BNP PARIBAS SUSTAINABLE FUTURE FORUM WHITE PAPER

White Paper prepared by ENEA

WHAT DOES ENERGY TRANSITION IN ASIA PACIFIC MEAN TO YOU?

Key Takeaways

- Climate change and technology innovation has accelerated energy transition prompting fundamental structural change in the energy system and economy. However, most stakeholders are still not fully aware this is happening and of its impact (opportunities and risks).
- Energy transition mapping is extremely wide and complex, where the dynamics at play (energy and non-energy sectors, value chains of industries, business models of companies / individuals, clients' interest in products / services, government policies and stakeholders' priority) in Asia Pacific will be distinct from those in the US and Europe.
- Asia Pacific is at the heart of the global energy transition and has emerged to be the world leader in renewables and new energy investments.
- ENEA estimates that over USD11 trillion of new energy transition investments will be needed in Asia Pacific to transform the economy by 2030, where the weight of investments will shift from conventional energy to renewables, network and new energy application.
- Asia Pacific energy supply is heterogeneous and hence the local contexts are likely to shape each country's own unique energy transition pathway.
- Energy transition in Asia Pacific is real and fast-changing, which will create immense opportunities for those prepared and willing to adapt, but imminent risks for those that neglect the issues or are not able to keep up with the pace.

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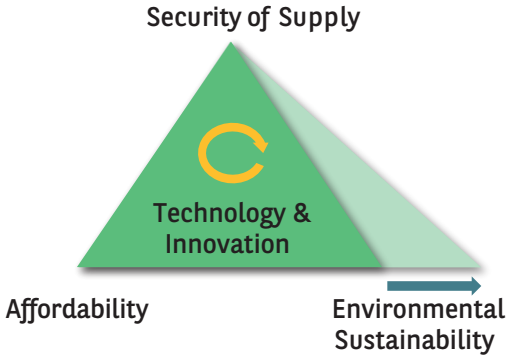
The increasing awareness of climate change, as well as the emergence of new technology and business innovation is leading to fundamental structural change in the energy industry – energy transition.

Energy is always a hot topic, as it fuels economic development. In Asia Pacific (APAC)[1], it is an even more important factor, given the region has emerged as the economic engine of today's world and, consequently its energy demand has also grown sharply. Traditionally, given the focus on economic growth and industrial development, the elements of affordability and the security of supply have been considered more critical in the energy trilemma[2]. As countries are becoming more developed, the awareness of climate change issues has increased. As a result, environmental and sustainability considerations start to carry more weight in the policy and business decision making processes. This shift has a subtle, but long-term effect on everyone.

Energy Trilemma

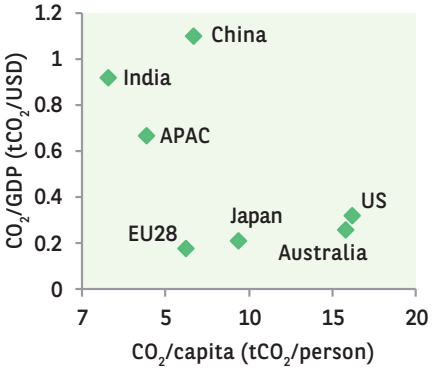


Meanwhile, technology and business innovation have also changed the dynamics of the energy trilemma. New forms of energy supply and consumption are emerging and affect the economic viability of investments and inherent interests of stakeholders. Most notably, the dramatic decline in solar installation costs[3] has made solar power generation more attractive in many countries. Furthermore, the expected decrease in storage cost will help integrate an even higher share of intermittent renewable power generation. It is already setting the path for commercially viable off-grid and mini-grid business models in some countries such as Australia. Innovations like integration of energy systems through high performance interconnectors, and evolution of new transportation will also allow more optimal use of resources and a higher utilization of existing capacities. In turn, these developments can gradually squeeze the capital intensive and long gestated conventional coal-fired and/or gas-fired generation out from the energy mix. More simply, the profitability of conventional projects is likely to come under pressure due to these changes and thus there will be a real risk of stranded assets for their investors and financiers.

Asia Pacific is at the heart of the global energy transition and has become the world leader in renewables investments.

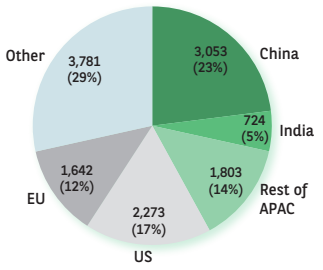
Today, as the fastest growing and the most populous region in the world, APAC is the largest consumer of primary energy and the biggest emitter of CO_2. Although the carbon intensity per person in APAC is still lower than the US and EU, the position is quite the opposite in terms of emissions per GDP. Regional governments have recognized these challenges and are making substantial efforts to achieve a more sustainable growth. For instance, the APAC is now a global leader for investments in renewables capacity. China alone has invested USD103b in renewables in 2015, more than the US and Europe combined[4]. Nevertheless, fossil fuels (primarily coal) are still likely to be pivotal in providing an affordable energy supply to sustain the regional growth. But then, will the low-emissions fossil fuels be another viable green option one day?

CO_2 Intensity 2014



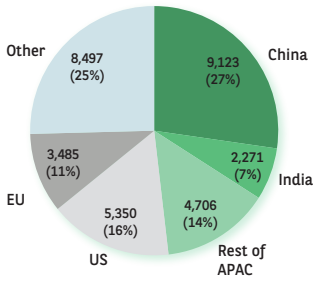
Source: IEA World Energy Statistics 2016

Primary Energy Consumption 2016



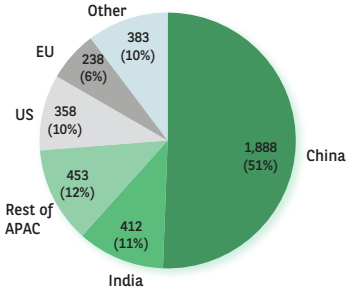
Source: BP Statistical Review 2017

CO_2 Emissions 2016



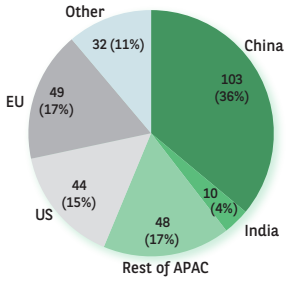
Source: BP Statistical Review 2017

Coal Consumption 2016



Source: BP Statistical Review 2017

Renewable Investment 2015



Source: UNEP, BNEF, 2016

[1] Asia Pacific (APAC) includes South Asia (India, Bangladesh, Nepal, Sri Lanka), Southeast Asia, East Asia (Greater China, Japan, South Korea, Mongolia), and Oceania (Australia, New Zealand, Pacific Islands)

[2] The energy trilemma concept - security of supply, affordability and environmental sustainability - was developed by the World Energy Council.

[3] Installation costs do not include the additional costs imposed on the energy systems like power network reinforcement or costs for additional back-up, which may lead to higher total system cost from a system economic perspective.

[4] Source: UNEP, Bloomberg New Energy Finance

Asia Pacific energy supply is heterogeneous that local context will shape each country's unique energy transition pathway.

APAC covers many countries, and each has distinct characteristics in 1) human and natural resources 2) demographic and economic growth 3) political ambitions and social priorities 4) energy infrastructure and supply chain 5) technology advancement and innovation, and 6) investment capability and creditability. Hence, there is no one standard model or pathway that fits to all of them.

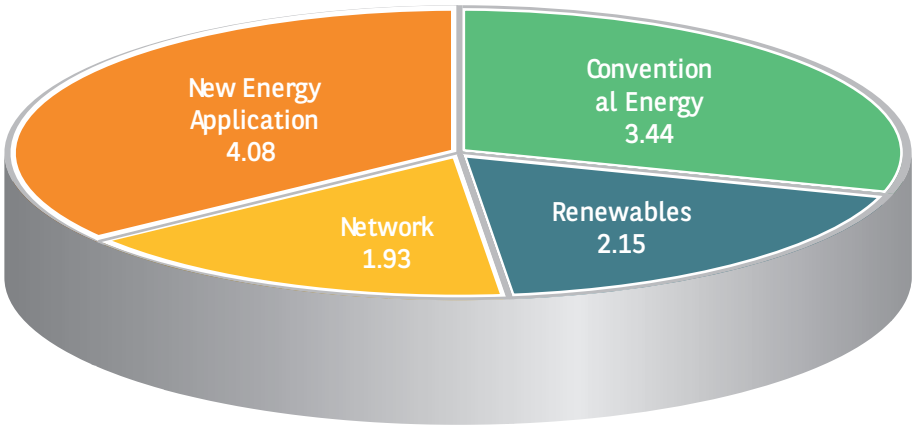
The commitments by countries in COP21 reflected the heterogeneity of the region and the different possible energy transition pathways they are planning to take. For example, China's NDC, focused on coal reduction, was qualified as the most ambitious, while India's NDC was considered restraint, having a more moderate target to reduce CO2 intensity per unit of GDP. In terms of implementation, China has defined strict energy efficiency standards for the power sector and is closing coal-fired power plants – starting with the less efficient ones. On the contrary, Japan has provided direct financial support to project developers and end-consumers to transition to a "hydrogen society".

	Conditional criteria	Unconditional criteria
CO2 intensity reduction target (per capita / per unit of GDP)	Malaysia: 45% by 2030 from 2005 level ➢ 35% on an unconditional basis ➢ Additional 10% conditional upon receipt of climate finance, technology transfer and capacity building from developed countries	China: 60%-65% by 2030 from 2005 level India: 33%-35% by 2030 from 2005 level
Absolute CO2 emission reduction target	Indonesia: 41% by 2030 from business-as-usual level ➢ 29% on an unconditional basis ➢ Additional 12% conditional upon receipt of sufficient international support	Japan: 26% by 2030 from 2013 level Australia: 26%-28% by 2030 from 2005 level

Source: Climate Action Tracker

To achieve this clean and sustainable energy future without constraining the economic growth, huge investments and efforts will be required in APAC. ENEA estimates that over 11 trillion USD of new investments by 2030 will be required to transform the industry. Investments in new energy application (including energy efficiency, storage and electric vehicles) will be at the top in the agenda. Although conventional energy (coal, gas, oil and nuclear) is likely to attract the second highest investments, its share in the new investments will decrease to about 30%. Whereas, driven by the continuous penetration of solar and wind, the renewable (hydro, solar, wind, geothermal and bioenergy) investments will remain growing. Besides, on top of the business-as-usual expenditures, significant investments in network (transmission and distribution) will be needed to integrate increasing renewable generation and adopt smart systems. However, countries will have different investment strategy according to their local conditions and energy mix. For example, India will utilize its ample solar resources while Japan will untap its onshore/offshore wind potential. The uniqueness of countries will drive their transition pathways.

Total Investments by 2030 in APAC in Trillion USD



>11 Trillion USD

Source: ENEA Analysis

Energy transition is dynamic and complex, creating new opportunities for players that are adaptive, creative and visionary.

Given the dependence on energy in our modern urban and industrial system, we are all stakeholders in the energy generation and distribution ecosystem – regardless of utilization or whether it is on-grid or not. **Penetration of decentralized generation** is one of the examples highlighting the multilateral and knock-on effects that energy transition has on the actors. It does not only affect the direct players, but also the value chains of various industries, their business models and other stakeholders. Along with the technological evolutions in other segments, this dynamic complexity creates a multiplier effect and makes the impact of energy transition hard to predict, and challenging to comprehend.

However, there is considerable evidence to suggest that new and immense opportunities exist for adaptive, creative and visionary players.

Energy companies are rethinking their global strategies and business models in order to capture the new value streams. Some O&G companies are moving downstream to invest in renewable power generation. For example, Shell is looking at a 250MW solar plant in Queensland, Australia. Other utilities are de-risking their portfolio exposure by divesting their carbon-intensive assets and use the untapped resources in new energy business development. For instance, Engie is divesting its stakes in coal fired plants and E&P business, while investing in renewables and energy services in various countries in the region. T&D companies are also making plans in the **"5 Ds"** *(Digitalization, Decarbonization, Deregulation, Decentralization and Democratization)* to cater for the evolution and increase their revenue streams from non-traditional services.

Residential consumers are exploring new forms of energy production and consumption. In Australia, solar has become economically competitive, where more than 1.5 million households (1/4th of the population) have installed their own solar panels for domestic use. On the other hand, as more households are equipped with smart meters and have a better capability of optimizing their consumption, new commercial opportunities appear for emerging companies, such as to become a solar generation aggregator (virtual power plant) or a demand response aggregator (like Enernoc). **Commercial and industrial consumers** are self-generating their energy for physical, operational and market considerations. More than 100 companies in the world joined the RE 100 Initiative and are committed to using 100% renewable energy in the medium term. In fact, renewable energy today represents a competitive alternative for many industries, which used to rely on diesel engines to power their activities. With the maturity of storage, many industries are beginning to combine renewable energy with storage capacity as a reliable power supply to their businesses. The emergence of mini-grids and advanced applications of renewable generation has benefited **other consumers** too. To illustrate, solar-powered water pumping solutions fit well with farming energy needs during daytime, and mini-grids are expanding electrification to remote villages in India. These applications do not only improve the productivity in rural communities, but also boost local economic activities and living standards.

System planners are using renewable energy and new technologies to reduce fuel imports, improve security of supply and reduce price volatility. For countries like Indonesia and Vietnam, where renewable capacities are small, the energy system can easily benefit from new supply sources without any instability problem due to intermittency. For countries like China and Japan, where renewable capacity is more significant, new technologies, such as smart grid and energy storage are being exploited to harness the renewable benefits without sacrificing system reliability. Besides, **public authorities** are looking at various mechanisms to fund their energy transition ambitions. One development is to mobilize private finance participation and to use fiscal resources to incentivize private funding to fill the investment gap. Another development is that many countries in APAC are shifting direct subsidies (e.g. feed-in-tariffs) to hybrid and more liberalized mechanisms, such as competitive auction systems in new energy procurement.

Financial institutions will have a significant and direct role to play. First, energy transition will drive new market structures and corporate consolidations, creating new M&A services. Second, as energy production and distribution ecosystems become more distributed, the financing appetite for traditional sources will change. It will necessitate formulating a different risk metrics to fulfill the project and corporate needs, such as by creating products that can link project finance to consumer finance and so on. This will require financial innovations and new risk management solutions (e.g. clustering the financing of small-scale assets and securitization). In order to accomplish sustainable development goals and leverage public climate financing, **Multilateral Development Banks (MDBs)** are also anticipated to play a more diverse role. Apart from providing grants and loans to projects under their typical framework, they will need to foster knowledge transfer on new energy dynamics, and facilitate development of public-private partnership (PPP). Recent success in the Tropical Landscapes Financing Facility (TLFF) in Indonesia[5] is a good example of unlocking private sector finance for climate and biodiversity. Similarly, **investors** will have alternative low carbon investment opportunities that offer diversification to their investment exposure. They could explore investing in new energy companies with business models that are disrupting current dominant market players, or can look at existing fossil fuel companies that are demonstrably changing their energy production mix.

Energy transition in Asia Pacific offers unprecedented opportunities and a bright future to those willing to adapt.

Energy transition is real and fast-changing. APAC is at the epicenter of evolution, with a need for USD11 trillion of investments and a potential to develop associated businesses opportunities by 2030. Both companies and investors need to understand the pace and scale of the transition, and get prepared. The changing dynamic will also require coherent functioning of many elements of the energy system, such as policy support, appropriate regulation, finance, technology and business innovation. In summary, energy transition in APAC encapsulates the most dynamic and focused business strategy evolution and the largest investment opportunity within the broader transition to a sustainable, equitable and cleaner world.

[5] For further details, please refer to http://grab-indonesia.com/tlffid/about-us/

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