The previous chapters analysed the various issues related to Energy, Security and Indian Ocean in the National Security paradigm, but this chapter elaborates the issues with reference to India’s Energy Scenario in Indian Ocean.

One of the least discussed and critically analysed areas in the strategic arena today is Energy and its Security. Energy has the direct link to a nation’s economic security which ultimately leads to nation’s development in all respect. Therefore, Energy plays a pivotal role for any nation’s security. Despite the limited availability of fossil fuels particularly oil and natural gas which is scarce, today the world totally depends on these resources for their economic growth. This increases competition for Energy resources and puts pressure on the states whose dependency is more on other states due to either unavailability of indigenous resources as well as by not having any healthy technologies to meet the requirement bring the concept of Energy Security in the main stream.

India is a growing economy, driven by energy hungry industries. To ensure wealth at home, and to increase its prestige in the international comity of nations, India must secure its energy resources. However, as the scenario is pretty much the same for its neighbours in the regions and even outside, it faces formidable challenges to meet the ever increasing demand for energy supply¹.

The uninterrupted flow of Energy supply is essential for any state for its survival and needs complete attention for a developing state particularly like India. The unavailability of adequate Energy resources compels a developing state like
India to find the possible ways to meet its Energy requirement. It is in this situation, Indian Ocean plays a significant role in India in achieving its Energy requirements from exporting states which requires additional Security.

The other options that is readily available for any state is the use of renewable energy technologies. The geographic position and the climatic condition of India provides opportunities to utilise the energy from its natural renewable resources like solar energy, wind, geothermal, bio gas, bio fuel and hydro and as well as from waves and tidal energy.

Though India has a huge amount of coal deposits, the coal mined is of low quality and also has high ash content\(^2\). Therefore, India imports oil from the Gulf to meet the energy requirement of all sectors of Indian industry. In order to diversify energy sources India is importing natural gas through pipelines. However there are serious concerns about the safety of the pipelines laid through land or sea routes. This will be discussed in the later paragraphs in detail.

India’s Energy vulnerability is high due to its increased import of oil and gas from external sources which could ultimately threaten National Security. It is imperative for a state to augment indigenous production to be a player in the international community.
The present Petroleum and Natural Gas Minister Mr. Dharmendra Pradhan, says that the goal is to make India self-sufficient in Energy resources. India is further investing and improving the various renewable Energy sectors. Such concerted efforts can increase India’s Energy supply and can enhance efficiency in Energy consumption.

**India’s Energy Situation: An Overview**

India is a rapidly growing economy which needs sustainable energy to meet its energy demand. The Indian economy faces significant challenges in terms of meeting its energy needs as of now and in the coming decade because of its dependency. To reduce its dependency on the conventional sources, the focus was given to renewable Energy technologies in that India has launched a Solar Mission in 2010. The Mission has set a target of 20,000 MW using solar energy. Solar Mission stipulates implementation and achievement of the target in 3 phases (first phase upto 2012-13, second phase from 2013 to 2017 and the third phase from 2017 to 2022) for various components, including grid connected solar power.

It is estimated that approximately 30 percent of India’s generated power is lost in transmission. Distribution is the weakest link of India’s power supply chain as it faces substantial technical losses (because of overloading of transformers and conductors, for instance) and commercial losses of electricity (because of low metering efficiency, poor billing and collection, large scale theft of power). Due
to the lack of transmission and distribution of power to less densely populated areas which are located far away from the power generating stations is the major reason for not being able to achieve the needed percent of electrification in the country.

The installed capacity of power plant in India as on 29.02.2012 was 1,90,593 MW which includes 22,253 MW from Renewable Energy Sources. It is estimated that as on 31st January, 2012, the total installed capacity of grid connected Renewable Energy is 23.12 GW. Amongst this, the biggest portion is through Wind power, which stands at around 16,000 MW\(^7\).

However, due to the new government initiative - Jawaharlal Nehru National Solar Mission (announced in year 2010), the Grid connected Solar PV and the Concentrated Solar Power Market plays a significant role in the Energy market and it is slowly booming.

Around 440 MW of Solar PV was installed in the last year and is expected to increase many folds due to highly lucrative government schemes. Small Hydro and Biomass technologies represent the remaining portion of the Grid connected Renewable Energy mix. Government also sees Geothermal Energy as an interesting Renewable Energy source for India and few sites in Andaman Nicobar Islands etc have been identified for trials\(^8\).
**Solar Energy**

India receives solar radiations from sun with almost 300 clear sunny days, most parts of the country receive 4-7 Kwh/m²/day with about 1500-2000 sunshine hours per-week (depending upon its location), which is far more than the current total Energy consumption. Ministry of New and Renewable Energy (MNRE), Government of India estimates solar potential at over 10000 MW. The states on the west part of India like Karnataka, Andhra Pradesh, Rajasthan and Gujarat have the highest potential. Parts of these states have the best solar irradiance in India with 4-7 Kwh/m²/day\(^9\).

**Wind Energy**

In wind power India is the world’s fifth largest producer after Denmark, Germany, Spain, and the USA. In 2011, it is reported installed capacity is 16084 MW and ranked as the 5th country with the largest installed capacity. In the same year India added another 3019 MW of wind power\(^10\).

**Hydro Power**

It is estimated that in India nearly 150,000 MV is produced through hydro power. During 2005, only about 31 plants have either been developed or are being developed. In the last decade the development of hydroelectric power has slowed down\(^11\). The reasons include high capital investment, time lag between feasibility studies and commissioning, environmental requirements and public opinion, etc. Recently Ministry of Power has initiated several steps to accelerate
the capacity addition of hydroelectric projects to utilize hydroelectric potential of
the country. Hydroelectric initiative for development of 162 new hydroelectric
plants spread across 16 states in the country with aggregate 47,930 MW has been
launched.

Electricity

In this industrialised and modernised world electricity is the inevitable choice of
energy and the prime component of primary Energy. Access to cheap, affordable
and reliable electricity is critical to a country’s growth and prosperity.

The states are working hard to satisfy the power deficits because power does not
only help for household purposes, but the huge amount of electricity has also
been utilised by the industrial sector which directly connects the states with the
world economy.

However, it is a matter of concern that per capita consumption of electricity is
among the lowest in the world. India’s energy consumption has been increasing
as one of the fastest rates in the world due to population growth and economic
development. Industrial consumers are the largest group of electricity consumers,
followed by the domestic, agricultural and commercial consumers, in that order.

Despite the overall increase in Energy demand, per capita Energy consumption
in India is still very low when compared to the other developing countries like
China\textsuperscript{12}. Due to unconditional weather, India has had to face increasing deficit in
power supply, both for meeting its normal Energy requirements as well as its peak load demand.

During the peak hours and in summer the utility of electricity is high and therefore it is necessary to take a step for a planned load shedding by many utilities to maintain the grid in a healthy state. The average all-India shortages in 2009-10 were at 10 per cent in terms of normal Energy requirement and about 13 per cent in terms of peak load\textsuperscript{13}.

Nearly 40 % of total Energy requirement in India depends on commercial fuels, especially in the rural household sector; it is met by non-commercial energy sources, which include fuel wood, crop residue, and animal waste, including human and draught animal power\textsuperscript{14}.

However, other forms of commercial energy of a much higher quality and efficiency are steadily replacing the traditional energy resources being consumed in the rural sector. However, the Indian Power Ministry has been increasing its power production every year, but still in the name of growth the power consumption in India keeps increasing.

**Power Shortages**

Rapid growth of the Indian economy places a heavy demand on electric power and this adds to the shortage of power which is already a huge problem. This shortage of power and lack of access acts as major constraints for economic
growth. Average peak shortages excluding scheduled load shedding was estimated at 12% and average Energy shortages at 11% in 2008-09\textsuperscript{15}. Shortage of power supply and frequent power cuts impose a heavy burden on India’s fast-growing trade and industry.

**Strategic Petroleum Reserves (SPR):**

As a precautionary step to counter any eventualities in times of crisis India developed its strategic crude oil reserve sized at 37,400,000 barrels, which is enough for two weeks of consumption\textsuperscript{16}. The petroleum stocks have been transferred from the Indian Oil Corporation to the Oil Industry Development Board (OIDB). The OIDB then created the Indian Strategic Petroleum Reserves Ltd (ISPRL) to serve as the controlling government agency for the strategic reserve. The first storage facility at Vishakapatnam, Andhra Pradesh will hold approximately 1.3 million tonnes of crude oil. The other facility at Mangalore, Karnataka will have a capacity of 10.995 million barrels. The third facility at Padur, Karnataka will have the capacity of 18.7 million barrels. The selection of coastal regions for storage facilities was made so that the reserves could be easily transported to refineries during the supply disruption\textsuperscript{17}. In order to strengthen the existing Energy Security measures, it is imperative to increase the volume of strategic reserves all across the country and also it should be operational.
Natural Gas:

Along with the oil, Natural gas is also viewed as a fast emerging preferred fuel of the future mainly because of its environment friendly character as well as economically attractive pricing. India has approximately 38 trillion cubic feet (Tcf) of proven gas reserves\(^{18}\). India’s Natural gas reserves come from the Bombay High complex situated off the western shores of India. The Bay of Bengal and Krishna – Godavari Basin provides the capability of achieving its Energy Security. Due to the large demand from the power and fertiliser sector there is a considerable increase in the demand for Natural gas. Despite the steady increase in India’s natural gas production, demand has outgrown supply and India has been a net importer of natural gas.

According to the Gas Authority of India (GAIL),\(^{19}\) the current natural gas pipeline network extends approximately about 4100 miles and its transmission capacity is approximately 5.2 Bcf/d. India started importing LNG in 2004. In 2008, India imports nearly 75 percent of LNG from Qatar. India has become the sixth largest importer of LNG in the world. India has two operational LNG import terminals namely, Dahej and Hazira terminals. The Dahej terminal in Gujarat has a capacity of 5 million tons per year (mtpa), the second terminal is at Hazira which has the capacity of 2.5 mtpa and in near future it is expected to increase by 5 mtpa. The fourth terminal is under process. Besides these indigenous programmes India has cross border pipeline projects. Currently India is working on three main pipeline projects\(^{20}\) which need to be highlighted.
because, these pipelines passes through the other states which comes under the umbrella of National Security. Besides the above three projects the Oman –India subsea gas pipeline is reconsidered again.

**Figure 8: Iran-Pakistan-India Pipeline:**

![Iran-Pakistan-India Pipeline](http://www.juancole.com/2013/03/sanctions-inaugurate-pipeline.html)

The idea of Iran-Pakistan-India gas pipeline was initiated in 1989 by Dr. A S Ardekani of Iran and the Director General of TERI, Dr. R K Pachauri. The world’s second largest gas reserves are in Iran and therefore it is very much appreciated if the supply of gas to India was channelized through a pipeline. The main problem in executing this project is because the pipeline has to pass through Pakistan region. It is a well-known fact that India and Pakistan never maintain a cordial relationship ever since their Independence and it is perceived that due to enmity Pakistan could interfere and stop the flow of gas to India at
any time. One can think that the Indus water treaty between the two had operated smoothly it is because Pakistan showed more interest in that treaty, but it is not the case with the gas pipeline. The risks are also high due to the Kashmir issue.

The 2,670 km long pipeline from Iran is to pass through Pakistan. Apart from the Security problem the other problem facing the pipeline projects is due to the lack of financiers. Besides the obstacles the three countries are trying hard to push the project with massive determination and confidence.

Pakistan has begun to realise that it will soon be running short of gas, therefore from the commercial and strategic point of view this project considered. The first detailed assessment of the project by Anglo-Australian Company, BHP Billiton was made in the year 2003. It is estimated to lay down 44 inch pipeline from Asalouyeh on the Iranian coast. From South Pars field it would be pumped and travel 1,115 kilometers across Iranian territory to the Pakistan border and a further of 760 kms through Pakistan to the Indian border. It is estimated that Pakistan would use about 60 MMSCMD and India 90 MMSCMD. The total cost of the project was estimated at $4 billion.

Though Pakistan shows interest in this project the internal situation in Pakistan poses an obstacle. The situation is volatile to the extent that any agreement with India will increase militancy in the country. Despite the unrest in Baluchistan where Pakistan’s own gas lines from the Sui Gas field, its own gas network, were regularly blown up by insurgents, it was felt that the project could go forward,
provided certain measures were taken to physically protect the pipeline. Also it is necessary to undertake repairs faster and at short notice.

In the meanwhile, Iran had proposed that each country should build its own section of pipeline; not a very satisfactory arrangement in terms of operation of the entire network, obtaining international finance and gaining the confidence of customers in terms of reliability of supply. Several meetings between India and Pakistan have been conducted, but still they could not come to an agreement on transit and transportation fees.

Figure 9: Myanmar – India Gas Pipeline

This pipeline is another option available for gas transportation to India. The opportunity gained power after massive gas reserves was found in A1 block in the Rakhie basin in Myanmar by an Indian-Korean group to the tune of 4.2 trillion cubic feet (TCF) to 5.8 TCF\textsuperscript{22}. GAIL has already been offered a 65 percent share by Myanmar in production, in addition to two new blocks in A2 and A3 on nomination basis. GAIL is exploring overland and undersea pipeline routes from Myanmar. The other option is to bring the pipeline through the north-east of India, which becomes excited due to the ongoing insurgency situation in North eastern part of India.

India has also drawn plans for a possible pipeline from the Bibiayana fields in Northeast Bangladesh to Delhi. The project is a low probability venture and is still pending for approval in the Bangladeshi Parliament. The main concern before Bangladesh is to satisfy both domestic and export demands.

Besides this, Myanmar advised India about the China’s intention to buy the gas. In 2007 it was agreed that the entire production of 16 MMSCM of gas from A1 and A3 fields will be sold to Petro China at a wellhead price of $4.279/MMBtu. China is to lay a 2,380 kilometer pipeline connecting the gas field to China. China was also to pay $ 150 million annually for 30 years as a transit fee for the 990 kilometers through Myanmar. Due to this China showed its interest in the area, but for India it becomes a critical issue. Apart from the gas pipelines, China also opened up the possibility of laying parallel oil pipeline to tranship oil from the Middle East to avoid the long route through the Strait of Malacca in the
Indian Ocean. It is not surprising that China may interfere in this issues which directly or indirectly affect India’s Energy Security which in turn would affect the National Security.

**Figure 10: Turkmenistan-Afghanistan-Pakistan-India Gas pipeline**

![Map of Turkmenistan-Afghanistan-Pakistan-India Gas pipeline](http://www.dw.de/peace-pipeline-moves-closer-to-fruition/a-15697941)

*Source: http://www.dw.de/peace-pipeline-moves-closer-to-fruition/a-15697941*

The laying of the gas pipeline from southern Turkmenistan through Afghanistan to Pakistan was proposed by an Argentinean company in 1992. Due to the US presence in the area, the project was re-allocated to an American company. Due to the unstable condition in Afghanistan the projects were pulled out. Later in 2002 the project was revived when the heads of the state of three countries signed an agreement to implement Turkmenistan – Afghanistan – Pakistan (TAP) project. Gas from the Afghanistan field was to be fed through a 56 inch diameter pipeline, crossing 1,680 kilometer in length with the capacity of 90 MMSCMD to Pakistan via Herat and Kandahar in Afghanistan to join up with
Pakistan’s local gas network. The cost of the project was estimated at $3.3 billion. A number of Steering committee meetings were held under the guidance of Asian Development Bank (ADB) to discuss the project but the details of the project could not be finalised. It is considered that the project should be extended to India to link up with the transmission line feeding gas to northern India. Initially India agreed to be an observer. In 2010 India became a member after which the project was renamed as the Turkmenistan – Afghanistan – Pakistan – India (TAPI) pipeline project. As a result the cost has now escalated to over $7 billion, due to this India showed its reluctance because it is not sure that this pipeline project would meet the Energy requirement of India because it has to share among the four states.

India is also not satisfied with the unstable political and Energy situation in Afghanistan. Other related security fears also pulled back India to reconsider. The reserves feeding the TAPI pipeline were originally estimated as 1.7 TCM by a Russian geologist. In an audit carried out in 2003, the estimated reserves were raised to 4.5 TCM which is more sufficient to meet the demand of 90 MMSCMD over 30 years. Till 2013 there has not been any progress in the project.
In 1995, the Oman Oil company headed by John Duess proposed laying a 1,100 kilometers subsea pipeline of 24 inch diameter that would link Oman gas fields to the state of Gujarat in India. An advantage of this proposal is that, it has the shortest coverage of distance and the fact is that it has no involvement of a third country during transit\textsuperscript{24}.

However, the proposal could not materialise as, first there were technical problems as there was a need to manufacture a thick pipe which is enough to withstand the water pressure at depths of 3500 meters; second there is no submarine vessel that has been designed to repair the pipeline at that depth if emergency arises. And third is that the strong ocean currents in the sea bed could affect the stability of the pipeline. Finally India had a doubt if the reserves of gas in Oman are capable of satisfying the energy needs of India in a sustainable manner in the near future.
The members of South Asian Gas Enterprises (SAGE) confirmed that the earlier technical difficulties have now been overcome due to the advancement in technologies. Corus, the UK steel company recently acquired by Tata Steel of India, now developed the technology to manufacture the steel pipeline for the project. It has taken up a contract to supply pipeline for about 312 kilometers length, which is proposed to laid on the Seabed in Gulf of Mexico. SAGE is planning to create an Energy corridor, with several pipelines connecting Energy producing countries like Iran, Turkmenistan, and Qatar and making the pipelines to pass through the UAE and Oman, all the way to India.

Through the observations it is clear, that India is surrounded by countries that have abundant gas reserves, but because of security and political considerations India has not been able to finalise any overseas pipeline projects as of now. It is clear that until the political and Security issues are settled it is difficult to finalise these agreements.

**Nuclear Energy:**

India has 20 operational nuclear reactors at six nuclear power plants with a generation capacity of 4.8 GW, representing about 2 % of total utility based generation capacity. At the end of 2013 the Kudankulam power plant in the southern part of Tamil Nadu was connected with the electricity grid in order to provide a continues flow of generating electricity throughout the state, by doing so additional 1 GW is added to the country’s nuclear capacity. The Government of India planned to install six additional reactors with a combined 4.3 GW of
capacity which are under construction and they are expected to come in mainstream by 2017.

For developmental activities, India requires reliable supply of electricity to equalise the growing power demand. The government expects to increase the nuclear share of total generation from 3% in 2011 to 9% by 2032\textsuperscript{25}.

The government has signed several agreements with countries including the United States, Russia, France, the United Kingdom, South Korea, and Canada. As a result of these agreements the reactors in India receive uranium fuels\textsuperscript{26}.

After the Fukushima disaster in Japan, there was much opposition from the people to start a nuclear power project even though the government follows safety audits with the existing reactors\textsuperscript{27}.

India has a flourishing and largely indigenous nuclear power program and expects to have 14,600 MWe nuclear capacity on line by 2020. It aims to supply 25% of electricity from nuclear power by 2050\textsuperscript{28}. India is a non signatory of Nuclear - non Proliferation Treaty (NPT) and Comprehensive Test Ban Treaty (CTBT)\textsuperscript{29}, India indigenously produces its nuclear power. India has reserves of thorium, thereby started programmes indigenously\textsuperscript{30}. After the Indo-US civil nuclear deal, foreign technology and fuel are expected to increase India’s Nuclear Power.
**Energy Challenges in the Indian Ocean:**

The Energy challenges in the Indian Ocean includes environmental issues, influence of power, competition for resources, piracy, maritime terrorism, increasing militarisation, marine pollution and oil related environmental disaster. These challenges do not only have its impact in India it is common to all the states that rely on resources from other states as well as who has the right to enjoy the sea borders.

**Environmental Issues:**

Earth is home to millions of species including the humans. Among the planets in the Solar System ‘Earth’ is the only place where life is known to exist. Liquid water which is necessary for all known life, is not known to exist on any other planet in the Solar System except Earth.31

The environmental issue today alarms the world to think in terms of safety and security of its own people as well as the entire world natural system as such. Due to the fast depletion of natural resources, excessive use of fossil fuel resources results in Global warming results in climate change which drastically affects the state in terms of famine, flood, unpredictable seasonal weather, etc. which is the basic survival of any state. Environmental issues will never stop with the above said issues alone - it further leads to other issues like rise in sea water level, rise in temperature level which make a direct impact on human Security which comes under the umbrella of National Security.
The above pointed issues are common to all states, but the issues in Oceans represent climate change, depletion of ocean resources, issues of bio Security and marine pollution will directly affect the state that have the direct access with seas.

**Climate Change:**

The entire world community faces serious problems due to climate change which cause rise in sea water level, migration of people living in low lying areas from one place to the other, environmental hazards, cyclones, drought, impact on health and crop yield, water scarcity due to unexpected seasonal weather condition because of the emission of greenhouse gases particularly methane, nitrous oxide, hydro fluorocarbons$^{32}$.

The countries by itself should take necessary action to reduce such activities in order to protect the human community from the above coated dangers. It is unpredictable that the countries who are no responsible for global warming will not suffer, because environment has no imitation it affects the nook and corner of the globe. This issue cannot be addressed without addressing the issue of Energy because the excess use of fossil fuel resource is the main culprit for Climate change$^{33}$.

**Depletion of Ocean Resources:**

Due to the overexploitation of marine resource by the humans for their own selfishness, ocean resources get depleted very quickly - particularly, the fishes,
coral reefs, oil, natural gas, etc. Importance of securing the marine resources to our future generation paved way to think in terms of Marine Security.

**Marine Pollution:**

The marine environment is facing a number of pressures; oceans are used for multiple purposes. It is not only used for transport it is the home of number of species and are rich in other minerals added as a valuable assert for any state when the shores touches. India is a peninsular state therefore it enjoys marine resources to a great extent.

Being a peninsular state India should also think about the pollutions that takes place in the Oceans. There is no need that the wastes should be put in the middle of the ocean even if they were in shores it will be washed away by the waves. For e.g. when people visit the beach they throw waste things in the sea. If the wastes are bio degradable then there won’t be any problem if a non bio degradable like plastic is thrown then the sea organisms in the water get polluted and leads to number of health issues to those who consume sea foods.

The marine environment is the biggest challenge because nearly 70 percent of the earth is covered by water in the form of oceans. It is imperative for a government to preserve its ecological sensitive areas, develop and increase the potential of marine living resources, ensure effective monitoring and enforcement with respect to fishing activities, improve the living standards of coastal communities, maintain the health of the marine environment and address issues of critical uncertainty and climate change.
The biggest challenge that the world is facing is from nuclear wastes\textsuperscript{35}. They are normally classified as low-, medium- or high-level, according to the amount and types of radioactivity they contain. The high-level waste produced by nuclear reactors is the longest lasting contamination risk of a nuclear power plant. These radioactive wastes are hazardous to most forms of life and the environment. They are regulated by government agencies in order to protect human health and the environment\textsuperscript{36}.

The oceans provide the most important food ingredient all around the world - common salt. It has variety of fishes and other related organisms, these marine lives become a source of livelihood to many people. Due to climate change and other environmental issues ground water level is decreasing - therefore the states are trying to harness advanced technologies to change salt water to potable drinking water\textsuperscript{37}. Apart from this the modern economy is based on oceans which contain huge amounts of natural gas and petroleum.

Ocean dumping alarms the society and today forces it to think in terms of Ocean Security. Sewage, chemical and nuclear waste of research foundations and the all-pervasive littering of beaches and other coastal picnic and recreational areas makes oceans a dumping yard.

A report by the United Nations Environmental Programme (UNEP) says that plastic, especially plastic bags and Poly Ethylene Terephthalate (PET), is the
most common of all ocean pollutants\textsuperscript{38}. Also, plastic is the most dangerous material to be dumped into the ocean with regards to marine life. Easily mistakable as food by marine mammals, fish, birds and turtles, plastic proves lethal for them.

The dumping of hazardous wastes is permitted to a certain extent\textsuperscript{39}, but these permits are almost always, grossly misused. Permits lead to the possibility of collisions, groundings and accidents that result in de facto ocean dumping, more often than not of materials not allowed to be dumped. Consumption of fish contaminated from radioactive wastes may pose a serious problem worldwide because of nuclear waste dumping in the oceans.

Dependence of import of Energy from external sources is vulnerable to disruptions. Energy Security does not only mean the Security of equity investments and trades with energy-rich countries it is mainly based on securing shipping routes especially for oil, coal and natural gas as well as the pipelines reaches the Indian territory. It is also important to note that investment and trade with Energy rich countries are directly linked with the stability of the source country. Transportation routes are open to risks like natural disaster and as well as to threats from the countries like blockade of shipping routes during war, which may make affected countries to divert its regular route to find alternative which is not familiar thereby unimaginable.
**Risk factor:**

India’s growing Energy demand is only through import, therefore Security of supply routes becomes as an integral aspect of India’s Energy Security strategy. The transportation through Sea Lanes of Communications is vulnerable to several types of threats. These threats are broadly classified into three:

i) International disputes
ii) Intra-state Conflict and Terrorism and Piracy
iii) Natural disaster.

**International Disputes:**

Conflict between the countries can be the source of instability for sea lanes. The fossil fuels have to pass through several other regions of the world which encompass choke points to reach the country of destination. Therefore when a conflicting situation arises it directly or indirectly affects India’s Energy routes. Strait of Hormuz is considered to be the most vulnerable. The daily flow of oil through the Strait is about 7-17 million barrels which is roughly about 40% of all seaborne oil trade.

Any threat or blockage to the Strait of Hormuz is capable of blocking nearly 30% to 65% of India’s oil import from Iraq, Kuwait, Qatar, the UAE, Iran and Saudi Arabia, and is depended on whether the load ports are located on the Persian Gulf that has to pass through the Strait or not.

This kind of blockage of the Strait becomes not only a challenge to India, but also to the rest of the oil importing states too. The conflict between Iran and west
particularly the US is very evident in the recent times. Development of Iran’s enriched Uranium had led to increase in tensions in the region. However, under President Obama’s new policy to engage Iran and a deal by IAEA to persuade Iran to ship Iran’s low-enriched uranium (LEU) for conversion of its 20 percent uranium for its medical research reactor in Tehran which helped to reduce the tensioned situation.

It is also perceived that if India-US strategic partnership becomes stronger then a possible eruption of hostilities between the US and Iran might affect the Iran-Pakistan-India pipeline project.

**Intra-State Conflict, Terrorism and Piracy:**

The disagreements between the government and secessionist groups as well as non-state actors such as terrorist groups and pirates pose a serious threat to the shipping routes as well as for the pipelines in the Indian Ocean. The pirates and the extremist group pose a serious threat to the supply routes that need to transverse region marked by intra-state conflict. It is difficult for states to individually deal with threats to SLOCs merely through military means and it is also believed that the use of military force do not address the root cause of the conflict.

It is also analysed that India’s energy imports that passes through the Malacca Straits and the Bab-al-Mandab or around the Gulf of Aden are most vulnerable for pirate attacks. It was also reported that during 2007 nearly 263 pirate attacks
took place in the region, particularly in unpatrolled waterways through which 90% of the global trade flows.

In 2009 the International Maritime Bureau’s Piracy Reporting Centre in Malaysia reported that pirates attacked 42 oil-laden tankers around the world. In 2010 there were three piracy attacks - two in Gulf of Aden and one in Malacca Strait. This disruption due to pirate attacks would affect India’s import of Coal from Indonesia and natural gas from Malaysia. As India seeks to diversify its energy imports, disruption caused by pirate attacks in the Malacca Strait could impact India’s energy imports from the countries such as Vietnam for coal, and Indonesia for coal and natural gas.

The tankers passing through this 1.7 mile-narrow strait are ready targets for hijackers particularly because the movement of the tankers were very slow and difficult to tackle it. The vessels carrying Inflammable nature of LNG are considered even more vulnerable for terrorist hijackers.

The Bab-el-Mandab poses another serious threat to energy imports, not only for India, but also for the states involved in maritime activities. It is situated between Yemen, Djibouti and Eritrea provides a strategic link between the Mediterranean Sea and Indian Ocean and connects the Red Sea and the Gulf of Aden and the Arabian Sea. The choke point at Bab-el-Mandab has the potential of being an obstacle for India’s Energy imports from North Africa - India’s import from West Asia it is minimal. As a diversifying process India is looking at Africa as a
new energy partner and in that way Bab-el-Mandab may pose a challenge to India’s oil imports from Sudan, Algeria, Libya and Egypt and also LNG from Europe (Belgium and Norway).

Piracy in Gulf of Aden has been a persistent threat over the last decade or so. However, the threat has only recently gained serious attention, particularly energy security because a total of 135 attacks took place and more than 600 seafarers having been kidnapped and held for ransom. Pirates functioning from the failed state of Somalia were behind the hijacking of supertanker MV Sirius Star about 450 nautical miles off the coast of Kenya in November. The Saudi owned ship, Sirius Star was loaded with 2 billion barrels of crude oil, worth about US$ 110 million. This highjack was considered as the first most direct instance of the impact of piracy on the security of energy supplies in the world.

**Natural Disaster:**

The natural disasters like hurricanes, cyclones and tsunami makes all countries vulnerable to supply disruptions results in sudden oil hike. In the Indian Ocean, there have been attempts to study the possible impact of natural disaster on the energy security of the littoral countries. The 2004 Tsunami caught all Asian countries unprepared. The recent Fukushima incident too hit the states to think about the nuclear disaster at sea. However, it leads the way to think about the need for emergency preparedness and early warning systems.
**Possible Response Options:**

India’s unique geostrategic location in Indian Ocean poses challenges as well as opportunities. The maritime challenges and threats that India is facing already have resulted in significant maritime relations between India and several Southeast Asian countries as well as with extra regional powers.

**Alternative Routes:**

By analysing the threats and existing transport routes India is pushing for alternative routes and mechanisms that would allow importing energy from alternative routes that are relatively safer. Though alternative routes were looked at earlier, they didn’t become a reality due to the geopolitical reason or due to cost effectiveness.

**Disaster Management:**

The Tsunami in 2004 brought to the fore the possibility of natural disaster disrupting the energy supplies in the region. Along with the joint patrolling, countries are increasingly making disaster management and mitigation a crucial part of their maritime security not only for securing the Energy supplies.

**Joint patrolling:**

The Indian Navy has collaborated with countries in what is called a “Sea Lane sanitizing role”. Countries such as Indonesia, Singapore, and Malaysia have seen India as a ‘reliable and non-controversial ally’ in keeping SLOCs and Choke
points, such as Malacca Strait, clear of piracy and their linkages with terrorism. India already has a series of joint patrolling exercise with Indonesia in a part of 200 nautical miles-long energy feeder paths\textsuperscript{42}.

A regional approach to securing SLOCs is however crucial. There is a need to pool resources, assets, efforts and intelligence in order to tackle threats to maritime security such as the identification of suspicious vessels on high seas\textsuperscript{43}. There are several regional multilateral issues that were addressed through East Asia Summit (EAS), ASEAN Regional Forum (ARF), Indian Ocean Naval Symposium (INOS), the Council for Security Cooperation in the Asia Pacific (CSCAP), and Regional Cooperation Agreement on Combating Piracy and Armed Robbery (ReCAPP) against ship in Asia. The Indian Navy also holds an annual diplomatic initiative called Milan that is a comprehensive Track 1 exercise for greater coordination on issues of Ocean governance, sea piracy, terrorism and disorder at sea\textsuperscript{44}.

Patrolling is relevant not only on sea based routes, but also for land based pipelines. The security of transnational pipelines can be ensured, through patrolling of the entire length of the pipeline. This patrolling can ensure the pipelines from attacks by secessionist groups working in that area.
Treaties and Agreements

The way of ensuring reliability of energy supplies is through bilateral and multilateral agreements such as the Indo-US Civil Nuclear Deal, Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) Free Trade Agreement (FTA) negotiations, Association of South East Asian Nations (ASEAN) and India Free Trade Agreement (FTA) negotiations, India - Sri Lanka Comprehensive Economic Partnership Agreement (CEPA) negotiations, India-Gulf Cooperation Council (GCC), and the Free Trade Agreement (FTA) negotiations. India-Israel Free Trade Agreement (FTA) Negotiations show that India is trying to balance a friendly relationship with extra regional states which in turn would strengthen its Energy supply routes and helps to attain its national security objectives.
End Notes

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