Potential impact of methane hydrate development on GCC and NEA energy trade dynamics: The Gulf perspective

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Abstract: - Northeast Asian (NEA) region has been one of the biggest fossil fuel clients of the Gulf Cooperation Council (GCC). The emergence of unconventional hydrocarbons, such as shale (oil & gas), coalbed methane, methane hydrates, biogas, coal gasification, etc. will naturally have an effect on the ongoing bilateral trade relations between the two regions. The development of such fossil fuel alternatives and more important the notion that the NEA is taking such alternatives into considerations poses a threat to GCC economy and the social welfare of the states in the region. In this study, we highlight the historical energy trade partnership between the two regions, the evolution and scientific basics of an alternative fuel source, primarily methane hydrate, a literature review on the methods of methane hydrate extraction, the challenges faced and most importantly, the uncertainty underlying the pricing of an alternative source which has yet not reached commercial production and consumption. Methane hydrates are present in substantial quantities in NEA and have the potential to disrupt global energy markets once economical extraction methods are identified and developed. Any NEA country that is able to exploit its methane hydrate resources will potentially alter its need for hydrocarbon imports, greatly impacting any future energy trade relations between NEA and GCC countries. However, one must account for the time period required for the development of methane hydrates as well as the ensuing political and technical challenges that could hinder it. A key question is: to what extent would GCC economies be affected by NEA unconventional gas development? GCC hydrocarbon exports would have to be modified to accommodate a change in customer demand. Demand would decrease and hydrocarbon price fluctuations would affect revenue streams as well as international trade partnerships. We attempt to answer these questions by developing an investment based methane hydrate model using metrics of oil & gas industry to understand the effect of such a change and its potential market penetration on the GCC region as a whole.

Key-Words: - Gas hydrates, North East Asia, Activity report, Trade partnerships, Investment modelling, Policy recommendations.

1 Introduction

The Northeast Asian (NEA) countries of China, Japan, Korea, and Taiwan rely on the GCC countries for hydrocarbon imports [1] - [3]. GCC countries have gradually increased their dependence on NEA countries as an energy export partners. For NEA countries, reliance on GCC energy imports creates energy supply risk and the subsequent desire to mitigate risk through strategic relationships with GCC countries, oil stockpiling, energy supply diversification, development of indigenous energy resources, and other means [4]. The US shale gas revolution and growing US energy independence illustrates how important the development of indigenous energy resources can be for a single nation and how disruptive such developments can be for global energy trading partners [5].

Japan, for instance, has historically been a net oil and gas importer, however, it possesses unconventional hydrocarbon resources that if developed could allow Japan to achieve gas partial or complete independence [6], [7]. Among the unconventional hydrocarbon resources that NEA countries possess, methane (or gas) hydrates are by far the most abundant [4], [8], [9], their development would create a predicament for GCC countries that rely heavily on NEA countries as hydrocarbon export markets. By some estimates, the amount of methane trapped in hydrates around the world (estimated at 187 trillion cubic meters [tcm]) [10] exceeds all other carbon-based energy reserves combined. NEA economies that are heavily dependent on imported energy are making gas hydrate recovery a strategic imperative [5].

Energy exports to NEA constitute a main driver of national wealth for GCC countries, amounting to approximately $50.5 billion in 2014 [11]. The emergence of unconventional gas resources has posed an imminent threat to GCC countries' future welfare. The potential emergence of methane hydrates in the NEA, given its probable impact on NEA gas imports as well as the interplay of this discovery in international gas markets, is alarming to GCC countries. At the same time, shale gas abundance in the United States is putting downward pressure on gas prices [10]. Several key factors contributed to the shale development boom in the United States [12], [13]:

(1) Access to cheap capital;
(2) Diversified base of market-driven oil field service industries;
(3) Innovation in technology and cost improvements;
(4) Availability of water in many basins; and
(5) Well-developed infrastructure and mineral rights laws.

The cost of drilling and completion per well for shale ranged from $4 to $9 million over the same time period, depending on the location (Niobrara, Eagle Ford, Wolfcamp, Bone Spring, Utica, Bakken/Three Forks, and Avalon) [14], [15]. The emergence of unconventional hydrocarbons reduced the volume of imported natural gas consumed in the United States. A similar effect would be seen in NEA if methane hydrate provides a similar influx of supply and reduced demand for GCC natural gas. Methane hydrates are present in substantial quantities, in excess of 12 tcm in the NEA region [2]. They have the potential to disrupt global energy markets once economical extraction methods are identified and developed. Any NEA country that is able to overcome the challenges associated with capturing and exploiting its methane hydrate resources will have access to a natural gas resource that can have a substantial effect on hydrocarbon imports. This would greatly impact future relations between NEA and GCC countries, and hence is a critical research question to address. In this work, we attempt to build an investment model that takes into all the measures and metrics to account for the monetary change in flux for the GCC in case NEA adopts a policy or a strategic change to move forward with long-term plans for change to natural gas.

2 GCC-NEA Gas Trade

NEA countries are among the largest importers of energy resources. For instance, in 2013, China imported 20 billion cubic meters (bcm) of natural gas and consumed 147 bcm, with Qatar providing 34 percent of the total imports. Similarly, Japan consumed 130 bcm, of which 124 bcm was imported. GCC sources included Qatar, the United Arab Emirates (UAE), and Oman at 17 percent, 7 percent, and 6 percent, respectively. Korea imported 46.8 bcm of its total consumption of 51 bcm. Qatar delivered 22 percent of this total and Oman provided 12 percent [2] - [6]. This energy trading profile has grown over decades, as the demand and supply of conventional hydrocarbons—such as crude oil, liquefied natural gas (LNG), motor gasoline, jet fuel, kerosene, liquefied petroleum gas, dry natural gas, distillate fuel oil (heating oil and diesel), residual fuel oil, and coal [6]—has continued to grow.

Japan, for instance, suffers from limited indigenous hydrocarbon production [5], with 45 percent dependence on oil for primary energy supply. In 2012, about 83 percent of Japan's crude oil imports came from the GCC, including UAE (23 percent), Kuwait (8 percent), and Qatar (6 percent). The main economic sectors that depend on oil are the transport (38 percent) and industrial (30 percent) sectors [1]. As for natural gas, demand is sharply rising is a result of many factors, including the Fukushima disaster that reduced nuclear power production [8]. In 2012, natural gas demand was 124 bcm, compared to 109 bcm in 2010 and 26 bcm in 1980 [2]. The primary energy demand profile is such that the transformation/energy sector is the major consumer at 64 percent, followed by the commercial sector at 16 percent, and then the residential sector at 9 percent. The major suppliers include Qatar (17 percent), Australia (16 percent), Indonesia (10 percent), Russia (9 percent), Brunei (7 percent), UAE (7 percent), and Oman (6 percent) [2]. Therefore, the need for intrinsic gas sources is an absolute must for Japan to meet current demand and future growth predictions.

2.1 What is Methane Hydrate?

Scientific research into the nature of methane hydrate dates back to the early 1800s, when scientists first created synthetic hydrate in a physical chemistry laboratory. In the 1930s, hydrate was observed forming in natural gas pipelines, in some cases blocking the flow of gas. Methane hydrate was first discovered in the natural world in the 1960s in subsurface sediments of the Messoyahka gas field of the Western Siberian basin [14] - [16]. In the 1970s, hydrate was observed in well samples from the North Slope of Alaska and in seafloor sediments collected from the bottom of the Black Sea [17]. These discoveries led to the realization that methane hydrate was not just a laboratory curiosity or an industrial nuisance, but a potentially widespread, natural storehouse of methane [16], [17]. Scientifically, it comprises of a clathrate, which is a chemical compound in which molecules of a particular material (the 'host') form a solid lattice that encloses molecules of another material (the 'guest') under conditions of high pressure and low temperature. Methane hydrate is a naturally-occurring clathrate in which a host lattice of water ice encloses guest molecules of methane [3] - [7]. In methane hydrate, the gas molecules are not chemically bound to the water molecules, but instead are trapped within their crystalline lattice [8]. The resulting substance looks remarkably like white ice [18]. When methane hydrates are exposed to pressure and temperature conditions outside its stable state or 'melted', the solid crystalline lattice turns to liquid water and the enclosed methane molecules are released as gas [19], [20]. This dissociation can be demonstrated by striking a match next to a piece of methane hydrate; the heat from the match will cause the hydrate to dissociate and the methane molecules will be ignited as they are released, giving the impression of burning ice [21].

Methane hydrates exist at different depths (reservoirs). Artic and marine sands contain shallow reserves close to the surface, with a higher reservoir quality and estimated percentage of recoverable resource. Current infrastructure can be used for their extraction. Fracture muds, mounds, and un-deformed muds are deep reserves with high reserve volume, but extraction is costly. Extraction difficulty is directly proportional to the depth of the reservoir and the deposit volume [22]. However, current oil and gas drilling and mining technologies can be used for extraction, including enhanced oil recovery methods [23], [24] such as carbon dioxide (CO_2) or high pressure steam injection into the well to dissociate the solid. Drilling can be performed using conventional oil and gas methods [25]. Fig. 1 shows timelines for methane hydrate activity by different countries in different reservoir types around the world [19]. The figure highlights that the first methane hydrate production is expected beyond 2020.

2.2 Natural Gas from Methane Hydrate

Producing natural gas from methane hydrate requires finding economical methods to safely extract gas while minimizing environmental impacts and competing on a cost basis with conventional natural gas. Most natural gas production occurs from conventional gas accumulations by drilling a well into the reservoir rock, casing the well with piping, perforating the piping to allow the gas to flow into the wellbore, placing a string of tubing inside the casing and then extracting the gas up the piping, sometimes with the aid of a pumping system [26]. Production of methane from hydrate deposits in sandstone or sandy reservoirs is likely to be approached in a similar manner [8]. As pressure in the well bore is reduced, free water in the formation moves toward the well, causing a region of reduced pressure, forcing the hydrate to dissociate and release methane [26]. The change in enthalpy (sum of internal energy and a product of pressure and volume) forces the dissociation of hydrate into methane and water. The molecular volume of methane extracted per dissociation chemical reaction depends on the hydrate density within a particular type of hydrate reserve and the reservoir temperature and pressure [27] - [29].

A complication is that hydrate dissociation is endothermic (heat consuming), which results in cooling and potential re-freezing. Therefore, depressurization and, in some cases, local heating are incorporated into production [28]. Methane hydrate wells are more complicated than most gas wells due to technical challenges, such as maintaining commercial gas flow rates with high water production rates, operating at low temperatures and low pressures in the wellbore, controlling formation sand production into the wellbore, and ensuring the structural integrity of the well [14]. Technologies exist to address these issues, but implementation would add to the costs of producing natural gas from hydrate [19], [20]. Production of natural gas from methane hydrate has potential environmental impacts and safety concerns, such as minimizing the release of methane to the atmosphere, as methane has a climate forcing potential 30 times greater than CO_2 [25].

2.3 Potential of Methane Hydrate Capacity in NEA

Countries such as the United States, Japan, China, India, Canada, South Korea, and Russia are in stages of exploring and developing methane hydrates [29]. Global deposits are estimated to be in excess of 187 tcm [10]. For the top players in the NEA region, Japan is in the most advanced stage of exploration. Conservative estimates put the country's gas hydrate reserves at 6 tcm, enough to meet its current natural gas needs for more than 80

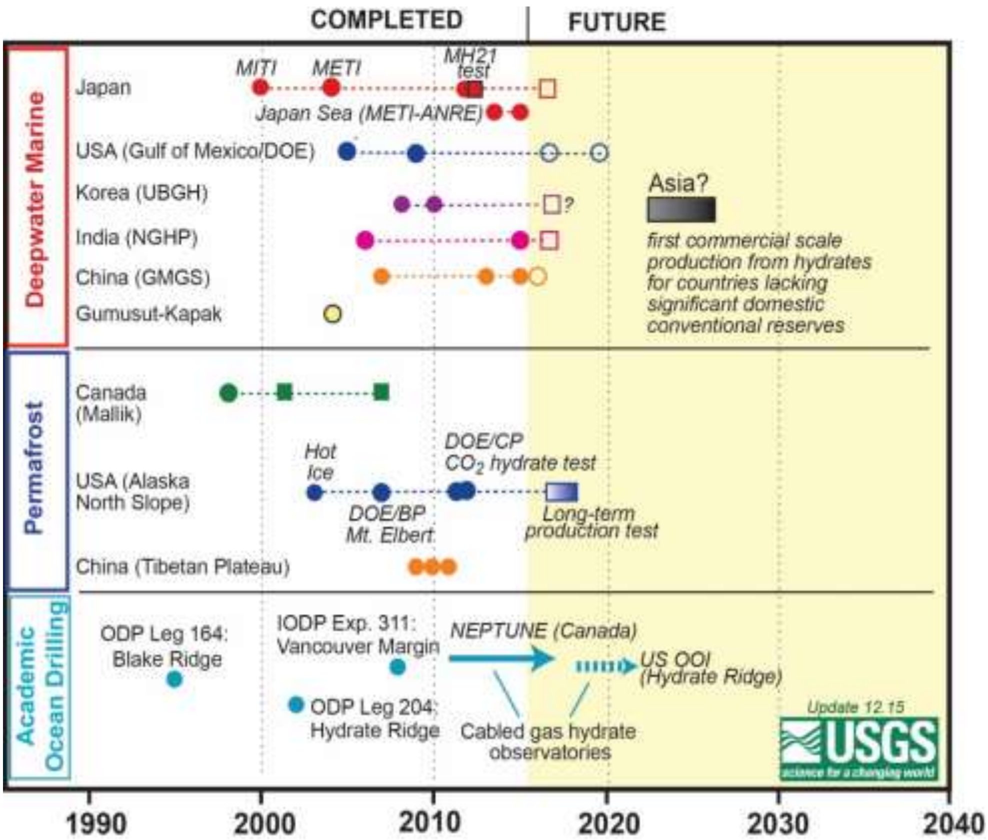

Fig. 1. Timeline chart showing the deep-water marine, Arctic permafrost and academic ocean scientific drilling expeditions dedicated to the research on naturally occurring methane hydrates by different countries around the world. Open symbols are planned/possible programs, circles are primarily 'geologic' programs (characterization) and squares denote production tests. [20]

years [2] - [6]. Similarly, China consumed 147 bcm of natural gas, 45.8 percent of its total energy use. A conservative estimate of China's hydrate reserves is a relatively modest 5 tcm, though smaller neighbours in East Asia hold another 10.5 tcm [5]. Korea consumed 51 bcm of natural gas in 2012 [3]. The country currently produces around 1 bcm of gas. Korea has confirmed hydrates in the Ulleung Basin, base of its modest traditional natural gas production which has been mapped already [2]. Before full extraction efforts, a country must

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2.4 Price and Cost Evaluation of Methane Hydrates

The cost per unit of methane hydrate depends on the following factors [7]:

(1) Resource field data, including distance from shore, water depth, exploration, volume, quantity, quality of hydrate, and the number of sweet wells.

(2) Production method, which entails depressurization, horizontal or vertical well, and gas pressure.
(3) The evaluation of economic potential, which requires the average production cost, NPV/IRR of investment, and payback time period.

Without data from a long-term production test, private sector partners are collaborating with government agencies to understand the economics of gas production from gas hydrate deposits. Studies by Howe [30] and Hancock et. al. [31] are among the few economic analyses of methane hydrate production to have been completed. These studies use CMG-STARS (STARS) for reservoir simulation of permafrost-associated gas hydrate production and Que$tor, an Oil and gas capital and operational cost estimation software [31], for estimation of cost per million British thermal units (MMBtu). The reported cost was $6 per MMBtu for production from permafrost-associated gas hydrates overlying producible free gas. These estimates include pipeline tariffs, but not local taxes and tariffs [19], [32]. To assess the production characteristics and economics of marine gas hydrates, Walsh et. al. [33] used the TOUGH+HYDRATE reservoir simulation results published by Moridis et. al. [34] and Que$tor for cost analyses comparing gas hydrate production to that from a conventional gas reservoir. The cost estimates included: pipeline, production facility, and subsea development for both conventional and gas hydrate production and the extra costs (e.g., additional wells, artificial lift to manage water production, etc.) associated with gas production from hydrates. At a 50 percent confidence level, the additional cost associated with production from deep-water gas hydrates as compared to conventional gas deposits is $3.40 to $3.90 per MMBtu [20].

The International Energy Agency has estimated that methane hydrates will be produced by 2025 at a cost of $4.70 to $8.60 per MMBtu [33], [34]. The breakdown of this range is not clearly defined and the evolution of the industry over time will dictate the eventual price per unit. At this point, it is too early to predict. Additionally, transportation issues will likely pose an even greater economic challenge for gas hydrates than for many conventional gas reservoirs or other forms of unconventional gas. The primary reason is geographic: many conventional and unconventional (e.g., shale, coalbed) deposits are closer to production and distribution infrastructure than the deep-water marine and permafrost areas where resource-grade gas hydrates are concentrated [33], [35]. NEA interest in methane hydrate exploration and development begs the question of the future evolution of supply and demand of fossil fuels and importantly, how GCC countries would deal with methane hydrate production. For this change to happen, cost and price per unit of methane hydrate would have to be competitive compared to conventional natural gas. The scenario is similar to shale gas integration in the US energy market, which provides a return on total capital of up to 15 percent (Exxon Mobil) [36] - [37]. In such a case, we believe that the GCC hydrocarbon export landscape would be altered in a phase-by-phase way over the coming years (beyond 2030). This stage-wise change could be a sector-by-sector replacement or penetration of methane hydrate in terms of demand volumes, hydrocarbon price fluctuations, as well as international trade partnerships. Every component in the energy value chain would be significantly impacted. As an example, Japan's current methane hydrate reserves are estimated at 6 tcf and the natural gas demand as of 2012 was 130 bcm, of which 4.8 bcm was locally produced and 124 bcm was imported. The transformation sector was the largest consumer, at 64 percent of total consumption. Assuming demand remains constant, Japan could meet 46 years of gas supply from hydrates alone, given a price per MMBtu less than natural gas (local and imported).

Methane hydrate integration into the NEA energy mix could also deal a significant blow to renewable energy, which remains somewhat capital intensive [37] - [40]. These technologies could take the back burner if methane hydrate production goes full scale or proves its worth as an independent, cheap, available, and reliable fuel source for the future. Therefore, hydrocarbon exporting countries, particularly in the GCC, will have to develop mitigation strategies to manage the transition, as their source of revenue is at stake. The key strategies moving forward must not only be development of strong ties with demand markets, but also economic diversification to reduce dependence on hydrocarbon exports.

3 A Long-term Investment Model Framework to Evaluate Market Penetration of Methane Hydrates in NEA Region

NEA interest in methane hydrate exploration and development begs the question of how longer the supply and demand of fossil fuels will remain in the future and importantly, the extent to which GCC countries would be flexible to accommodate this new energy scenario (with methane hydrates) and if it would be financially viable to mitigate such a change in terms of supply and demand loss. We believe that in most likelihood the GCC hydrocarbon export landscape would be altered in accommodating such a paradigm shift in customer demand although it is worth mentioning that the methane hydrates energy industry in the NEA is still in its infancy with no widespread exploration. Changes would come in phases over time in demand volume, hydrocarbon price fluctuations, as well as international trade partnerships. Every component in the energy value-chain would be significantly impacted and would require alterations. Below is a causal loop representation of how supply/demand change would affect the trade that would impact GCC economics hence evaluate penetration? All of which, would influence trade, as shown in the causal loop of Fig. 2.

$$\Delta supply, \Delta demand\ of\ fossil\ fuel\ from\ GCC\ to\ NEA$$
$$\xrightarrow{affects} GCC\ fossil\ fuel\ trade\ (exports)$$
$$\xrightarrow{impacts} GCC\ economics$$
$$\xrightarrow{helps\ in\ understanding} NEA\ methane\ hydrate$$

$$penetration\ depth$$

$$\xrightarrow{influences} GCC\ future\ energy\ trade\ stance$$

Fig. 2. Causal loop of our approach that explains how (a) A paradigm shift in supply-demand would potentially affect trade dynamics (b) how this change impacts GCC GDP, (c) GCC would respond to penetration of an alternative energy source (methane hydrate) in the NEA energy market, and (d) GCC would evaluate future business growth prospects with NEA using (a), (b) and (c).

Table 1. A sample set of performance and monitoring indicators for methane hydrate integration into the energy mix by the NEA countries.

	Indicators
Impact on GCC hydrocarbon industry	% change in oil & gas supply [PCiS] % change in oil & gas demand [PCiD] % price fluctuation [PF] % change in supply elasticity [PCSE] % change in demand elasticity [PCDE] % loss of revenue [LoR] % Investment disparity [ID] .... **% change in GCC GDP [ΔGDP]**
Impact of Methane Hydrate on NEA countries	***NEA Region*** # of stakeholders # of countries developing hydrates # of countries consuming hydrates # of countries exporting hydrates # of countries with adaptive national strategies for hydrates …. ***Individual NEA Country*** % increase in hydrate contribution in the energy market [PP] % domestic hydrate production [DHP] % imports of hydrates [IHV] % domestic production growth rate increase of hydrates [DPG] % import growth rate increase of hydrates [IGD] % saving w.r.t. a unit of fossil fuel [SFF] % change in domestic fossil fuel exploration volume [PVFF] % change in fossil fuel import volume [IV] % of execution of hydrate adaptation projects % expenditure according to the annual budget for hydrates related practices # of funding agreements signed and managed for hydrates # of projects/program proposals prepared for future expansion of hydrates # of contracts signed …. ***Sector breakdown (specific sector)*** # of sectors using hydrates in the mix % of methane hydrate contribution in specific sector % change in fossil fuel usage in specific sector % increase of jobs created directly or indirectly in hydrate industry …

Further we split the indicators into two prime categories: change of fossil fuel trade supply from the GCC to NEA (Δsupply) as a result of a change in demand required by NEA of GCC fossil fuel (Δdemand). For each category, we list the indicators shown in Table 1, for Δsupply: percentage change in demand, price fluctuation, price elasticity of supply, loss of revenue, investment disparity, etc. and for Δdemand: percentage change in demand, NEA local methane hydrate production, imports/export of methane hydrate by NEA, growth rate of methane hydrate activity in NEA, etc. as shown in Fig. 3. The indicators have a set of dedicated market influencers such as for Δsupply: fossil fuel trade activity, supply trade volume to NEA, supply chain finance, money supply, consumption rate of fossil fuel by NEA, cost minimization of trade when trading with NEA, the interest rates of trade with NEA, etc. and for Δdemand: volume change of import, risk of replacement from fossil fuel to methane hydrate, price per barrel comparative to methane hydrate extraction, price elasticity of demand, etc. Using these influencers, we devised mathematical equations (also shown in Fig. 3) to calculate each one of them.

Once the supply-side and demand-side performance (using indicators) of both GCC and NEA, respectively, is evaluated. We see their corresponding effects on GCC fossil export volume (Δexport), which is an important component in determining the overall GCC GDP. A negative change in GDP is an export loss which in turns means that the supply and demand has had negative performances. In such a case, the GCC would have to start trading oil, maybe at a lower prices and to different client countries as it has an outstanding surplus now, which is not good for the GCC. The trade links between both regions would change for the future.

The indicators come from the entire energy industry: oil & gas/renewable/alternative energy sector, stock evaluations, trade volumes, trade changes, price derivatives, stock market pricing, methane hydrate trade activity in NEA, consumption rates, export/import volumes, international market pricing, methane hydrate effect on investment, etc. All of which will consequently calculate "the market penetration effects of methane hydrates in NEA from a GCC fossil fuel export perspective".

4 Model Based Policy Recommendations for GCC Countries for Future Strategic Economic & Trade Development

GCC countries clearly face an uncertain long-term future regarding the emergence of new energy sources that may greatly impact demand for their hydrocarbon exports. To assess the effect of the emergence of such alternatives on bilateral relations between GCC and its fossil fuel importing partners, the following key factors must be considered:

(1) Hydrates are largely offshore and often far from traditional gas sources, which will slow initial development, limit it to areas with government support, and create larger logistical hurdles than, for example, onshore shale gas production. On the other hand, once infrastructure is in place in these fields, operators should be able to ramp up production, with more predictable long-term production than shale gas enjoys.

(2) The technical hurdles are different and nontrivial for hydrates. The time that industry will need to overcome these hurdles is reflected in the timeline, which uses current projects and progress as a guide for how quickly individual countries will build production on a large scale. Once these technical barriers have been overcome, we expect hydrates to be a viable resource much in demand in the relevant markets, which are largely areas where traditional gas resources are limited.

(3) Early gas production from shale gas occurred at a time of high gas prices worldwide. Gas demand is still relatively high in Japan, which is driving continued activity on hydrates. There is currently little appetite for gas hydrate development in the Gulf of Mexico, though the Gulf does have excellent infrastructure and would be a better target than the undeveloped Japanese fields if the economic drivers were similar. An unexpected spike in local gas prices could drive faster growth in areas outside Asia.

Should methane hydrate development follow a growth curve similar to that of shale and tight gas reserves in North America, infrastructure deployment in the next decade would be followed by hydrate production that could result in a major portion of NEA energy demand, particularly in the power sector, being met by hydrate resources by 2040. This opportunity will only be realized, however, if NEA countries leading hydrate development, particularly Japan, pursue policies to implement the necessary infrastructure tapping into in hydrate-rich fields. The energy strategies of NEA countries must therefore explicitly account for hydrate development to ensure the necessary development commitments are in place. Even NEA countries that will only adopt proven technologies and infrastructure rather than lead their development need to incorporate regional hydrate development explicitly into their energy outlooks and strategies.

Overly conservative energy strategies must be avoided by NEA countries that continue to have substantial hydrocarbon imports in their long-term energy plans. Only the development of indigenous energy resources, such as hydrates, will offer the energy security that all countries aspire to achieve. From the perspective of GCC countries, the NEA hydrate opportunity needs to be understood and the appropriate mitigation and adaption measures implemented to ensure that there will continue to be valuable end markets for hydrocarbon resources that today are largely exported to NEA countries with active hydrate development programs. In the GCC, hydrocarbons are a precious resource for multiple industries and so planning for maximum value extraction from abundant hydrocarbon resources must be in place long before any potential disruptions, such as those discussed here, occur.

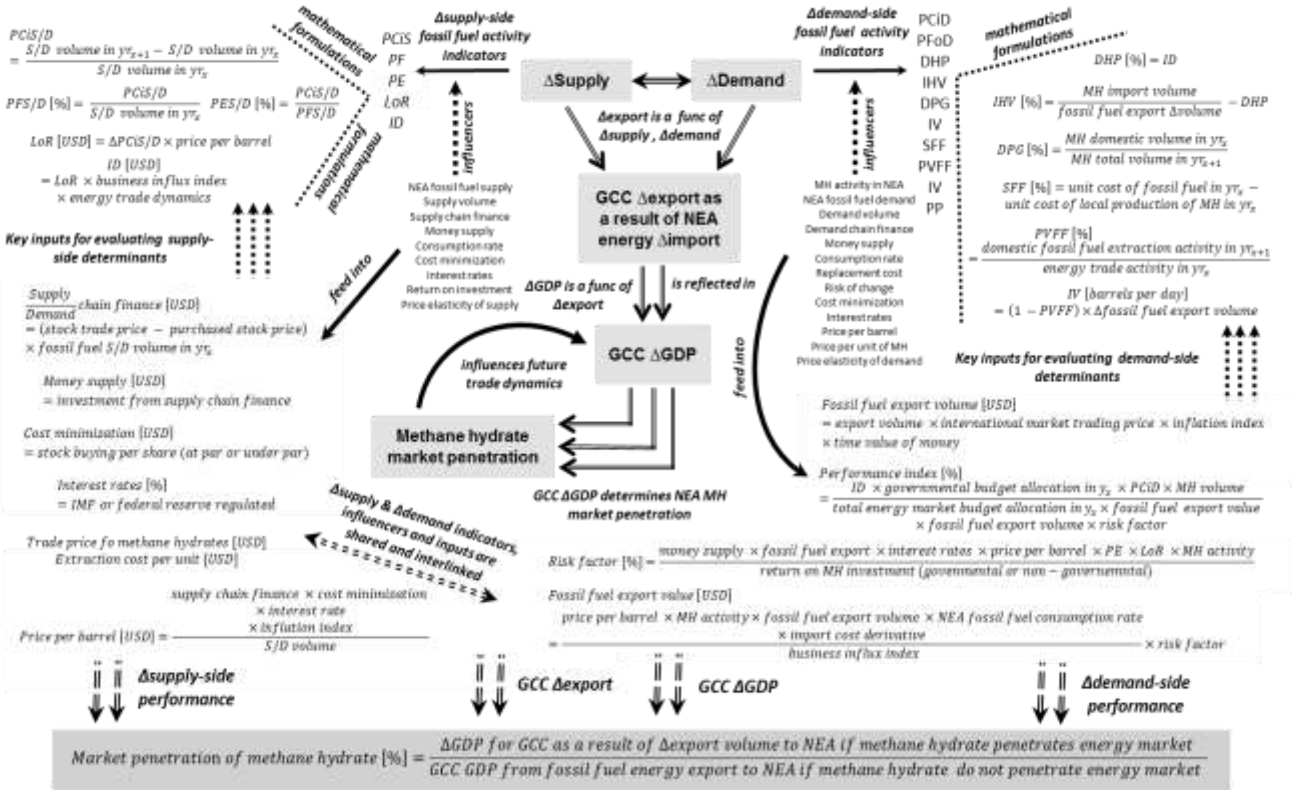

Fig. 3. Shows the hierarchy of our approach in terms of change in supply of fossil fuel to NEA as result of demand of fossil fuel change from GCC to NEA. In the supply/demand sections we show an industry sample-set of indicators (that we propose are indicator relationships) and their subsequent influencers from a GCC point-of-view. The independent blocks of supply and demand input into GCC fossil fuel exports which reflects in GCC GDP change and finally showcases the effect of market penetration of an alternative energy source (methane hydrates). The change of GCC GDP would help GCC decide on how to proceed further with the NEA region in terms of fossil fuel trade.

5 Conclusion

Methane hydrate activity would impact GCC-NEA natural gas trade in terms of a change in NEA demand volume and GCC loss of export. For instance, in Japan's case, contributions from Qatar, UAE, and Oman (the highest GCC contributors of natural gas to the country) could decrease by 30 percent, 9 percent, and 7.5 percent, respectively over the course of 2013-40 [2].

For the GCC, the lack of demand for conventional gas and downward pressure on its commodity prices would result in lower government revenues in the medium to long-term. Reduced government receipts would bring about reduced government spending and decrease economic growth below its present rate of four percent. Furthermore, slower economic growth with increased inflationary pressure (due to global pricing, monetary and fiscal policy, trade, etc.) in the market would result in decreased consumer spending and decreased investment (declining trend in interest rate and high inflation) would negatively affect the gross domestic product of the region.

These economic changes may also be inflationary. Slower economic growth may bring about a fiscal stimulus, with higher government spending and increased borrowing creating extra demand in the circular flow. If no change in government spending occurs, the economy may require a monetary stimulus, for example, raising demand for loans leading to house price inflation. Monetarist economists believe that inflation is caused by ‘too much money chasing too few goods’ and that governments can lose control of inflation if they allow the financial system to expand the money supply too quickly. All the above can result in increased inflationary pressure. GCC would have to approach other trading markets, formulate new partnerships, or find new client countries to prevent these macroeconomic effects.

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