

Energy Security in the Indo-Pacific Region Challenges and Outlook

A report from the inaugural Perth USAsia Centre Indo-Pacific Energy Security roundtable - Andrew Pickford, Director, Indo-Pacific Energy Security Program

Changes to global energy framework over the next two decades will have profound geopolitical implications, even if the fuel mix does not change radically. These trends are magnified in the Indo-Pacific region which is becoming a much more important energy consumption centre as its economies expand, albeit at uneven rates. As global economic weight shifts towards the region in coming years, and geopolitical relations within the region are reformed, concerns over access to energy and raw materials will increase. This can lead to resource nationalism and potential conflict over control of resources.

Thucydides' Trap—the phenomenon describing a rising power challenging a status quo power—is becoming commonly used in reference to China's rise, but it need not be a self-fulfilling prophecy. The same can be said about nationalism and conflict driven by energy security concerns. As nations within the Indo-Pacific become global economic and diplomatic powers, there needs to be conscious effort to understand evolving patterns of energy interdependence, and the motivations behind national energy strategies. These drivers are complex—touching on a range of political, economic, technical and market issues—and vary from nation to nation as well as over time.

The purpose of the Perth USAsia Centre's Indo-Pacific Energy Security Program is to better understand energy security concerns and propose practical regional solutions. The ultimate aim is to avoid conflict and ensure all nations can access energy to power their economies. This involves devising approaches ahead of crises. During radical change, shocks and volatility can result in ad hoc energy policies which exacerbate existing political tensions that undermine regional energy security as a whole. Given the Indo-Pacific is home to both supplier and consumer nations, mechanisms that promote transparent, rules-based and liquid markets will be critical for ensuring the region's energy security.

This report has been prepared by Andrew Pickford with input from Jeffrey Wilson and draws upon the discussions from the Perth USAsia Centre's first Energy Security Roundtable held on 18 February 2016, in Perth, Australia.

DEFINING ENERGY SECURITY

There has been a tendency amongst commentators to expand the meaning of 'energy security' to cover a vast array of agendas, issues and considerations. We adopt a narrower view, which is the uninterrupted availability of appropriate forms of energy at affordable prices. This conventional view ultimately assumes interdependence between energy producers and consumers will be managed through existing market arrangements. For example, that oil contracts are settled in US dollars, with trade conducted using key benchmarks such as Brent or West Texas Intermediate that indicate current and forward prices. While favouring market mechanisms, we foresee continual evolution of the structure of energy markets, as well as a change in the importance of crude oil alongside the maturation of LNG. This long-term view of energy security takes into account transport and stationary applications, which includes oil, gas, coal and uranium as well as the supporting infrastructure. While the idea behind energy security is relatively timeless, we may require new structures and mechanisms to satisfactorily meet energy requirements in the Indo-Pacific region.

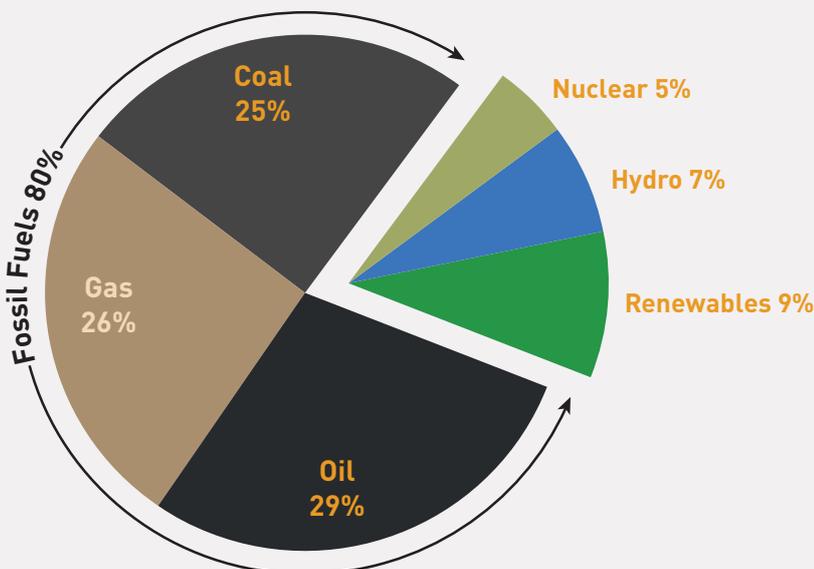
AN ENERGY SECURITY STRATEGY?

While each nation has its own unique energy security challenges, it is mainly Western, developed countries which have a formal, articulated strategy. During an acute crisis these strategies are tested and many found to be not fully appropriate. In the case of market-based economies, a takeover of a large energy firm by a foreign company usually forces a review of broader energy strategies. Gaining insights into how energy security priorities are set requires an understanding of the myriad of actors involved in policymaking and their internal drivers. Whether national oil companies, international oil companies, state owned and private utilities, government departments or regulatory bodies, examining the institutions responsible for energy flows can help develop and work towards a consensus understanding of energy security in the region.

THE INDO-PACIFIC REGION 2016-2036

Markets provide an immediate snapshot of the demand-supply balance for energy commodities. They can also indicate a "security premium" which is factored into the underlying price due to uncertainty or what is sometimes described as geo-political risk. There is also the related issue of "sovereign risk" which is the likelihood of resource nationalism, expropriation and other forms of arbitrary financial penalty applied by host governments. Market gyrations and incidents in individual countries can result in peaks and troughs which can cloud long-term analysis. This is also true of short time horizons of most commercial analysts. Low energy prices during 2014-2015 changed contemporary calculations. Volatility should be expected into 2018 as demand and supply rebalance. In the period to 2036 there will be phases of both high and low prices. Predicting a price target for energy at the end of 2016, let alone 2036, is a fool's errand. Nevertheless, there are a number of observations that can be made about the next two decades in the Indo-Pacific. For the purpose of this program we will consider the following dominant themes influencing the energy mix as well as supply and demand patterns:

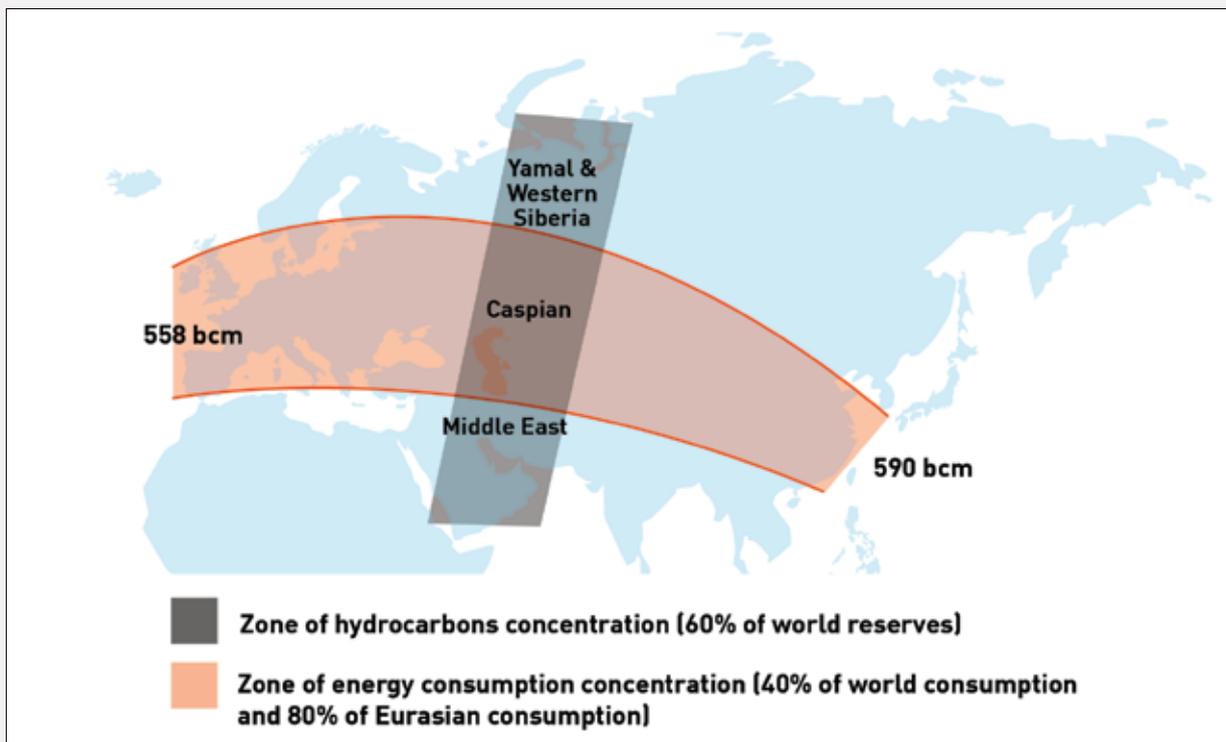
Primary energy mix 2035



Source: BP, BP Energy Outlook 2016 Edition: Outlook to 2035, London, BP, 2016

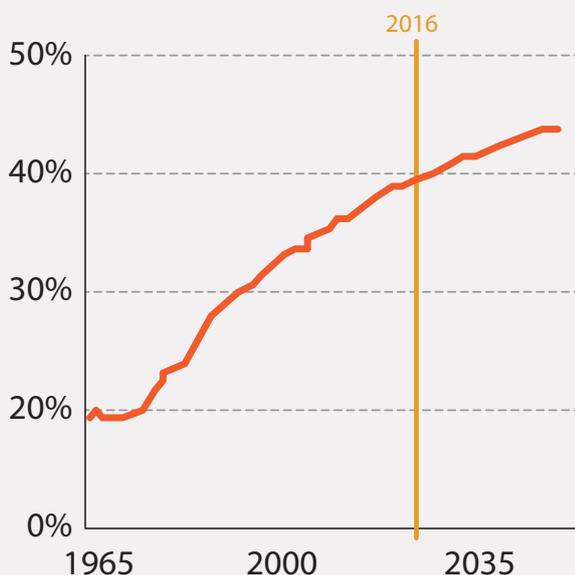
- **Fossil Fuels Still Dominate:** Despite moves towards an international climate agreement, the energy demand growth for the next two decades in developing nations will be met largely by a mix of oil, natural gas and coal. Most forecast scenarios see non-fossil fuels as contributing only a small share of total primary energy supply. BP's outlook to 2035 notes that fossil fuels will remain the dominant source of energy in 2016, providing around 60 percent of growth in energy and accounting for around 80 percent of total energy supply (in 2014 it was 86 percent).¹
- **Natural Gas Rises as a Key Fuel:** In both BP and the International Energy Agency (IEA) forecasts, natural gas demand is expected to grow around two percent per annum as the fastest growing fossil fuel. This trend continues a long-term shift away from an emphasis on coal as a base load power option toward the use of natural gas. Within areas of high renewable penetration, natural gas is also used to address intermittency issues. The issues will continue to grow as solar and wind power expand (albeit off small bases).
- **Natural Gas is Increasingly Moved as LNG:** Internationally traded gas is moved via pipelines or as LNG on ships. In 2016, pipelines are the primary mechanism used to move gas across international borders. At a point near 2035, LNG volumes will surpass pipeline imports of traded gas. The US shale gas boom will drive some of this shift, but the trend toward consumption centres in Europe, Asia and other new gas buyers will help grow the importance of seaborne LNG movements. However, the shift towards LNG is not preordained or inevitable. In the period up to 2025, Dr Tatiana Mitrova expects competition for markets in the two main natural gas demand centres (Europe and Asia) to intensify. The struggle for energy market share within "Eurasian Cross" is expected to be a competition between two different gas sales models. The first is defined by long-term bilateral arrangements, generally delivered via gas pipelines and referred to as the Heartland model. The second is conducted via oceanic transport routes as LNG in which Anglo-Saxon style markets regulate buyer-seller relations in what has been termed the Atlantic model.²

'Eurasian Cross' in 2025: three arbitrating suppliers



- **Coal Use Continues:** During 2016, natural gas will displace coal in the US power mix when it reaches around 33 percent of generation, compared with coal's 32 percent. The April 2016 bankruptcy of Peabody Energy, the largest private private-sector coal company in the world, appears to confirm the trend. The current low price of coal and a range of regulatory, environmental and political developments, primarily in Western, developed nations, suggest that coal is in a period of structural decline. This decline may not be mirrored worldwide, however, as Asian and African nations may decide to rely on coal as a cheap power source.
- **China's Economy Transitions:** A key variable in global economic and energy forecasts is the path that China takes over the next two decades. Its 'heavy industrialisation' in the first decade of the 21st Century—based on the construction, machinery, shipbuilding and steel sectors—was abnormal and unique in global history. The key indicator will be the speed to which China rebalances away from an emphasis on energy intensive, industrial sectors. The rate at which this occurs will depend on a range of policy settings which will influence the change in energy use intensity and demand. Annual demand growth of energy will be less than the eight percent seen in recent years, and will soon settle at a lower level. Yet, even at three to four percent annual demand growth, China will still reshape global energy flows.
- **India Lurches Towards Reform:** The development path of China, and the East Asian "Tiger" economies which include Hong Kong, Singapore, South Korea and Taiwan, is unlikely to be replicated in India. Political power is too fragmented and it is too diverse to have a similar period of sustained and consistent economic growth. It is likely that India will lurch towards economic reform (which will stimulate energy demand) and also inch towards energy reform. Like the experience of the Indian coal sector, this is a complicated process but there is potential for much greater levels of energy consumption. Demand outlook will be influenced by a range of factors and it is probable that seaboard markets shift away from domestic thermal coal towards imported LNG.
- **ASEAN Rises in Importance:** Despite great promise, the growth trajectory of ASEAN has disappointed many observers. However, if economic integration and investment in infrastructure accelerates, ASEAN may emerge as a more important economic engine over the next decade. Its largest member, Indonesia, is already moving in this direction with an ambitious plan to procure 35 gigawatts of electricity and associated infrastructure which will require an investment of almost US\$100-billion.³ While Southeast Asia is rich in various forms of energy, commodity flows (already evidenced in the region's turn to net oil exports) could reverse over the next two decades if domestic demand picks up. The April 2016 agreement for Australian energy firm Woodside to provide 0.5 to 1.0 million tonnes of LNG per annum to Indonesia's state owned oil and gas corporation Pertamina is an early indicator of this trend.
- **Technological Innovation:** While popular media focuses on energy transitions in terms of consumer products, such as Tesla's electric vehicles and new battery packs, it may be the less glamorous support infrastructure that changes energy systems. It is expected that there will be a continued trend towards electrification and an increase in power in the overall primary energy mix. Key facilitators like electricity transmission, natural gas technologies and smart grids could make a profound change to the sector and further blur the line between stationary and transport infrastructure. Smart grids and vehicle automation have benefits, but are vulnerable to cyber-attack.

Inputs to power as a share of total primary energy

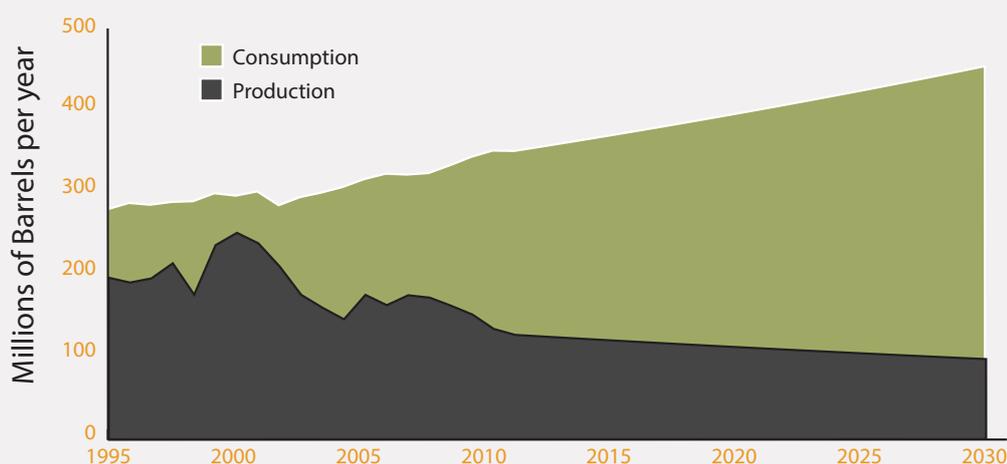


ENERGY SECURITY AND NATIONAL OUTLOOK

Energy security depends on your vantage point. Beijing, New Delhi, Tokyo and Canberra will interpret energy security differently, and indeed there is often not even a national consensus on the matter. Defence departments may consider energy in terms of operational requirements. Companies which consume energy will often emphasise price and affordability concerns. State bureaucracies may also factor in economic resiliency and the provision of essential services. As a result, tensions can develop between different groups defining national priorities. This was the case in Australia during the first Rudd Government when energy security, environmental priorities and economic goals clashed. Similarly, Indonesian energy policy is influenced by a range of factors, including (at times) diverging energy subsidy and welfare objectives. Each country and sub-national jurisdiction is different. As this is an Indo-Pacific program, it will consider Australia, and Western Australia, as part of the broader region.

Australia is increasingly connected to energy security considerations of countries in the Indo-Pacific region, especially with increasing volumes of LNG reaching Indo-Pacific demand centres. While Australia is set to become the world's largest LNG exporter by 2020,⁴ it has long been a crude oil importer, and is becoming increasingly reliant on refined fuel. As Australia's refinery capacity is gradually closed in coming years, this dependence on importing refined products will increase which represents a long-term security challenge for the nation. Australia is also a coal exporter of importance to regional markets, especially in the case of metallurgical coal which is primarily sold to steel mills for the integrated steel mill process. Unlike thermal coal, which is used for power, there are no substitutes for metallurgical coal.

Australian Oils and Liquids Consumption: Emerging Production Shortfall



Source: Author's calculations based on data from the Bureau of Resources and Energy Economics, Australian Energy Projections to 2049-50, Canberra, Australian Government, November 2014.

At the core of Australia's energy policy choices is the need to balance market and security considerations.⁵ These priorities change over time and are not a unique dilemma. Similar tensions are playing out in national capitals across the region. At the sub-regional level in Western Australia, the government has a stated domestic gas reservation policy which obliges LNG producers to allocate the equivalent of 15 percent of gas from new offshore developments for domestic use. Like any government intervention, this distorts the local energy market as gas producers are partially limited in their capacity to export. Economic modelling suggests that this costs the Western Australian economy up to AUD\$1.1 billion each year.⁶

Just as Western Australia favours domestic consumption of natural gas to ensure local energy security, many nations distort energy markets by implementing policies which are designed for a particular outcome or to favour local interest groups. This includes fuel subsidies or discounted electricity charges for industry. The scale of global energy subsidies are staggering, with the IEA recently estimating their value at US\$493 billion in 2014.⁷ All of these energy policies restrict market forces in some manner. While free-market advocates favour the removal of state involvement in these areas, it is unlikely to be fully implemented in any jurisdiction. Market reform of energy systems produces greater levels of investment and capacity, yet domestic considerations, memories of energy shortages and the historical experiences of energy shocks will continue to influence decision makers.

THE POWER OF HISTORY

The idea of a strategic commodity is not new. Control of natural resources has driven competition between human societies since we first emerged as a distinct species. This included skirmishes over a particular stream or hunting ground. Yet these conflicts were localised. The emergence of the first civilisations in the fertile crescent saw agricultural goods, and in particular grain, providing an advantage for the society controlling production that saw control of commodity have implications over a larger area. This changed as technology evolved, as did the geographical implications of one group or society controlling a commodity. Just as the stone-age gave way to the iron-age attests, there is no permanent strategic commodity. End-use applications and availability is a major determinant in the value of a specific commodity.

Strategic commodities have included salt—used to preserve food and extend the reach of militaries—and coal, which at one time sustained the British Royal Navy and was so valuable that it was referred to as ‘black diamonds’. Availability and stockpiling of strategic coaling ports by the Royal Navy influenced the borders of many existing nations, including those in the Indo-Pacific region. However, the age of coal eventually gave way to the age of oil.

The emergence of oil as a strategic commodity was hastened by Churchill’s decision to switch the Royal Navy to oil on the eve of WWI.⁸ Oil provided operational advantages over coal power, making control of coaling ports and coal fields less critical. The focus then shifted to the Middle-East which remains a key production zone of low cost oil in 2016. German and Japanese aggression during WWII was motivated in each country by the idea of *Lebensraum* and the creation of the Greater East-Asian Prosperity sphere, respectively. These expansionist policies included a desire to access and secure a range of raw materials and natural resources, especially oil.

In more recent history, Organisation of the Petroleum Exporting Countries (OPEC)-induced fuel shortages of the 1970s still resonate in popular memory and drive many of the discussions over energy security. However, the ghosts of WWII still haunt policy makers, especially in Australia. With virtually no domestic oil production and an increasing reliance on oil and refined fuel, Australia became extremely vulnerable. The 1942 attack by Japan, and associated maritime threats, meant that supply by oilfields in the Middle East and California were the closest allied production sites.

Beyond the physical supply of oil is the issue of regionally fragmented oil markets. While oil is now a global, fungible commodity, during WWII there was a metaphorical fence dividing oil into two markets: Axis controlled and Allied controlled. The Allied zone included conventional supplies in the US and Latin America, whereas the Axis powers of Japan and Germany had to rely on unreliable supplies from the East Indies and production of fuel from coal respectively. The result of the separation of oil markets meant that in 1944, US prices were \$1.21 a barrel or \$12.87 per barrel in inflation adjusted 2013 US dollars. While it is difficult to determine the cost of oil and refined fuel within the Axis powers, it would have likely been multiples of the Allied price and caused a significant drain on their wartime economies.

One of the greatest concerns to strategists is the breakdown of a global oil market into one or more separate markets. Disruptions do not necessarily result in the fragmentation of markets. In analysis of the relatively frequent oil supply disruptions post-WWII, some security scholars have favoured market responses to deal with shocks.⁹ Energy economists agree with this approach. They tend to think in terms of a global market, which can be best conceptualised as a single bathtub where numerous taps (representing producers) fill the bathtub with numerous drains (representing consumers). Encapsulating this view one economist notes: “[...]t is necessary to think about security-enhancing policies from a worldwide, rather than individual country perspective.”¹⁰

While a worldwide approach to energy security is desirable, realpolitik and Hobbesian impulses mean that a breakdown of global markets and military barriers to the free flow of energy need to be considered as a distinct possibility. OPEC’s role in the 1973 and 1979 energy shocks, and Russia’s recent use of the ‘energy weapon’ in its diplomatic dealings with East European neighbours, demonstrates that energy markets can become subject to political interference by powerful states. The creation of modern forms of international energy governance, such as the International Energy Agency, were an attempt to augment the transparency and openness of global energy markets in the face of such politicised threats. Western nations, especially the US, now face different demand and supply issues than four decades ago. Like the Bretton Woods institutions, existing mechanisms may not be well suited to the realities of the 2020s and 2030s. As in any period of energy transitions and geopolitical change, new governance arrangements will need to emerge to address contemporary security challenges.

THE ENERGY GOVERNANCE GAP

Open, transparent and well-functioning international energy markets do spontaneously not arise. Rather, as public goods they require the concerted effort of governments and businesses to cooperatively develop market rules, trade practices and governance institutions. Unfortunately, at present there are major gaps in global energy governance. Trade and investment in energy commodities are largely excluded from the disciplines of the World Trade Organization. The Organisation of Petroleum Exporting Countries have seen their market share, and thus ability to stabilise markets, decline with the emergence of new energy players. Emerging global energy institutions—such as the International Energy Forum and Gas Exporting Countries Forum—have yet to move beyond “talkshop” functions. The consequence is what one analyst has described as an “energy vacuum”¹¹ in global economic governance.

Recent efforts to promote producer-consumer energy cooperation in the Indo-Pacific region have similarly failed to live up to expectations. In APEC, efforts have been launched to scale-back distortive energy subsidies, which artificially raise consumption and undermine market efficiency. However, the results have been uneven, with many member economies exploiting the ‘voluntary’ nature of APEC agreements to make only cosmetic changes to their energy subsidy schemes. In Southeast Asia, the Trans-ASEAN Gas Pipeline (TAGP) has been flagged as a game changer for regional energy security, by creating a single integrated gas pipeline grid. But after close to two decades of planning, the TAGP project remains only half built¹², with interconnections between Indonesia and peninsular Southeast Asia incomplete. In an environment of energy insecurity and uncertainty, Asian governments have been hesitant to fully commit to joint energy projects.

The primary cause of these governance gaps is the ‘securitisation’ of energy policy. For most governments, energy is a matter of existential importance to their economic, political and geostrategic security. Energy is not viewed as ‘just another commodity’, to be traded on open markets and supported by cooperative international institutions. Energy goods are instead considered strategic commodities, and governments are highly covetous of their policy autonomy. In this context, nationalistic energy policies—such as trade and investment controls, state ownership requirements, and distortive subsidy schemes—become the norm. The nationalistic and competitive environment this creates undermines cooperative efforts to strengthen global energy governance, and predisposes governments to being drawn into energy conflicts.

Past schemes to facilitate energy cooperation between Indo-Pacific governments have demonstrably failed. Many initiatives have been too ambitious, or asked governments to make politically-impractical policy reforms that infringe on their energy sovereignty. In future, regional efforts need to be refocused upon the ‘art of possible’. Shared energy interests should be the starting point for cooperative projects, which must then proceed in a way that preserves the policy autonomy of governments. Deepening the market for LNG through the development of regional trading hubs are an important first step. Facilitating international trade in electricity, through the construction of national grid interconnections, would also help unlock the potential of hydropower in several Southeast Asian economies.

STRATEGIC DRIVERS FOR ENERGY SECURITY

A wide range of factors shape the energy security policy decisions of governments. These include geography, generation mix, import-export balance, policymaking structures, historical legacies, and perceptions regarding the political reliability of markets. In Western Australia, the experience of import dependency in WWII helped promote the creation of a refining facility and exploration efforts. More recently, the OPEC shocks, a major blackout in 2004 and the Veranus Island explosion in 2008 have cumulatively had a significant impact on Western Australia’s energy policy. In this sense, energy policy and energy security tend to look backwards. This is akin to the military experience, where ‘generals often fight the last war’.

New technologies have improved the resilience against some disruptions but have made our societies vulnerable to cyber-attacks on grid and related electrical transport systems. A cyber-attack is likely within the next decade¹³ and in the event of a major conflict, it would be expected that domestic grids, power systems and even nuclear plants, well behind the battle lines, would be targeted. These are all worst case outcomes, but many energy security policies are based on these eventualities. In this program, we will investigate the key areas of concern and how some concerns over energy security can be managed through regional modalities and mechanisms.

STRATEGIC SHOCKS: DEMAND AND SUPPLY

An important starting point for looking at the future of energy and energy security in the Indo-Pacific involves looking at potential demand and supply shocks. This includes consideration of the physical flows of oil and gas, as well as transport and stationary energy infrastructure. Potential demand and supply shocks include:

- **Japanese Nuclear Program Surprises:** Aside from the slowdown of China and energy of new LNG export capacity, the restart of Japan's nuclear program was a major factor in lower LNG prices after the spike in demand caused by the Fukushima disaster. The speed of the restart, and potential setbacks, will be a key driver for LNG demand.
- **Korean Transitions:** The Republic of Korea, the second largest LNG importer after Japan, also faced challenges with its nuclear power plants and is similarly dependent on imported energy. Developments on the Korean peninsula and the health of the South Korean economy are an often-overlooked aspect of East Asian energy demand.
- **Iran's Rehabilitation:** After the removal of international sanctions, Iran is returning to world energy markets. The timing and speed of bringing oil and natural gas to market may determine the extent of the downturn in energy prices. However, while there are competing power centres in Tehran, a gradual normalisation of trade relations (and energy sales) is likely to occur in coming years. This will fundamentally change the balance of energy supply coming from the Middle East, with implications for global markets.
- **Blockages of key Sea Lines of Communication:** A frequent scenario for those looking at oil flows is the potential for a blockage in the Strait of Malacca or the Strait of Hormuz. When they occur, these blockages cause halts in tanker traffic for a period of time. Outside of a conflict, a disruption would likely see oil prices spike and then gradually return to normalcy. However, if the blockage is linked to a conflict or cannot be cleared quickly, this would likely trigger a worldwide energy crisis and stockpiling.
- **Shale Technology Revolution Exported:** The shale revolution package of technology—including land access, skilled workforce and pipeline infrastructure—has not been successfully exported from North America. During the 2020s it could be replicated in other jurisdictions. Low energy prices make this less likely, but the speed at which the sector has improved technology and reduced costs may make it viable in other areas, especially if governments devise attractive regulatory frameworks.

STRUCTURAL SHOCKS

In considering energy security, there is a tendency to focus on the trajectory and deviations of growth curves from publically available outlooks, such as those produced by BP, the IEA and the US Energy Information Administration. These forecasts are useful for considering the extension of energy systems in terms of evolution of the status quo. However, structural transitions change the fundamental nature of energy flows, systems and markets. These are less grounded in historical data sets than other forms of forecasts. It is possible that for our 20-year outlook, we may witness the beginning of one or more transitions. These may include:

- **Saudi Arabia Fractures:** A great deal of attention is focused on Saudi Arabia as the swing oil producer and its current strategy of retaining market share which is driving down global prices. Proposed reforms including the sale of a minor stake in the national oil company, Saudi Aramco, through an initial public offering of shares which could help diversify government investments and the economy. This suggests that a new generation of leaders may be able to chart a path away from an overwhelming reliance on oil revenues. However, even with reform, the ability to produce low cost oil should not be viewed as a given. Energy subsidies and welfare policies are causing significant drains and distortions on national finances. The Kingdom's youthful and underemployed population is restless and its regional competitor Iran is facing less pressure from sanctions which will likely allow it to attract foreign investment, helping strengthen its economy and expand options for its ruling elite. Instability in Eastern Arabia and proxy battles in Yemen may be omens for fragmentation which could result in a loss of power or even collapse of the House of Saud.

- **Rapid Shift to Yuan Based Oil Contracts:** There are tentative moves to liberalise the Chinese currency and shift to Yuan-based oil contracts, with the potential for a Yuan global reference price like Brent.¹⁴ This would not cause a significant impact to the dominant role of the US dollar status as the global currency of exchange and medium for settling oil contracts. If the US economy stumbles into the 2020s, there could be a period of growing use of the Yuan in the oil trade. Aside from shifting power in the global energy system, this trend may confer economic and strategic advantages to China, including lower transaction costs; less exchange rate risk (especially when acquiring commodities); and long-term, lower borrowing costs.
- **A New LNG Pricing Formula:** Traditionally, internationally-traded LNG has been sold under long-term, oil-linked contracts. The growth of spot-market sales has resulted in a number of hubs emerging as key reference points in gas consuming regions. For example, Henry Hub in North America acts as the pricing point for natural gas sales on the NYMEX. With an increase in the volumes of LNG sold in Asia, lower prices and concerns about a premium compared to other gas markets, there have been efforts to create an Asian LNG hub. Proponents aim to create physical and futures markets within Asia. Competition to be the home for a LNG hub has been intensifying, with China, Japan and Singapore all mooted as potential locations. If there is a new hub created in Asia and this shifts to a non-oil linked price, the weight of global gas decision-making will shift towards Asia.
- **Kra Canal:** There have been proposals for centuries to build a canal across the isthmus of Thailand which is located at the narrow neck of southern Myanmar and Thailand, connecting the Malay Peninsula to the Asian mainland.¹⁵ If built, this 40–48 kilometre shipping route would connect the Gulf of Thailand to the east and the Andaman Sea to the west and allow shipping to bypass the Strait of Malacca. While periodically raised, its recent incarnation has been promoted in some commentary of China's 'One Belt, One Road' policy. Such a project would change the security dynamics of the South China Sea, and also make Singapore less important geopolitically. Prior to 2036, it is difficult to see a scenario where a Kra Canal will be commissioned. However, by this stage it may become less abstract and a more distinct possibility. From a Chinese perspective, the extension of power projection into the Andaman Sea is a long-term logical step. If a Kra Canal becomes an option, it could alter global flows of energy into North-East Asia.



- **Nuclear Renaissance:** The Fukushima disaster halted visions of a uranium-based nuclear renaissance in large conventional plants. However, other nuclear technologies may start to become commercially viable and attractive for a range of applications. Thorium and small, miniaturised nuclear reactors may offer inbuilt safety features and portability down to sizes smaller than a sea container.¹⁶ The decline of available fresh water and simultaneous development of new desalination technologies could mean that new nuclear and desalination offerings are created which would appeal especially on the African continent. Another driver for small nuclear offerings would be in areas where there is low population density and high demand centres, such as mining or mineral processing operations.
- **A Renewable Breakthrough:** While many billions of public funds are being channeled towards renewables, the promise of a true breakthrough in non-carbon (and non-nuclear) forms of energy remain illusionary. Government intervention, most clearly seen in Germany¹⁷, has distorted the growth paths of solar and wind power which, aside from hydro sources, is the most common form of renewable power. Regardless of this legacy, geothermal or some form of wave or ocean current generation type may be an unexpected breakthrough which can quickly find a mass market without direct forms of government subsidies. This could see billions of dollars flow into a new form of electricity generation and radically change demand patterns for fossil fuels.
- **Forward Positioning:** Similar to the concept behind the Royal Navy creating coal bases and forward positioning assets, pre-positioning of assets to protect energy and resource flows is a distinct possibility. This has been evidenced in efforts by Asian powers including South Korea, China, India, Japan and Malaysia to combat Somali piracy and has been seen through the creation of a military Chinese port in Djibouti. While focus has been on China's 'One Belt, One Road' policy, and the earlier "String of Pearls", forward basing will start to make sense for a number of Indo-Pacific powers, especially those which predominantly rely on imported energy. This includes India's April 2016 agreement to access the Iranian port and free zone of Chahbahar which is located on the Gulf of Oman. Given current flows of energy, the anchor points would likely include the Southeast Asian archipelago, Middle East and, in time, East Africa.

Structural shocks are rarely discussed in discussions of energy security and will be considered as part of future analysis by this Centre. Part of the challenge of conceptualising these events and transitions is that they break from our collective post-WWII experiences. As part of framing future work, we will consider scenarios that could replicate a break down in global oil markets to sub markets as well as oil becoming a less important strategic commodity.

NEXT STEPS

Beyond the initial overview of the challenges and outlook for energy security in the Indo-Pacific, it is necessary to consider discrete regions such as East Asia, Southeast Asia, South Asia, and Australia and the South Pacific. Specially convened roundtables and associated publications will examine the following issues:

- *The Transformation of ASEAN: Implications for Energy Security*
- *China's One Belt, One Road: The Role of Energy Security in Grand Strategy*
- *Energy Security Options in the Indo-Pacific Century*
- *Resource Nationalism after the Boom*

FURTHER READINGS

- Daniel Yergin, *The Prize: The Epic Quest for Oil, Money, and Power*, New York, Simon & Schuster, 1991.
- Gal Luft and Anne Korin (eds), *Energy Security Challenges for the 21st Century: A Reference Handbook*, Santa Barbara, California, Praeger Security International, 2009.
- Andreas Goldthau and Jan Martin Witte (eds.), *Global Energy Governance: The New Rules of the Game*, Washington, D.C.: Brookings Institution Press, 2010.
- Andrew Pickford and Michael Petric, *Industry Consolidation in the Age of Gas: Strategic Implications for Australia*, Perth, Perth USAsia Centre, 2015.

RELATED PERTH USASIA CENTRE ACTIVITIES

- Ian Satchwell, Senior Fellow, Perth USAsia Centre: Natural Resource Management program.
- Dr Jeffrey Wilson, Research Fellow, Perth USAsia Centre: Economic regionalism in the Indo-Pacific; Australia-Asia economic ties; the transformation of Asian trade architecture

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ENGAGEMENT OPPORTUNITIES

The Perth USAsia Centre is developing an expanded Indo-Pacific Energy Security program for 2017. For more information on these planned activities, please contact Andrew Pickford.

CONTACT INFORMATION

Andrew Pickford
Director, Indo-Pacific Energy Security Program
Perth USAsia Centre
Email: andrew.pickford@perthusasia.edu.au
Phone (Australia): + 61 438 834 858
Phone (Canada): + 1 581 777 4452

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Perth USAsia Centre

www.perthusasia.edu.au

Located at:
The University of Western Australia
M265, 3rd Floor, Old Economics Building
35 Stirling Highway
Crawley WA 6009

P: +61 8 6488 4320
E: perthUSAsiacentre@uwa.edu.au



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