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PHYSICAL PROTECTION OF INDIA'S CRITICAL MARITIME INFRASTRUCTURE: Part 2: MARITIME ENERGY SECTOR

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The impact of the energy sector upon other sectors of the economy, especially in a severely energy-deficient country like India, is inordinately large. As such, its criticality is commensurately high. The production and supply of energy resources relies on a complex system of[1] infrastructure that includes Exploration and Production [E&P]) — commonly known as the 'upstream' sector — involving a large variety of drilling rigs, processing and control platforms, pipelines, and, numerous types of support ships and vessels. Transportation of petroleum-based energy involves specialised ships, pipelines and associated manifolds, dedicated oil terminals and berths in ports, Single Point Moorings (SPMs), etc. The storage of these products involves strategic oil storage fuel-storage tanks and underground cisterns, above-ground tank-farms, flow stations, and other such infrastructure. Finally, the refining and distribution infrastructure involves refineries (India has the fourth-largest refining capacity in the world)[2] and a network of crude-oil pipelines, product pipelines, natural gas pipelines, and so on. Much of this infrastructure is either 'maritime' in nature or has close relational linkages to 'maritime' infrastructure. This is true of non-petroleum-based energy as well. For example, many nuclear power stations use seawater for cooling and are located along the coast. Likewise, in India, the promise of solar energy notwithstanding, it is offshore wind energy that holds the greatest potential. "At a wider level, *the global* interdependence of the energy industry – and its impact on the global economy as well as directly upon that of India – demands that serious consideration be given to addressing its multifarious vulnerabilities".[3]

"Terrorist movements and organisations such as the Al Qaeda and the ISIS have attacked facilities and personnel of oil companies in Algeria, Iraq, Kuwait, Pakistan, Saudi Arabia and Yemen, and have also captured numerous oil fields".[4] At one point

1. CTED,PHYSICAL PROTECTION, March 2017, 4.
2 Press Trust of India India to Continue Growing Fastest; Be Second-largest Economy by 2030: PM." Business Standard, February 11, 2019. Accessed June 9, 2019. https://www.business-standard.com/article/pti-stories/india-to-continue-growing-at-fastest-pace-could-be-second-largest-economy-by-2030-pm-119021100314_1.html.
3 CTED,PHYSICAL PROTECTION, March 2017, 4.
4 *Ibid*.

in the recent past (2015) crude oil extraction, storage and refining facilities was estimated by the UN to be generating income to Al Qaeda of the order of $500 million. As the awareness of 'easy pickings' to be had from attacks on energy infrastructure spread within terrorist circles, there has been a sharp rise in the interest shown by terrorist groups in oil and gas infrastructure. According to START[5] (Consortium for the Study of Terrorism and Responses to Terrorism), between 2010 and 2014, Pakistani energy infrastructure was the target "of almost as many attacks (439) as the next three States — Yemen (170), Colombia (161), and Iraq (146) — combined. The Philippines, with 73 attacks, rounds out the top five".[6] The preferred modus operandi has been bombings, though arson and sabotage have also been witnessed in significant numbers of cases.[7]

Insofar as 'Maritime India' is concerned, some 56% of India's proven oil reserves are located offshore. Offshore production accounts for some 45% of overall indigenous production but only some 16% of India's overall demand. These figures mean that not only is it critical to protect infrastructure pertaining to the indigenous exploration and production of offshore oil and its transportation to the shore, but it is equally if not more important to ensure the 'security-of-energy' in terms of the oil being imported. In both cases, the associated infrastructure encompasses a complex mix of shore-based, underwater, and sea-based assets.

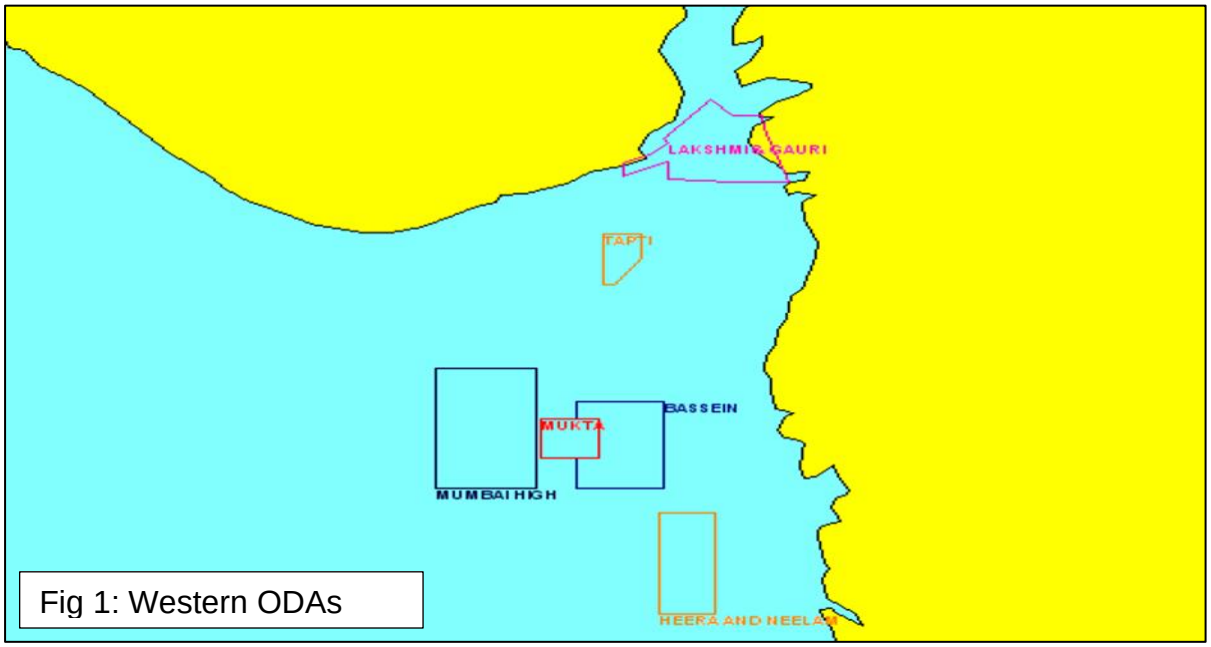


Fig 1: Western ODAs

Insofar as indigenous offshore production is concerned, there are ten Offshore Development Areas (ODAs) on the western seaboard. These are Mumbai High North, Mumbai High South, Bassein, Panna, Mukta, Heera, Neelam, Laxmi, Gauri and Tapti. These ODAs, which are located at average distances of between 40 nm and 130 nm

[5] START is a university-based research and education Centre comprising an international network of scholars committed to the scientific study of the causes of human consequences of terrorism in the USA and the world.

[6] CTED,PHYSICAL PROTECTION, March 2017, 4

[7] *Ibid*.

(i.e., 75-240 km) from the coast are depicted in Figure 1. They contain some 15 process complexes, 7 SBMs, 214 well head platforms, 25-30 oil rigs and a varying number of support vessels. The replacement cost of this infrastructure is estimated to be well upwards of Rs 200,000 crores.

Likewise, as shown in Figure 2, ODAs are located on India's eastern seaboard within the Krishna Godavari, Mahanadi and Cauvery basins. Active production is ongoing in the KG D6 block being exploited by Reliance; the Ravva field being exploited by Cairn and ONGC, and, the PY 1 & 3 fields being exploited by HOEC and Hardy, respectively. As in the case of the western ODAs, here, too, there are a number of valuable albeit scattered assets, including, *inter alia*, two floating Processing Platforms, ten well platforms, some 15 oil-rigs and/or drill-ships, and over a hundred support vessels of varying sizes, descriptions and functions.

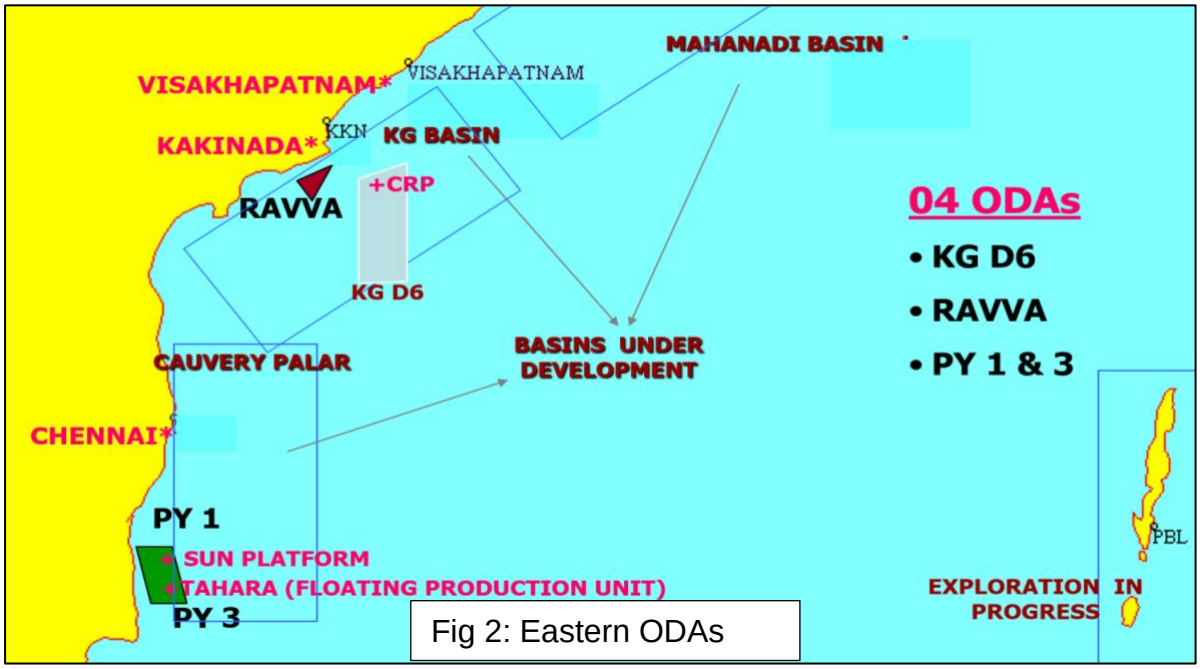


Fig 2: Eastern ODAs

The defence of offshore all offshore assets (including the offshore exploration and production infrastructure) is the responsibility of the Indian Navy's Flag Officer Defence Advisory Group (FODAG), who, since June of 2002, is also the advisor on offshore defence to the Government of India as a whole.[8] Since there are a number of agencies and organisations that are involved in the security, safety and and protection of these offshore energy assets in times short of inter-State armed conflict, coordination in respect of the physical protection of this critical infrastructure is sought to be ensured through an 'Offshore Security Co-ordination Committee' (OSCC), chaired by the Director General of the Indian Coast Guard.[9] The OSCC was constituted 1978 and is the apex body for reviewing and evaluating Offshore Security in India. It meets every six months and comprises members drawn from the Indian

[8] Indian Navy, *Flag Officer Defence Advisory Group*, Accessed 02 December 2019, https://www.indiannavy.nic.in/content/fodag-0

[9] Indian Coast Guard, *Maritime Surveillance*, Accessed 28 November, 2019, https://www.indiancoastguard.gov.in/content/1718_3_MaritimeSurveillance.aspx

Navy, the Indian Air Force, the Indian Coast Guard, the IB, the MEA, various echelons of the police, and the ONGC.

At a slightly more granular level is the Regional Contingency Committee, which is chaired by the respective Chief of Staff of the Indian Navy's Western and Eastern Naval Commands and also meets every six months. In addition to the organisations represented in the OSCC, the RCC has representatives from private players in the upstream oil and natural gas sector.

Physical security is ensured through continuous patrol effected by some 21 light but armed patrol craft, known as 'Immediate Support Vessels' (ISVs), manned by Indian Naval personnel. Apart from routine dissuasive and deterrent patrolling, the actual 'doing' of whatever needs to be done in the face of a heightened threat is regularly practised via a series of exercises culminating in a contingency-based simulated 'emergency' exercise, conducted six-monthly, which bears the generic name "Exercise PRASTHAN". Emergencies that are practised include, *inter alia*, anti-hijacking drills and bomb disposal procedures involving the Indian Navy's Marine Commandos (MARCOS) and Explosive Ordnance Disposal (EOD) Teams, while testing and honing skills required to combat consequent outbreaks of fire, structural damage, damage from premediated and inadvertent collisions, etc.

Around-the-clock surveillance is crucial to the protection of such critical infrastructure. This is because the UNCLOS limits Coastal States to buttressing the 'navigational safety' of artificial islands (which includes, *inter alia*, drill-rigs, process-platforms, etc.), by creating 500-metre 'safety zones' around them. This radius of 500-metres is clearly inadequate for purposes of security. For instance, an explosive-laden speedboat traveling at 30 knots that entered this safety zone would physically collide with the offshore asset in about 32 seconds. Within these 32 seconds, even if a fully-trained security-team with an equally fast interceptor-craft were to be available at the offshore asset itself, it is clearly impossible to realistically identify the vessel as friend or foe, attempt to establish communications, await a response, and, if no response or an unsatisfactory response is received, to then dispatch the security team to intercept the vessel. Although UNCLOS does state that the "*safety zone "… shall not exceed a distance of 500 metres…except as authorized by generally accepted international standards or as recommended by the competent international* organization*",* the International Maritime Organisation (IMO) has yet to approve" [10]a single request for an increase in this radius. All that the IMO has done is to task "Flag States with ensuring that their vessels do not wrongly enter established safety zones"[11]. It is utterly silent on the question of non-State entities and other threats to offshore assets. Consequently, ever since 9/11, noting the failure of international

[10] Simon O William "OFFSHORE INSTALLATIONS: PRACTICAL SECURITY AND LEGAL CONSIDERATIONS." *CIMSEC*(blog), October 11, 2013. Accessed June 10, 2019. http://cimsec.org/offshore-installations-practical-security-legal-considerations/7872.
[11] *Ibid.*

treaty law to provide specific authority for an "immediate response to vessels that pose imminent threats to"[12] an offshore-asset, States have opted for security measures under the universally recognized concept "of right of self-defence to protect life and property from imminent risk of harm"[13]. India, too, is using these broad tenets of international law to strengthen its legal framework in protecting its offshore assets. However, the paucity of police-officials, lawyers and judges who are well versed in international maritime law is a major national infirmity that our contemporary strategy must actively address.

For all that, the security of energy-assets is not limited to upstream segments of the oil and natural gas sector alone. As an example, the FODAG is also responsible for the security of OTEC and Offshore-Wind installations, as stipulated in the "National Offshore Wind Energy Policy – 2015". Likewise, OTEC-based Low-Temperature Thermal Desalination (LTTD) plants currently provide almost all potable water in Kavaratti, Agatti and Minicoy islands, while similar ones are planned in another six of the islands of this chain, viz., Androth, Amini, Kalpeni, Chetlat, Kadmat and Kalpeni. These invaluable offshore assets, too, form part of India's critical maritime infrastructure within the energy sector.

APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
2014-15: 1,89,432 Thousand MT ÷ 1000 = 189.432 Mn MT x 7.33 = 1388.53656 Mn bbl ÷ 365 days = **3.80 Mn bbd**											
16902	14905	16211	14222	15990	15989	16193	15005	16820	17560	12991	16645
2015-16: 2,02,850 Thousand MT ÷ 1000 = 202.850 Mn MT x 7.33 = 1486.890 Mn bbl ÷ 365 days = **4.073 Mn bbd**											
15535	17454	15619	17732	17235	15787	15568	16636	17726	18129	16882	18546
2016-17: 2,13,932 Thousand MT ÷ 1000 = 213.932 Mn MT x 7.33 = 1568.121 Mn bbl ÷ 365 days = **4.296 Mn bbd**											
18127	17903	17666	17320	18207	17529	18897	19051	19641	20066	17631	18405
2017-18: 220434 Thousand MT ÷ 1000 =220.434 Mn MT x 7.33 = 1615.781 Mn bbl ÷ 365 days = **4.427 Mn bbd**											

Fig 3: India's Oil Imports

India's imports of crude oil constitute perhaps the most glaring criticality in terms of maritime infrastructure. Figure 3 documents the fact that India is currently importing some 4.4 million barrels of oil per day, yielding an import dependency of 80%.

With 7.33 barrels of oil being considered to be equal to one 1 Metric Ton (or 'Tonne'), India is importing approximately 220,434 thousand tonnes annually. Dividing this

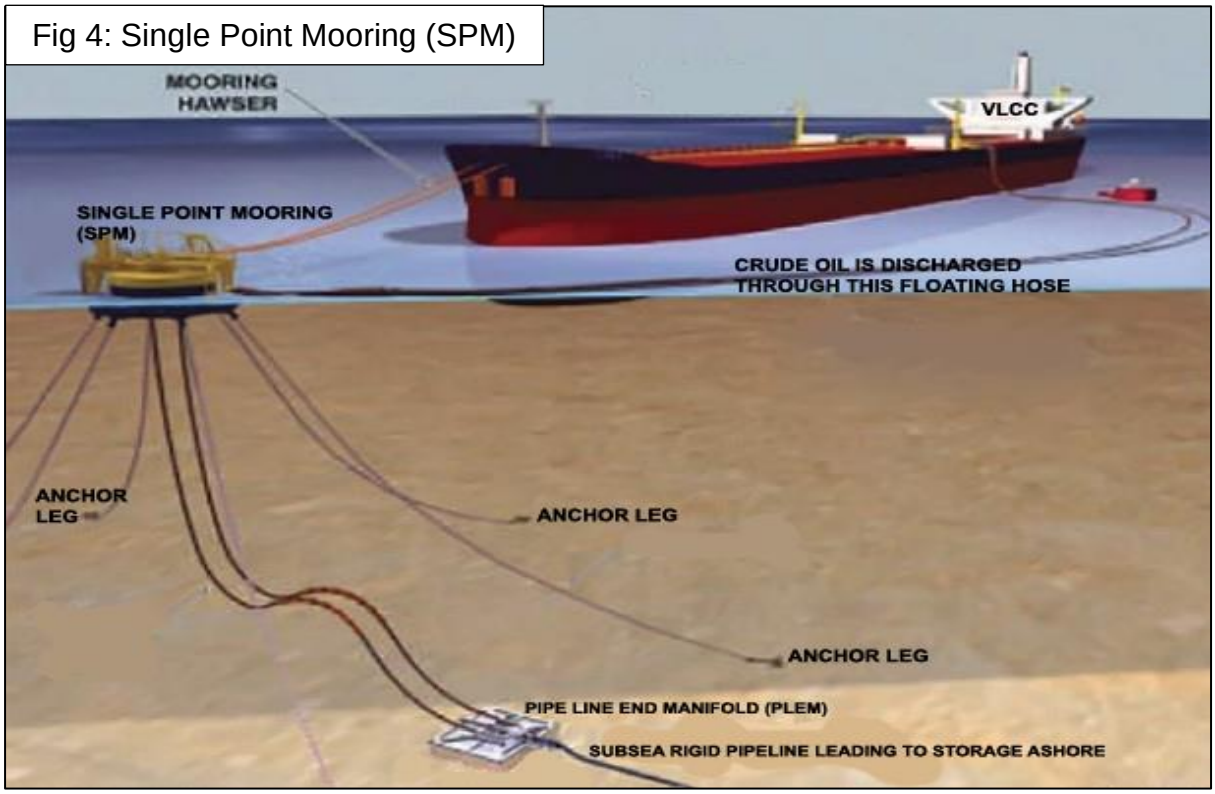
[12] *Ibid.*
[13] Simon O William, OFFSHORE INSTALLATIONS.

value by 365 (days in a year), yields a requirement of 604 thousand tonnes per day. Now, an average crude-oil tanker carries about 80,000 tonnes of crude oil (≈ 0.6 million barrels), while an average Very Large Crude-oil Carrier (VLCC) carries about 250,000 tonnes of crude oil (≈ 1.8 million barrels). So, to bring in 604 thousand tonnes of oil per day, 8 standard oil tankers must call at Indian ports per day. It all of this oil were to come on VLCCs, the requirement would be for 2.5 VLCCs per day — i.e., one every 8-12 hours!

These huge VLCCs are needed to feed, for the most part, the northern refineries at Jamnagar, Vadinar, Mathura, Bina, Babina, Bathinda and Koyali, to which list will soon be added Barmer.

In order to discharge their cargo of 250000 to 300000 tonnes of crude oil, each of these oil-laden giant ships tie up to large, purpose-build buoys known as Single Point Moorings (SPMs). Each SPMs is "anchored offshore and serves as a mooring point as well as an interconnection for tankers loading or offloading liquid products"[14]. The crude oil is transferred from the ship into the buoy using a floating hose. It then enters the SPM, which is connected to a submarine pipeline between the pipeline end manifold (PLEM) on the seabed and the buoy.[15] The oil is then led to storage tanks ashore via a rigid submarine pipeline. Figure 4 offers a schematic depiction of an SPM:

Fig 4: Single Point Mooring (SPM)



[14] Ocean State Forecast *Ocean State Forecast.*Publication. Center for Ocean Information Services, Government of India. Accessed June 10, 2019. https://www.incois.gov.in/portal/osf/osf.jsp.
[15] Raunek "How Single Point Mooring (SPM) Offshore Operation Works?" *Marine Insight*, October 26, 2017. Accessed June 9, 2019. https://www.marineinsight.com/offshore/how-single-point-mooring-spm-offshore-operation-works/.

It takes no great imagination to realise the criticality of this segment of maritime infrastructure related to the energy sector. At present, the safety and security of each SPM, as also that of the VLCC(s) moored at the SPM, is the responsibility of the port authority concerned and, as such, it is the Central Industrial Security Force (CISF) that physically discharges this responsibility. However, challenges remain as the CISF claims that the organisation lacks requisite assets and trained personnel.

Ships smaller in size than a VLCC can, of course, go directly to a designated alongside berth (a quay or jetty). Within the limits established by the concerned port, the safety and security of all assets, including the tankers themselves, is that of the port authority, and this responsibility, once again, is physically discharged by the CISF.

Then there is the whole business of the country's Strategic Petroleum Reserve (SPR) which must be factored while considering energy as a critical infrastructural sector. However, since this is located ashore rather than in 'floating tankage' as is the case with some other countries, it is not directly a maritime issue and, as such, has not been dealt-with in this piece.

It is not just imports of crude oil that the protection of India's energy-based critical infrastructure must encompass. "India has nearly doubled its refining capacity over the last decade to almost 5 million barrels per day, making it the world's fourth largest refining centre after the U.S., China and Russia"[16]. As a result, the export of refined petroleum-products constitutes India's second-largest export-commodity. It is only the very recent rise in the domestic consumption of petroleum products that has brought the export ranking of this commodity down from the Number One position to Number Two.

With India's external 'merchandise-trade to GDP ratio' (imports plus exports divided by GDP) now standing at an impressive decadal average of 36%, and with 95% by volume (and 77% by value) of this merchandise trade moving by sea, the criticality of the nodes of this trade, namely, ports, can hardly be overstated[17]. However, this aspect concerns maritime transportation and to some extent, of course, there is an overlap with energy imports and exports, which are, after all, a type of merchandise-trade that requires to be 'transported'. As such, this will be dealt with in a subsequent article.

[16] BP Statistical Review of World Energy 2015. As quoted in Jacob Gronholt Pedersen, "India Starts up 300,000 Bpd Paradip Refinery - Sources." Online Posting. April 26, 2015. Reuters. Accessed June 10, 2019. https://in.reuters.com/article/india-refinery-idINKBN0NH0N320150426.

[17] "Building Support for a Response." *Foreign Policy Bulletin*, February 13, 2009. Accessed June 10, 2019. https://www.cambridge.org/core/journals/foreign-policy-bulletin/article/ii-september-12october-6-2001-building-support-for-a-a-response/F6861A4C38A723B1F3AA977C4A0E75AB.

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