude oil and also known as spot market prices. They are used to determine cargo prices under long term and spot transactions by traders and oil companies. They are used by government organizations for the purposes of tax and by banks and companies for settlement of derivative instruments. They are also used by futures exchanges for settlement of their financial agreements. Crude oil pricing is based on two factors *i.e.*, Physical benchmarks, which is dated Brent, or financial layers around the physical benchmarks which is Brent Weighted Average (*hereinafter* referred to as the BWAVE). The BWAVE is an index determined on the prices obtained from market of Brent futures. It is the average of weighted quotations of future prices arising from an agreement of the future exchange on a trading day.⁹ The weights become the shares of the volume of the agreements.

Natural gas

There are two methods of determining natural gas price in the international gas trading market. They are oil indexed pricing and gas on gas-based pricing.¹⁰ Under the former, the formula which is used to assess the natural gas prices are set in an agreement under the indexation of oil, and these formulae differ

⁹ *Id.*, 25.

¹⁰ Anthony J. Melling, "Natural Gas Pricing and its future" *Carnegie Endowment* 15 (2010).

between contracts. Generally, the formula is based on a price whose base is already decided from the beginning. This base price is added to the mean value of oil calculated based on the decided benchmark rate. The time period at which the benchmark rate will be taken is generally a preceding time period. The outcome is multiplied with a coefficient. The stated formula applies demand and supply rates and because of this, the prices of gas tend to rise although if there is over supply of natural gas. Its prices are calculated on the basis of rates prevailing in the spot markets of crude oil. The oil market prices change with demand and supply of crude oil. This system is prevalent in Europe and Asia Pacific.¹¹ Whereas, under the latter, the natural gas rates are indexed to pre-determined prices of spot market on the gas market which adjust in response to supply and demand for natural gas. In general, this pricing mechanism demonstrates the equilibrium among demand and supply of gas which in turn involves several suppliers. When the ration of gas supply to demand declines, prices rise which under predominant prevailing theory can damage demand and attract more investment in exploration of gas. This system is prevalent in North America.¹²

A key factor leading to difference of gas prices and questioning the development of “one price” (without transport) is the existence of multiple dominant pricing systems in different

¹¹ *Ibid.*

¹² *Ibid.*

markets. Liberalization of the natural gas industry in the North American and British market has resulted in the dominant pricing of gas on gas-based structure, with price change primarily determined by changes in the demand and supply for natural gas. A region with a natural gas monopoly supplier usually does not use this system. Examples of countries not using this pricing system are China, North Africa, South East Asia, India, Russia and most of the Middle Eastern countries. In these countries, instead of that, the prices are set by monopoly or by an institution under the control of the government.

The prices set by two national governments can never be similar unless they are approved by the governmental regulator itself. These institutions do not prohibit international trade prices from converging (for example, crude oil pricing). Since, both the systems take into account the prices of various products to reflect prices for gas, significant difference in the rates arise when oil and natural gas demand and supply balances are synchronized. Through the application of different pricing mechanisms, therefore, greater rate divergences can be expected. Although the existence of multiple pricing systems does not in itself prevent price convergence, rather it encourages price divergences that can increase demands of gas.

Power

Electricity pricing is a complex mechanism as it is regulated at the international as well as the regional level. Globally, electricity prices are set on trading exchanges whereas regionally, the power sector is regulated by the government or private distributors. Government or private distributor companies around the world follow different pricing policies. This paper discusses the pricing mechanism of trading exchange only.

The power trading market is highly disintegrated as compared to the conventional capital markets. Independent System Operator (*hereinafter* referred to as the ISO) controls as well as operates the intraday and real time markets. Such non-profit institutions are structured according to a physical grid arrangement generally known as network topology. ISOs function as market operators, conducting tasks *like*, dispatching power plants and balancing the power market in real time. They also serve as exchanges and clearing-houses on various electricity markets for trading activities.

All ISOs use a pricing method known as Locational Marginal Pricing (*hereinafter* referred to as the LMP). For electricity markets, it is one of the significant aspects. 'Locational' is the rate of clearing of the grid at a specified point of time, 'Marginal' means the rate of transmitting one unit of electricity, which is generally 1 Mega Watt (*hereinafter* referred to as the MW). Hence, LMP is said to be the price of supplying an

additional MW of electricity at a specified grid area. In general, the formula consists of three variables which are prices of energy, congestion and loss. The energy price is the amount of rate a generation unit requires to generate 1 MW. The determination of price of congestion is difficult. Congestion is induced by the grid's physical limits, namely, the capacity of the transmission line. Power lines have the highest power level they can bear without having to overheat and collapse. Loss is the quantity of lost power when transmitting through the transmission lines which is generally caused due to heat as, the electricity flowing through the transmission lines heat itself.

Major drivers affecting Energy Market Pricing

Drivers are described as major influencers of the industry's future which drive wide variations in the energy system. As with financial market pricing, the most fundamental concepts of supply and demand are responsible for energy market price fluctuations. Natural gas, oil or electricity rates can differ based on how much purchasers need and how much the market has to sell. Under this, the answer to the question "What determines prices of energy goods and services?" will be dealt with.

In order to ensure the growth of modern industry and development of economy, oil is considered as a strategic commodity, which is significant to every sector in the world. The

fluctuation in crude oil prices is often looked upon as an important aspect of the global economy, where any change generally leads to a debate in every country's financial spheres. Oil price determination should always be in accordance with fundamental rules but due to the peculiarity of crude oil and it being a special product, there are several other unseen factors that impact international crude oil prices.

As with every openly traded commodity market, the network of factors influencing the price of natural gas is complex. Electricity being a byproduct which is extremely hard to store has infrastructural constraints and is highly dependent on the prices of oil and gas. The relation between energy transactions and pricing mechanisms can be understood by throwing a light on the following factors:

Energy Value Chain and Financial Layers

A value chain can be described as a series of consecutive manufacturing activities. In the energy sector it is the network of activities involving hydrocarbon and electricity production. Profitable market prospects occur all along the value chain, including those operations that are ancillary to the core manufacturing processes. Important macro-economic benefits often flow from an energy value chain in the form of increased revenue, employment, technical growth, technology transfer, and infrastructure development. The more the value chain develops,

the greater the benefits for individual businesses as well as for the economy.

The value chain of crude oil and natural gas can be classified as; upstream, midstream and downstream activities. Upstream activities generally include procurement of crude oil and natural gas from the earth's crust. It includes exploration, drilling and production of raw crude oil and natural gas. These activities take immense time, machine & man power and huge amounts of investments. The expenditure incurred on these activities eventually adds up to increase the fossil fuel and power prices. Midstream activities generally include processing and refining the crude oil and natural gas into consumer products so that it can be transported to the distributors which in turn transport it to the end users. It also includes storage processes of the produced crude oil and natural gas as well as processed products. Processing and refining include removing impurities from the energy commodity and manufacturing petroleum and natural gas and its by products *like*, diesel, plastics, fertilizers, etc. Midstream also includes converting petroleum and natural gas to Liquefied Petroleum Gas (*hereinafter* referred to as the LPG) and Liquefied Natural Gas (*hereinafter* referred to as the LNG). These activities require huge inventories, refineries and pipelines. Investment in infrastructure is a crucial part of midstream industry. Pipelines have to be laid

down like a grid system for transportation which involves government and private entities but is mostly monopolistic as it involves huge investments and capital. Downstream activities mostly include marketing and distribution of the end products. Distribution is done to retailers, industries as well as consumers via pipelines, ships, railways as well as tankers.

For any country, electricity sector is among the important drivers of development. The electricity system is not a sequential network but instead a connecting network. Traditional sectors of electricity value chain contain electricity generation plants, transmission grids & lines, distribution grids, wholesale energy market, retailing market and power trading exchanges. Power supply change efficiency is the efficiency of the generation plant which is determined by the consumption from which load settings are removed. The four sectors are generation, transmission, distribution and retailing. Generation is the method by which electricity is produced by transitioning one form of energy to another. Production is done at power plants and is produced most frequently by electromechanical generators powered mainly by engines. These engines are run through combustion of fossil fuels *like*, coal or petroleum. They can also be operated by nuclear fission and other sources of renewable energy including photovoltaic panels, windmills, dams etc. Power transmission includes bulk transportation of electricity from a generation site to an electrical substation *such as*, a power plant. The interconnected

lines that facilitate this transportation are called transmission networks. These transmission lines are distinct from distribution lines as they are located between high voltage generation plants. Disintegrated network of grids is called “power grid” or “national grid”. Power distribution is the last stage in the supply chain. This is done by bringing power to end users via transmission grids. The interplay of high and low voltages supported by transformers ensures safe distribution from the generation plant to the customer’s house or industries. Retailing involves spelling of energy to the customer from generation to end use. Competitive retail distributors provide a range of service plans to both customers and companies. These service plans offer flexible energy purchase options for customers and companies.

Energy transactions involve a lot of instruments through which trading is done on the international trade market. Every sector has its own set of instruments through which trading takes place. These transactions have several financial layers in the trade market at every level of the transaction. For instance, while trading of crude oil, one enters into a transaction for the purchase of crude oil and then at the time of delivery, the rate of shipping has to be paid by the buyer or the seller which adds up to the final cost of the petroleum.

Moreover, there are additional costs added to the final cost of an energy commodity at every level of the value chain. For instance, in the case of crude oil, once it is delivered to the buyer, the cost of refining, processing, storage, transportation to the final customer, various taxes to governmental authorities etc. are added up at each transaction. The value chain of energy goods and services are not regulated by a uniform regulation or by any single regulatory authority. At every step of the value chain, there exist several private as well as governmental organizations which handle the transactions and this scenario differs from country to country across the globe.

Benchmarks

Generally, pricing is based around a typical value called the 'benchmark' value which is different for disparate regions as well as for different products containing divergent properties. There are numerous benchmarks for disparate regions around which the prices in trading market are set. These different prices result in different rates of energy goods around the world which can result in trade barriers and non-uniform access to energy goods. Talking about 'benchmark', it becomes crucial to assess its properties in order to conclude the importance it holds in determining the relation between transactions and tariff determination in the energy sector.

The benchmarking mechanism is imperative and the benchmark values are published by the PRAs. The question here

arises that from where are the values determined / evaluated? To answer this question, one has to look at the way these PRAs determine such values. The most relevant PRAs are Platts and Argus who on their website by carrying out all the research publish the benchmark values. In the financial market, prices are determined by the buying and selling of shares whereas the benchmark values determined by agencies where the prices are determined on a human level. This makes it more complicated as they cannot determine the present rate. This is because the data on which these agencies rely on for determining the benchmark values are of a previous day or old information. These values are important for the energy market as the market participants cannot directly observe the physical transactions concluded between parties. After all, there is no duty on the parties to disclose their transactions. The PRAs determine their prices on the basis of details they gather about the concluded transactions. They also take into account any bidding offers that took place on the market that day. They also consider information of private and public entities or organizations that is reported to them by several journalists. The information obtained from any financial institution, body, organization or market is also examined in order to arrive at a conclusion. Therefore, the identification of prices is based on deals which have been observed.

The second question that arises here is what are the methods or formulas used for determining the benchmark values and can it be different for different PRAs? To answer this question, we have to analyze the different formulas used by these PRAs in order to determine the benchmark value. These PRAs do not always deliver the same price as they adopt different formulas for calculating the same. Since the formulas differ from one agency to the other it can happen that on a same day two different prices are published. This results in an issue of tariff determination as both these agencies are reliable and the market cannot decide which one to follow. This issue can be resolved if there is an independent international body, which take into account all these globally published prices individually and determine an average price, for the energy market to function smoothly.

The third question here is that if these values are dependent solely on the physical transactions or also dependent on the financial transactions concluded on the energy market? The energy market has evolved since its inception and continues to do so with each passing day. As the energy market awards the determination method used for the values of benchmarks also need to evolve around these markets. Earlier the energy market only based on physical transactions *like*, long-term agreements and spot markets which consisted of monetary consideration along with the delivery of the traded energy commodity. At present with the introduction of other financial markets, the scenario has

completely changed. Now the parties do not always have to deliver the traded energy commodity but rather pass on the energy shares to another party. For the benchmark values, the agencies have to monitor the financial transactions also, so that a close value can be determined. This has resulted in a panic among the participants of the energy market as all transactions are not transparent enough to be taken into account by these agencies. This result in most of the transactions concluded without being reported in the energy market. Hence, the real benchmark value cannot always be determined.

The fourth and the most important question is that most of the energy producing countries have their own benchmarks, so how the prices on a global market can be determined by following different benchmarks for different products originating from different countries? Ever since the introduction of the benchmark formula pricing in the energy market, several energy producing countries have introduced their own benchmarks in order to compete in the global energy market. Energy products differ in characteristics when produced in different countries. Hence, the prices of these products are based on the country of origin. Similar products produced in two different countries can have different prices on the energy market. This can lead to pricing disputes as well as discrimination between two like products.

Limited availability of fossil fuels

Crude oil and natural gas are non-renewable source of energy whose quantity of reserves is quite less and difficult to increase significantly. In addition to this, energy production efficiency, including the entire value chain is not rising rapidly to fulfill the global demand. The amount of fossil fuels produced around the globe is not enough to meet the energy demand. Furthermore, the cost of energy production will influence the supply quantity on the energy market by influencing producer's inter-period production allocation decisions.

Supply and Demand

The basic factors that determine the international oil price are the demand and supply cycle. By evaluating major fluctuations of international oil price in the past, often the presence of imbalance in demand and supply is seen; hence, their relation is regarded as an evident and important parameter which influences international oil price.

As per the economic theory, demand is among the fundamental factors affecting the international price. Therefore, the rapidly growing demand for oil will inevitably cause the price of oil to rise. While analyzing the various major fluctuations and rise in the history of international oil prices, it is easy to see the significant role that the oil demand change has played. In the second half of 2008, global economy experienced a financial crisis under whose impact, global consumption and demand dropped and

the crude oil price collapsed.¹³ Thus, the shift in crude oil demand has an influence on the international price fluctuation.

The key drivers of global markets for natural gas are the dynamics of demand and supply for natural gas and its industrial growth in relation to organization and structure itself. Gas is also the key resource for setting of prices, as prices have increased recently and power generation depends on different sources of fuel. Hence, the factors driving gas prices have downstream impacts on the production, demand and pricing of electricity. Changes in the factors can also occur simultaneously, which makes predicting market shifts challenging.

Also, the electricity cannot be easily stored like other goods and because of that the market cannot offset price fluctuations by cutting back reserves. So, fluctuations in supply and demand for electricity may produce more frequent or more drastic shifts in prices.

Exporting Countries

Exporting countries play an increasingly crucial role in the global energy system while the importing countries do not. It is generally assumed that OPEC and America are one of the factors that influence the fluctuation of crude oil and natural gas prices.

¹³ Neha Mehra and Krishan K Pandey, "Aftermath of 2008 financial crisis on oil prices" *7th International Conference on Knowledge Discovery and Information Retrieval* 1 (2015).

The OPEC countries have more than half of the reserves available in the world.¹⁴ Therefore, oil production policies and steps taken by the organization, the volatility of OPEC's growing under-production and development plan will result in a rapid increase in the price of oil and a significant improvement in the risk premium.

Infrastructure constraints

Natural gas is transported using a pipeline infrastructure. The pipeline network, like an interstate highway system, extends across the country, taking natural gas from drilling locations to consumer houses or business organizations. The required pipeline network may not be available in that region to provide supply to consumers while new production sites are being built. Building new pipelines needs compliance with the legislation and much planning. But lack of supply infrastructure and controversy over whether and where natural gas pipelines are located can lead to competitive price volatility.

Power, unlike oil and gas, cannot be transported via ships or tankers. Major transmission infrastructure is required to transport power which is not available around the world. This is a major reason that electricity is not a global product, unlike oil and gas. The power infrastructure *like*, the transmission lines and distribution grids which link generation plants to customers have costs which can be damaged due to accidental reasons. These have repair costs which further increases the electricity costs.

¹⁴ *Supra* note 2.

Regulatory authorities

Some countries have governmental authorities to regulate the prices, while in others it is regulated by private entities. The price depends upon the policies of the regulatory authority. The involvement of government consequences in subsidies, which add to the prices of the goods supplied to consumers availing unsubsidized goods.

Natural disasters, Weather conditions and Political Scenarios

Most of the petroleum reserves are concentrated in the areas of Maghreb, Caspian Sea, Persian Gulf, extending to Transcaucasia, Siberia whose reserves account for more than half of the world's petroleum reserves.¹⁵ Instability in these areas can directly affect the supply of oil, thereby impacting oil price. A look at the oil price fluctuation, in the last century, reflects that the oil prices are dependent on the political scenario prevailing in these areas. Middle East countries still have an ongoing geopolitical risk which is affecting the international oil supply market. Also, the ongoing political turmoil will result in high volatility as the market status regarding pricing is uncertain.

Aside from having common product characteristics, petroleum and natural gas also has the characteristic of strategic supplies. Hence, its price is influenced to a large extent by

¹⁵ *Ibid.*

emergencies, climate change and other factors. Based on the difference in method, nature and emergency mechanism, the public emergencies influencing the fluctuation of oil and gas prices can be classified into: Conflicts & political instabilities; Scenarios of terrorist attacks, economic security, social security & emergencies involving foreign countries; and Natural disasters primarily referring to meteorological events, geological events, etc.

Emergencies can directly impact the demand, supply and psychological aspirations of citizens regarding future energy market, thus influencing the international price. But emergencies usually play a significant role in the price fluctuation in the short run. Furthermore, as the world's oil and gas wealth distribution are extremely unbalanced, almost more than half of the oil and gas needs to be transported through certain essential straits, canals or pipelines. Thus, the security of the oil and gas traffic route will also in the short term have a big impact on the international price.

High temperatures will boost the demand for electricity resulting in the increase of rates. In rainy and winter seasons, the demand is generally low which decreases the price and also leads to low-cost electricity generation because of wind speeds. Similarly, in season of famine and drought, the prices rise as the generation is quite difficult.

Change in global inventories and dollar exchange rate fluctuation

The inventories include conventional as well as unconventional. Former are those which can ensure regular running of the world's petroleum and natural gas production, refining and supply network, whereas later are commercial inventories which the transnational oil and natural gas companies have mastered. Since the conventional inventory consumes more than half of the total global inventory of crude oil and natural gas, the effect of this is much lower from the effect of the latter on the price of oil and gas. These inventories, in all nations, as the fluctuation between fuel supply and demand, play a stable function on the international price over the long term.

After 1974, crude oil started to be billed, transported and transacted in US dollars.¹⁶ The fluctuation in the dollar exchange rate has a significant effect on the world economy as well as the oil price and policies of oil exporting and consuming countries. The devaluation of dollar eventually triggers the rising international price of oil, whereas dollar appreciation leads to a fall in the international price of oil.¹⁷ Dollar is seen as a settlement currency of petroleum in most of the exporting countries. When

¹⁶ Birth of petrodollar 1974-1975, Great power relations, *available at*: Birth of petrodollar - Great power relations (last visited on Feb. 1, 2022).

¹⁷ How the US Dollar influences oil price, *available at*: How the U.S. Dollar influences Oil Prices | OilPrice.com (last visited on Feb. 19, 2022).

the imported commodities from Europe are paid in Euros, the alteration in the rate of exchange directly impacts the export costs of petroleum producing countries to rise and indirectly causes increase in domestic inflation. Therefore, it is evident that the valuation of the currency plays a significant role on the international oil price.

Import and export of natural gas and Liquefied Natural Gas

Areas that utilize natural gas but do not produce it, or produce enough of it, must import it from other countries using the pipeline infrastructure available to them. Import demand will establish market competition in a region where its own domestic supply of natural gas is produced and used.

When gas prices are sufficiently high to justify overseas exports, producers may opt to tap into new global markets. Such markets (new demand) bring domestic consumer competition raising the costs. LNG, *for example*, is generated by turning natural gas into a liquid. LNG is easier to store and more cost efficient to ship over long distances (*like*, overseas) where there are no pipelines. While LNG production facilities can be expensive, the opportunities for gas producers to extract the commodity are global demand and increased prices.

Technical trading of natural gas

A large amount of regulated money is invested in natural gas stocks, like many commodities. When traders look at the price volatility indicators based on their calculations and market

patterns, they cash in on a buying or selling strategy. Movements created all at once by large investment groups can very easily push market prices.

Oil and Natural gas prices for power market

These prices can rise in the seasons when there is increased demand for electricity or during the oil and natural gas shortages occurring due to severe weather conditions or transport and distribution networks being damaged due to accidents. Increase in prices of crude oil and natural gas will lead to higher prices in electricity generation as they are the main sources.

Issues and Challenges

From the above, it is evident that energy transaction and pricing mechanisms are interrelated. The prices of energy products and services depend majorly on demand and supply cycles which are determined by the physical and financial transactions in the international trade market. To determine the supply and demand of any energy commodity, one has to examine the transactions taking place in the trading platform. Whereas the transactions are highly dependent on the pricing mechanisms as the transactions increase when the prices decrease and vice versa. Thus, one can say that both, energy transactions and pricing mechanisms of energy goods and services are both interdependent on each other.

For addressing energy security concerns, one needs to examine the trading activities as energy trade ensures uniform availability of energy resources around the world. Energy trading has developed a lot of tools over the years on its own by its players such as buyers, sellers, traders, speculators, hedgers, investors, price reporting agencies, oil exploration companies etc. These trading instruments are not regulated by any international regulatory institution but rather by the individual players of the trading market. This raises concerns about the trading scenario about how every country addresses the trade aspects as every country has different exchanges on which these energy goods and services are traded.

Infrastructural security concerns regarding transboundary pipelines for the transit of oil and gas, both onshore and offshore and cables for the transmission of electricity are prevalent in every major region in the world. This results in infrastructural issues like the delivery of electricity and natural gas which is traded on a regional level as there is not enough infrastructures for transportation of the same. Electricity and natural gas are transported through transmission lines and pipelines respectively which involve huge capital investments. The constraints of not being able to trade commodities at international level result in abusive practices in the competitive market as the players on a regional level set monopolistic prices. The buyers have no option

rather than buying as there is immense demand besides security concerns.

Regulation of investment in energy sector *via* the Agreement on Trade Related Investment Measures (*hereinafter* referred to as the TRIMS) is a topic of discussion. Article 2.1 of the TRIMS states that there shall be no applicability of any trade related investment measures by the WTO members in case of inconsistency with the principle of national treatment given under Article III or prohibition on quantitative restrictions given under Article XI, but there is no definition of trade related investment measure in the agreement itself.¹⁸ TRIMS only provides a list containing requirements for local content, requirements on trade balancing, restrictions regarding foreign exchange and requirements of domestic sales. Another issue is that the agreement is not applicable to trade in services thereby making it non-applicable to the power sector.

The Energy Charter Treaty is an organisation that overseas and regulates energy security and trading activities. However, it is not a global multilateral treaty and is restricted only to the European countries. Rules for investment have been suggested for inclusion within the World Trade Organization (*hereinafter*

¹⁸ The Agreement on Trade Related Investment Measures, 1995, Art. 2.1.

referred to as the WTO) Millennium Round of Negotiations;¹⁹ however, with the collapse of negotiations at the fifth ministerial meeting of the WTO, this decision awaits the outcome of further rescue talks.²⁰ As there is yet no global multilateral treaty on investment protection, one resolution to the quandary of investment protection can be a bilateral or multilateral investment treaty between the host state for the investment and the national state being the investor. However, the Organisation for Economic Co-operation and Development (*hereinafter* referred to as the OECD) held international negotiations in order to conclude a multilateral agreement for the same which commenced in 1995 but was later on officially abandoned in 1998.²¹ If concluded, this agreement would have been open to accession by non-OECD countries also.

Conclusion

Energy resources and fossil fuels are concentrated unevenly around the globe which is a major reason for energy security concerns. With the demand for energy growing every day and it being indispensable for the human lives, security concerns

¹⁹ The World Trade Organization, *Singapore Ministerial Declaration*, WT/MIN(96)/DEC (Dec. 18, 1996).

²⁰ Draft Cancun Ministerial Text, WTO, *available at: [WTO | Ministerial conferences - Cancún 5th Ministerial, 2003 - Draft Cancún Ministerial Text](#)* (last visited on Mar. 10, 2022).

²¹ The Multilateral Agreement on Investment, OECD, *available at: [extension://elhekieabhbkmcefcobjddigjcaadp/viewer.html?pdfurl=https%3A%2F%2Fwww.oecd.org%2Fdaf%2Fmai%2Fpdf%2Fng%2Fng987r1e.pdf&clen=498700&chunk=true](https://elhekieabhbkmcefcobjddigjcaadp/viewer.html?pdfurl=https%3A%2F%2Fwww.oecd.org%2Fdaf%2Fmai%2Fpdf%2Fng%2Fng987r1e.pdf&clen=498700&chunk=true)* (last visited on Mar. 16, 2022).

are rising to a whole new level. Every industry in the business sector needs energy in one or the other way to perform its activities including manufacturing, processing or other ancillary. The increasing complexity in energy supply reflects that law is an important facet to tackle energy security concerns.

Recent market scenarios have provided reminder of the central role that energy holds in our near-term security. Energy insecurities arising from geopolitical instabilities, terrorism, natural disasters and poor regulatory design can lead to shortage of energy commodities. Lack of infrastructure, production facilities and no potential for substitution of fuel demands enormous attention to existing security policies and framework. The available international laws governing energy trading and energy security issues are not enough and hence the development of minimum standards regarding treatment of energy trade and investment at an international level is the way to go for establishing robust environment for energy transactions globally.

The issues and challenges in the energy transactions and pricing mechanism cannot be ignored, in the present times, when trading platform has developed immensely. There is a need to focus on energy trading as an altogether different sector as the regular trading framework cannot cater to its needs. Government and private entities involved in the energy transactions and pricing

need to be uniformly regulated at international level to ensure fair and transparent mechanisms across the globe. This can be done only by the establishment of an international regulatory body which can regulate every aspect at international as well as regional level by bringing standardization in the existing regulators, who have botched the energy sector due to the special properties of energy goods and services.

International energy transactions require comprehensive legal framework. The need of the hour is to find a balance while connecting energy regulating law and restructuring the energy sector. A comprehensive legal framework will do away with the complex arrangements that are required to establish market competition between various companies that are in operation of different parts of the supply system. Legislation must find the appropriate balance between the private rights of operating a business enterprise and the public duties for satisfying the demands of energy necessary for social and economic well-being, thereby eliminating any threats to energy security.