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**ENERGY SECURITY, DEVELOPMENT AND SUSTAINABILITY IN
BIMSTEC REGION**



Raagini Sharma

**(RIEAS Senior Analyst & Research Coordinator,
Global Counter-Terrorism Council, India)**

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Abbreviations

ADB	- Asian Development Bank
AEDP	- Alternative Energy Development Plan
BBIN	- Bangladesh-Bhutan-India-Nepal
BIMSTEC	- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
CBET	- Cross Border Energy Trade
CEB	- Ceylon Electricity Board
HVDC	- High Voltage Direct Current
LNG	- Liquefied Natural Gas
MW	- Megawatt
NEEP	- Nepal Energy Efficiency Programme
PPP	- Public Private Partnership
RCI	- Regional Cooperation and Integration
SASEC	- South Asia Sub-regional Economic Cooperation

1. Abstract

The research presented in this paper is a novel effort to examine the availability of energy resources in BIMSTEC nations, the scope of sustainability and development possible through the existing and proposed interconnection initiatives in the energy sector in this region. The key objective of this report is to assess the estimations and efficiency advantages of these cross-border interconnections with existing power network ventures, addressing not only economic viability but also technological feasibility. The regional power grid which will expand from India to Thailand will offer multiple benefits to the BIMSTEC member states. Moreover, the BIMSTEC countries do not aim for one single grid, rather the focus is on building and strengthening bilateral interconnections through which the countries can extract and exploit more energy resources which is more secure and thoughtful, unlike the Gulf Cooperation Council (GCC) and Central American Electrical Interconnection System (SIEPAC). The synergy of thinking and ensuing strategy; concerted efforts in ensuring meaningful coordination and time bound implementation in energy sector in this region must be established between the member states as these will be vital for safeguarding the availability of sustainable energy mix. The counties of BIMSTEC should not hold independent strategy and policies which could limit development and sustainability in energy exchange and growth.

2. Introduction

The Bay of Bengal region is coming into focus as an emerging strategic and economic hub in the greater Indo-Pacific region.¹ The region is of pivotal importance to the littoral countries bordering it. It is a bridging point which connects South Asia to Southeast Asia, and further merging into the Andaman Sea and from there into the face of Strait of Malacca.

The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), a regional organisation, is comprised of seven member states which are Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka and Thailand. Together these nations hold a population of 1.5 billion people which is 21% of the world population, and combined GDP of over US\$ 2.5 trillion.² Earlier BIST-EC (Bangladesh, India, Sri Lanka, Thailand -

¹ Frost, Ellen L. (2017), *It's Time To Deepen Integration Around The Bay Of Bengal*, Carnegie India, Available from : <https://carnegieindia.org/2017/05/31/it-s-time-to-deepen-integration-around-bay-of-bengal-pub-70128>, [Accessed : 20 July 2020]

² Ministry of External Affairs, India (2014), *Brief on BIMSTEC*, New Delhi, Government Publications

Economic Corridor) was formed on 6th June 1997 through Bangkok Declaration³, in the same year in December, Myanmar was declared as a member making the acronym as BIMST-EC. In 2004, Nepal and Bhutan were admitted, and the name changed to BIMSTEC. This inter-regional organisation was primarily a combination of India's 'Look East Policy' and Thailand's 'Look West Policy'.⁴

The purpose and objective of such an alliance were to harness economic growth, ensure shared and mutual cooperation in different areas of combined interests by making use of regional resources and making its geographical region to its advantage. This regional organisation is a sector driven organisation, which focuses on - trade, technology, energy, transport, tourism, fisheries, agriculture, public health, poverty alleviation, counterterrorism, environment, culture, people-to-people contact and climate change.

One of the sectors of development between BIMSTEC countries is energy which drives economic development and interdependence. To maintain its economy, the region requires an affordable and competitive supply of energy / electricity on a long-term basis.⁵ Energy is the lifeline of all individuals, modern societies and nations. In whatever any individual does, one utilises different forms and sources of energy. Hence, the life without energy supply if not impossible is next to impossible in present-day living. Till date, the availability and supply of energy has been taken by the citizens and to the extent by the industries as a given, but it is not the case anymore. The adequate and easy availability of energy by the nation states cannot be guaranteed because of the disruptions in supply of energy due to various reasons. Those could be the increasing demand because of economic growth, heavy consumption on account of rising living standards, combination of geopolitical, geological and environmental constraints.

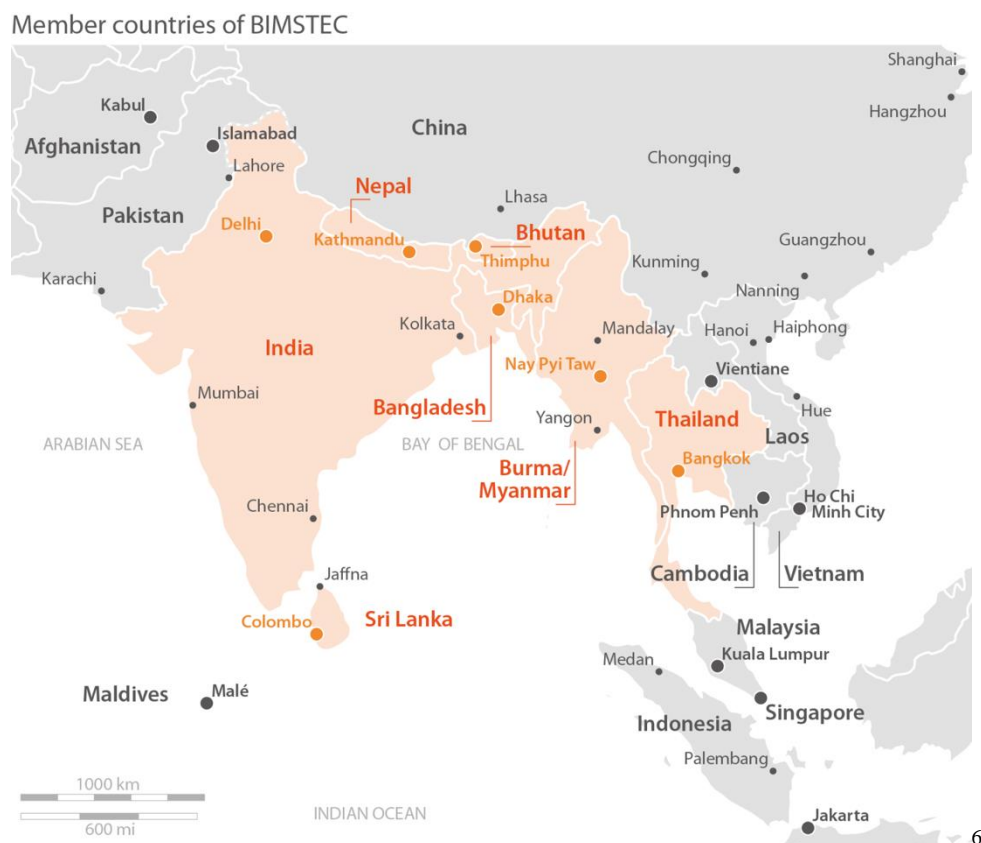
There is thus a requirement of ensuring Energy Security by every nation in order to carry forward itself on the path of economic growth and sustainable development as also by providing its people energy to ensure comfortable living and high quality of life. Classically, Energy Security is determined from four perspectives (4A's), Availability, Accessibility, Affordability and Acceptability. There should be an uninterrupted availability of energy at an

³ BIMSTEC (2020), *ABOUT BIMSTEC* (Online) (Last Update 20 June 2020) Available at: https://bimstec.org/?page_id=189 [Accessed on: 20 July 2020]

⁴ Kundu, S. 2014. *BIMSTEC at 17: An Assessment of its Potential*, Vol. 70 (3), pp.207-224

⁵ Panda, R.R; Maitreyi, K (2020), *Regional Energy Cooperation for Accelerating Cross Border Electricity/Energy Trade 7 Mobilizing Investment in BOMSTEC Region*, Available at: <https://sari-energy.org/wp-content/uploads/2020/04/Regional-Energy-Cooperation-for-Accelerating-CBET-Mobilizing-investment-Rajiv-Ratna-Panda-Maitreyi-Karthik-1.pdf>, [Accessed on 20 July 2020]

affordable price. Energy should be accessible to the households, social institutions, enterprises and industries. Citizens are more likely to accept energy policies and changes in energy systems when these policies and changes align with their essential values and have more positive and less negative impact on their individual and collective lives.



The heavy reliance on energy in conjunction with the asymmetric global distribution of energy deposits have impacted most of the nations. It is interesting to note that the energy-rich areas viz the Persian Gulf, Caspian Sea and Latin America are not the high-end users of energy, rather United States, European Union, China, Japan and India are the heavy consumers. The vulnerability is not restricted to the 4As, but it also would be affected by the unfavourable political and economic environment and the dynamics of international relations. Energy Security is not a standalone function, and it is correlated with several tangible and intangible factors. Factors like, lack of infrastructure and heterogeneous use and application of energy, impact energy security of the nation.

⁶ European Parliamentary Research Service Blog (2016), *BIMSTEC Member Countries* [Online], Available at: https://epthinktank.eu/map_south-south-east-asia_highlights_gw/

In the BIMSTEC region, there is an upward curve of economic growth with an average of 6.5% economic growth despite the global financial meltdown.⁷ The rising standards of living causing heavy consumption of energy; increase in demand of energy by the ever-growing population the majority of which so far has been denied of 24*7 electricity and the paucity of primary energy resources; each factor gives rise to the challenges which the littoral states of Bay of Bengal region are facing. They will be facing more in the future when the need of energy will multiply manifolds thus necessitating the requirement of well-conceived plan to amend the existing policies on the subject at the national level and favourable engagement with the source countries at the multilateral and regional level.

In this paper, I will be examining the relationship between energy security, its sustainability and development. Further, the focus will be on potential of energy resources of BIMSTEC, energy trade, projects for energy generation and their benefits and finally the potential of renewable energy resources. I will begin with the genesis of regional grouping BIMSTEC, its vision and elaborate on its aims and common goods. Second, what is the relationship between energy security, sustainability and development signify? Third, the availability of energy for the growing demands of BIMSTEC nations, the synergy and exchange of resources to meet their demands. Lastly what are the recommendations to achieve energy security for all as also the way ahead? For this paper, the area of focus is Energy trade, Energy Security, Energy Development and Sustainability; especially examining the hypothesis, that can BIMSTEC cooperate and sustain with the resources available in the region or still in the near future have to depend on imports with the growing population demands?

2.a Backdrop of BIMSTEC

The primary objective of the oceanfront states surrounding Bay of Bengal was to integrate and establish a close connection, increase cooperation and build substantial economic growth. The area of interest by all its member states was to strengthen regionalism, endure and enhance the cooperation, sustain the desire for economic-social growth and maintain the regional identity.

⁷ BIMSTEC, (2020), “*About BIMSTEC*”, [online], Available at: https://bimstec.org/?page_id=189, Accessed on: 22nd August 2020

Regionalism theory when implemented requires significant amount of political / economic cooperation among states in a geographical close knitted region. Vasantha Senanayke, in 2017 remarked regarding the region “we have been somewhat slow and complacent to keep pace with the trend of regionalism”.⁸ The reason for this integration was that, that BIMSTEC was eye-catching for selected South Asian Association of Regional Cooperation (SAARC) countries and unlike SAARC, BIMSTEC was hassle-free as the sub-region did not share any serious rival like situations.⁹

The secretariat of BIMSTEC is in Dhaka, Bangladesh and was established with the signing of Memorandum of Association at the third summit. The BIMSTEC working structure is sector oriented, with focus on trade and investment, transport and communication, energy, tourism, technology and fisheries which were adopted in the second Ministerial meeting at Dhaka¹⁰, Bangladesh. Seven more sectors were added after the eighth ministerial meeting at Dhaka, Bangladesh, the new priority areas of cooperation were agriculture, public health, poverty alleviation, counter-terrorism, trans-national crime, protection of biodiversity/environment or natural disaster management, culture and people-to-people contact.¹¹ At the 11th ministerial meeting, held at New Delhi, India in 2008, climate change was included as the 14th priority area of cooperation with the change of global dynamics and with the increase of natural disasters, pollution and lack of knowledge amongst individuals.¹²

BIMSTEC in true sense bridges South Asia and South East Asia. Every sector has its own leading country with the other nations responsible for the sub-sectors. Since 2015, BIMSTEC member states have sustained an average 6.5% economic growth trajectory by using regional resources and geographical advantages.¹³ But, since the time of commencement of the organization, there has been a lack of regional cooperation and integration until 2014 with the new government in India, integration and policy changed from “Look East Policy” to “Act East Policy” or “Neighborhood First Policy”. This policy was given boost through the invitation of Heads of the States by Prime Minister Narendra Modi during his swearing in ceremony. Later

⁸ BIMSTEC (1998), *BIMST-EC Ministerial Meeting*, Dhaka: BIMSTEC Available at: https://bimstec.org/?page_id=945

⁹ Kundu, S. (2014) ‘BIMSTEC at 17: An Assessment of its Potential’, *India Quarterly*, 70(3), pp. 207–224.

¹⁰ Ibid

¹¹ Ibid

¹² Ibid

¹³ Asian Development Bank (2019), *Supporting the Implementation of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation Initiative*, Asian Development Bank, Available at: <https://www.adb.org/projects/53117-001/main>, Accessed on: 27 June 2020

in 2016, it was an encouraging sign that BIMSTEC got a platform for visibility in Goa along with BRICS nations (Brazil, Russia, India, China and South Africa).

According to Asian Development Bank's (ADB) forecast, India and Thailand are the two most powerful economies of BIMSTEC, both the countries are amongst the seven drivers of Asia's comeback in the world economy.¹⁴ There are many advantages and benefits for BIMSTEC region, one of which is the geographical proximity between the member countries which can increase the inter-bloc trade and sector oriented cooperation. Open border policy could also benefit and get returns for development but with illegal migration, trafficking of narcotics or arms, cross-border terrorism, the governments need to be vigilant and have to initiate robust policies to arrest these illegal activities accordingly. Two former Indian officials aforesaid: BIMSTEC represents "the only real bridge" or a "unique link" between South and South East Asia¹⁵ if the member countries want economic rewards through this regional connectivity. The regional connectivity among the states became stronger with the creation of sub regional and mini-lateral initiative which includes Bangladesh-Bhutan-India-Nepal (BBIN) which was formalized in 2013 as a quadrilateral working group. All the member countries have recognized the ADB's South Asia Sub Regional Economic Cooperation (SASEC) (2016-2025), to build consensus and a stronger connectivity between South and Southeast Asia.

Geographical characteristics can be used as influential variables which is significant factor in trade, and in case of BIMSTEC, it is necessary for the member countries to invest resources and capital for development of infrastructure and to corroborate groundwork.¹⁶ Energy trade is one of the most significant trade sectors. In a globalized world, energy services are now an important component of international trade as these play a vital role in the development of the economy.¹⁷ It is the standalone stratum on which any country's movement swings. The question then arises, in terms of energy trade, how are BIMSTEC countries dealing with energy security and energy development? And how the countries are exploiting the energy resources available in the region for their growth?

¹⁴ UNESCAP (2012), *Growing together economic integration for an inclusive and sustainable Asia-Pacific century*, Bangkok: UNESCAP

¹⁵ Second Round Table of BIMSTEC Network of Think Tanks (2014), *BIMSTEC Integration: Challenges and Tasks Ahead*, Indian Ministry of External Affairs, Myanmar, Available: <https://mea.gov.in/Speeches-Statements.htm?dtl/23021>

¹⁶ Banik, N. (2005), *Trade liberalization and regional development in BIMSTEC region: Does geographical characteristics matter?* (CAIRD Discussion Paper No. 3). Available at: <http://www.csird.org.in/discussion.html>

¹⁷ Banerjee, K; DipankarDey, (2017), *India and BIMSTEC: A comparative study of the trade potential of India's energy sector in BIMSTEC and BIMSTEC+1 region*, Centre for Studies in International Relations and Development and Institute of Foreign Policy Studies, University of Calcutta

Asian continent is rich in energy resources and these resources are diversified to a larger degree, more so the Bay is rich in untapped natural resources, with some of the world's largest reserves of gas and other seabed minerals, as well as, it is increasingly believed, oil reserves remain untouched.¹⁸ Though recently petroleum companies from India and Bangladesh like Reliance Petroleum Ltd (RPL), Oil and Natural Gas Company (ONGC) and Bangladesh Petroleum Corporation (BPC) are exploring the Bay to extract oil. Resources like hydrocarbon, hydropower, wind energy and natural gas are in abundance within the littoral states of Bay of Bengal and two Himalayan counties (Nepal and Bhutan). The energy trade between the countries can significantly contribute to the goal of regional cooperation. The region wide Trans Power Exchange, Grid Interconnections and BIMSTEC Energy Center are identified as the projects under Energy Sector which could benefit the region with rising demand of energy. Member countries with the support of energy trade can eventually be wealthy if exchange is free flow and without any tariffs.

2.b Correlation Between Energy Security, Sustainability and Energy Development

International Energy Agency (IEA) is an autonomous intergovernmental organisation established in the framework of Organisation for Economic Cooperation and Development (OECD) in the year 1974 in the wake of 1973 oil crisis wherein the Middle East oil producing countries cut their oil production and imposed oil embargo on the US and few other countries to force a change in their political support to Israel. The use of oil by Arab countries, the major producers, to gain political leverage shattered the consumers sense of energy security. The IEA was initially dedicated to responding to physical disruptions in the supply of oil, as well as serving as an information source on statistics about the international oil market and other energy sectors.¹⁹ Since then, IEA's mandate has broadened to focus on energy security, economic development and environmental protection.

The term Energy Security has not been clearly defined; therefore, it is hard to measure. According to Daniel Yergin Energy Security is "the security and integrity of the whole supply chain and infrastructure, from production to the consumer."²⁰ As per IEA definition of Energy

¹⁸ Brewster, D. (2015), *The Rise of the Bengal Tigers: The Growing Strategic Importance of the Bay of Bengal*, Journal of Defence Studies, Vol. 9, No. 2, pp. 81-104, New Delhi, Available at: https://idsa.in/jds/9_2_2015_TheRiseoftheBengalTigers

¹⁹ Tethys, (2020), *International Energy Agency*, [online] Available at: <https://tethys.pnnl.gov/organization/international-energy-agency-iaa>, Accessed on: 25 August 2020

²⁰ Yergin, D. (2005), *The Katrina Crisis*, The Wall Street Journal, Available at: <https://www.wsj.com/articles/SB112562841827429987>

Security, it is the “uninterrupted availability of energy sources at an affordable price”.²¹ For Energy Security to be stable, there should be a continuous supply and demand of energy. For the implementation of Energy Policy, one of the vital factors is well structured and guided energy security policies. Political issues, population and ambitions of continuous supply and demand of energy are of extremely importance for stable energy security. Energy security with national and economic security is becoming an important factor for countries due to climate change and the rise of greenhouse gases. Energy security is heard increasingly around the world; from energy issues, to reformation of coal sector to the pricing of petroleum products or energy being a part of energy policy planning. World leaders, United Nations officials, think-tank professionals and even multinational companies who are responsible for production and supply of energy have expressed concerns about this issue due to limited resources available for the upcoming generation.

With growing population, there is a hike in energy demand. To have a stable, sustained high economic growth and development, countries should focus on the blend of reliable, accessible, affordable and modern clean energy. Energy has in its domain interlinked players viz producers of energy, consumers of energy, state owned energy enterprises, multinational companies dealing with energy, shipping industry, infrastructure and rail-road industry and rail-road transport. To strengthen all these sectors of energy in terms is actually to conserve and sustain supply and securing of energy.

Post Arab-Israel War (1973-74) provoked the Organization of Petroleum Exporting Countries (OPEC), to make “oil as a weapon”, its boycott to many energy consumer countries brought all of them together as energy security was important to all the governments, to business enterprises, to ordinary citizens to keep their daily lives running.²² Barry Barton, Catherine Redgwell, Anita Ronne and Donald Zillman have described Energy Security as a “condition in which a nation and all or most of its citizens and businesses have access to sufficient energy resources at reasonable prices for the foreseeable future free from serious risk or major disruptions of services”. Security overall is concerned with risks and threats; risks can be in terms of rise in prices, disruptions in energy supply chain, irregular and inadequate availability of energy, lack of storage houses to store energy or lack of knowledge to exploit

²¹ IEA. 2019. *Energy Security - Areas Of Work* - IEA. [online] Available at: <<https://www.iea.org/areas-of-work/ensuring-energy-security>> [Accessed 17 July 2020].

²² Barton , Barry., Redgwell, Catherine., Ronne, Anita., and Zillman, Donald N.. (2004) *Energy Security: Managing Risk in a Dynamic Legal and Regulatory Environment* . United States: Oxford University Press.
(Barton , et al., 2004)

other resources like renewable energy, nuclear energy as an alternative. The status of BIMSTEC countries in 21st century indicates that they are growing rapidly, with this provision of development, they have an obligation to make energy as a top priority so that all the sectors can run without any interference.

Energy has several dimensions, long term energy security which primarily deals with timely investments to supply energy in line with economic development and sustainable environmental needs. Short term energy security focusses on the ability of the energy systems to react promptly to sudden changes within the supply demand balance. According to International Energy Agency: “Energy security is defined in terms of the physical availability of supplies to satisfy demand at given price”. In other words, the energy supply should be secure all the times, even during the scarcity, calamity or disruptions in supply or also a region where energy might lead to prices above certain edge during pandemic.

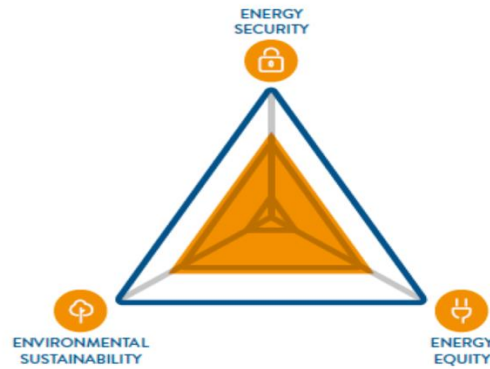
In all, the principles of energy security are: conservation (infrastructure to store energy for later usage), diversity of energy mix (secure access to all sources of energy), environmentally sustainable, secure from shocks and disruptions, affordable (energy to all) and reliable.

3. Energy Accessibility, Efficiency, Generation and Security in Member States

Adequate, affordable, clean and sustainable supply of energy is fundamental pre-requisite for all the development pursuits and endeavours from economic sector to healthcare sector.²³ BIMSTEC countries rate low according to the World Energy Trilemma ranking, which is focused on energy security, energy efficiency, energy infrastructure, energy equity and environmental sustainability. Of the 128 nations, rankings substantiate the fact, Bangladesh-114, India-109, Myanmar-104, Nepal-117, Sri Lanka 85 and Thailand-68.²⁴

²³ Panda, R.R and Karthik, M. (2020), “*Regional Energy Cooperation for Accelerating Cross Border Electricity/Energy Trade and Mobilizing Investment in BIMSTEC Region*”, Energy and Power, pp 17-25

²⁴ World Energy Council, (2019), “*World Energy Trilemma Index:2019*”, [online], Available at: <https://www.worldenergy.org/publications/entry/world-energy-trilemma-index-2019>, Accessed 21 August 2020



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Amid, 2008, the regions overall capacity has been accelerated. 55 percent of the cumulative generation quantity has been from coal, proceeded by natural gas and renewable (20 and 17 percent respectively). India and Thailand have the highest generation capacity reckoning with 9 percent of overall energy mix. Multilateral funding agencies such as GiZ²⁶ have funded projects to organise and improve energy efficient capability creation and technology sharing activities between the countries of South Asia and South East Asia.

3.a. India

India is distinguished from the rest of Asia, marked by mountains and seas, which give the country a vast geographic structure. It extends southward and into the Tropic of Cancer and is surrounded in the north by the Himalayas and flies off into the Indian Ocean between the Bay of Bengal and on the West Arabian Sea.

India is the largest country in terms of land occupation. There is no surprise that for over 25 years, India has generated a tremendous demand for energy with an economy forecast to expand by more than 5% per year. India is the fifth largest energy consumer in the world at present, and forecasted to be the third-largest prepared to overtake Japan and Russia by 2030. Industrial sector leads the energy consumption, followed by residential sector, transport sector and other non-specified sectors.

With less of domestic production and limited natural gas, India till date is the net importer of oil. In contrast, all the leaders of India have focused on: energy independence²⁷, but with the lack of domestic production and availability, the country does not hold any other option but

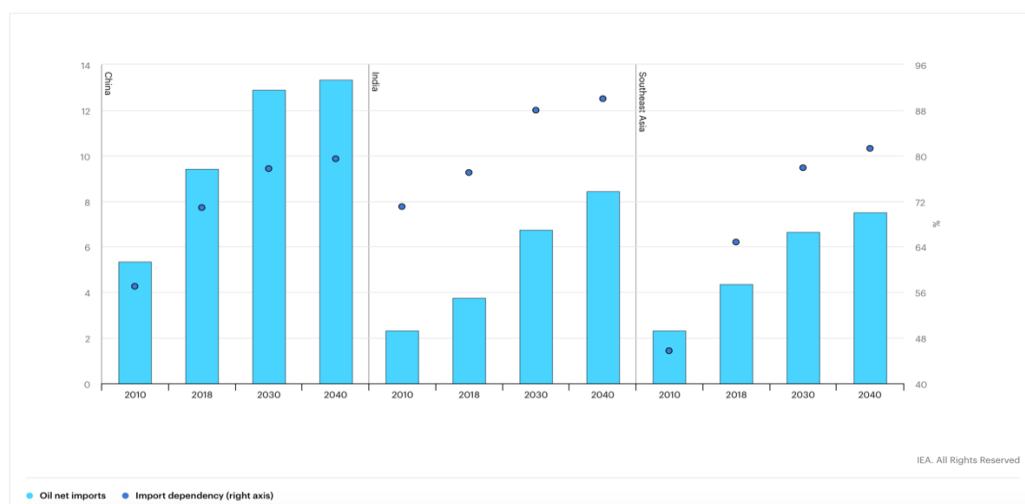
²⁵ Ibid

²⁶ Bigdon, Christine (2013), “Regional Efficiency Programme South Asia”, German Federal Ministry for Economic Cooperation and Development, [online], Available at: <https://www.giz.de/en/worldwide/16917.html>, Accessed: 13 August 2020

²⁷ Madan, T. (2006), *Energy Security Series*, Brookings Foreign Policy Studies, Brookings Institution, Massachusetts, U.S

to import energy resources from other countries. India imports a major portion of its energy supply. Energy sources like oil, gas and coal are imported and oil is imported from more than two dozen countries. According to the Government of India report, in 2012, two third of the Indian population relied on solid biomass as their cooking fuel. This usage of Biofuels is decreasing as more and more people are substituting the energy resource with Liquefied Petroleum Gas (LPG) which emits much lesser emissions and thus provides better solution for the country. LPG is affordable for the rural population and gives an advantage towards security.

With its fast-growing economy and rising rural electricity consumptions, India has intense power demands. The energy demand will grow in the coming years. This medium of energy supply calls for increased resources for a new diversified generation capability. Although there is a considerable shortage of coal supplies, more than half of the existing Indian energy supply is based primarily on coal-fired power plants. Such shortages as a result of existing capacity shortages could have extremely high economic costs which could lead to sluggish and inadequate energy development affecting the overall development of the country.



Oil imports and import dependency in Asian countries, 2010-2040

As per the chart provided by IEA, the import of oil will gradually increase by 2040. There will also be a spur in high oil prices over decades to come. Growth rate is fairly high and increasing rapidly. Concern about where the energy is going to come from has been increasing

²⁸ International Energy Agency (2020), *India*, [online], Available at: <https://www.iea.org/countries/india> [Accessed: 27 July 2020]

as the realisation grows that India is not alone in this high-speed quest for energy-it is competing with China, Japan, Europe and the United States.²⁹

The Government of India has made a remarkable progress in providing electricity and clean cooking while implementing a range of energy market reforms and integrating a high share of renewable energy resources into the grid.³⁰ Predominantly, the planning is state dominated. The concern is of reliable and affordable energy to sustain economic growth where private investment in energy sector is lacking, due to this the ramifications of planning are directionless, fractious and ineffective. A clear vision and a grand strategy are vital. Some experts call for an action plan for energy policies, more integrated, efficient and cost effective.³¹

Coal as a source of energy remains the largest source of energy supply in the country. The government of India in 1961 established National Power System / National Grid System to improve security, which was divided into five regions: Northern, Eastern, Western, North Eastern and Southern grids (HVDC back-to-back links), in which power stations and major power substations were connected to ensure that every corner of the mainland India gets access to Electricity. The Power Grid Corporation of India is one of the largest grid corporations in India with the power generation capacity of 371.054 GW.³² For the period 2016-2018, the share of solar PV and wind doubled in the electricity generation mix from 4% to 8%.³³ Coal, Natural gas and crude oil are the main resources which are used to produce electricity for the country. These are produced in India but are grossly inadequate and are imported.

²⁹ Ibid

³⁰ Ibid – 27

³¹ Pachauri, R.K., *Oil in India's Energy Future*, Available at: <http://www.india-seminar.com/2005/555/555%20r.k.%20pachauri.htm>

³² "All India Installed Capacity of Utility Power Stations" (PDF). Retrieved 10 July 2020

³³ Ibid-4



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The High Voltage Direct Current (HVDC) system provides the country with immense stability. It is the backbone of India's development in the energy sector. The progress of HVDC link over the period of time has prevented the country from cascading grid eruptions. It allows progress and control over the flow of electricity around the country. However, the HVDC link with the huge number of consumers in India faces complexity and load. To supply and meet the needs for the development of the country, India can exploit the plethora of other energy systems like the utilization of renewable resources or boosting power trade in the BIMSTEC region.

The 1×500 MW HVDC BTB India-Bangladesh interconnector has been operational since September 2013, while the second 1×500 MW HVDC BTB converter unit is under way, after its completion in June 2018 ³⁴, the link's capacity will increase to 1,000 MW.³⁵ India is gradually expanding its HVDC link, with its neighbouring states. An HVDC connection between Madurai in India and Anuradhapura in Sri Lanka, the project is initiated through overhead transmission line and submarine cable which is 334 km and 90 km respectively through the Palk Strait, it is under consideration?

³⁴ Powe Line, (2017), "Changing Powe Dynamics", [online], Available at: <https://powerline.net.in/2017/11/02/changing-power-dynamics/> [Accessed: 3 August 2020].

³⁵ Ibid 30

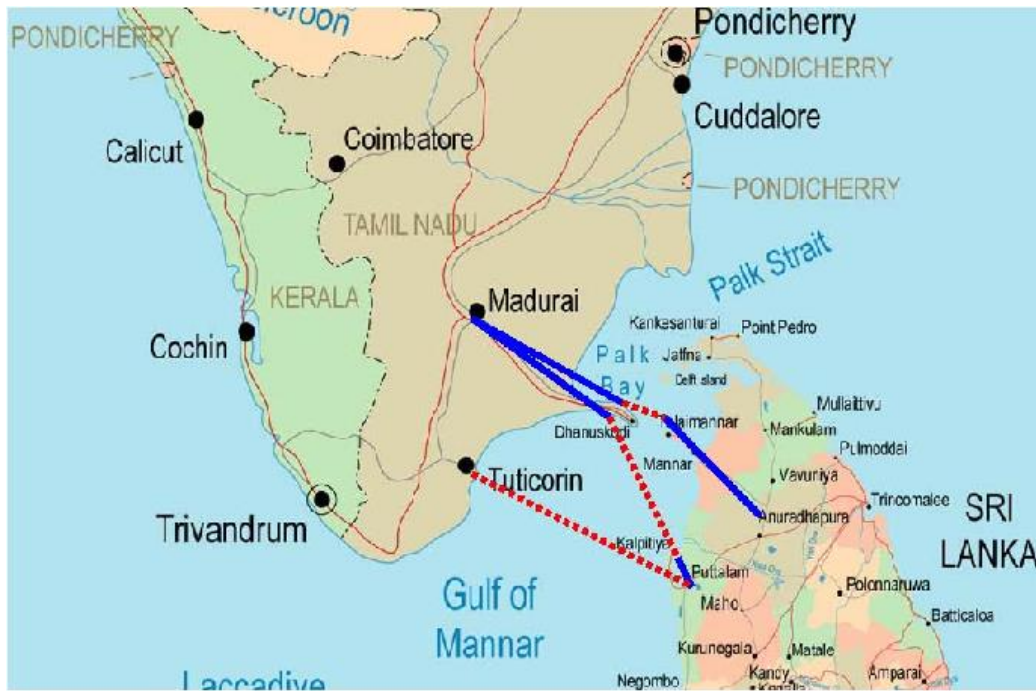
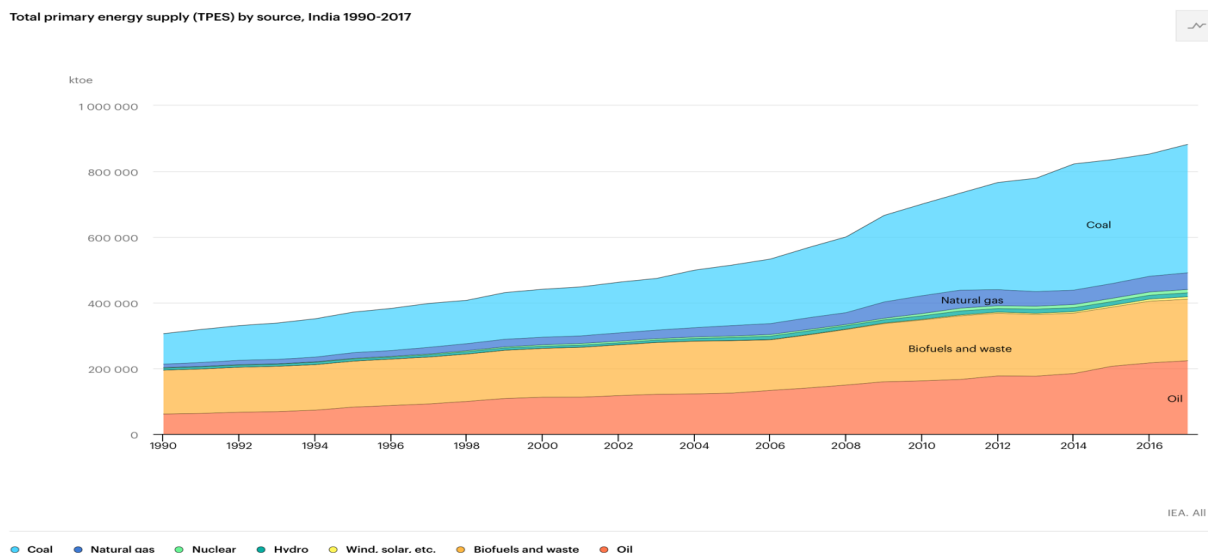


Fig 1 : India-Sri Lanka HVDC interconnections.

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If implemented completely, the HVDC link would provide both the countries with controlled power exchange as also it will improve AC system stability and will reduce the transmission voltage.



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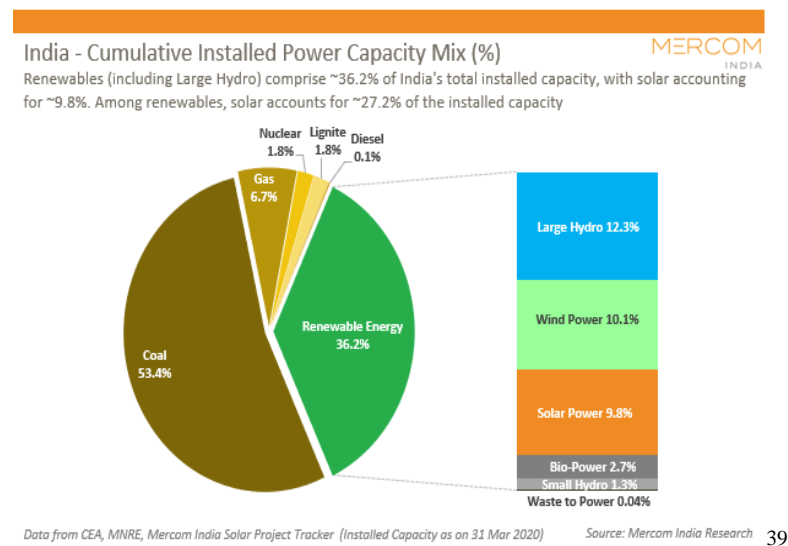
The above chart explains that the country is highly dependent on Coal followed by renewables and crude oil. India is hence dependent on these primary energy supplies.

³⁶ Jowsick, A., Arulampalam, A., & Wijekoon, H.M. (2009). HVDC transmission line for interconnecting power grids in India and Sri Lanka. 2009 International Conference on Industrial and Information Systems (ICIIS), 419-424.

³⁷ International Energy Agency (2020), *India*, [online], Available at: <https://www.iea.org/countries/india> [Accessed: 27 July 2020]

For continuous development, India is expanding its grid interconnections. India holds synchronous and asynchronous links with its neighbouring countries to increase its trade and efficiency in energy. The primary programme being the supply of electricity to all by 2030 as per United Nations Sustainable Goal 7. Synchronous interconnects with Bhutan and Asynchronous interconnections with Bangladesh, Myanmar and Nepal.³⁸

Currently in India, the apprehension persists about clean, convenient and reliable energy with the introduction of Sustainable Development Goals Agenda 2030. For the security purposes of energy, the concern is also to sustain and foster itself from the susceptibility of collapsing into fiscal and trade deficits.



In 2020, the use of Coal is significant and dominant primary energy of India to maintain and develop the energy sector. To make India less depended on non-renewable energy resources, as noticed in the above chart, the exploitation of resources like hydro (12.3%), Wind Power (10.1%) and Solar (9.8%) is on increase. India is investing ponderously in nuclear power and solar energy, which will dash off India's dependence to the Middle East.

³⁸ Central Electricity Regulatory Commission (2011), *Grid Security-Need for Tightening of Frequency Band and Other Measures*, [online], New Delhi, Available at: http://www.cercind.gov.in/2011/Whats-New/AGENDA_NOTE_FOR_15TH_CAC_MEETINGHI.pdf [Accessed: 27 Jul. 20]

³⁹ Prasad, N.T./ Marcom, (2020), "Solar Share in India Installed Power Capacity Mix Rises to 9.8% as of Q1 2020", [online], Available at: <https://mercomindia.com/solar-share-india-installed-power-capacity-mix/>, Accessed on 26th August 2020

The development has also taken place in the Institutional Framework stratum. The Ministry of Power (MoP) is the apex body which manages and makes decision with regard to Indian Power Sector. Below them lies two bodies - the Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commissions (SERCs). Electricity Act (2003), is the foundations of the power sector.

3.b. Bhutan

Bhutan is a rugged mountainous landlocked region situated in the eastern Himalayas with its capital Thimphu. It has an area of 38,394 km. Regional cooperation in leveraging its hydropower capacity has become an essential part of the region. Its development is primarily through agricultural. Bhutan serves its electricity needs mainly from renewable energy sources, with firewood and hydropower responsible for the maximum sources of energy consumption in the country. The potential for hydropower in Bhutan is estimated to be around 30,000 MW of which around 23,760 MW is estimated to be techno-economically feasible for development.⁴⁰

Compared with other BIMSTEC countries, its per capita consumption is the lowest of all. Bhutan is a net exporter of energy.⁴¹ Most of the electricity generated is exported to India. The export of electricity is one of the major sources by which it creates its revenue. With maximum export to India, it has strong interrelations. The country has sufficient generation and capacity to satisfy its needs. Energy consumption is driven by the residential sector, followed by the manufacturing, construction and transport industries. The country has also given priority to developing hydropower storage facilities to ensure national energy stability and security.⁴² Hydropower potential is about 30,000 MW. Till date, it supplies energy to India which is more than 70 percent and meets its requirement with only 30 percent.

Bhutan is exploring and using other resources and integrating it in its energy mix. Oil and Coal are among them. It imports oil mostly from India. There are coal reserves in Bhutan, around 2 million tonnes but the extraction is limited. The Coal produces are mainly used by the industries to reduce the dependence on oil. Bio-energy is easily available and used in many

⁴⁰ Annual Report, (2010), “*Harnessing and Sustaining Bhutan’s Renewable Energy Resources*” Drunk Green Power Corporation Limited, Thimphu, Bhutan.

⁴¹ Ministry of Economic Affairs, Government of Bhutan (2015), “*Bhutan Energy Data Directory 2015*”, Available at: <https://www.moea.gov.bt/wp-content/uploads/2018/07/Bhutan-Energy-Data-Directory-2015.pdf>, Accessed 26 August 2020

⁴² Royal Government of Bhutan (2016), “Economic Development Policy, [online], Available: <https://www.moea.gov.bt/wp-content/uploads/2017/07/Economic-Development-Policy-2016.pdf>

of the household works. It is easily available and accessible due to the vast amount of forest area in the country.

Other than hydropower potential, Bhutan has diversified its energy mix towards renewables, which makes the energy sustainability and efficiency more secured. Energy sources like Solar power, wind energy and bio-mass are among the few. The Government of Bhutan in 2013 targeted the implementation of the usage of renewables up to 20MW by 2025. Energy efficiency is met by the Energy plus programme. The replacement of incandescent bulbs with LED bulbs is one of the initiatives taken by the Government. A Renewable Energy Development Fund (REDF) has been established which will bring out funds for the energy efficiency initiatives.⁴³

Bhutan is at an early stage of economic development and its energy intensity is likely to be closely linked to GDP growth for the next several years.⁴⁴ 2002 was the turning point in Bhutan's Energy Ministry. The handling of policy-oriented decisions in energy was given to the Ministry of Economic Affairs. Under this Ministry, three different but united departments were formed: Department of Hydropower and Power System (DHPS); the Department of Renewable Energy and the Department of Hydromet Services.⁴⁵ DHPS is involved in planning, development of countries energy economy, national policies, the guideline for energy security, implementing the institutional framework and providing access to the public and private sector. The Bhutan Electricity Authority is responsible for putting tariffs on the supply and cross-border trade.

The two state owned corporations, first, the Bhutan Power Corporation (BPC) is responsible for providing transmissions for domestic supply as well as export and the second, Druk Green Power Corporation (DGPC), owned by the government wholly, is a self-governing corporation and looks after the large hydropower assets of the country.

3.c. Nepal

Nepal a landlocked country with vast amount of hydro-power is facing a deficiency in energy supply, thus blocking the country in terms of development in all the sectors. Imbalance

⁴³ International Renewable Energy Agency, (2019), "*Renewables Readiness Assessment: Kingdom of Bhutan*", Abu Dhabi, Available: https://www.irena.org/media/Files/IRENA/Agency/Publication/2019/Dec/IRENA_RRA_Bhutan_2019.pdf

⁴⁴ Ibid

⁴⁵ Ibid

of supply and demand is a burden which Nepal faces currently. It suffers with a lot of load cutting. A range of factors can be linked to electricity supply issues in Nepal, including the high transmission and distribution losses of power, the partial extension of the national grid, high power purchasing agreements, electricity shortfalls and the under-use of installed electricity. After the 1990s, the nation has changed from an authoritarian monarchy to a constitutional democracy, suffering a lengthy civil war, crushing the royal family, and at least 25 independent administrations, which are now the cause of the country's democratic system. The pattern of regular change in government has slowed the introduction and completion of some of the country's critical structural reforms, further undermining Nepal's socio-economic progress.

The electricity shortfall has led to high energy dependency on the biomass burning particularly in the rural areas which has adverse effects on health and the climate, notably in women and children. Energy sources available in Nepal are biomass and hydropower electricity. Biomass / Biofuel is the primary source of energy in the entire energy resource base, as it produces more than 85% of the country's total demand for energy. In contrast, actual hydro resource consumption continues to be untapped. Hydropower, as a source of energy supply, can change Nepal's status from a poor country to a developing nation. The existing level of sustainable energy development is just 0.61%, which is a matter of significant consideration. The small share of hydropower in the power grid demonstrates the shortage of access to electricity in the country. Gyawali, the water expert of Nepal, argues that "the rivers hold the promise of abundant sources of energy that very few places in the world can match. But the evolution of complex problems involved in harnessing the cascading waters of the Himalaya began to cast doubts on the viability of quick development".⁴⁶ Due to a lot of load shedding, Nepal has shifted its policy focussing on increasing transmission capacity, reducing transmission losses, importing more fuel, or applying a service charge to the power tariff.

13 MW of Upper Madi was added to the grid for curbing the losses faces. A further 40 MW of energy is being supplied from India, with overall imports currently standing at 350 MW. Nepal agreed with Power Trade Corporation, India, to import a minimum of 120MW

⁴⁶ Gyawali, Dipak, 2001. Water in Nepal. Himal Books; Kathmandu, Nepal.

⁴¹ Energy sector synopsis report, GON, 2010.

from 1st January to 1st May 2017 via the Dhalkebar-Muzaffarpur transmission line. NEA estimated that the peak demand load would rise from 1,385.30 MW to 2,203.8 MW over the next five years. Several hydropower projects are under construction to cater to the increasing demand for electricity, including Chamelia, Raughat, Upper Tama Koshi and Tanahun – a total of 1,047MW. With the building of the transmission lines and the introduction of hydropower projects - both river flowing and storage - there is hope to end load shed around the nation.

The Hydropower Development Policy of 1992, the Water Resource Act of 1992, and the Electricity Act of 1992, all put together were a turning point for Nepal hydro sector. Nepal's government had encouraged private sector participation in the hydro sector. The growth of any nation relies on the government's stability. However, Nepal's political turmoil and weak law and order tend to obstruct its growth cycle. In addition to political uncertainty, advances in hydropower infrastructure have often been hampered by lack of funding, lack of equipment and poor environmental evaluation policies. In 2014, 16.7% of the total energy was imported due to the lack of resources and infrastructure.⁴⁷ With the increase of imports from India, Nepal has managed to lower the load shedding. The access of grid electricity 78 percent of the population at the end of financial year of 2019 had access to electricity, which is a beckon to progress and development.⁴⁸

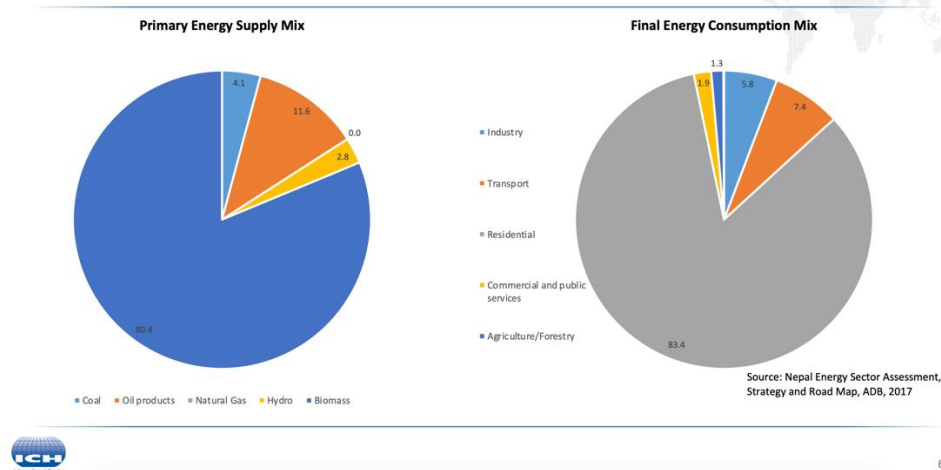
There are few ongoing challenges which the country faces. Firstly, Nepal is dependent on transport of petroleum products from India by road, this creates a lack of energy security, but with the creation of pipeline the security challenge can be mitigated. Second, during the winter period it is difficult to produce hydropower from snow fed mountains. Due to this, country is aiming for Heavy Hydro Power Projects like Arun-III and Upper Tamakoshi.⁴⁹ Both the projects are signed between India and Nepal. These projects will uplift the socio-economic levels of people residing near to the area, by creating employment. The project will also strengthen the bilateral relationship between India-Nepal.

⁴⁷ World Bank, World Development Indicators – <https://data.worldbank.org/indicator/EG.IMP.CON.S.ZS>

⁴⁸ Nepal Electricity Authority (2019), “*Annual Report*”, Available at: https://www.nea.org.np/admin/assets/uploads/supportive_da/ocs/annual_report_2076.pdf

⁴⁹ Power Technology, (2018), “*Arun-III Hydropower Project*”, [online] Available at: <https://www.power-technology.com/projects/arun-iii-hydropower-project/> (Accessed: 1st September 2020)

ENERGY MIX IN NEPAL



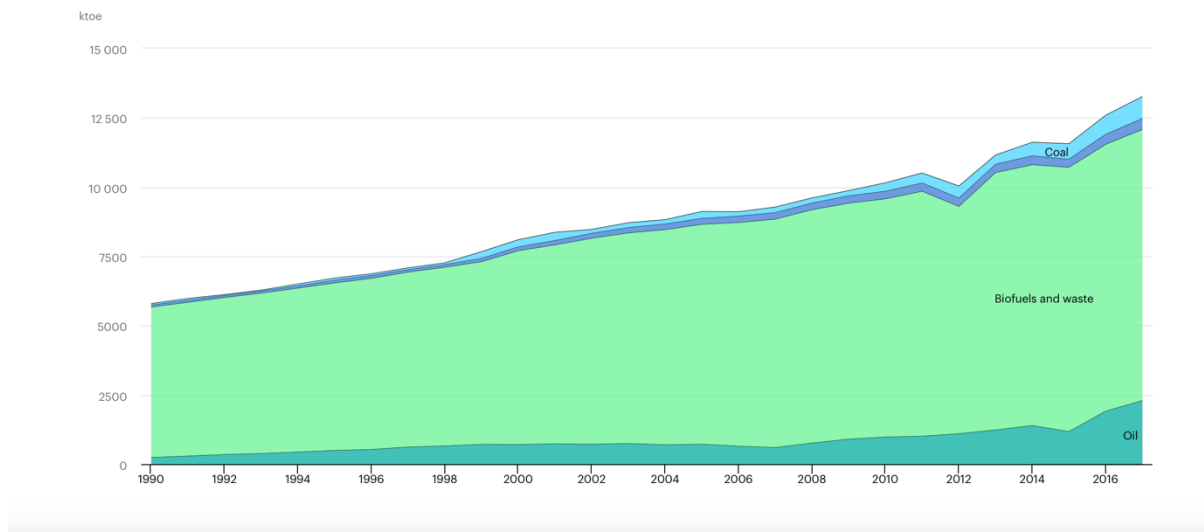
High demand and usage of oil products and coal is the reason for decreasing share of bio-fuels in the country. Gradually, the primary energy supplied and consumed is increasing. Industries, followed by residential areas, public services and agriculture are some of the sectors that consume electricity. The high potential of renewable energy resources makes the security issue less challenging. Resources like hydro, solar, wind and bio-mass are easily accessible. They are technically and economically more advantageous. The latitude location of Nepal is beneficial for the country, as it receives ample amount of solar radiation. From solar energy alone, 2,920 GWh of energy per year can be exploited.⁵¹ The government of Nepal is devising projects to build solar panels in villages and rooftop solar projects. The Nepal Energy Efficiency Programme (NEEP)⁵² is promoting energy efficiency and sustainability since 2010. This program opens the market for private and public sector to augment Public Private Partnership (PPP).

⁵⁰ International Centre for Hydropower, (2020), "Energy Situation in Nepal", [online]. Available: <https://tekut.no/wp-content/uploads/2019/09/Country-Presentation-Nepal-2019.pdf> (Accessed: 2nd September 2020)

⁵¹ Ibid

⁵² Energy Efficiency, (2010), "Nepal Energy Efficiency Programme (NEEP)" [online], Available at: <http://energyefficiency.gov.np/article-about>, (Accessed: 2nd September 2020)

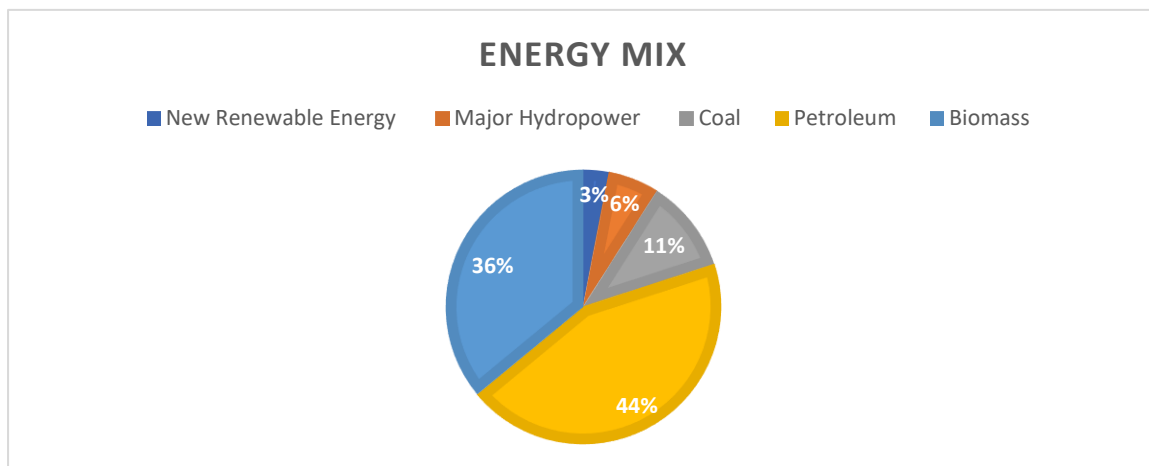
Total primary energy supply (TPES) by source, Nepal 1990-2017



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3.d. Sri Lanka

Sri Lanka is one of the founding members of BIMSTEC. It is an island nation situated in the Indian Ocean south of India.



The household, commercial, industrial and transport sectors are few among others which consume energy. Bio-mass energy is easily available in the country and at a lower cost. In 2017, 38 percent of energy mix consumed was biomass, mostly by household and industrial sector. On the other hand, petroleum products are generally used for transport, which was about 44 percent of consumption by transport itself as mentioned above in the chart. There has been

⁵³ International Energy Agency, 2018, Available at: <https://www.iea.org/countries/nepal> [Accessed: 17 August 2020]

a constant expansion and inclusion of diversified and alternative energy resources like coal and hydrocarbons in Sri Lanka's Energy mix. With the increase of demand in the country, Sri Lanka imports most of the energy resources. The demand thus puts a bounty on government of Sri Lanka to meet the needs of people and different sectors with maintaining energy security and efficiency. Security thus, for Sri Lanka government means, affordable energy resource with less dependency on oil market. Balancing both supply and demand thus increases energy security.

To reduce the import of energy, Sri Lanka can target and aim for the following measures to maintain security, affordability and accessibility. These are: (1) exploring potential hydro capacity in the non-Maheweli river networks; (2) increasing renewables; (3) examining the role of coal, taking into account both direct as well as the indirect costs (externalities associated with the carbon footprint); and (4) maximizing the benefits of the discovery of commercial quantities of natural gas in the Mannar basin.⁵⁴

The transmission of electricity in the country is handled by Ceylon Electricity Board (CEB). The CEB is duty-bound to look after the generation, transmission and distribution of electricity in Sri Lanka. Growing demand of electricity has led the country to build HVDC marine cable lines to get access to South Asian regional electricity grid. The share of renewables in the energy mix is rising. Renewables like solar, wind and hybrid sources, these off-grid solutions are helping the accessibility of energy in the remote places. The share of renewables is sprouting each year from 11 percent in 2017 to 17 percent at the end of 2017. The Sri Lanka Sustainable Energy Authority⁵⁵ is actively making policies to increase the energy access and secure the energy supply.

3.e. Bangladesh

Bangladesh is located at a strategic geographical land which connects South Asia with South East Asia. The country holds modest amount of coal, oil, natural gas, offshore wind energy generation and Bio-mass to fulfil daily needs for the population. It is assured that coal,

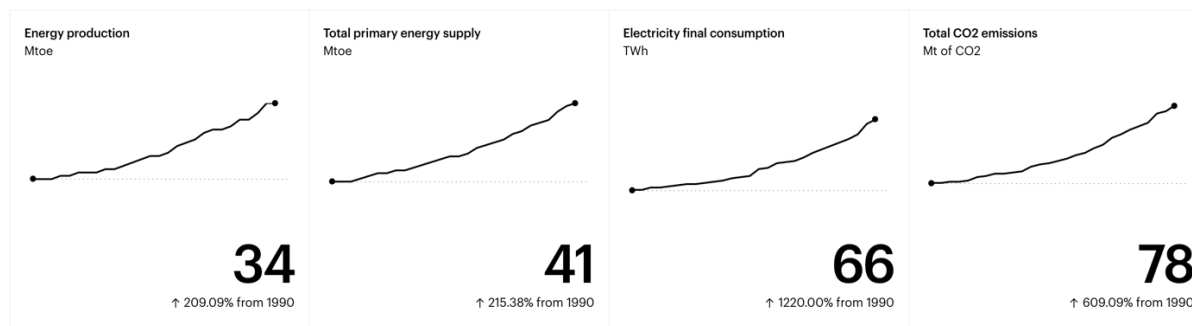
⁵⁴ Path Finder Foundation, (2020), "*Lanka's Energy Security: From Import Development to Production*", [online], Available at: <https://pathfinderfoundation.org/pf-projects/on-going/energy-alert/201-sri-lankas-energy-security-from-import-dependence-to-production> , Accessed 3rd September 2020)

⁵⁵ Sri Lanka Sustainable Energy Authority, (2020), *New Renewable Energy*, [online], Available at: <http://www.energy.gov.lk/en/renewable-energy/new-renewable-energy>, Accessed on 26th August 2020

even if it has the properties of low ash and sulphur content, it will run out soon. Hence, Bangladesh would be dependent on imports of energy.

Key energy statistics, 2018

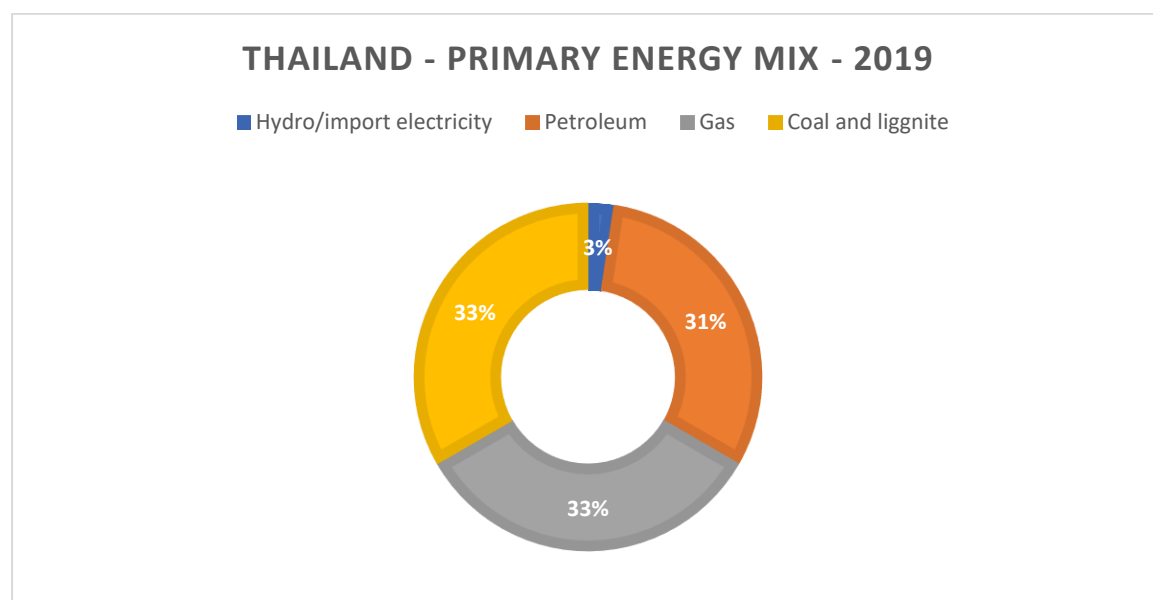
[All statistics](#)



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3.f. Thailand

Thailand is located at the heart of Southeast Asian region. Along with Myanmar, it connects South Asia with South East Asia region. The primary energy supply to the country needs is met by the utilization of gas and petroleum. Natural gas and LNG are imported. To meet the requirement of demand, Thailand imports the electricity.



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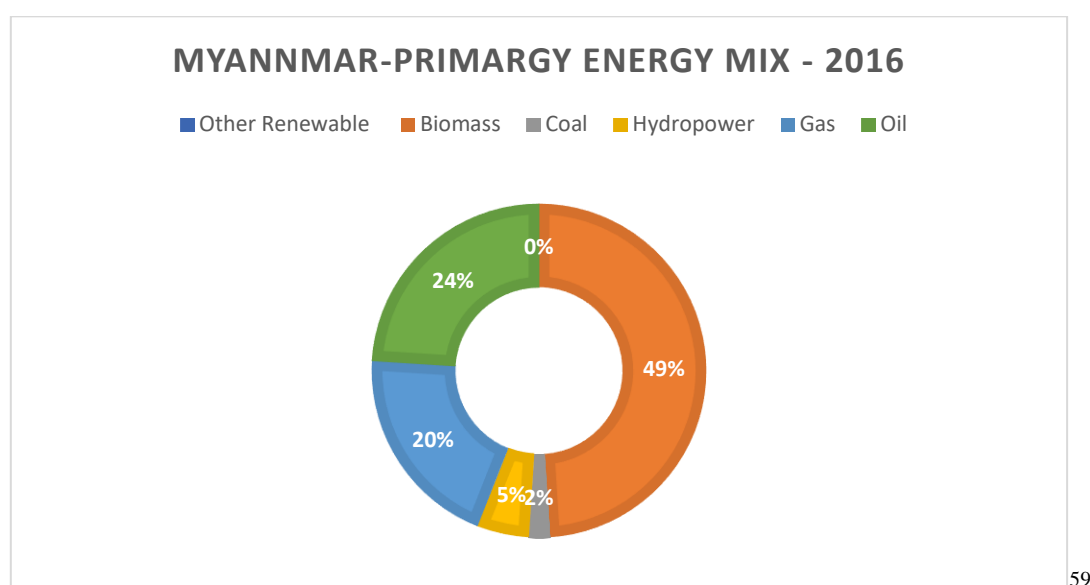
⁵⁶ International Energy Agency, (2018), Country Profile: Bangladesh”, International Energy Agency, Available <https://www.iea.org/countries/bangladesh>, Accessed 23 August 2020

⁵⁷ Energy Policy and Planning Office, Ministry of Energy, (2020), “Thailand Power Development Plan”, [online], Available: <http://www.eppo.go.th/index.php/en/policy-and-plan/en-tieb/tieb-pdp>, Accessed: 23 August 2020

The share of energy is dominated by Natural Gas and Coal. All the countries need to keep on going by maintaining and promoting the relationship between energy security and energy development, as number analysts regard that: a country which is energy-insecure will not oscillate towards a great power. There is no shortage of electricity in the country, nor there are any reports filed against the load shedding. The challenge for the country is to reduce the dependency on import which has higher tariffs. According to the power ministry plans, the country aims for the increase of renewables share in the energy mix by 2036 under Alternative Energy Development Plan (AEDP) 2015.⁵⁸ Another challenge for the country is to build a strong and cost-effective grid integration.

3g. Myanmar

Myanmar / Burma, a sovereign state in South East Asia is bordered by Bangladesh, India, China, Laos and Thailand. In the South and Southwest of the country lies Andaman Sea and the Bay of Bengal. The capital of Myanmar is Naypyidaw.



Myanmar's primary energy mix is dominated by biomass, supplemented by oil and gas. The use of biomass is primarily by the domestic segment, such as fuelwood and charcoal. The country is the net energy exporter. Myanmar is rich in gas reserves, and thus, with this

⁵⁸ Ministry of Energy (2015), “*Alternative Energy Development Plan 2015*”, [online], Available: <https://www.eppo.go.th/images/POLICY/ENG/AEDP20/5ENG.pdf> , Accessed: 1st September 2020

⁵⁹ Ministry of Electricity and Energy; and Economic Research Institute for ASEAN and East Asia (2019), *Myanmar Energy Statistics 2019*”[online], Available: https://www.eria.org/uploads/media/0.ERIA-Myanmar_Energy_Statistics_2019.pdf

availability, the BIMSTEC region would benefit if cross-border trade is carried out well and without any disturbances. The challenge for Myanmar is to improve the access of electricity, due to the less integrated national grid system.

All the initiatives and decisions in power sector is done by the Ministry of Energy and Electricity (MOEE). The power-oriented responsibilities are owned by Electric Power Generation Enterprise (EPGE), which is state owned. By 2030, with National Electrification Plan, the government has targeted to achieve “electricity for all” by the year 2030.

4. BIMSTEC Outlook Towards Energy

In the BIMSTEC region energy will be secure when there is supply of lifeline energy to all its citizens as well as, when all its member countries meet their effective demands for safe and convenient energy to satisfy various needs at affordable costs at all times with a prescribed confidence level considering shocks and disruptions that can be reasonably expected. With the rise of economy in these countries the requirement of energy is also rising exponentially.

Power and electricity shortages can impact the economy of any country. Adequate supply of energy is the prerequisite for development. For the BIMTEC countries, to meet the need of power shortages the important and urgent requirement was to build grid interconnection for trade in electricity. In this regard, the MoU was signed on 31st August 2018, it is focused on: -

- a. The optimization of using energy resources in the region for mutual benefits on non-discriminatory basis subject to laws, rules and regulations of respective parties.
- b. The promotion of efficient, economic and secure operation of power system needed through the development of regional electricity networks.
- c. The necessity of optimization of capital investments for generation capacity addition across the region.
- d. Power exchange through cross border interconnections.⁶⁰

In 1998, among the nine major areas during the period of formation of the regional organisation, Energy sector was one of the areas of focus for development. In Dhaka, Myanmar was nominated as the lead country to chair the energy sector for BIMSTEC. For building and

⁶⁰ Government of India, Ministry of Power (2005), “*Memorandum of Understanding for establishment of the BIMSTEC Grid Interconnection*”, New Delhi, Government Publication.

strengthening the energy flow between the countries. For coordination India and Thailand were given the responsibility. Two projects were chosen for cooperation: -

- a. Development of New and Renewable Sources of Energy
- b. Energy Infrastructure Development, particularly for natural gas.

The source of energy in BIMSTEC till few decades to come, will be depended on fossil fuels. The share of fossil fuels is likely to increase from 73 percent in 2015 to 77 percent in 2030.⁶¹ Nature has bestowed with enormous Hydropower potential amongst BIMSTEC countries, the usage of this economically feasible resource is increasing day by day. Installed hydropower capacity in South Asia grew by almost 4 GW in 2018, continuing the growth trajectory from 2017.⁶² In the Energy mix block, Bio-fuels, a resource which is easily accessible and affordable for rural population in these developing countries will decrease the usage by 2030. The utilization of Hydropower has many positive factors like: Affordable and Reliable energy, Protection from natural disasters like floods and droughts, managing fresh water responsibility and it boosts economic growth and jobs.

5. Availability of Energy Resources in the Bay of Bengal Region

There is a tremendous amount of diversity of resources among the countries. The significant commodities are Coal and hydropower. Coal constitutes about 48 per cent of the energy mix as of 2019, and renewable energy accounts for about 20 per cent, natural gas accounts for about 14 per cent, oil and diesel account for 8.2 per cent. With the shortage of energy resources, most of the BIMSTEC countries import it from other energy-rich countries to meet their needs and requirements. India (1000 GW) leads the green energy capacity led by Myanmar (60 GW) and Thailand (23 GW). In order to maintain energy security and develop the region, BIMSTEC countries can benefit from interdependence, supporting each other during the time of energy shortages and also upholding to the MoU's terms in energy trade.

From the commencement of BIMSTEC energy trade there has been a steady increase in supply of energy amongst BIMSTEC countries. On an average, the per capita primary energy supply in the region is marked an increase of 29.4 per cent, with an annual average growth of

⁶¹ Ibid

⁶² International Hydropower Association, (2019), "*Hydropower Status Report: Sector Trends and Insights*", London: Chancery House

3.27 percent.⁶³ The development will continue in the energy sector, and it will see a change towards, mainly thermal power to cleaner sources because more renewables would be introduced to the grid. Coal fired power plants are likely to cultivate into a more robust industry to produce electricity with the annualised percentage of 3.9 by 2030.

The states in the region are preparing the expansion of the share of renewables in the electric grid. India leads the expansion of renewables in the BIMSTEC region. The generation of electricity by the use of renewables is primarily focused on solar energy, wind energy, biomass and hydropower. Thailand is the second largest benefactor to contribute renewable energy to the region.

6. Cross Border Energy Trade in the BIMSTEC Region

With the development of modern energy, humankind has been able to free themselves from poverty, hunger and destitution. As per the United Nations norms it is integral that all the member states should have a vision for development, transfer and diffusion of clean energy technology and services. At present 2.6 billion people of the world rely on biomass as an energy resource and 1.6 billion people do not have access to energy. Energy is at the core of every country's economic, developmental and environmental issue. With this the importance should be given to reliable, clean and affordable energy.

The international perspective of BIMSTEC as a grouping highlights that it is an essential building block in India's Act East Policy in the context of the renewed importance of the Indo-Pacific region.⁶⁴ The BIMSTEC region is rich in energy and has been bestowed with diverse energy sources, cooperation among members and cross border energy trade can aid to mitigate the challenges faced like energy access, sustainable use of natural resources and building of infrastructure which makes it possible for the demand and supply of energy in the region and also with neighbouring countries by which they can accelerate the development and enhance energy security.⁶⁵

⁶³ Integrated Research and Action for Development, (2017), "South Asia Regional Initiative For Energy Integration: BIMSTEC Energy Outlook 2030", [online], Available: <https://irade.org/SARI-EI-Report-on-BIMSTEC-Energy-Outlook-2030.pdf>, Accessed: 02 August 2020

⁶⁴ Wagner, C. and Tripathi, S. (2018), *New Connectivity in the Bay of Bengal: Opportunities and Perspectives of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)*, SWP Comment, German Institute for International and Security Affairs, No. 53.

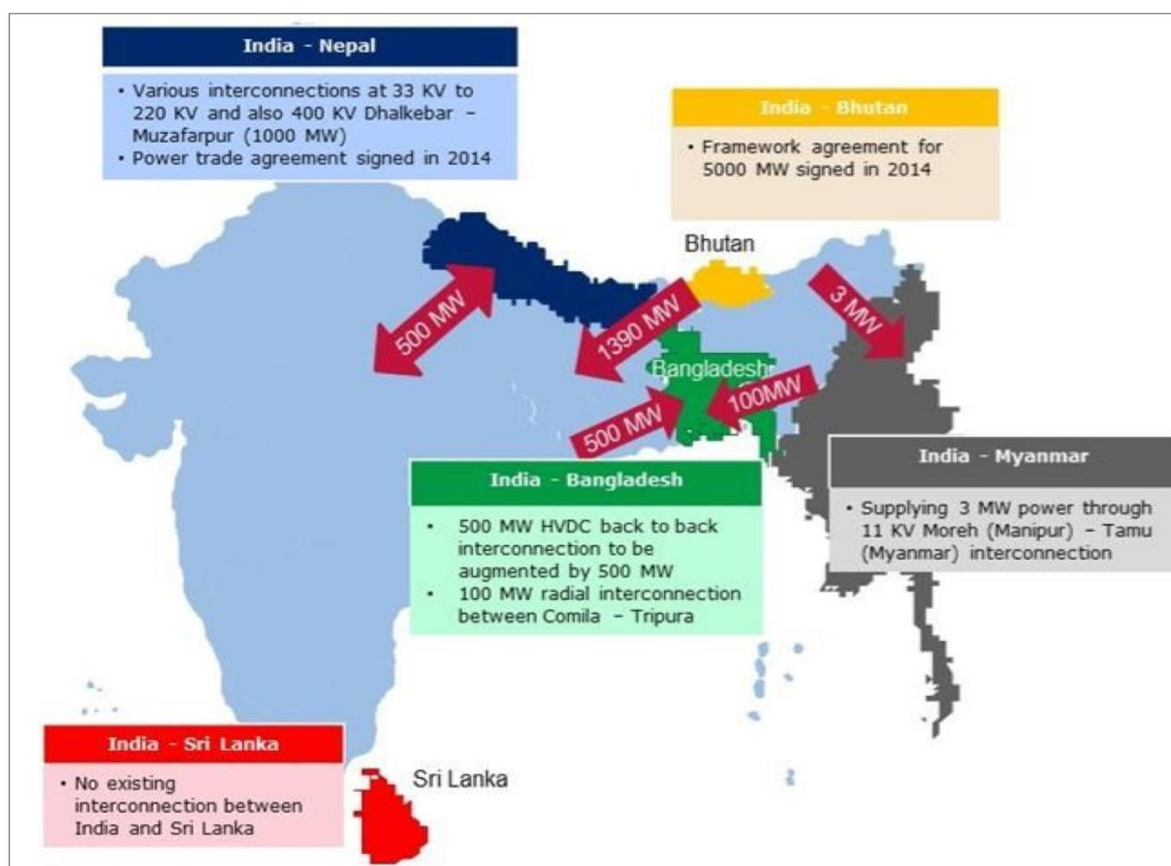
⁶⁵ SARI/EI (2020), *Prospects of Regional Energy Cooperation and Cross Border Energy Trade in the BIMSTEC Region*, Integrated Research and Action for Development (IRADE), Available from: <https://sari-energy.org/publications-list/prospects-of-regional-energy-cooperation-and-cross-border-energy-trade-in-the-bimstec-region/> [Accessed on: 6th August 2020].

There is a Memorandum of Understanding on expanding cross-border power grids by which energy trade could be a core focus of the member countries to boost connectivity and trade. To maintain high economic growth the countries are required to sustain the norm of affordable and competitive supply of energy. Countries like Nepal, Myanmar and Bangladesh has a deficit to the access of electricity. Cooperation and the potential to mitigate the lack of access and availability of energy can be minimised by import of energy from other regional countries which have surplus amount of resources to supply power to the region, extend the power grid system which should be long lasting and financial assistance and most of the countries in the BIMSTEC region are Least Developed Countries (LDC's). On the contrary, there persists a lack of sharing in energy and electricity. Most of the energy trade are bilateral in nature and with limited capacity of flow and storage; which means low supply and limited infrastructure to save the energy for future needs. Lack of energy security among the countries can lead to the fall of regionalism and integration if not implemented well.

Cross Border Energy Trade (CBET) in the region has developed at a fast rate. CBET has increased from 1350 MW in the year 2012 to almost 3563 MW in 2020. Currently CBET between Bhutan-India is 1800-1900 MW; India-Bangladesh 1160 MW, India-Nepal 550 MW and India-Myanmar is 3-5 MW.⁶⁶ CBET takes an incredible amount of political support, massive fund that invests in infrastructure, addressing institutional barriers, developing and harmonising laws and regulations. Regional level cooperation and harmonisation can uplift trade.

⁶⁶ Ibid

Figure 4: Cross-border transmission interconnections in South Asia



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For the demand-rich area, hydropower, is a resource which is still to be exploited. The potential of Bhutan, Nepal and Myanmar with a capacity of power generation - 23.8 MW, 42 MW, and 100 MW, is still small. It would take a strategic solution and a competitive energy market to make the energy partnership effective. BIMSTEC countries can draw on the competitive value of their resource base and varying electricity demand to fulfil their energy needs. Focusing on transitioning to green energy in most countries, expanding regional grid convergence will better stabilise the regional grid and coordination for the supply of energy.

In order to promote cross-border energy trade, key domestic shortfalls need to be prioritised. The first Secretary General, Sumit Nakandala, conveyed, “we are not reinventing the wheel” but just “rediscovering the common heritage around the Bay of Bengal.”

⁶⁸ According to BIMSTEC Energy Outlook⁶⁹ the power generation capability by the countries

⁶⁷ South Asia Regional Initiative For Energy Integration (2018), *Linking South Asia with Burma and South East Asia to Advance Cross Border Electricity Trade: A Political Economy Electricity Trade*, [online]. USAID, Available https://sari-energy.org/wp-content/uploads/2018/08/Linking-SA-with-Burma-and-SEA-to-Advance-CBET_A-Political-Economy-Study.pdf, Accessed: 10 August 2020

⁶⁸ Mohan, C Raja, and Nakandala, S (2016), *BIMSTEC and the Bay of Bengal*, Carnegie India, Available at: <https://carnegieindia.org/2016/11/04/bimtec-and-the-bay-of-bengal-event-5419>

⁶⁹

is proposed to increase threefold, in 2014 it was 293 GW and it is projected that it will increase to 904 GW by 2030. There will be more green energy add on to the energy mix like thermal based power generation. The utilization of renewable energy resource will be also a positive factor for the energy development of the region. By 2030 the estimate of generation through renewables is 383 GW.

6.a Grid Interconnection and Electricity Trade in BIMSTEC Region

A vital element in building a community and a stronger region must entail with trust and connectivity, which is the first step-familiarisation by contributing to increased trade and investment as well as tourism and people-to-people contact.⁷⁰ In 2016, India gave access of its land to Bangladesh for connectivity between Bangladesh, Nepal and Bhutan which proliferated and strengthened the subregional multi-modal connectivity.⁷¹

Between India and Bangladesh, the first national grid interconnection was built in the South Asian region and launched in October 2013. The ADB assisted and financed this project. The key motivating factor for interconnection was Bangladesh's significant power gap and the two governments' political dedication to power-sharing. Bangladesh's limited power grid had then been attached to a vast Indian power network, allowing them to retain an autonomous power system regulation through a back-to-back high Voltage direct current device to minimise the deficit of electricity supply. The capacity of this power system was 250 MW, which Bangladesh had the capacity to access from India.

The required regulatory regimes must be in place at the country, subregional and regional level to ensure adequate investment when developing transmission infrastructures. The large-scale transmission of interconnection capacity through hydropower which Nepal and Bhutan holds has the impending power to lower the use of fossil fuels in India and Bangladesh if India gives access to its land, there will be power shortages and less emission of Carbon Dioxide and greenhouse gases. The strategic location and the sheer weight of the power grid with a clear demand for massive volumes of electricity India could play a pivotal role in increasing electricity trade throughout the region. Seeking to exploit the enormous capacity of renewable energy in the BIMSTEC area and the widespread availability of natural gas and hydroelectricity in Nepal, Bhutan, Myanmar, Bangladesh and Thailand, in particular, is essential to the efforts

⁷⁰ Yhome, K. (2017), "*BIMSTEC: Rediscovering Old Routes to Connectivity*", ORF Issue Brief, No. 213, New Delhi

⁷¹ Ibid

of the power industry to meet the region's fast-growing demand at the lowest rate, with negligible effects on energy security and environmental degradation.

The BIMSTEC region's energy sector has a significant diversity of generation patterns, demand patterns throughout the timeframes and access to different forms of energy overseas. Furthermore, in certain nations, there are facing an escalating rising demand for energy due to electricity scarcity. Obviously, this diversity helps to facilitate economically viable power trading between the Member States.

The utilization of the ability for hydropower and associated transmission, including cross-border interconnections, would, therefore, become a core priority of the sustainable development agenda of BIMSTEC countries.⁷² Moreover, the abundance of natural reserves and the nature of demand and supply for energy both during the day and during various seasons in these countries opens up possibilities for better usage of affordable and renewable power, assisted by the integrated generation capacity, including trans - border networks.

India is the prime supplier of electricity in BIMSTEC region. Bhutan, Nepal, Bangladesh, Myanmar all import electricity from India due to lack of adequate development of infrastructure and hydropower potential. At present both Bangladesh and Myanmar imports electricity from India, 7 per-cent and 3 MW respectively. This signifies the high cooperation and dependency factor in bilateral relations. The bilateral relation thus needs to shift to multilateral relationship among member countries. Cross Border Energy Trade interconnects in the BIMSTEC region which are proposed and are being developed are: -

6.a.i India – Nepal

Over a period of time Nepal as a landlocked country has built and gained its potential in hydropower development and long run regional trade agreements. The establishment of energy trade interconnections are as under:-

- 400 KV D/c Dhalkebar - Muzzafarour Line (presently charge at 200 KV)
- 132 KV line: Kataiya - Duhabi, Raxal - Parwanipur, Tanakpur - Mahendranagar, Kataiya – Kushaha, Gandak East – Gandak/ Surajpur (Operating Radial Mode).

⁷² Junquera-Varela, R.F., Verhoevan, M., P.Shukla, G., Haven, B., Awasthi, R. and Moreno-Dodson, B., (2017), *Strengthening Domestic Resource Mobilization: Moving from Theory to Practice in Low and Middle-Income countries*, World Bank Group, Washington D.C, USA.

6.a.ii India – Bangladesh

- The first 500 MW interconnection between India and Bangladesh was developed with aid from the Asian Development Bank (DB) and was launched in October 2013. Extended high capacity lines and grid expansion programmes are at separate levels of growth which will come up simultaneously.
- In 2016, Tripura (India)-Comilla (Bangladesh) 400 KV transmission interconnection was instructed.
- Reliance Power, an Indian company, signed a memorandum of understanding with Bangladesh in 2017. The project has a transmission capacity of around 300 MW at Meghnaghat in Bangladesh. Another company, Adani Power Ltd., has agreed to supply 1,600 MW of power from Jharkhand to Bangladesh.

6.a.iii India – Bhutan

- Cross border interconnections are strong between Indian and Bhutan since the early 2000's. The present power capacity between the two nation is around 2500 MW.⁷³
- Dadachuu Hydropower Project commissioned in Bhutan to supply to India in 2015.
- Punatsangchu HEP – Alipurduarduar 400 KV D/c – 170 km
- Strengthening the Indian grid from Alipurdiar – Alipurduar – Siliguri – 400 KV D/c line.

6.a.iv. Thailand – Myanmar

- Mai Khot – Mae Chan – Chaiang Rai (369 MW)
- Hutgyi – Phitsanulok 3 (1,190 MW)
- Ta Sang – Mae Moh 3 (7000 MW)

⁷³ Ibd 30

- Mong Ton – Sai Noi 2 (3,150 M W)

6.a.v. Bangladesh – Nepal

- Purnea – Barapukuria (1000 MW by 2025, and additional 1000 MW by 2030)

6.a.vi. Bangladesh – Bhutan

- Bongaigaon/Rangia – Jamarpur (1000 MW by 2030)

6.a.vii Bangladesh – Myanmar

- Cox’s Bazar – Myanmar (500 MW by 2040)

6.b Regional Power / Electricity Grid Gains and Challenges

Integration of the power grid and CBET offer multidimensional advantages. Monetary and fiscal benefits, technological and organisational benefits, environmental benefits, climate change and the growth of the energy/power sector.

- Monetary and Fiscal Benefits - This form of gain allows an adequate market supply of fuel, access to affordable renewable energy sources, use of one country's excess energy generation from another, and increased regional social and economic development. In case of Nepal importing power from India, the cheaper cost of electricity serves as an engine.
- Technological and organisational benefits
- Environmental benefits
- Climate change
- Growth of the energy/power sector

The failure of a standard set of rules, laws and policies, regulatory mechanisms, political agreements, lack of integrated transmission networks and lack of a centralized energy sector poses numerous threats and challenges. The cross-border aspect significantly raises risks due to diplomatic, financial and trade-related factors. It is also evident that even initiatives

by member countries for project development that seem to be practical, reasonable, cost-effective in reality, are failing to get them funded and constructed. To mitigate the risks the countries, need to substantiate the development of BIMSTEC-Comprehensive Plan for Energy Cooperation (BIMSTEC-CPEC) to intensify the connectivity. Firm legal frameworks need to come into force for open access to transmission networks, settlement mechanisms, disputes at the border areas and coordination procedure. To plan the energy sector the BIMSTEC countries can take few actions: monitoring energy demand and supply, introducing new technologies for sustainable energy production, supporting BIMSTEC Energy Centre and establishment of regional energy market.

Individual countries should improve and upgrade energy management, construct a database, exchange information, train and pass on the knowledge for secure energy and development. For the energy sector to flourish in BIMSTEC region, Asian Development Bank, World Bank and BIMSTEC Grid Interconnection Coordination Committee have actively coordinated to promote the Cross-Border Energy Trade amongst member countries of the regional organisation. World Bank and ADB have mostly provided finances for the construction of cross border transmission lines. The international organisation involvement, has given an opening for foreign direct investment for developing the regional power grid. Hence, this cross-border initiative between the countries will give access to the countries to transfer electricity to other countries which are not directly connected, like from Nepal and Bhutan to Bangladesh with the help of India.

7. A strategic importance for the region from the lens of India

As India is a developed country than other BIMSTEC countries, with a high energy storage capacity, with vast landmass, India could play and integrate energy trade between member countries. The launch of electricity markets in India, such as the Indian Energy Exchange (IEX) and the Power Exchange India Limited (PXIL), is an environment-friendly step into a national power sector. Such transactions of energy would dispense a marketplace for sales to be based on demand and supply between buyers and sellers. Extending such markets to cover the integrated area of South Asia and South-East Asia will be a big trading place for suppliers and consumers in neighbouring countries to export and purchase elsewhere in the region.

For fairly obvious reasons, Bangladesh and Nepal are currently having insignificant cascades of energy shortages. They could have significantly profited by connecting all the

power systems and operated by a regional power exchange, where massive excess of power can be swapped from several states.

In the future, Sri Lanka is expected to experience shortages in terms of peak load generation while its base load would surpass. Around the same period, besides, Bangladesh will still struggle from both peak and baseload shortages. Therefore, in both countries with long-term exposure to the Indian power sector, any link with the country would remedy the situation.

7.a Energy Transformation: Integrating North Eastern Region of India with BIMSTEC

India's North-East area is less developed compared to other Indian states and as well as struggling for energy. The north-eastern India's area sits at a point where a significant transformation may take place. The potential hydropower area was mostly unused until now, mainly because of poorly conceived projects that led to residents and environmentalists protesting. To enhance power trade, the relation with Bangladesh, an AC interconnection from the Northeast and eastern part of India to Bangladesh has been proposed along with a 500/1,000 MW HVDC BTB terminal in Bangladesh.⁷⁴ The eastern region of the country is rich in hydro power resources. If the hydropower resources is exploited at a higher level, Bangladesh could import hydroelectricity from this region, which can lead to development and job creation of the region. The draw-back of the region is that it has not been much explored by the Government of India since the time of Independence. The northeast grid is linked to Bangladesh, Bhutan and India.

8. Energy Security Challenges and Way Ahead

BIMSTEC, as a regional organization, must perform a significant role in channeling country-level policies to administer a forum for ensuring an adequate, secure and reliable supply of energy/electricity through the incorporation of sustainable energy and region's social, economic development. Even though, the region holds lots of natural resources, there is a lack generation and infrastructure development, hence by promoting energy trade among themselves, the region can mutually benefit from one another. BIMSTEC countries per capita

⁷⁴ Ibid 30

consumption ranges from 190 kwh per person for Nepal to 2821 kwh per person for Thailand, 2976 for Bhutan and the region on an average, it is only around 1086 kwh per person, which is much lower than the world average of 3132 per person.⁷⁵

One of the challenges for the countries is to supply more power to every corner of every member country. The supply becomes mandatory due to the binding force of MoU energy plan. The second challenge is to exploit the use of renewable energy resources like solar and offshore wind energy. The domination of the use of fossil fuels may hamper the dependency and depletion of fossil fuels. The incorporation of more green energy options in the energy mix, with the loss of fossil fuel stocks, market fluctuations, the increase of carbon emissions, climate change reduction, the use renewables energy can strengthen energy security and development for the member countries. Interconnections of electricity grids and gas pipelines for developing energy connectivity can contribute to multiple energy/electricity sector in times of crisis and as a safety net. If law and order, and policies are prioritized, various multilateral development banks are willing to invest more in the energy sector. World Bank, Asian Development Bank and New Development Bank are few. Irrespective of the individual countries share and stakes on various projects, with these Banks initiative the development of energy can advance quickly at a significantly higher rate.

For the BIMSTEC countries there is a concern for the supply route which is a junction in the Bay of Bengal connected to the Indian Ocean which could be disrupted by the instability like: accident, attack or natural disaster.

9. Conclusion

The geographically interconnected area enables the recounting of new high-capacity transmission lines via another country where there is a right of way / other issues in direct point-to-point communication. If BIMSTEC countries create cross-border trade in energy like the Indian-Bangladesh power grid, the region will grow and be adequately stable. It will also be less dependent on other countries for energy imports.

⁷⁵ Ibid

Second, with a large amount of hydropower and gas available, there is less storage capacity to protect the energy produced. Third, with growth, the area also needs advances in technology transfer and incorporation into the BIMSTEC energy plan for 2030. Technologies like smart grid, and related with energy efficiency and power storage will be extremely beneficial in ensuring prudent use of energy, less losses in transmission and storage, better accounting and reserves to deal with contingencies. These are the fields where regional cooperation is required to be strengthened.

South and South-East Asia will have an increased rate of development only when the two regions are well connected and hold enhanced amalgamation of cross border energy trade and distribution. In particular India has shown enhanced levels of growth and development in last two decades resulting in its rapid economic transition should take the lead and guide the other member states to synergize their efforts in energy trade and offset each other's limited energy resources and infrastructure and leverage the geographical advantage of being in proximity to each other through land and water routes.

South East Asia will find its way into and across the Pacific whereas South Asia will have easier access to the Central Asia and Europe.⁷⁶ Besides, significant improvement has been made in each field, impacting economic growth and development in both directions. One of the problems is energy, considering the region's reliance on oil supplies and the persistence of high oil prices, there is an aspect of speculation about the future. Diplomacy has to take realities into account if progress has to be achieved with regional initiatives in areas such as energy.⁷⁷ BIMSTEC will continue to face significant challenges towards regional cooperation and integration if obstacles to the free flow of people, ideas and goods are not addressed.⁷⁸

Globally, energy generation systems are under gradual transition, and innovation is steadily evolving. BIMSTEC countries should collaborate and concentrate on other aspects of the energy market other than CBET, such as energy conservation programmes, manufacturing quality enhancement, implementation of smart grid projects, the introduction of distributed

⁷⁶ Asia & Pacific, Yinglin, (2018), "*bimstec to act as vibrant organisation to deepen regional cooperation: experts*", [online], Available: www.xinhuanet.com/english/2018-08/25/c-137416684.htm (Accessed 20 August 2020)

⁷⁷ Devare, S. & Devare, S. T., 2008. *A new energy frontier : the Bay of Bengal region*, Singapore : Institute of Southeast Asian Studies

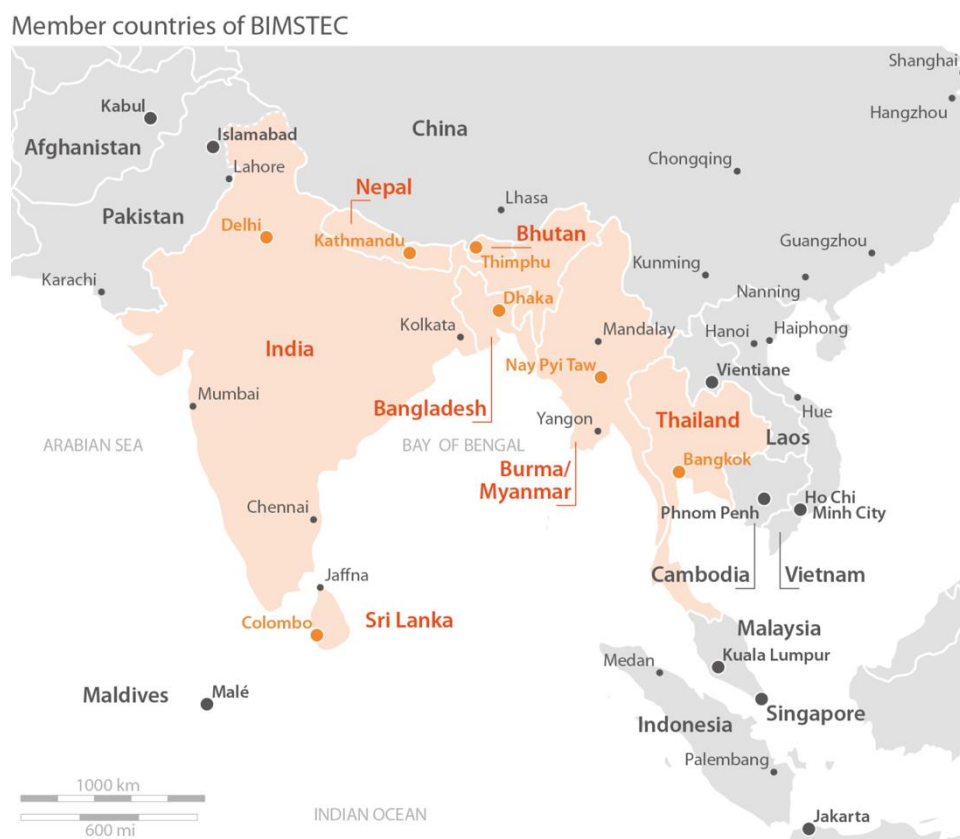
⁷⁸ Xavier, Constantino and Sinha, R., (2020) "*Regional connectivity and India's BIMSTEC Policy*", National Security, Vivekananda International Foundation, Vol 3, no.1, pp. 34-51.

power, clean power technology, electricity scarcity, electric cars and large-scale use of renewable energy. Although the BIMSTEC Grid Interconnection MoU (Reference) will facilitate electricity grid interdependence in the region, there is a need to establish a BIMSTEC Comprehensive Energy Cooperation Plan (BIMSTEC-CPEC)⁷⁹ to enhance all prospective areas of energy cooperation (including the oil and gas sector) to improve energy connectedness and encourage regional energy flow.

⁷⁹ Ibid

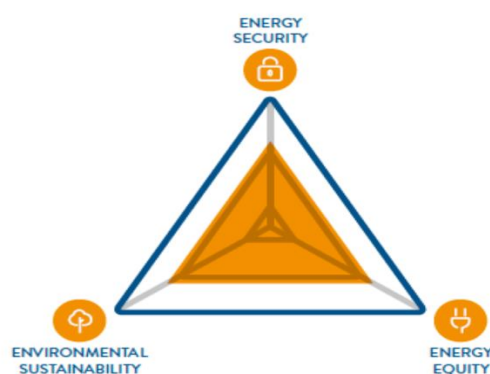
Appendices – 1

Chart 1 – Member countries of BIMSTEC organisation



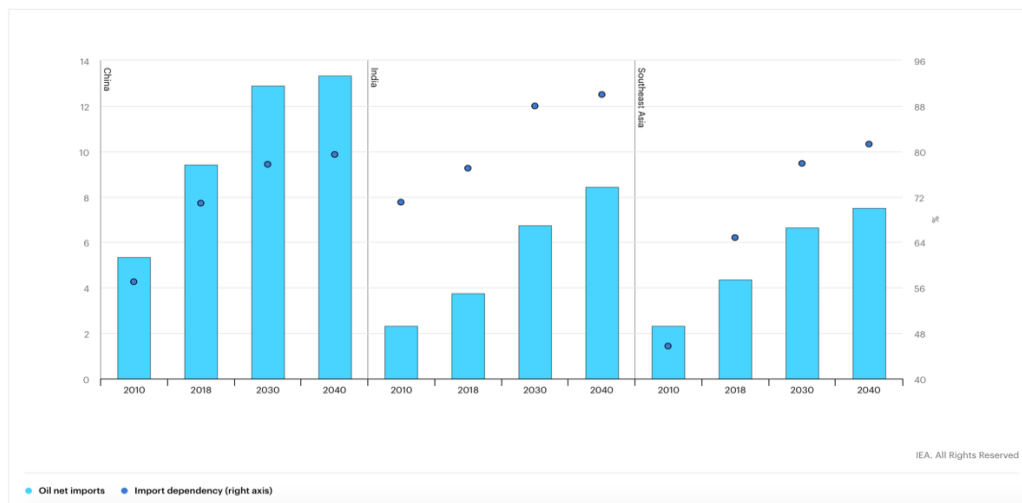
(Source : European Parliamentary Research Service Blog (2016), *BIMSTEC Member Countries* [Online], Available at: https://epthinktank.eu/map_south-south-east-asia_highlights_gw/)

Chart 2 : World Energy Trilemma, World Energy Council – 2019



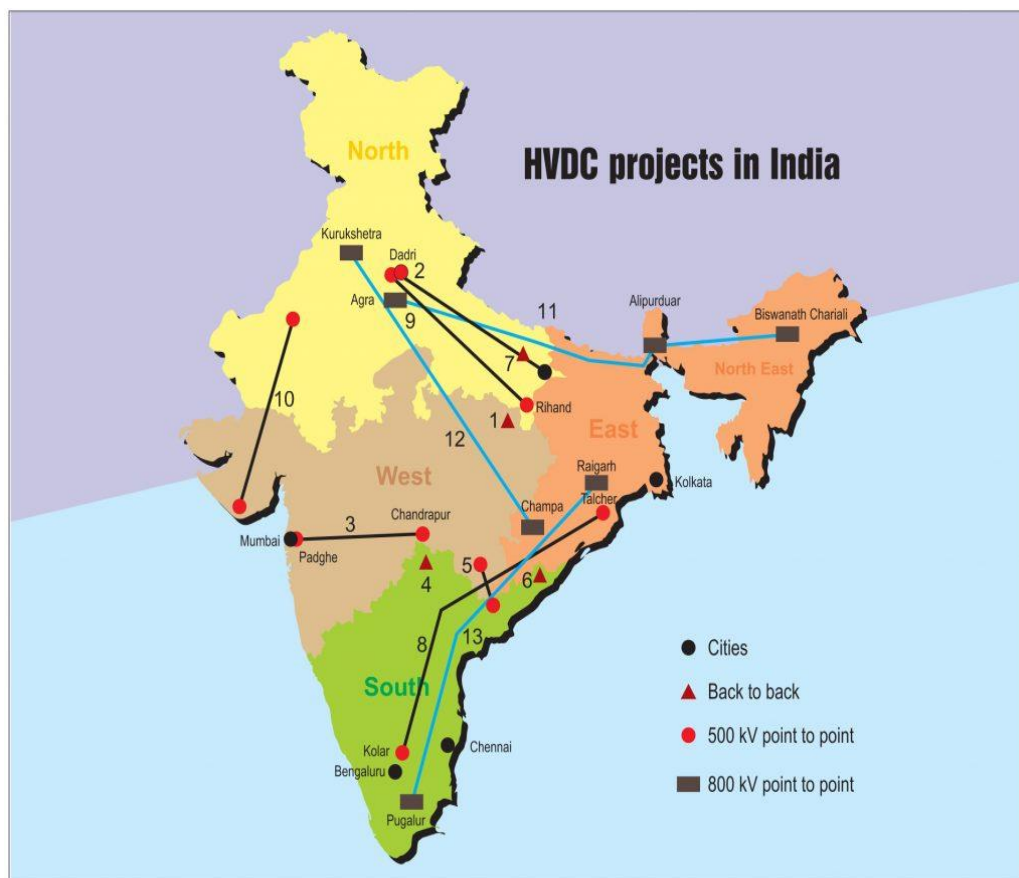
(Source - World Energy Council, (2019), *“World Energy Trilemma Index:2019”*, [online], Available at: <https://www.worldenergy.org/publications/entry/world-energy-trilemma-index-2019>)

Chart 3: Oil Imports and Import Dependency in Asian Countries, 2010 – 2040



(Source: International Energy Agency (2020), *India*, [online], Available at: <https://www.iea.org/countries/india>)

Chart 4: High Voltage Direct Current (HVDC) projects in India



(Source - Powe Line, (2017), “*Changing Powe Dynamics*”, [online], Available at: <https://powerline.net.in/2017/11/02/changing-power-dynamics/>)

Chart 5: India : Sri Lanka HVDC Interconnections

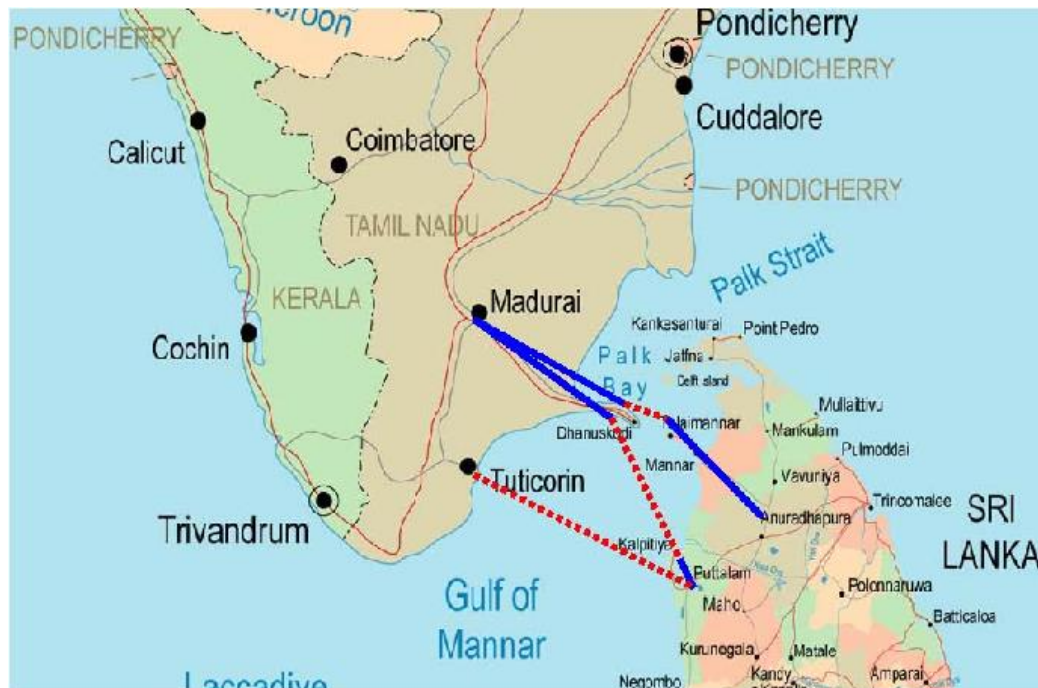
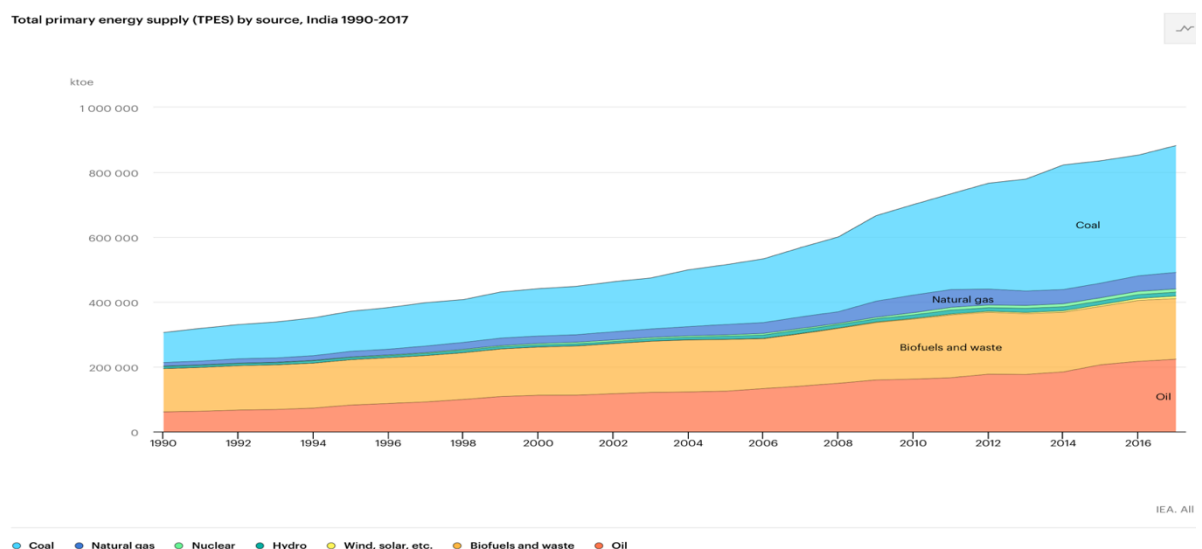


Fig 1: India-Sri Lanka HVDC interconnections.

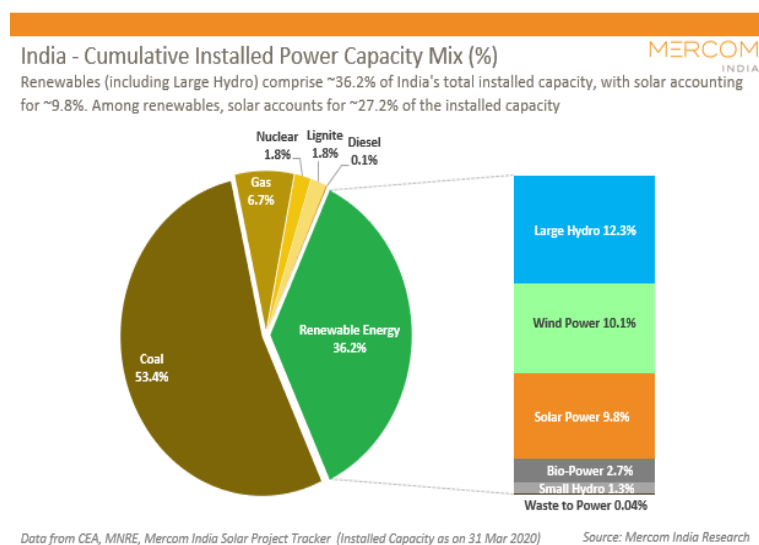
(Source - Jowsick, A., Arulampalam, A., & Wijekoon, H.M. (2009). HVDC transmission line for interconnecting power grids in India and Sri Lanka. *2009 International Conference on Industrial and Information Systems (ICIIS)*, 419-424)

Chart 6: Primary Energy Supply in India 1990-2017



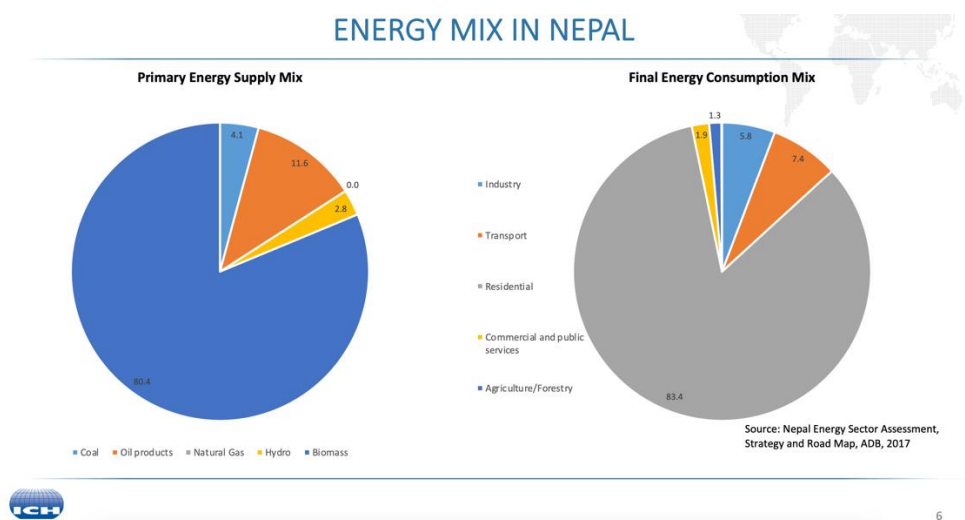
(Source - ¹ International Energy Agency (2020), *India*, [online], Available at: <https://www.iea.org/countries/india>)

Chart 7: Cumulative Installed Power Capacity in India – 2020



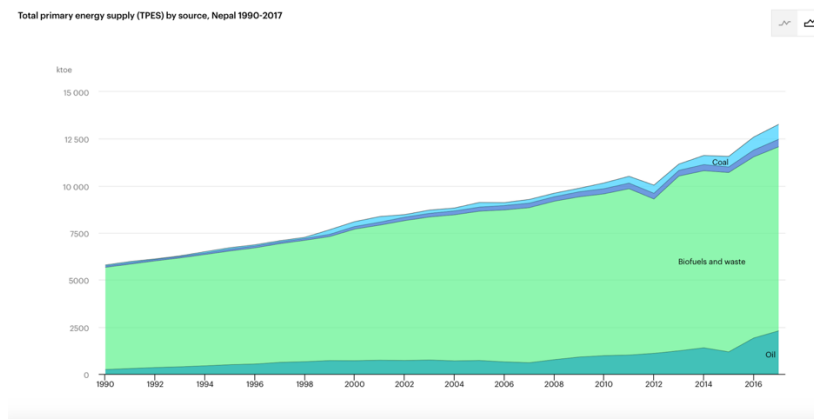
(Source - Prasad, N.T./ Marcom, (2020), "Solar Share in India Installed Power Capacity Mix Rises to 9.8% as of Q1 2020", [online], Available at: <https://mercomindia.com/solar-share-india-installed-power-capacity-mix/>)

Chart 8: Energy Mix in Nepal



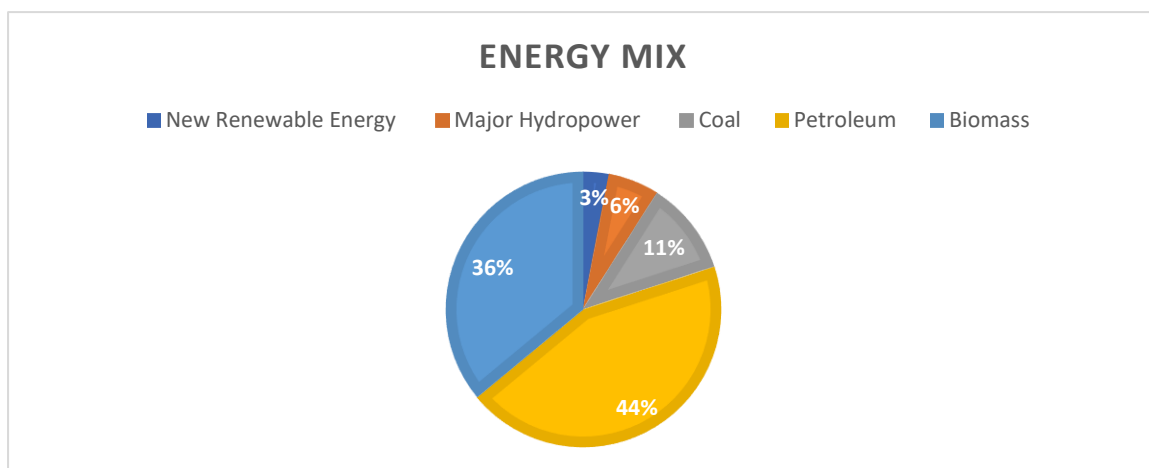
(Source - International Centre for Hydropower, (2020), "Energy Situation in Nepal", [online]. Available: <https://tekut.no/wp-content/uploads/2019/09/Country-Presentation-Nepal-2019.pdf>)

Chart 9: Total Primary Energy Supply in Nepal – 1990 – 2017



(Source - International Energy Agency, 2018, Available at: <https://www.iea.org/countries/nepal>)

Chart 10: Energy Mix in Sri-Lanka

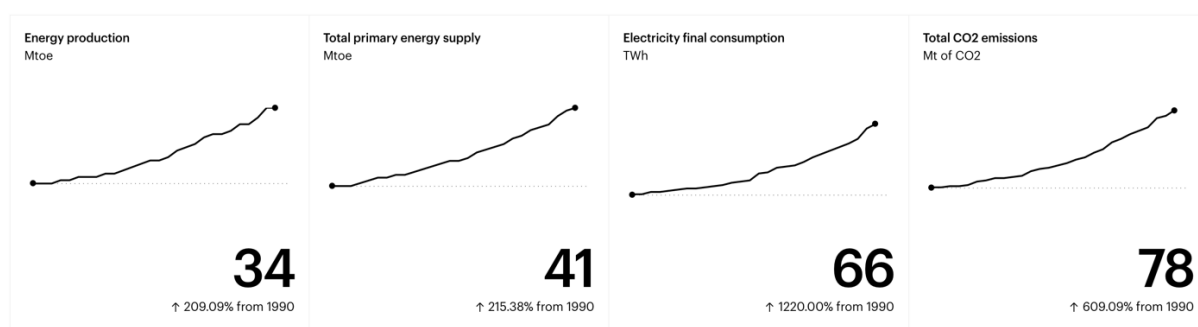


Source - Path Finder Foundation, (2020)

Chart 11: Key Energy Statistics in Bangladesh – 2018

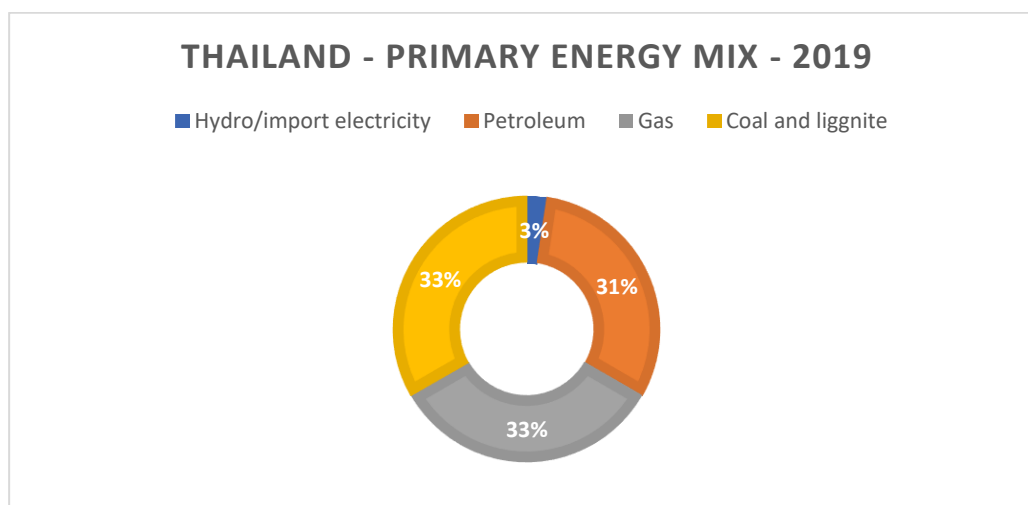
Key energy statistics, 2018

[All statistics](#)



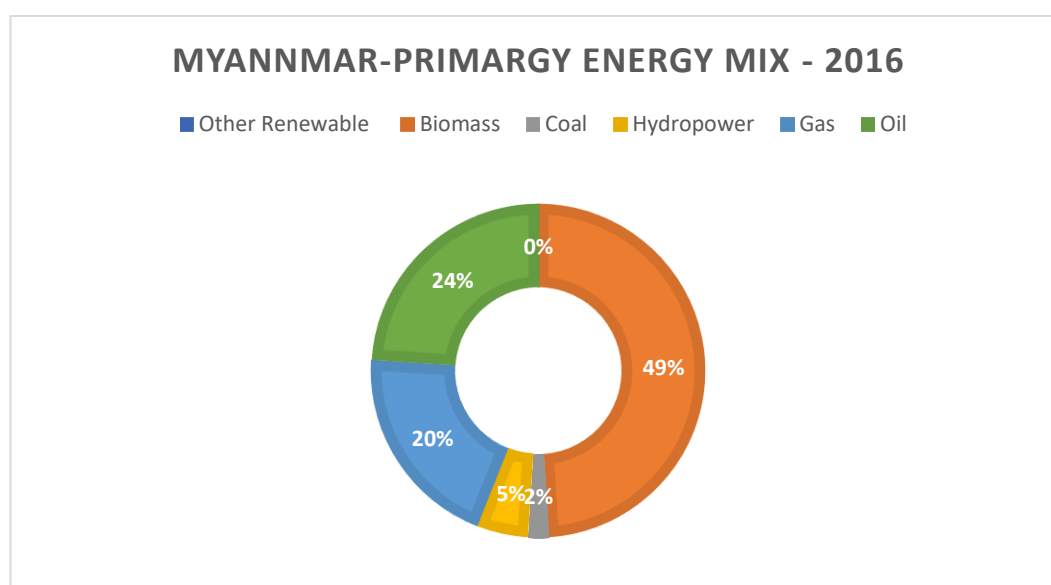
(Source - International Energy Agency, (2018), Country Profile: Bangladesh”, International Energy Agency, Available <https://www.iea.org/countries/bangladesh>)

Chart 12: Thailand Primary Energy – 2019



(Source - Energy Policy and Planning Office, Ministry of Energy, (2020), “*Thailand Power Development Plan*”, [online], Available: <http://www.eppo.go.th/index.php/en/policy-and-plan/en-tieb/tieb-pdp>)

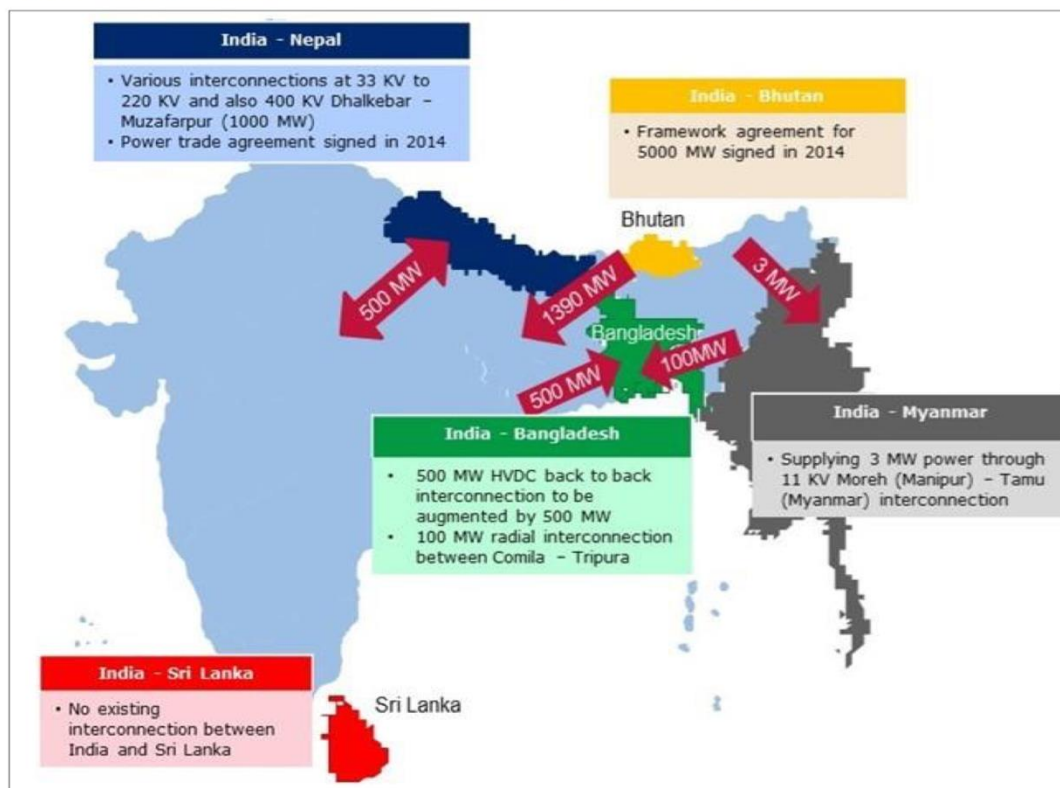
Chart 13: Myanmar Primary Energy Mix – 2019



(Source - Ministry of Electricity and Energy; and Economic Research Institute for ASEAN and East Asia (2019), *Myanmar Energy Statistics 2019*”[online], Available: https://www.eria.org/uploads/media/0.ERIA-Myanmar_Energy_Statistics_2019.pdf)

Chart 14: Cross Border Transmission in South Asia

Figure 4: Cross-border transmission interconnections in South Asia



(Source - South Asia Regional Initiative For Energy Integration (2018), *Linking South Asia with Burma and South East Asia to Advance Cross Border Electricity Trade: A Political Economy Electricity Trade*", [online]. USAID, Available https://sari-energy.org/wp-content/uploads/2018/08/Linking-SA-with-Burma-and-SEA-to-Advance-CBET_A-Political-Economy-Study.pdf)

Appendices 2: Abbreviations

A

ADB - Asian Development Bank – is a regional development bank, Headquartered in Ortigas Center, Mandaluyong, Philippines. It was established in 1996.

AEDP - Alternative Energy Development Plan – is targeted oriented to bring the use of renewables at maximum use by the year 2035.

B

BBIN - Bangladesh-Bhutan-India-Nepal - The Bangladesh, Bhutan, India, Nepal Initiative is a subregional architecture of countries in Eastern South Asia, a subregion of South Asia

BIMSTEC - Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation

C

CBET - Cross Border Energy Trade

CEB - Ceylon Electricity Board

H

HVDC - High Voltage Direct Current

L

LNG - Liquefied Natural Gas

M

MW - Megawatt

N

NEEP - Nepal Energy Efficiency Programme

P

PPP - Public Private Partnership

R

RCI - Regional Cooperation and Integration

S

SASEC - South Asia Sub-regional Economic Cooperation

References

- Acharya, A. (2000). *The Quest for Identity. International Relations of Southeast Asia*, Singapore, Oxford University Press.
- Adhikari, Deepak, 2006. Hydropower Development in Nepal. *Economic Review-Nepal Rastra Bank*, 18, 70-94
- Afram G. and A. Del Pero, 2012. Nepal's Investment Climate: Leveraging the Private Sector for Job Creation and Growth. The World Bank; Washington, D.C. USA
- Asia & Pacific, Yinglin, (2018), "*Bimstec to act as vibrant organisation to deepen regional cooperation: experts*", [online], Available: www.xinhuanet.com/english/2018-08/25/c-137416684.htm (Accessed 20 August 2020)
- Attenberg, R.H., ebrary, Inc & United States, 2009. *Global energy security [electronic resource]*, New York: Nova Science Publishers.
- Asian Development Bank (2019). Supporting the *Bay of Bengal initiative for multisectoral technical and economic cooperation initiative (BIMSTEC) Technocal Assistant Report (Technical Assistance Consultants' Report)*. Accessed on 21 July 2020, Available at: <https://www.adb.org/projects/documents/reg-53117-001-tar>
- Asian Development Bank (2019), *Supporting the Implementation of the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation Initiative*, Asian Development Bank, Available at: <https://www.adb.org/projects/53117-001/main>, Accessed on: 27 June 2020
- Attenberg, R.H., ebrary, Inc & United States, 2009. *Global energy security [electronic resource]*, New York: Nova Science Publishers
- Banik, N. (2005), *Trade liberalization and regional development in BIMSTEC region: Does geographical characteristics matter?* (CAIRD Discussion Paper No. 3). Available at: <http://www.csird.org.in/discussion.html>
- Banerjee, K; Dipankar Dey, (2017), *India and BIMSTEC: A comparative study of the trade potential of India's energy sector in BIMSTEC and BIMSTEC+1 region*, Centre for Studies in International Relations and Development and Institute of Foreign Policy Studies, University of Calcutta
- Barton, B., (2004). *Energy Security*. Oxford: Oxford University Press.

- Bohi, Douglas R., Toman, Michael A. and Walls, Margaret A. (1996), *The Economics of Energy Security*, Boston, Kluwer Academic Publishers
- Chattopadhyay, D. and Fernando, P.N., (2011) “*Cross-Border trading in South Asia: It’s Time to Raise the Game*”, The Electricity Journal, Vol. 24, No. 9, p. 41-50
- Central Electricity Authority, (2011), *Second Progress Report on National Transmission Grid Master Plan for Bhutan*, New Delhi
- Devare, S. & Devare, S. T., 2008. *A new energy frontier: the Bay of Bengal region*, Singapore: Institute of Southeast Asian Studies
- Devare, S. T. (2020) ‘Book Review: India’s Eastward Engagement: From Antiquity to Act East Policy by S. D. Muni and Rahul Mishra’, *China Report*, 56(1), pp. 144–148
- Energy World (2017), *Cabinet approves signing pact for BIMSTEC countries power grid*”, [online], Available at:
<https://energy.economictimes.indiatimes.com/news/power/cabinet-approves-signing-pact-for-bimstec-countries-power-grid/58150456> (Accessed 20 August 2020)
- EA (2019), *The world can’t afford to relax about oil security*, IEA, Paris
<https://www.iea.org/commentaries/the-world-cant-afford-to-relax-about-oil-security>
- Government of India, Ministry of Power (2005), *Memorandum of Understanding for establishment of the BIMSTEC Grid Interconnection*, New Delhi, Government Publication.
- Henry, R., 2012. *Promoting international energy security: sea-lanes to Asia*, Santa Monica: Rand Corporation.
- International Security Advisory Board, “Energy Geopolitics: Challenges and Opportunities,” July 2014.
- Kester, J., 2018. *The politics of energy security: critical security studies, new materialism and governmentality*, London: Routledge.
- Kuzemko, C., Keating, Michael F., author & Goldthau, Andreas, author, 2015. *The global energy challenge: environment, development and security*, Basingstoke, Hampshire: Palgrave Macmillan.
- Kundu, S. (2014). *BIMSTEC at 17: An Assessment of its Potential*, Vol. 70 (3), pp.207-224
- Porrua, F. and Chabar, R. et al, (2009), “*Incorporating Large-Scale Renewable to the Transmission Grid: Technical and Regulatory Issues*”, IEEE General Meeting, Calgary, Canada

- The Third Pole, (2019), :*India eyes regional ambitions through energy trade*”, [online]
Available: <https://www.thethirdpole.net/2019/06/india-eyes-regional-ambitions-through-energy-energy-trade/> (Accessed 2 August 2020)
- Victor, D.G., Jaffe, Amy & Hayes, Mark H., 2006. *Natural gas and geopolitics [electronic resource] : from 1970 to 2040*, Cambridge: Cambridge University Press.

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