

ASIA-PACIFIC: INVESTMENTS IN RENEWABLE ENERGY – THE TIME IS NOW



Preface

The Asia-Pacific region is expected to attract approximately 40% of the total global investment in Renewable Energy capacity between now and 2050. The region – especially South East Asia – benefits from a unique combination of electricity demand growth, electricity supply crunch and abundant solar, wind and water resources to spur investments in Renewable Energy assets. Long being a laggard in terms of market development compared to other regions and to its theoretical potential, regional governments are expected to pave the way that will help to reduce currently prevailing regulatory and policy hurdles as the electricity generated from renewable generation sources becomes more and more price-competitive. In this still rather immature market environment, it is challenging for investors to originate, develop and operate renewable energy assets directly – Aquila Capital has built a team with a longstanding experience in investing, developing, building and operating Renewable Energy assets throughout the region, both in developing as well as developed markets. With this team and building on two decades of real asset investment experience, Aquila Capital is well set to serve investors in the challenging but exciting market environment in Asia-Pacific. The time to invest in Renewable Energy in Asia-Pacific is now!



Alexander Lenz

Chief Executive Officer APAC

alexander.lenz@aquila-capital.com

Alexander has worked in the renewable energy sector since 2007. Prior to joining Aquila Group in 2020, Alexander was the CEO of Conergy, based in Singapore. Previously, when Conergy was part of a global group, Alexander was the CEO & President APAC, responsible for the group's business in Asia Pacific and the Middle East. Before moving to Asia, Alexander was Head of Corporate Development in Conergy's headquarters in Hamburg, Germany. Alexander was previously a consultant in the Restructuring and Corporate Finance practice of Roland Berger Strategy Consultants in Berlin, Germany and a consultant in the management consulting practice of Deloitte in Duesseldorf, Germany. He holds a master's degree in Economics from Maastricht University, The Netherlands.

Author:



Peter Schnellhammer

Investment Writer

peter.schnellhammer@aquila-capital.com

Peter is Investment Writer at Aquila Capital. He has more than 4 years experience in Strategic Research and Alternative Investments. Prior to joining Aquila Group in 2019, he focused on macroeconomic research of Real Estate markets. Peter Schnellhammer holds a M.Sc. in Economics from University Rostock.

Please find in this Paper,

On-site Market Knowledge from:



Hendrik Bohne

*Head Business Development &
Asset Management APAC*

hendrik.bohne@aquila-capital.com

Hendrik started working in the renewable energy space in 2007 in the Indian hydro power sector, before moving into solar PV for the main part of his career. Prior to joining Aquila Group in early 2020, Hendrik was responsible for the C&I business of Blueleaf Energy, based in Singapore. A core activity in this role was the PPA origination and execution with corporate offtakers. Previously, as part of global group Conergy, Hendrik was responsible for the EPC business unit in APAC and Middle East. During his tenure Conergy was able to gain significant market shares in APAC with projects across Australia, South East Asia and Japan. He holds a master's degree in Economics & Engineering from Furtwangen University, Germany and a Bachelor of Engineering in Product Design from Hanzehogeschool Groningen, The Netherlands.



Christian Krebs

*Head Investment and
Development APAC*

christian.krebs@aquila-capital.com

Christian has over 20 years of international lending, structuring and advisory experience. He came to Asia in 2014 to head the APAC energy origination and structuring business for Norddeutsche Landesbank (NordLB) where his team advised and financed ca. 1.6 GW of renewable energy in the region until his departure in early 2019. He subsequently joined the Australian renewables and energy transition advisory and accelerator firm Energy Estate before coming back to Singapore mid 2020 to lead Aquila Capital's APAC development, origination and structuring activities.

Before moving to Asia Christian held several senior positions in NordLB's international renewable energy, industry and infrastructure lending business based out of Hannover/Germany and London/UK. He also led a liquidity team within treasury department and managed the bank's derivative team for Shipping and Aircraft.

Christian holds a degree in economics, is married with three children and speaks English, German and Russian.

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Management Summary

- The Asia-Pacific region accounts for more than half of the world's projected economic growth.
- Industrialisation and the emerging middle class in Southeast Asia are leading to the most dynamic growth in energy demand worldwide.
- The transformation of energy systems in the developed countries of East-Asia and Australia is still in its initial stages in global comparison.
- However, renewable technologies have in most Asian countries already reached grid parity with new fossil fuel power plants.
- The strength of coal is fading, import restrictions, and interest groups are the only reason why coal is in terms of average prices still competitive. However, these cannot be maintained in the medium term for a variety of reasons.
- Fossil sources are increasingly facing headwinds due to problems of financing and import dependency.
- Major areas of APAC are showing high potential in solar radiation, due to their location in tropical areas and the sunbelt.
- The adoption of climate targets as well as public engagement are driving state incentive mechanisms for the expansion of renewable energies.
- Supportive regulatory measures, constantly improve the market environment.
- Strong growth in demand for renewable energies by companies is leading to a significant increase in the importance of the market for private electricity purchase agreements.
- The economic stimulus provided by the expansion of renewable energies offers a sustainable way out of the recent global crisis triggered by the pandemic.
- Irrespective of external costs, the purely economic superiority of renewable energies will continue to give a boost.
- Knowledge transfer is accelerating the progress of financial and technical framework conditions.
- The anticipated significant growth of renewable energies in the region offers attractive risk-return-profiles.

1. Asia-Pacific Driving the global economy

Asia-Pacific is one of the most diverse regions on earth. It is characterised by a multitude of languages, religions, forms of government, and energy systems. It includes countries at all stages of development, from the highly developed Australia and high-tech countries such as Japan, Taiwan, and South Korea, to the emerging markets of India and China, and the developing countries of ASEAN¹.

The region is characterised by its economic dynamism. A contribution to global economic growth of more than 50% results in the most dynamic energy demand worldwide. The non-OECD countries of Asia account for two-thirds of the 70% increase in global energy demand by 2050.

While the region still has relatively low capacities in the field of renewable energies today, opposing developments are constantly changing the market positions. Headwinds for fossil energy sources are growing while continuing efficiency gains are making renewable energies increasingly competitive. Regardless of the external costs arising from emissions, economic superiority has already been achieved several times in relation to new construction.

The provision of the region with natural resources, with a still low share of renewable energies and an unprecedented growth in energy demand, is creating a huge growth market.

Even small changes can restructure the market conditions and offer corresponding opportunities. In order to take advantage of opportunities that arise and to control and identify risks, a local presence in the markets is essential.

„Hardly any other economic region is as culturally and economically diverse as Asia-Pacific. Think local & Act local is therefore a mantra that we anchor in our team and in the development of our presence“

Hendrik Bohne, Head Business Development & Asset Management
APAC

Economic development

While the world economy in the 20th century was largely shaped by the influence of Europe and North America, the centre of gravity of the world economy is increasingly shifting towards the south-east. The wave of globalisation led to the dynamisation of the world economy and particularly promoted industrialisation in East and South-East Asia.

Figure 1: Economic center of gravity²

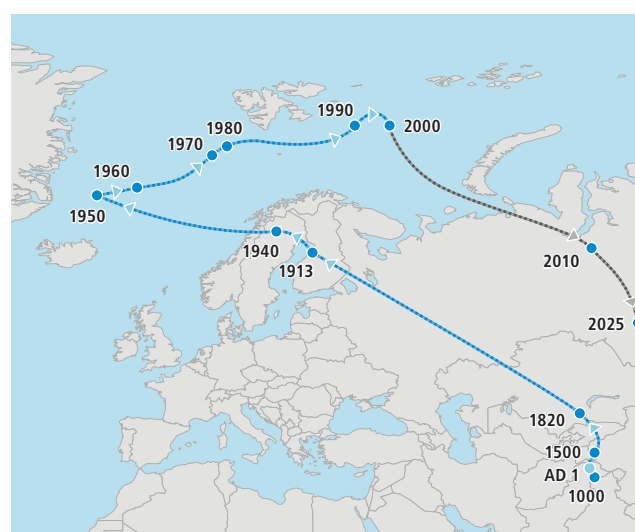


Figure 1 illustrates this development. Whilst the industrial revolution that began in Europe saw the centre of global economic performance move north-west for 130 years (1820-1950), a reversal of this process can be observed from 1950 onwards. According to forecasts, the starting point will almost be reached again in 2025. However, it should be noted that the current movement is expected to take only 75, instead of 130, years.

Starting with the relocation of labour-intensive processes in particular to Asia, considerable productivity increases have been achieved. In the course of this, China was given the designation “Workbench of the World”. Today, the emerging economies have the fastest growing sales markets in the world.

¹ Association of Southeast Asian Nations: Brunei Darussalam, Cambodia, Indonesia, Lao P.D.R., Malaysia, Myanmar, Singapore, Thailand, the Philippines and Vietnam

² McKinsey (2012)

Figure 2: Share APAC of global GDP and GDP-growth³

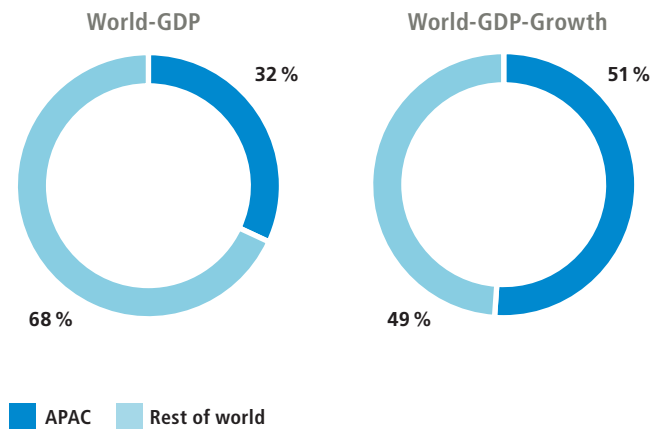
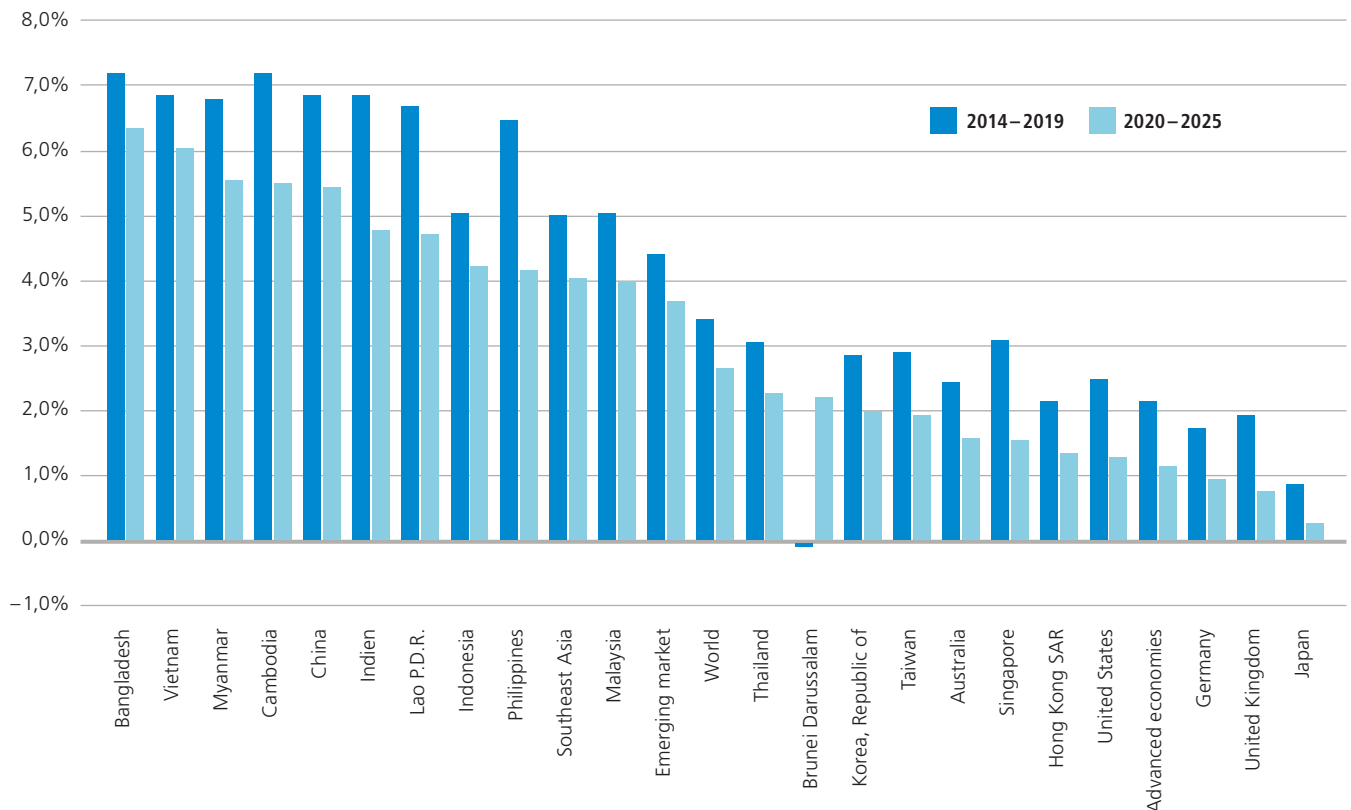


Figure 2 shows the prevailing momentum in the APAC region. The current share of global economic output is only about one third. This contrasts with a clearly over-proportional share of global economic growth of more than 50%.

Heterogeneity of the economic area

The heterogeneity of the countries within the APAC region requires a differentiated view. The range of economies extends from highly developed and emerging countries to the globally least developed countries. This entails very different risk profiles, taking into account the variety of political systems and the associated more or less given uncertainty. This underlines the need for local teams to identify and manage potential changes. Beyond the different levels of maturity, cultural differences play a major role. Starting from Oceania, i.e. developed economies and economies close to Western culture, developed countries such as Japan, South Korea and Taiwan show considerable cultural differences. While the emerging economies of China and India have been and continue to be the main drivers of growth, the developing countries of ASEAN are playing an increasingly important role. Productivity and population growth well above the global average keep potential growth at a very high level, which means that the future prospects for sustained dynamism are extremely positive.

Figure 3: Average annual growth of real GDP⁴



³ Worldbank (2020)

⁴ IWF (2020)

With annual growth rates of in some cases well over 6%, the dynamism of most ASEAN countries is well above the average of developing countries as a whole. Overall, however, there is a clear correlation with the maturity of respective economies. Exports resulting from the relocation of production to the region are of major importance. The increase in per capita income is leading to a growing middle

class, whose increasing consumption is creating very attractive sales markets. The combination of low wage levels and growing sales markets will attract further foreign direct investment. Against this background, the framework conditions for investors will continue to improve and stabilise development in the long term.

Figure 4: Index of foreign direct investment net inflows (2009=100)⁵

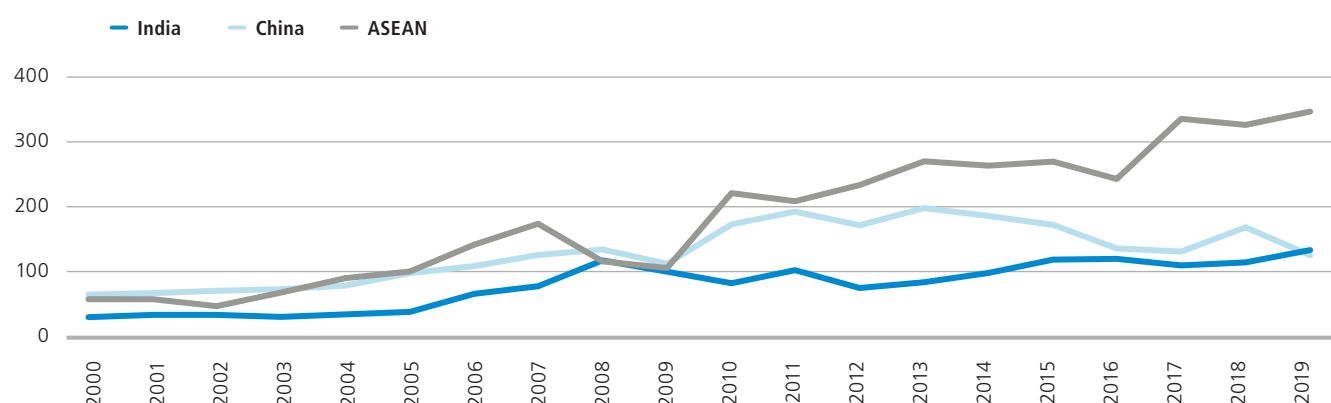


Figure 4 significantly illustrates that the growth of foreign direct investment within ASEAN is already outpacing that of China and India.

Resulting appetite for energy

In the industrialised countries, energy demand has largely been decoupled from growth rates due to the significant expansion of the tertiary sector. However, an expansion of industrialisation combined with rising incomes, as is the case in Asian developing countries, has direct effects on energy demand.

Figure 5: Energy demand⁶

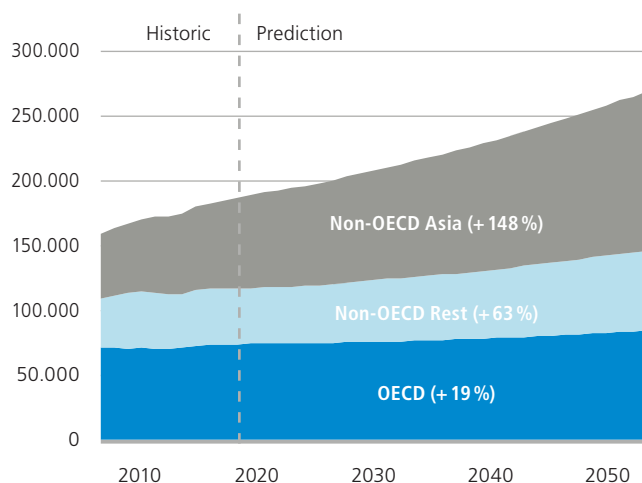


Figure 5 illustrates the influence. Asian non-OECD countries are responsible for two thirds of global energy demand growth, which will rise by 70% between 2010 and 2050. While in the OECD countries the focus is primarily on the transformation of the energy system, current and potential growth - especially in the Asian developing countries - presents challenges and opportunities to meet the rising demand for energy in a sustainable manner. In line with global climate efforts and increasing social demands, the focus should be on an ecologically sustainable development of energy systems.

The reduction in prices for renewable technologies in recent years as a result of economies of scale and technological progress ensures the basic prerequisite - competitiveness. This environment is expected to have an increasingly positive impact on the approval procedures for renewable energy projects, the demand for capital and the development of electricity trading prices. In line with this, it can be concluded that the demand for capital will remain high and that the framework conditions for investors will remain positive and continue to improve.

⁵ IWF (2020)

⁶ IEA (2019)

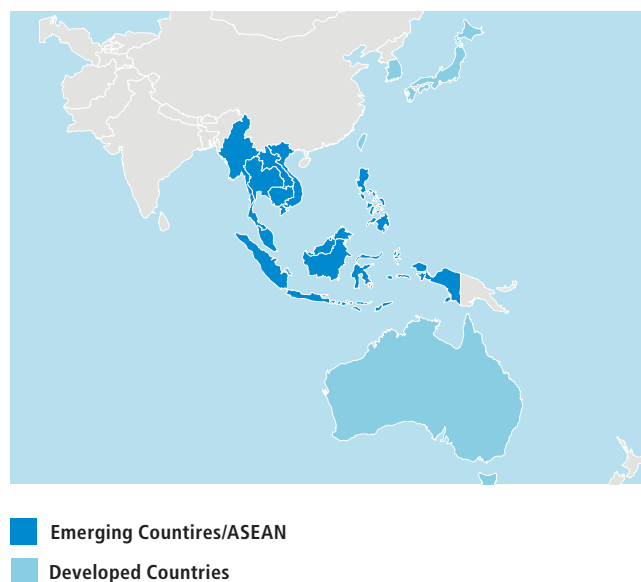
Choosing the right countries

The heterogeneity of countries offers a high degree of diversification potential. A wide variety of risk-return profiles can be represented. The natural resources for renewable energy and the currently low level of expansion create an attractive starting situation.

Challenges arise in particular from monopolistic market structures, which often focus on the expansion of conventional thermal power plants (e.g. ASEAN) and a high dependency on trade with fossil fuels (e.g. Australia).

Due to the very limited market situation in China as well as enormous, domestically diminished competition in India, we are concentrating on the growth markets in ASEAN and the developed countries South Korea and Taiwan, while we are expanding existing activities in Oceania and Japan.

Figure 6: Target markets APAC (ex. China, India)⁷

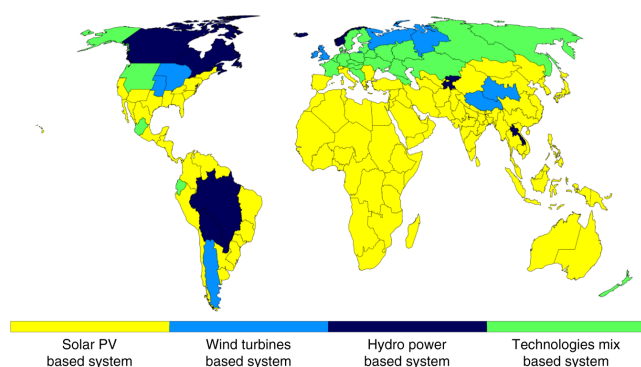


⁷ Aquila Capital (2020)

2. Focus on technology

Solar energy is the world's largest renewable energy resource. The distribution of resources depends on the climatic conditions.

Figure 7: Regions by main resource availability⁸



As can be seen on the map, the APAC region is also located in areas characterised by solar energy resources. Besides the endless availability of this resource, the competitiveness of the technology is also convincing. Levelized costs of electricity have fallen by almost 90 % in the past 10 years⁹ – largely influenced by economies of scale and efficiency improvements.

BOX 1

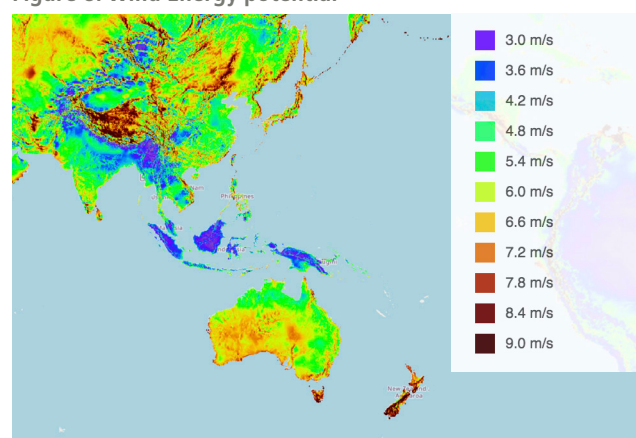
Levelized costs of electricity – LCOE

The total cost of a generation technology is related to the energy production expected over its lifetime. The result is the cost of generating one unit of energy (e.g. kWh). LCOEs thus provide a way of comparing different technologies from an economic point of view (no consideration of external effects of emissions). The comparison with the achievable electricity prices also provides an indicative statement of the economic efficiency of a project.

It should be noted, however, that the electricity production costs in each country have a certain bandwidth, which results from different site conditions.

Extensive coastal regions also offer good conditions for wind energy.

Figure 8: Wind Energy potential¹⁰



In figure 8 can be seen the predominant conditions with regard to wind speed, which is a proper indicator for electricity generation potential and thus for returns on investment. Anticipated progress in the competitiveness of nearshore and offshore technologies in the coming decade¹¹ brings us to keep an eye on this development. These technologies would provide the ideal answer to sometimes very limited land availability.

In addition the regions within the tropical climate zone, characterised by heavy rainfall, offer considerable opportunities for hydroelectric power plants.

„Also within hydropower, the APAC region is of great interest to Aquila Capital. With hydro power installations already producing nearly 1000 TWh in the region, and with a financially / technically viable potential to double this capacity, there is an abundance of opportunities both within operational and to-be-developed assets. Particularly hydro power plants with flexibility to balance solar and wind power in the intraday/intraweek market is also seen to be an interesting add-on to our expanding portfolio of wind and solar assets.“

Dr. Tor Syverud, Head of Hydro Power Investments at Aquila Capital.

Dr. Tor Syverud has had senior positions within the hydro power sector in Europe and Asia since 2005. He holds a Ph.D. in Mechanical Engineering from the Norwegian University of Science and Engineering, where part of the studies were done at the University of Tokyo.

⁸ www.nature.com/articles/s41467-019-08855-1/figures/1

⁹ BNEF (2020)

¹⁰ IRENA Global Atlas (2020)

¹¹ BNEF (2020)

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In particular, diversified energy systems can provide a stable supply through complementary and very low-correlated technologies. Missing grid capacities and rigid demand clusters can be compensated by integrating storage capacities. In addition to the use of water reservoirs, battery solutions increasingly offer a valuable alternative for securing the base load. Technological progress has also led to a significant reduction in electricity production costs. Battery systems, for example, have seen a price reduction of almost 75% in the last 5 years.¹²

„But this is still happening on a very low basis: according to the US Department of Energy, pumped storage power plants cover 97% of the world's storage capacity, batteries only 1.5%. Of course, it must be taken into account that the technologies usually serve very different service markets.“

Hendrik Bohne, Head Business Development & Asset Management APAC

„In addition, there are four things to consider.

1. The two technologies will serve completely different markets. Batteries support the stability of the grid, control frequencies and can compensate for short-term demand fluctuations. Pumped storage power plants, on the other hand, can cover a much larger volume for a longer period of time.

2. Although the cost per MW of pumped storage power plants has also decreased over time, the cost curve for batteries is likely to continue to fall significantly in the future.

3. The approval and construction time play an important role: batteries have a comparatively short approval and construction time. Elon Musk, CEO of Tesla, promised the Federal State of South Australia for the construction of the largest Australian battery storage facility to date that the construction would be free of charge if it took longer than 100 days. Pumped storage hydro plants usually have a much longer planning and approval phase and in addition take years to build.

4. The regulatory systems in most countries hasn't adapted yet to storage technologies. For example, can a renewables plus storage hybrid plant be seen as a base load power provider and be compensated with a capacity charge? The consequential lack of economic market signals (compensation for grid and ancillary services) can currently make broader deployment difficult (Vietnam).“

Christian Krebs, Head Investment and Development APAC

Compared to Europe, South-East Asia and Australia in particular show significantly higher potentials for the use of solar energy.

Figure 9: Potential of solar radiation (in W/m²/day)¹³

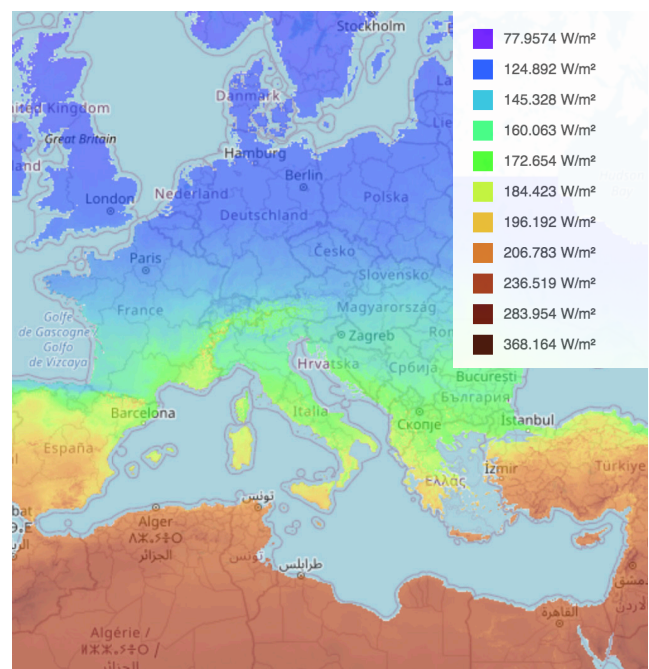
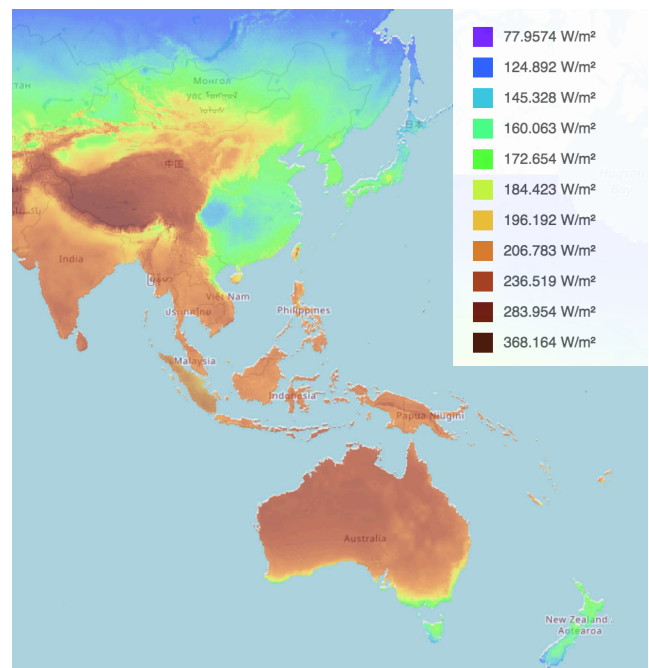
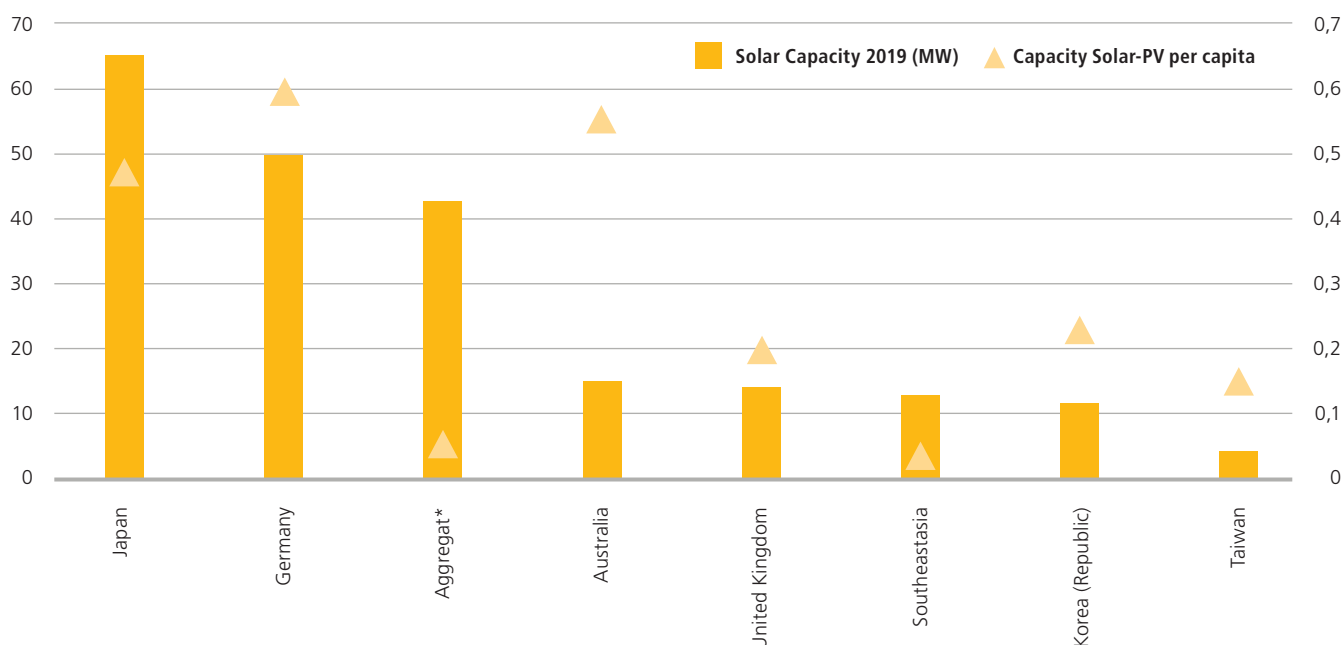


Figure 9 shows clearly the superiority of the APAC region in terms of solar energy resources. However, a look at the installed capacities by geographical distribution raises questions.

¹² BNEF (2020)

¹³ IRENA Global Atlas (2020)

Figure 10: Installed capacity photovoltaics (in GW-left axis / in MW per capita -right axis)¹⁴



*Sum Australia, Southeastasia, Korea (Republic), Taiwan

Regardless of the resources – which have a significant influence on the cost of electricity generation – Japan and Germany have capacities that exceed the sum of the installations in Australia, Southeast Asia, South Korea and Taiwan. With the exception of Australia, this situation becomes even clearer when considering the capacities in relation to the population. However, it should be noted that the high per capita expansion in Australia is mainly due to the initiative of private households. Unlike in Germany and Japan, the capacities in Australia are mainly characterised by private rooftop installations.¹⁵

The substantial differences between the regions are the result of the existence of attractive state subsidies, the competitiveness within the national markets, and the availability of appropriate infrastructure.

„The network infrastructure in APAC, which varies greatly from region to region, and often a lack of interconnections with other countries (e.g. Korea), represents a major challenge for a transformation of the energy sector to cheaper but more intermittent sources. On the other hand, it also offers great opportunities for countries such as Laos or Myanmar, since they can skip a technology step similar to mobile telephony and do not have to invest in expensive and long-lasting infrastructure, which would then make adaptation to renewable energy more difficult and more expensive (Australia).“

Christian Krebs, Head Investment and Development APAC

¹⁴ BNEF (2020); Weltbank (2020); National Statistics Republic of China [Taiwan] 2020

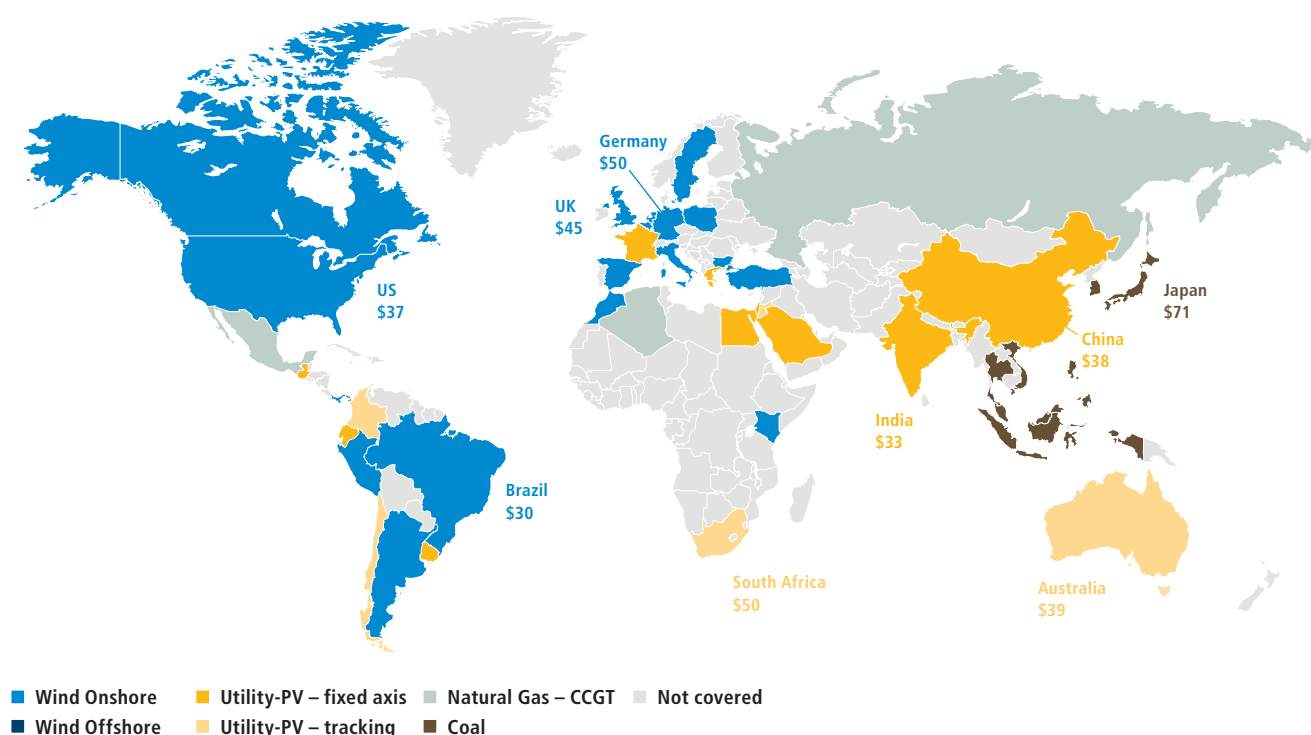
¹⁵ BNEF (2020)

Paradox of cost-efficient technologies

Renewable energies are the cheapest source of energy production (in terms of new construction) in most countries worldwide due to efficiency improvements and the associated cost reductions. This

applies to countries whose population represents two thirds and whose economic output represents 72% of the global total.

Figure 11: Cheapest source of new generation capacity (electricity)¹⁶



Following an analysis of Bloomberg New Energy Finance (BNEF) paradoxically, especially in South-East Asia, which is exposed to solar energy within the tropical climate zone, coal continues to be the cheapest option for new generation capacity. The same applies to South Korea, Taiwan and Japan.

Only Australia has one of the world's lowest electricity production costs in the solar sector, but its use is largely limited to the construction of private rooftop installations. According to an analysis by Bloomberg, investment costs are the decisive determinant. According to the report, investment costs explain 70% of the global variation in electricity generation costs ("CAPEX matters more than resources"; BNEF 2020) and are therefore the decisive factor which leads, for example, to the fact that the production of solar energy is cheaper in the UK than in Bali. However, in view of significantly lower labour costs and a significantly higher capacity factor, this requires a more detailed consideration.

„Coal as an energy source is still deeply embedded in the current energy mix of many countries. However, political and social pressure is mounting, making a further expansion more difficult. This is accelerated by the increasing unwillingness of investors to support such assets given both the reputational and, in particular, economic risk (stranded assets). In cases this leads to the bizarre situation of investors seeking governmental support in form of tax reliefs, direct financing or make whole provisions for future carbon tax as a precondition to investing into coal fired power stations (Australia)“.

Christian Krebs, Head Investment and Development APAC

¹⁶ BNEF (2019)

Learning curve and turning points

With the exception of Australia, renewable energies, especially wind and solar power, have on average not yet reached grid parity with existing fossil fuels.

BOX 2

Grid parity

In the context of renewable energies, grid parity is said to exist when the electricity production costs of these technologies correspond to those of conventional thermal power plants.

Figure 12: Range and average of LCOE's in the Philippines in H1 2020 (USD/MWh)¹⁷

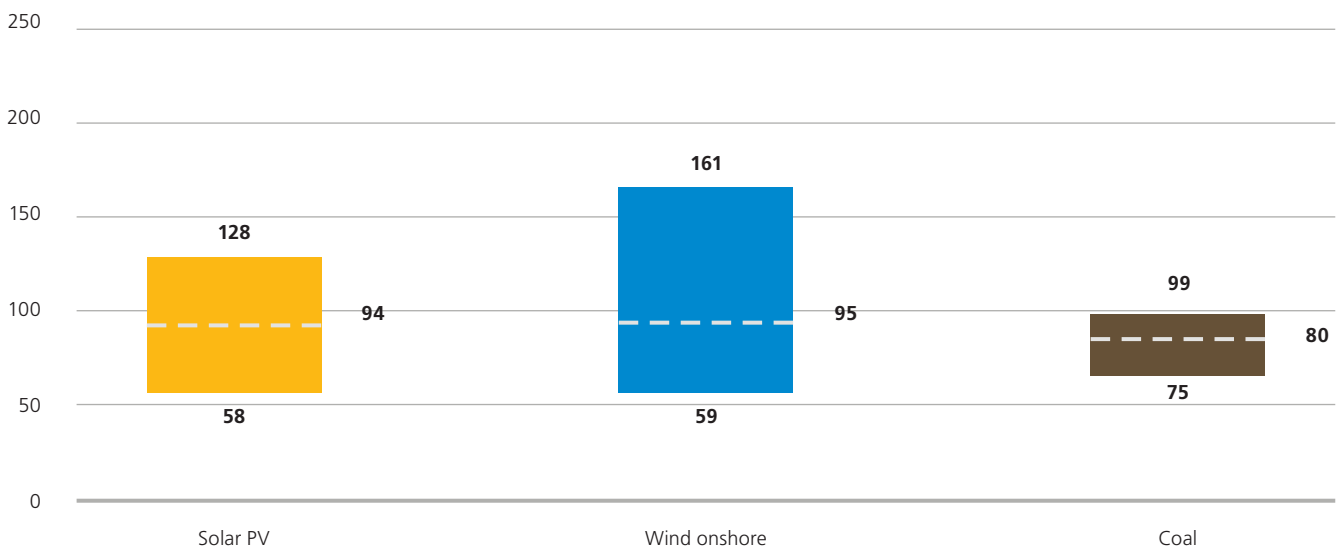


Figure 12 shows, using the Philippines (representative for ASEAN) as an example, that depending on the respective site conditions, the electricity generation costs for wind and solar plants in some cases already undercut the costs of coal energy. Without taking external costs into account, the electricity generated from coal is, on average,

even cheaper. However, the dynamic reduction in the price of renewable technologies is continuing. Once grid parity has been achieved in most regions of the world, competitiveness in the target countries under consideration is also only a question of time.

¹⁷ BNEF (2020)

Figure 13: Achieving grid parity Solar and wind energy in respective countries¹⁸

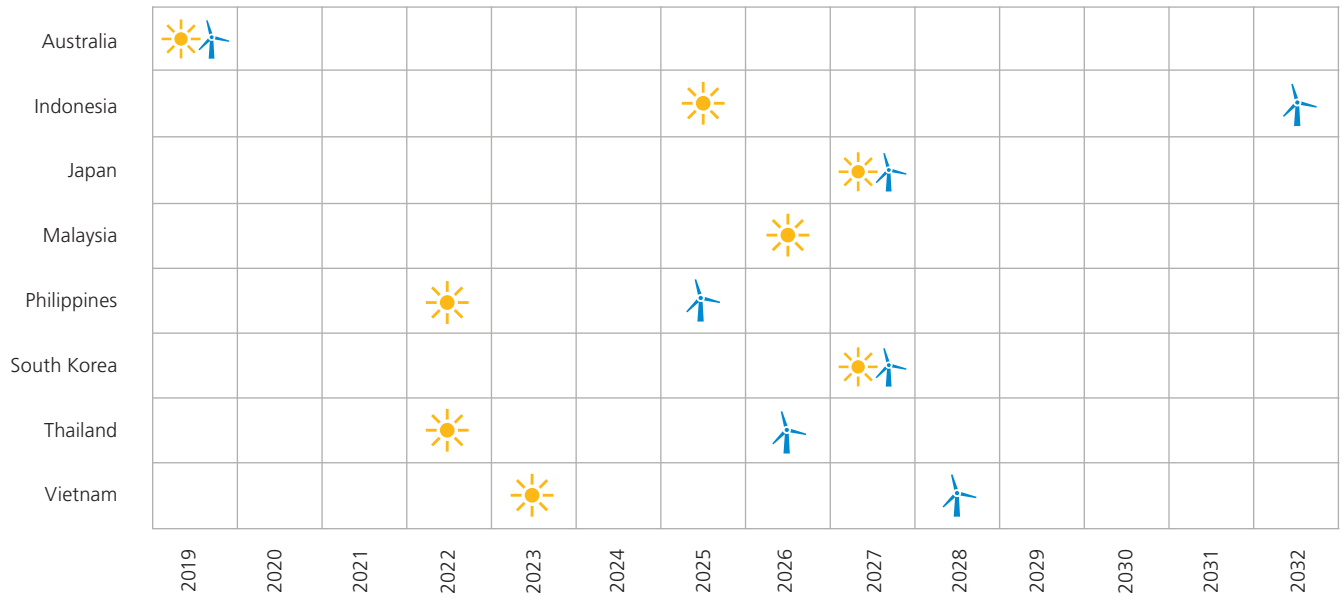


Figure 13 illustrates the times when solar and wind energy are the cheapest sources of new energy production in the countries under consideration. It is clear that this state of affairs will be reached in the coming years. This constellation also shows that even the

smallest political changes in favour of renewable technologies can directly change the initial situation. The observation of local developments and the immediate exploitation of opportunities that arise requires agile operating teams on site.

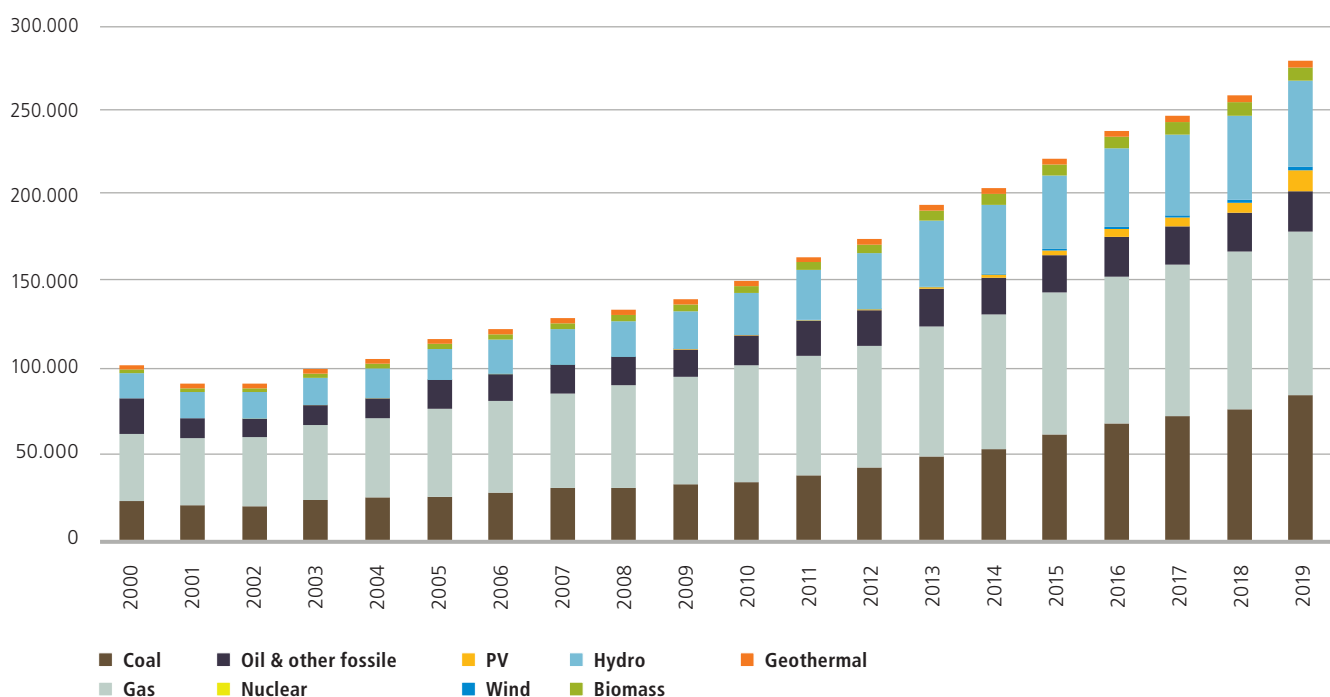
¹⁸ BNEF (2020)

3. Southeast Asia energy market

Around one tenth of the world's population lives in the ASEAN economic area. It is not only since the beginning of the millennium that the states have been faced with the challenging task of providing all people in the region with access to affordable energy by 2030. Despite considerable progress, which is reflected in the rising demand for energy, some 45 million people remain without access to the electricity grid.¹⁹ A significantly larger part of the population is still dependent on the use of biomass (e.g. wood) for cooking. On the current development path, this dependence on biomass will still exist for around 175 million people even in 2040.²⁰

Since 2000, energy demand in ASEAN has increased by more than 80%. With an average annual growth rate of 6%, the region is one of the world's fastest growing markets.²¹ Most of this development has been driven by a doubling of fossil fuels. Although oil is the most important energy source in the region, the share of coal, especially for electricity generation, is growing fastest.

Figure 14: Development of electricity generation capacity ASEAN (in MW)²²



Despite the high potential for the use of renewable energy sources, they only cover about 12% of demand.²³ While the use of hydro-power has quadrupled since 2000 and geothermal energy has increased by 65%, solar and wind power remain at a very low level despite the cost reductions achieved.

The International Energy Agency (IEA) estimates that ASEAN's economic output will double by 2040. In the same period, the population will increase by 120 million people – this growth will be concentrated

mainly in the cities. In the light of these developments, energy demand will increase by a further 60% by 2040. Demand for electricity will even double during this period, growing at 4% per annum, almost twice as fast as the rest of the world.²⁴ Even before the industrial sector, residential buildings are responsible for most of the growing demand for electricity. The demand for air conditioning systems, which are becoming affordable due to growing incomes, is a driver of this development.

¹⁹ IEA (2019)

²⁰ IEA (2019)

²¹ IEA (2019)

²² BNEF (2020)

²³ BNEF (2020)

²⁴ IEA (2019)

Figure 15: Cooling degree days across the world 2007-2017²⁵

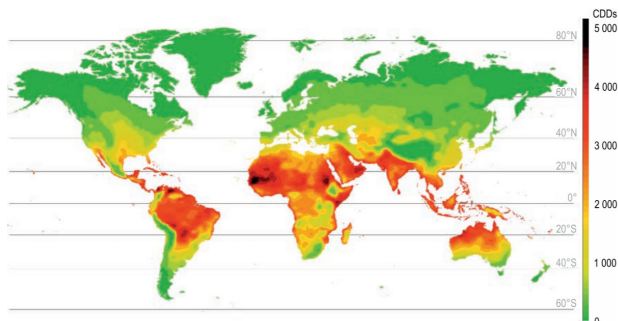
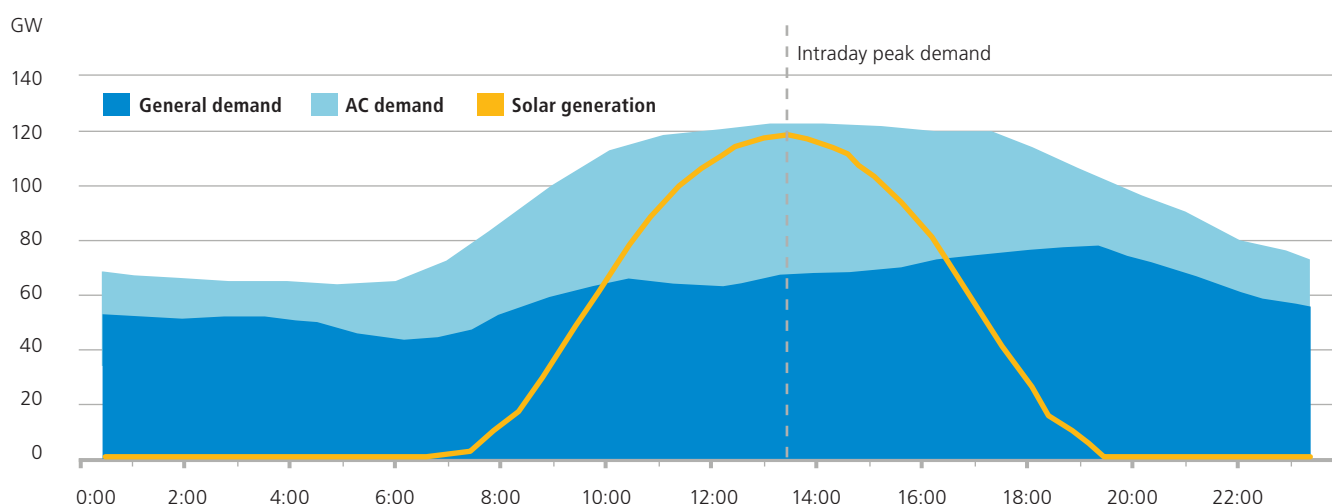


Figure 15 illustrates the plausible demand for cooling systems in the region, especially in comparison to Europe and North America.

Figure 16: Illustrative hourly profile Indonesia 2050²⁶



The expansion of coal-fired plants continues to be the focus of attention, partly because of individual but influential interest groups. Regardless of the external costs caused by pollution, however, the framework conditions will increasingly change.

In addition, conventional power plants have high follow-up costs, such as renaturation of coal mining or storage for nuclear fuel rods, which are not yet applied in the calculation of LCOEs.

Supply under pressure

Satisfying the enormously growing demand for energy from fossil sources entails difficulties. It would lead to increasing import demand due to a lack of sufficient resources. The raw materials available within the region increasingly no longer meet demand. As a result, the states are faced with a significantly growing deficit in energy trade. On the current path a net deficit of more than USD 300 billion

BOX 3

Load profiles of solar-PV systems and increasing demand for air conditioning systems

The increasing use of air conditioning systems has led to a shift in peak loads. In line with the daily temperature, which peaks around noon, electricity demand also reaches its daily peak. In particular, the production profile of solar systems behaves in a similar way and therefore offers the ideal and emission-neutral counterpart to this development.

BOX 4

External costs

External costs or external effect is the impact of economic activities on uninvolved third parties who do not receive compensation for the damage. Emissions and the resulting air pollution are a classic example. The IEA expects the number of deaths in ASEAN due to air pollution to increase by 200,000 to a total of 650,000 people per year by 2040.

As part of the restrictions imposed to combat the pandemic, the ubiquitous smog disappeared, particularly in Asian conurbations. It is hoped that this state of affairs will have a lasting impact on society's awareness.

²⁵ IEA (2019)

²⁶ BNEF (2020)

is expected by 2040.²⁷ This enormous burden on national budgets is increased to the same extent by the existing subsidies for fossil fuels, which shield consumers from the resulting market prices. In 2018, the subsidies already amounted to USD 35 billion annually, which corresponds to a burden of 0.5% of the total economic output.²⁸

Further burdens arise from the fluctuations in raw material prices on the world market. In the event of rising prices, this dependency can put a heavy strain on national budgets. In case of a price shock energy security, which is an essential component of ongoing industrialisation, would be at risk due to high import dependence. The generally relatively high volatility on the raw materials markets can also increase the burden considerably due to currency fluctuations, since raw materials are traded on the world market in USD.

In the short to medium term, the capital costs of building fossil-fuel power plants will also rise significantly. Domestic and international investors and lenders are becoming increasingly reluctant to finance such projects.

„We will not directly finance any new coal-fired power plant projects, including expansions, in any location.“

Standard Chartered Bank²⁹

On the one hand, this is supported by specially formulated ESG criteria that exclude climate-damaging investments. On the other hand, the risks associated with the projects also increase. These relate to long-term use or decommissioning and competitiveness against renewable technologies. In addition, the general bankability is increasingly endangered by the reluctance of insurance and reinsurance companies. IEEFA³⁰ publishes [a list of over 100 major banks and insurance companies](#) that have already decided to exclude coal-related industries.³¹

Renewable energy demand drivers

ASEAN's economic upswing is largely determined by and highly dependent on foreign direct investment. Boosted by the sharp rise in wage levels in China and the geopolitical and trade policy distortions in China, the region is considered a beneficiary, as it offers a stable alternative. Multinational corporations such as Apple, Microsoft and Google are considering relocating production from China to ASEAN³², and even Chinese companies are investing in the production capacities of the neighbouring region.

Announcements such as the European Union's supply chain law³³, which could impose tariffs for non-compliance with environmental standards, would put an additional burden on fossil fuels. In addition, international companies in particular are setting ever higher standards with regard to their sustainability criteria. The availability of renewable energy sources is at the centre of their strategies to decarbonise supply and value chains.

BOX 5

Cloud computing is paving the way to higher demands for Renewable Energy

The hunt for market shares in Asia's rapidly growing markets drives expansion strategies. Asia has lagged behind the US and Europe in terms of cloud adaption but it is picking up quickly. Accelerated by the pandemic-lockdowns, the demand for new datacentres is growing significantly and thus the future demand for electricity. Particular multinational Tech-Companies pursue net-zero emissions goals. Google for example reports that 2019 was the third year in a row in which the company covered its energy requirements with Renewable Energies.³⁴

The availability of renewable energy will be included in the investment decisions of a growing number of companies. This surge in demand will create opportunities for the realisation of renewable energy projects. The central decision-making criterion for the implementation of projects are long-term stable and predictable cash flows. Private power purchase agreements can realise these. The worldwide growth of this market is also affecting ASEAN.

All contracts currently relate to solar projects. In the competition for foreign direct investment, other ASEAN countries are likely to open their markets and allow private contracts.

„Indonesia plans to overhaul laws to raise foreign investment“

Financial Times (2020)

²⁷ IEA (2019)

²⁸ IEA (2019)

²⁹ <https://www.sc.com/en/sustainability/position-statements/prohibited-activities/> (2020)

³⁰ Institute for Energy Economics and Financial Analysis

³¹ <https://ieefa.org/finance-exiting-coal/>

³² CNBC (2020)

³³ <https://lieferkettengesetz.de/pressemitteilung/eine-regulierung-ohne-sanktionen-ist-keine-regulierung-eu-kommissar-reynders-kuendigt-entwurf-fuer-eu-lieferkettengesetz-an/> (2020)

³⁴ <https://www.blog.google/inside-google/infrastructure/data-centers-work-harder-sun-shines-wind-blows/>

BOX 6

Power Purchase Agreement – PPA

Away from state subsidies, private power purchase agreements offer the possibility of fixing payment flows in the long term. A supply volume is contractually agreed, which is purchased at a fixed price over a defined period (approx. 5-25 years), e.g. by a company. The pricing is based on the stock exchange prices. In order to secure the payment flows, the producer has to accept a discount on the stock exchange price.

The steadily increasing demand for emission-neutral energy will give the PPA market a further boost, thus opening up the possibility of implementing further renewable energy projects. It has been shown that renewable energy, which is still somewhat more expensive, isn't an obstacle to economic development, but can even be conducive.

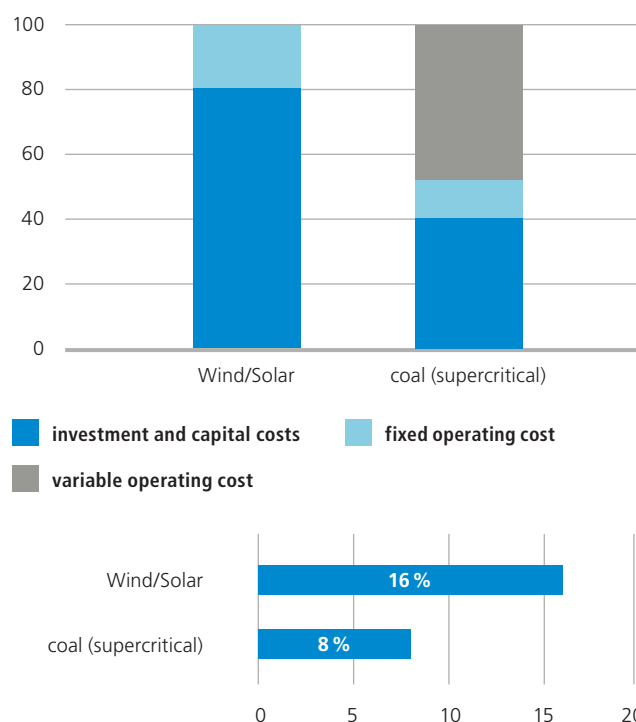
„Nevertheless, from our own experience in Thailand, Myanmar, Japan, Indonesia and Vietnam, we can say that in the past we have been able to conclude power purchase agreements with companies whose prices are lower than what these companies would have paid to their supplier. Renewable energies are therefore already fully competitive.“

Hendrik Bohne, Head Business Development & Asset Management APAC

Competitiveness of technologies

Due to the different cost structures of conventional thermal power plants and renewable energies, they react very differently in terms of sensitivity to various changes in the framework parameters - such as capital costs and fluctuations in commodity prices.

Figure 17: Total cost structure (in %) and resulting price decrease with a 20% reduction of investment and capital costs³⁵



Around 80% of the costs for wind and solar plants and their operation are determined by the actual costs of the investment (i.e. materials, construction, grid connection). Additional costs arise only from maintenance, servicing and operation. In the case of coal-fired power plants and diesel generators, the investment costs only account for approx. 40% and 10% of the total cost structure. The variable costs arising from the use of fuels amount to almost 50% for coal and about 90% for diesel generators.³⁶

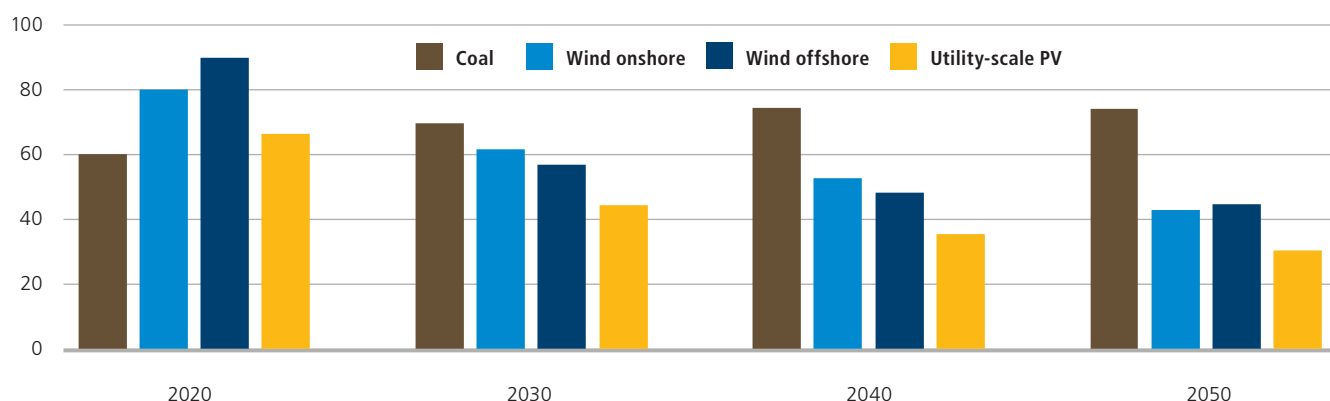
As shown in Figure 17, falling investment costs have a disproportionate impact (16%) on the renewable energy sector. The same reduction in costs leads to an only half as high reduction (8%) in generation costs for coal-fired power plants. Fluctuations in commodity prices, on the other hand, affect only conventional power plants.

This correlation will determine generation costs in the coming years and will also lead to the economic superiority of renewable energies in ASEAN.

³⁵ Aquila Capital (illustrative)

³⁶ Agora Energiewende (2019)

Figure 18: Development of LCOEs in the Philippines – comparison of technologies (in USD/MWh)³⁷



As shown in Figure 18, grid parity or significantly lower LCOE's than the currently still cheapest variant of coal for PV, onshore and even offshore plants will be achieved within the next few years. The course shown for the Philippines is representative for ASEAN.

One way to accelerate this development is through government support programmes such as feed-in tariffs (FiT) and tendering procedures (auctions), as they ensure predictability and bankability.

Figure 19: Capacity Solar-PV (in MW)³⁸

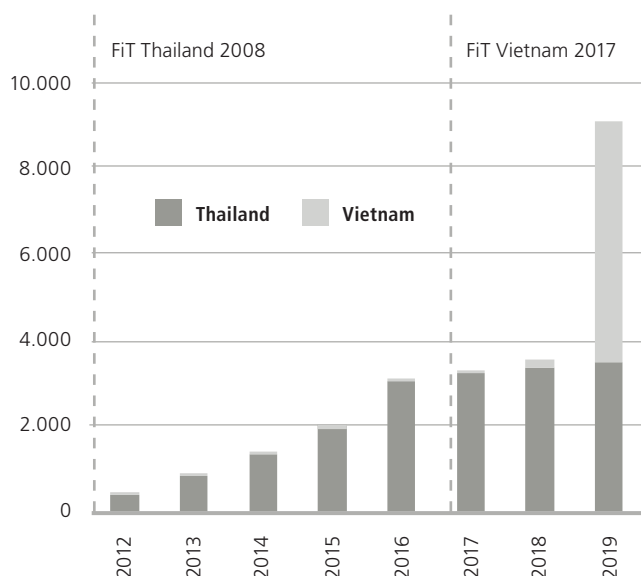


Figure 19 illustrates the effect of government support measures for renewable energies and also shows the interest of investors in using the natural resources of the region. With the introduction of feed-in tariffs in Thailand (2008) and Vietnam (2017), the number of solar installations multiplied.

BOX 7

Feed in Tariff (FiT)

The feed-in tariff is a fixed – usually state-guaranteed – remuneration for the electricity generated. The remuneration is paid at a fixed price per unit of generated energy over a predefined period. This is a very effective support measure, as the payment flows are secured and easy to forecast.

³⁷ BNEF (2020)

³⁸ Aquila Capital (2020)

BOX 8

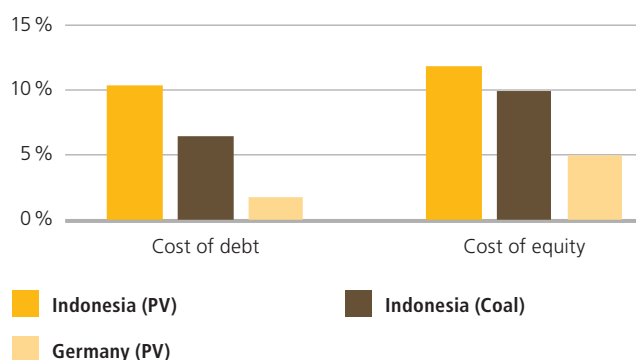
Auction

Further development of the feed-in tariff. The level of remuneration is no longer defined in advance but is determined by an auction procedure. A fixed amount of capacity is put out to tender. Bidders must indicate how much capacity they are building at a self-defined level of support. Bids with the lowest eligibility requirements are awarded the contract.

Beyond state subsidies, however, there are other opportunities to accelerate development. For example, dismantling import restrictions on solar modules would massively reduce investment costs. Taking Indonesia as an example, unlimited imports would halve the current LCOE's and thus represent a much cheaper alternative compared to coal.³⁹

A further possibility would be offered by state guarantees, the influence of which would reduce the currently significantly higher capital costs compared to coal and thus lead directly to grid parity. The importance of capital costs in the renewable energy segment also underlines the supporting effect of the global low-interest phase. The resulting constellation has a very positive effect on the expansion of renewable energies, which are characterised by capital intensity.

Figure 20: Capital costs in comparison⁴⁰



Investors also have the opportunity to access additional financing options through development banks and cooperation with international banks in order to increase competitiveness. However, cooperation with regional banks should not be neglected, because on the one hand this can increase the influence on regional decision-makers. On the other hand, the learning process is supported by experience and cooperation, whereby the financing conditions can be continuously improved. This shows that local presence and the possibility of exchange with regional decision-makers are of crucial importance for successful market access and, above all, long-term success.

³⁹ Agora Energiewende (2019)

⁴⁰ BNEF (2020)

4. Energy market: Developed countries in APAC

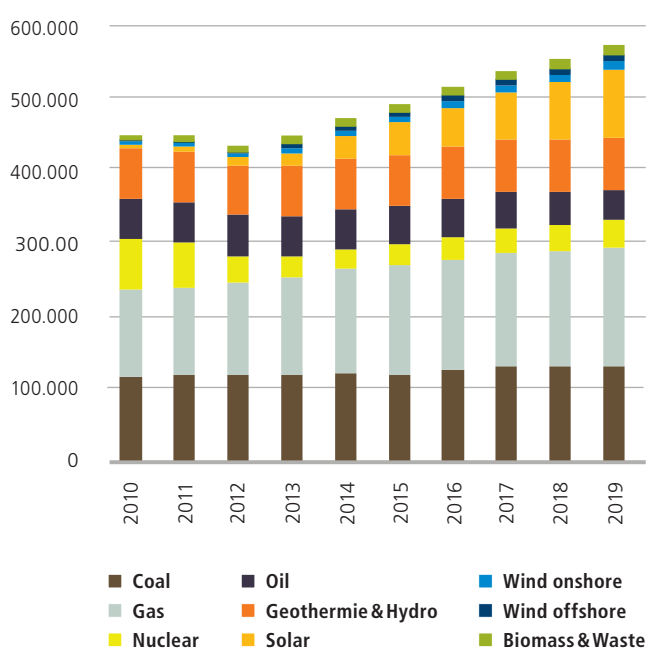
The developed countries - in particular East Asian Japan, South Korea and Taiwan - have many parallels with ASEAN. The development of these economies has been similar to that in Southeast Asia. It is only because of the time lag that they have already reached a significantly higher degree of maturity. In comparison to the rapid industrialisation of the East Asian states, Australia's prosperity is largely based on the continent's wealth of raw materials.

In contrast to ASEAN, the growth rates are much more moderate, corresponding to the degree of maturity. In contrast to the development of an energy system, the focus is on the transformation to renewable sources, similar to Europe.

Status quo

In recent years, significant progress has been made in expanding renewable energy sources.

Figure 21: Development of electricity generation capacity (Japan, Taiwan, South Korea, Australia / in GW)⁴¹



In 2010, the capacity of renewable energies amounted to only 20%, characterised by geothermal and hydropower, without any significant expansion in the solar and wind energy sector. By 2019, the share of renewable generation capacity had risen to one third of total capacity. This development was mainly driven by the expansion of solar energy, which accounted for almost one fifth of total capacity in 2019. It should be noted, however, that Japan accounts for 70% of this development. As the largest energy consumer, Japan

also accounts for more than half of the electricity generation capacity.

However, the efforts in Taiwan, Australia and South Korea have remained at very low levels. This development seems paradoxical, as Japan has the lowest irradiation values within the region and the highest electricity production costs for solar energy. One reason for this, however, is probably that Japan is making particularly strong efforts to develop renewable energy following The Great Earthquake. With the phase-out of large parts of nuclear power, Japan abandoned almost 30% of its electricity generation overnight.⁴² As a result, there were attractive tariffs for the expansion of solar energy, which has the advantages of being able to be built in a very short time and reducing dependence on imported energy sources.

Heterogeneity of countries

There is also a high degree of heterogeneity among the developed countries in terms of policy orientation, the climate goals pursued in each case and the natural availability of resources. While South Korea is the first East Asian country to announce a Green New Deal, Australia is strengthening fossil fuel industries in response to the recent global crisis triggered by the pandemic. In return, Australia has one of the lowest electricity production costs for solar energy in the world and Japan and South Korea have global highest costs.

BOX 9

South Korea's Ninth Basic Plan⁴³

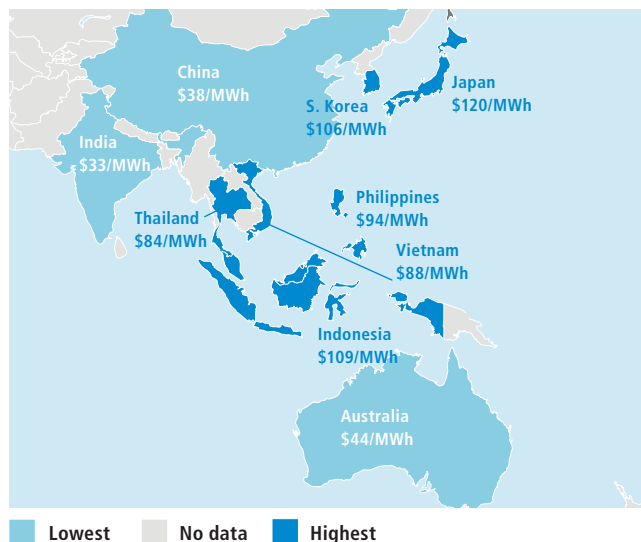
In order to achieve emissions neutrality by 2050, South Korea published in December 2020 the milestones until 2034. The plan includes the shutdown of 30 coal-fired power plants and the reduction of nuclear energy. In contrast, the current renewable energy capacity will be quadrupled to meet the rising energy demand. By 2034, more than 57 GW of renewable capacity is to be created. This development would make renewables the main component of the country's energy supply with a share of over 40%. To ensure the framework conditions for the transformation, the plan also includes significant investments in the country's grid capacities.

⁴¹ BNEF (2020)

⁴² BNEF (2020)

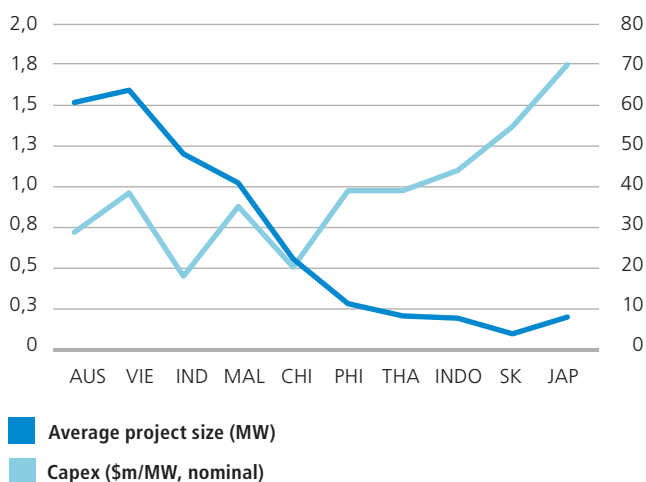
⁴³ The Korea Herald, 2020

Figure 22: LCOE's APAC 1st HY 2020⁴⁴



In addition to other effects, the following facts play a major role also with regard to the efforts of ASEAN.

Figure 23: Relation of Investment costs (CAPEX) and project-size⁴⁵

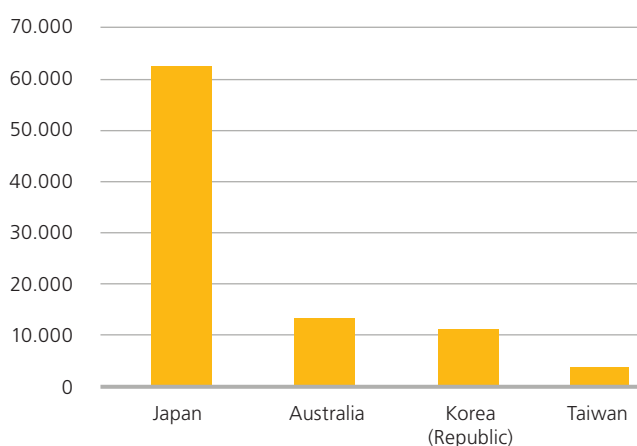


In addition to other effects, the following facts play a major role also with regard to the efforts of ASEAN.

Figure 23 illustrates the relationship between project size and investment costs. The availability of suitable areas for solar projects varies considerably from country to country. Large installations allow economies of scale to be exploited and have a direct impact on the investment costs per MW. For example, large plants in Australia offer significant advantages compared to smaller plants in South Korea and Japan.

However, political incentive systems are able to compensate for these natural conditions. They can, however, trigger unwanted distortions through market mechanisms.

Figure 24: Solar-PV Capacity (in GW)⁴⁶



For example, Japan has more than four times the installed capacity of photovoltaic systems than Australia, despite competitive advantages (see Figure 9).

Market environment Japan

Japan has the highest electricity generation costs in the world. The average cost of 120 \$/MWh for solar energy in Japan is more than four times the cost in China. This is due to several factors:

- The availability of land is limited due to restrictive regulations and topography
- This makes it difficult to use economies of scale
- Japan shows significantly higher labour costs
- The feed-in tariffs introduced in 2012 were extremely attractive and thus also led to the construction of less efficient plants
- Construction companies achieved margins of 30–40%

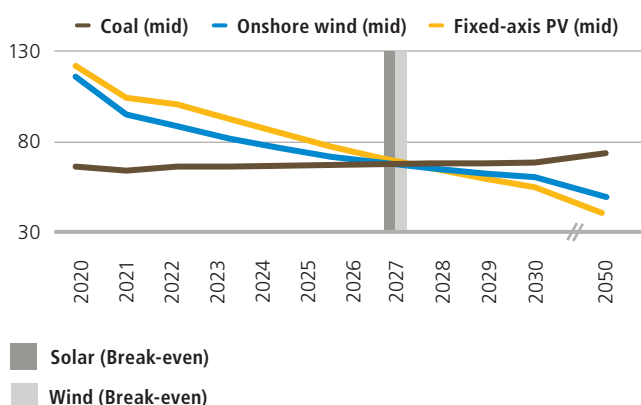
A 70% reduction in the feed-in tariff and the introduction of tendering procedures between 2012 and 2020 will strengthen the competitive situation. As shown in Figure 25, this results in a positive development of the LCOE's.

⁴⁴ BNEF (2020)

⁴⁵ BNEF (2020)

⁴⁶ BNEF (2020)

Figure 25: Forecast LCOE-development by technologies Japan (in USD/MWh)⁴⁸



The so-called learning rates lead to annual cost reductions of around 8% for solar and onshore wind turbines in Japan.

While the first auction in September 2020 resulted in attractive prices, developers are currently facing political risks. A subsequent change in the framework conditions denies access to subsidies to those projects that are not connected to the grid by a fixed date. This kind of approach depresses investor interest and prevents a dynamic expansion of renewable energies.

On the other hand, positive prospects are coming especially from the wind segment. In addition to the dynamics of onshore electricity generation costs shown in graph 26, the expansion of offshore plants also offers a response to the limited availability of land. The first tender for a large offshore wind farm was launched as early as June 2020. The goal is to increase offshore capacity by 45GW by 2040.

In addition the declaration of Japanese Prime Minister Suga to go carbon-free by 2050 will accelerate the positive development.⁴⁷ As part of the announced green growth strategy, guidelines are to be set to increase the share of renewable energies to 50–60% of the electricity mix in 2050.

Promotion of Renewable Energies

Korea, Taiwan and Japan have ambitious targets for the expansion of renewable energies. Supporting political measures such as feed-in tariffs and tendering procedures offer relatively good framework conditions for investors. Incentive mechanisms and targets are also active in parts of Australia – in line with the federal structure. However, development is particularly promoted by the extremely favourable natural resources.

It is expected that economic stimulus packages to overcome the crisis triggered by the pandemic will offer additional upside potential for the markets. While South Korea, like Europe, has announced a Green

New Deal, Australia, on the other hand, is strengthening fossil fuel industries, whose importance within the Australian economy remains high.

Apart from state support mechanisms, which also entail risks (cf. Japan), private power purchase agreements are also recording enormous growth in these markets and are opening up further potential for investment.

BOX 10

PPA record⁴⁹

The Taiwanese semiconductor company TSMC⁵⁰, which produces chips for Apple, signed the world's largest PPA contract to date in 2020. TSMC secured 1,200 MW of capacity from onshore and offshore wind farms in Taiwan.⁵¹ TSMC's entry into the RE100 initiative – a corporate initiative with the goal of 100% use of renewable energies – will also increase the pressure on other companies in the region that are heavily dependent on exports.

„Asia-Pacific has seen a significant increase in recent years in the number of companies committing themselves to climate targets and groups such as RE100. For strategic investors like Aquila Capital, this opens up a huge market potential for power purchase agreements.“

Christian Krebs, Head Investment and Development APAC

As the intentions of large companies to decarbonise production and supply chains increasingly influence their reputation and the behaviour of consumers, demand is rising.

The efforts of companies to support climate protection and implement their own goals are becoming increasingly important strategically and are opening up competitive advantages or disadvantages, especially for export-dependent countries.

Meanwhile, Australia's companies benefit from the low cost of electricity generation, which is mainly due to the natural conditions. The resulting high competitiveness of renewable energies offers cost-efficient solutions for companies and private households. In particular, the high expansion of private rooftop installations is proof of the advantages. Political and social debates, also in view of the devastating forest fires, will increasingly focus on climate protection aspects in the coming years. In view of an ageing energy supply system and dependence on the raw materials sector, future prospects are needed in the medium term. Because maintaining the coal industry will be difficult already in the next years as the country's largest bank ANZ is going to end all investment in thermal mines and power stations by 2030.⁵² Among other things, investments in the hydrogen sector could open up new opportunities and make use of existing structures and capacities in the future.

⁴⁷ BNEF (2020)

⁴⁸ <https://apnews.com/article/virus-outbreak-shinzo-abe-cabinets-health-yoshihide-suga-726ac43cceb4b94fe2b532bdea704410>

⁴⁹ BNEF (2020)

⁵⁰ Taiwan Semiconductor Manufacturing Company

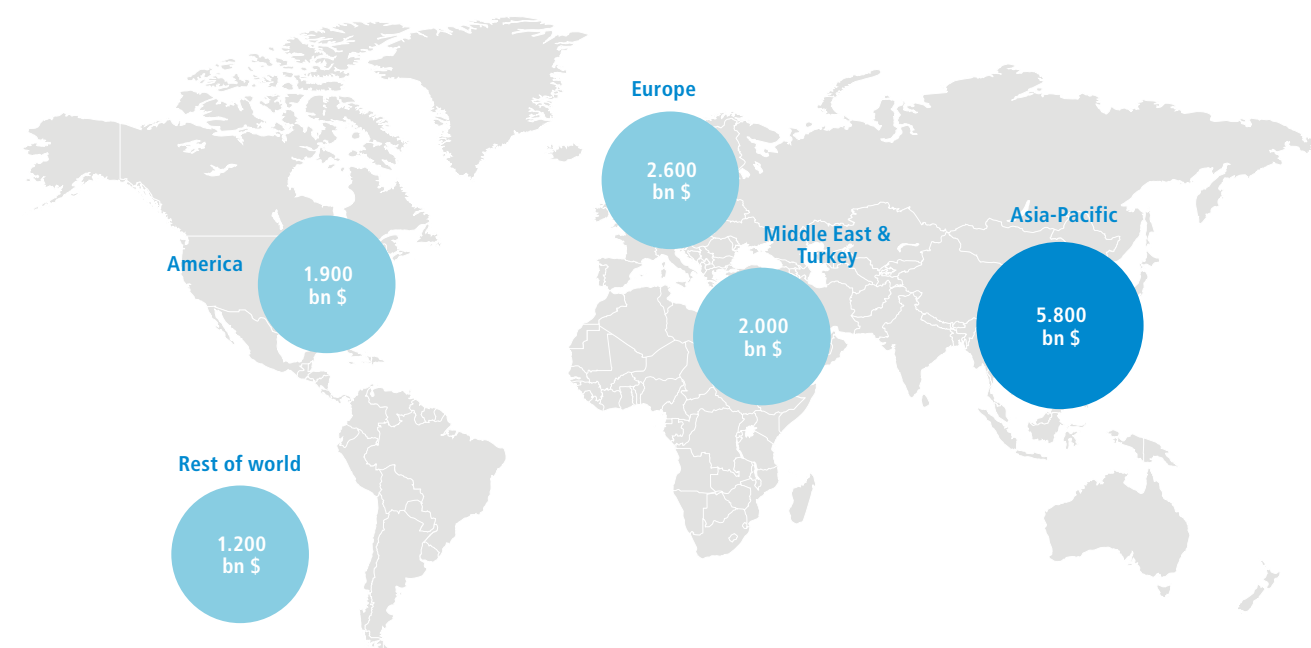
⁵¹ BNEF (2020)

⁵² BNEF (2020)

5. Outlook

Driven by the rapid growth in Asia, especially based on the developing and emerging countries of the region, the demand for energy is increasing significantly.

Figure 26: Investments in new capacity 2019–2050⁵³



The Asia-Pacific region accounts for 40% of the global investment requirements. Figure 26 illustrates the enormous capital requirements.

Private investment plays a major role in providing the necessary capacities. Accordingly, it is to be expected that markets will open

up further, general conditions will improve and numerous opportunities will arise for investors. The competitiveness of renewable energies and the region's natural resources also support the development of sustainable energy systems from a purely economic perspective. The APAC region therefore offers enormous potential for private investors.

⁵³ BNEF (2020)

5.1 Investment Forecast ASEAN

Overall grid parity for renewable energies will soon be fully achieved and is driving investment in the capacity of solar PV systems.

Figure 27: Investments in new capacity ASEAN* (in USD bn.)⁵⁴

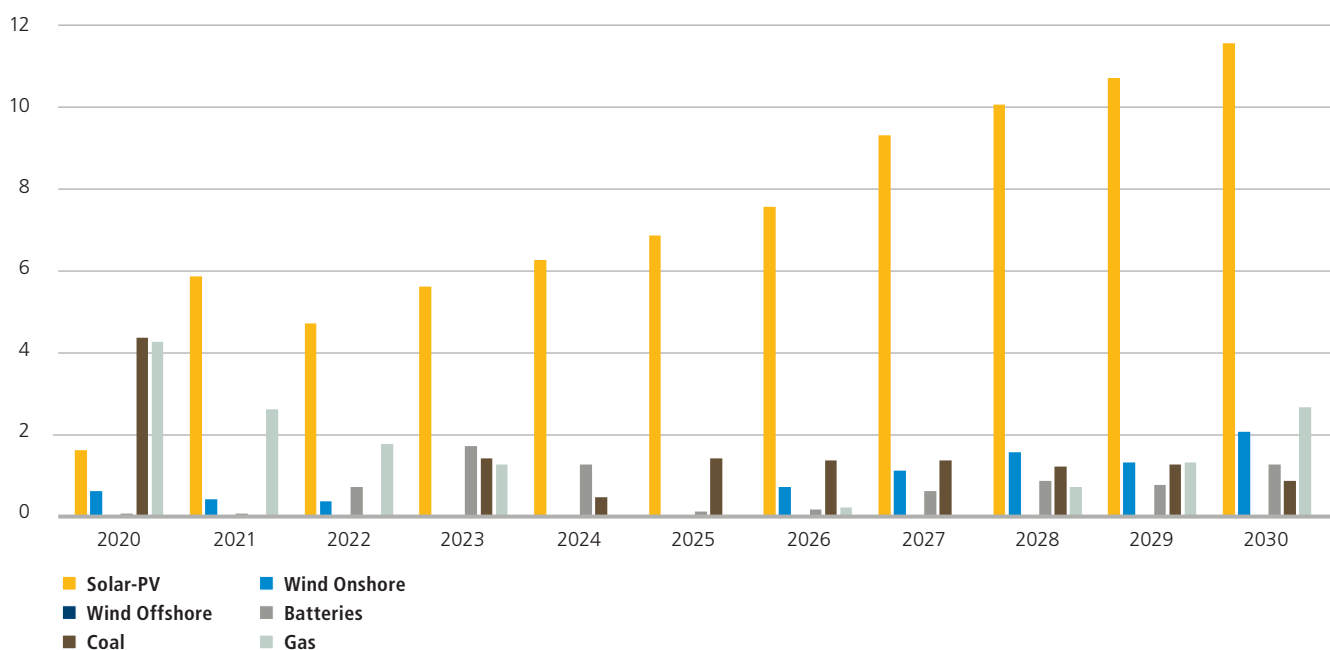


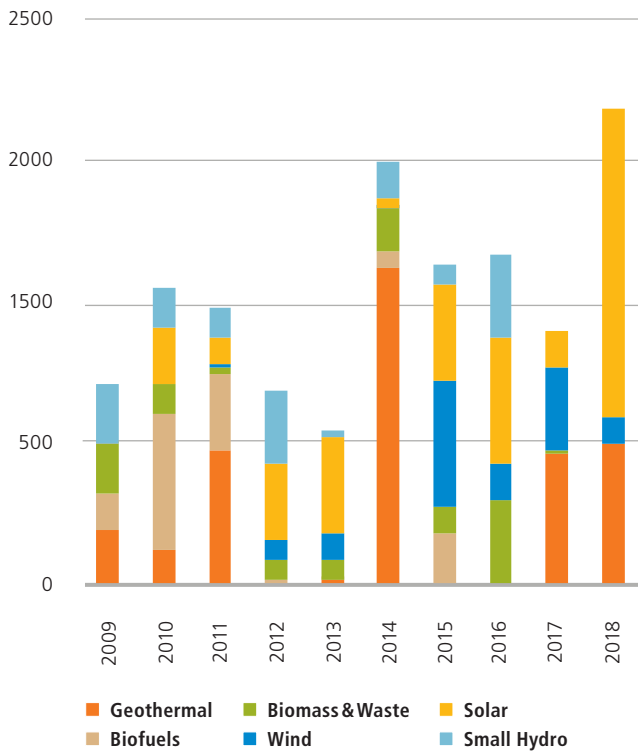
Figure 27 illustrates the still high level of investment in fossil plants – especially coal and gas – in the coming years. However, the advantages of solar technology combined with the region's excellent natural resources are leading to steady growth. While the headwind for fossil-fuelled power plants is steadily increasing, further innovations in the field of renewable energies will allow efficiency and cost reduction to continue. The dynamic development especially in the field of storage technologies will increasingly provide answers to the

problems of stable base load supply and grid bottlenecks. A further dynamic market development can therefore be expected. The identification of emerging opportunities must be ensured by local presence and experienced teams.

In particular, there is a high demand for foreign direct investments in the energy sector to meet the rising demand.

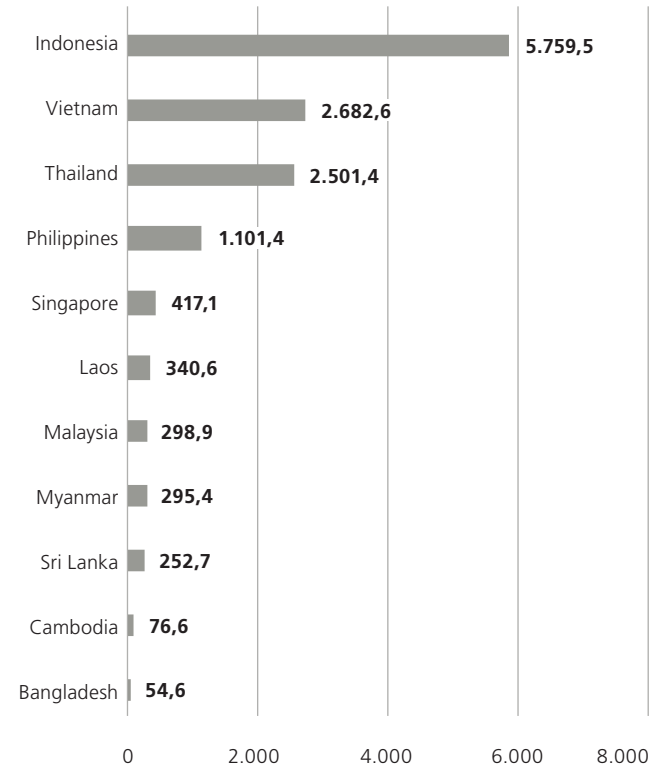
⁵⁴ BNEF (2020) / *ASEAN (Indonesia, Malaysia, Philippines, Thailand)

Figure 28: Foreign direct investments in Renewable Energy ASEAN (in USD m.)⁵⁵



Sustainability criteria are increasingly determining the investment decisions of international investors. With the expansion of possibilities to invest in sustainable generation capacities, significantly higher capital inflows can be achieved in the future. It is therefore becoming increasingly important for the developing countries of ASEAN to create stable framework conditions and market relations in order to attract the expansion of renewable energies and thus foreign investment. The expansion of generation capacities is the basis for further industrialisation and thus secures the development and growth of ASEAN's economies.

Figure 29: Recipient countries foreign direct investments in new capacity ASEAN (in USD m.)⁵⁶



Due to the many national differences, a selective approach is essential. The capital inflows provide information about the existing framework conditions for investments. The initial focus is on Indonesia, Vietnam, Thailand and the Philippines. But other countries will follow and improve the investment conditions. Through local presence and constant exchange, emerging opportunities are recognised and can be exploited by acting quickly.

⁵⁵ BNEF (2020)

⁵⁶ BNEF (2020)

5.2 Investment Forecast Developed Countries (APAC)

In the East Asian countries Japan, South Korea and Taiwan in particular, attractive opportunities are created by government incentive mechanisms and the dynamically growing PPA market. Additional

impetus is expected from economic stimulus packages to overcome the crisis, as the expansion of renewable energies has a far more positive effect on the tight labour markets than fossil-fuelled plants.⁵⁷

Figure 30: Investments in new capacity Japan and South Korea (in USD bn.)⁵⁸

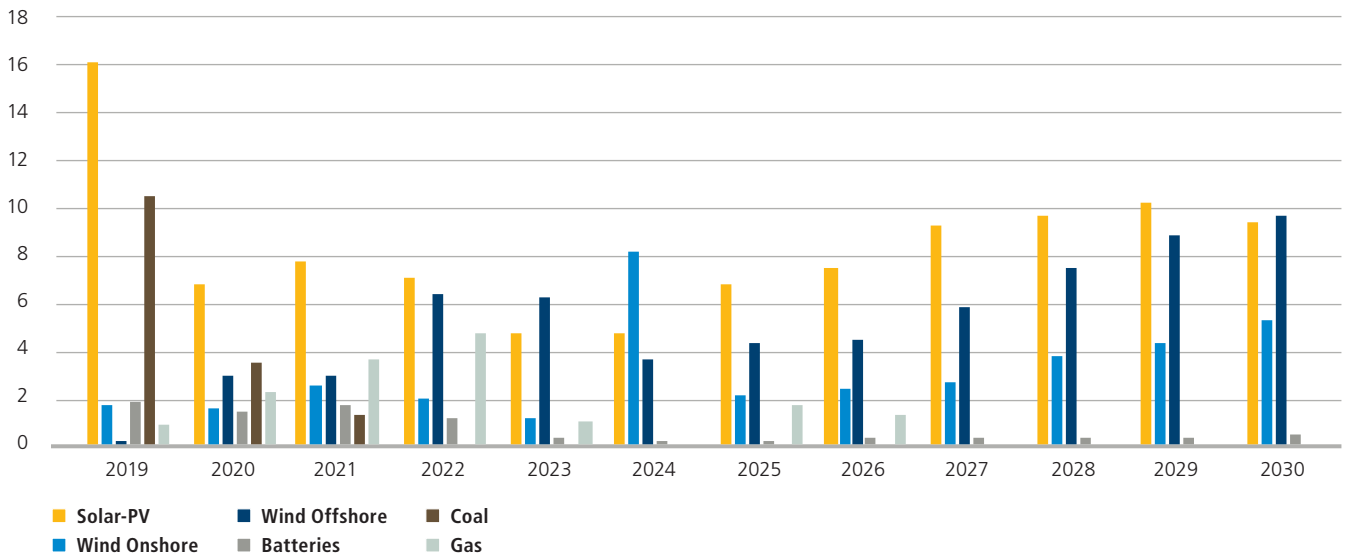


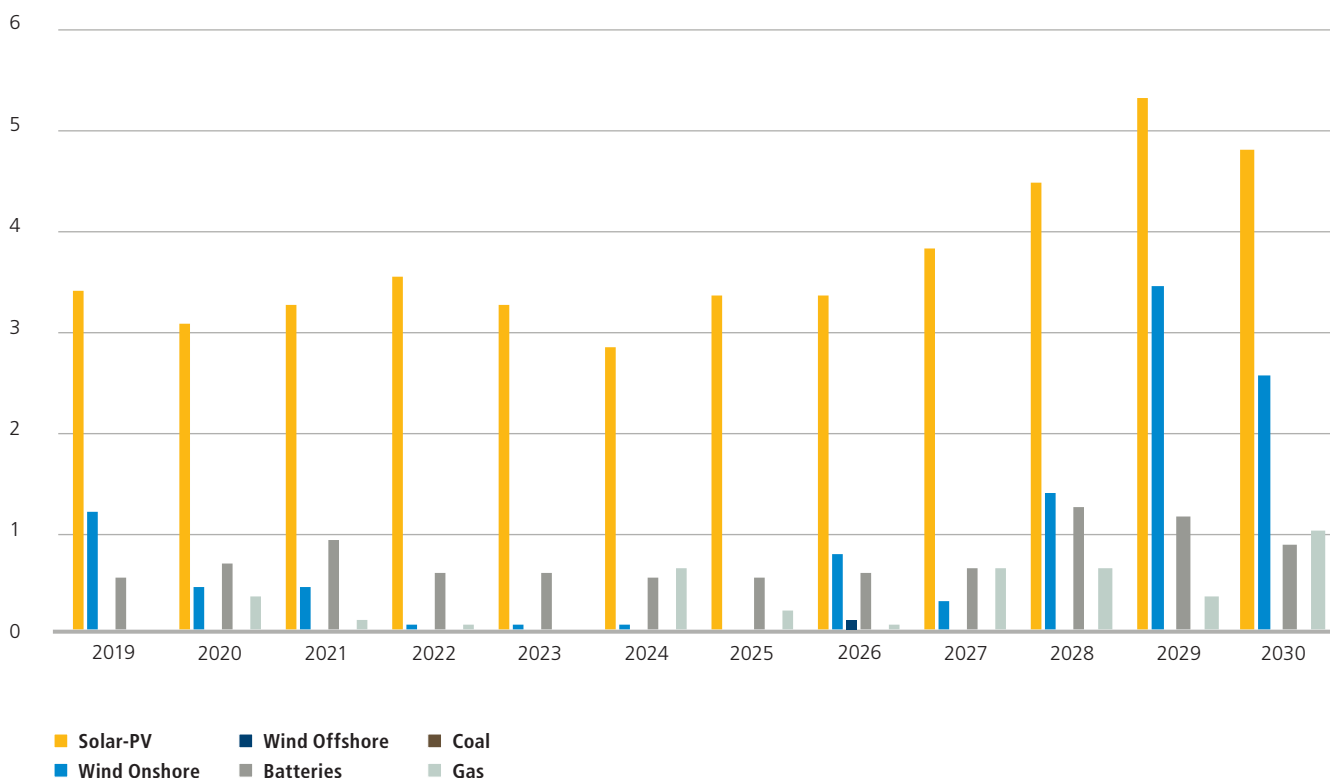
Figure 30 shows that in South Korea and Japan, too, reaching grid parity gives a new boost to investment in renewable energies. While solar plants are also attracting most investment here due to their

cost efficiency, the response to the very limited land availability shows enormous growth potential in the onshore and especially the off-shore wind segment.

⁵⁷ Heidi Garrett-Peltier (2017)

⁵⁸ BNEF (2020)

Figure 31: Investments in new capacity Australia (in USD bn.)⁵⁹



As expected, investment in Australia is focused on solar energy. Relatively stable investment sums indicate that no additional incentive mechanisms are planned as things stand. The comparatively high proportion of investment in batteries illustrates the demand for storage facilities. These offer advantages, particularly in the event of grid bottlenecks, and thus compensate for problems in the partly outdated Australian grid.

„Wind and Batteries Saved South Australia From Blackout“

BNEF 2020

In addition to existing and future incentive mechanisms, the PPA market is expected to grow significantly throughout the region.

„Whether as a result of pressure from shareholders and investors, in response to utility companies who are sometimes very slow to adapt, a lower electricity price or simply to increase security of supply, we see demand for bilateral power purchase agreements (corporate-rate PPAs) increasing. Even in communist Vietnam and Indonesia, where state monopolies control the grid and supply, there is noticeable movement. We see a trend that may still be influenced in speed, but can no longer be stopped.“

Christian Krebs, Head Investment and Development APAC

⁵⁹ BNEF (2020)

As a consequence, there will be more and more opportunities to ensure the realisation of renewable energy projects through private contracts. In these cases, independence from state subsidies can offer competitive advantages in tendering procedures and reduces the risks of political changes of course.

The importance of renewable energies could also receive additional support through the production of green hydrogen. Current developments and efforts in many countries give cause to consider this. In particular with regard to the decarbonisation of industry, initial hydrogen projects, e.g. in steel production⁶⁰, show alternatives to natural gas and coal.

Figure 32: Investments in green hydrogen 2020 (in USD bn.)⁶¹

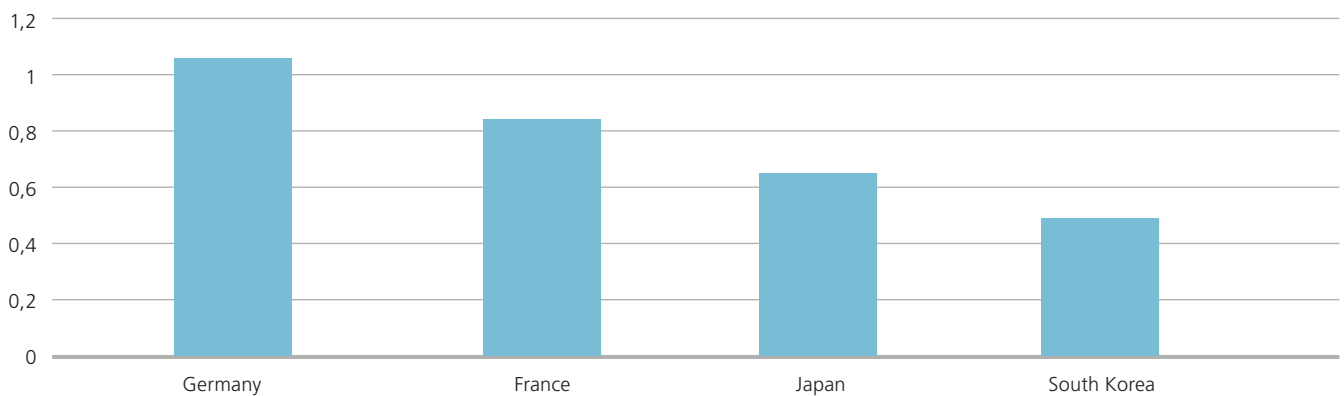


Figure 32 illustrates the investment in green hydrogen production by country. While Japan has long been considered a leader in the technology, it is now falling behind the European countries Germany and France. The introduction of a zero emission target would help to give new impetus to developments. The announcement of a zero-emissions target by China could offer a huge market in the

future. Australia in particular has ideal conditions for the production of green hydrogen in terms of land availability and natural resources. This would open up new export opportunities for the continent, which could show a sustainable and viable path beyond the focus on fossil raw materials.

⁶⁰ <https://www.ingenieur.de/technik/fachbereiche/produktion/kann-wasserstoff-im-hochofen-die-emissionen-nachhaltig-reduzieren/>

⁶¹ BNEF (2020)

6. Return expectations of renewable energy investments in APAC

As described in this paper, renewable energies are poised to increase both their relative as well as absolute share in the electricity markets of APAC. Bottlenecks in supply, resulting from thermal power plants that are largely hardly feasible and increasing dependence on imports, contrast with the most dynamic energy demand worldwide. The driving force behind the economic upturn in developing countries – foreign direct investment – and the corporations of East Asian countries are leading to significant increases in demand for renewable energies. In addition to this market constellation, the dynamically increasing competitiveness of wind and solar-PV technologies is a further advantage. Consequently, the economic superiority together with speed to market of renewable energies are the fundamental drivers of future development.

This paradigm shift means that more and more countries are following the path of the European Union. Japan and South Korea are also

pursuing energy neutrality by 2050, the Philippines is banning the further expansion of coal-based power generation, and Australian banks – in addition to numerous international banking and insurance institutions – are no longer willing to bear the risks of the coal sector despite political support.

What can we learn from developments in Europe?

Initial, attractive government subsidies in the EU helped renewable energies to enter the market. An incipient learning process, increases in efficiency, innovations and the use of economies of scale associated with the increasing speed of expansion then led to a self-reinforcing development.

The associated establishment of renewable energies as an asset class led and leads to steadily increasing investor interest and confidence.

Figure 33: Development of capital costs in Germany (Onshore Wind / in %) ⁶²

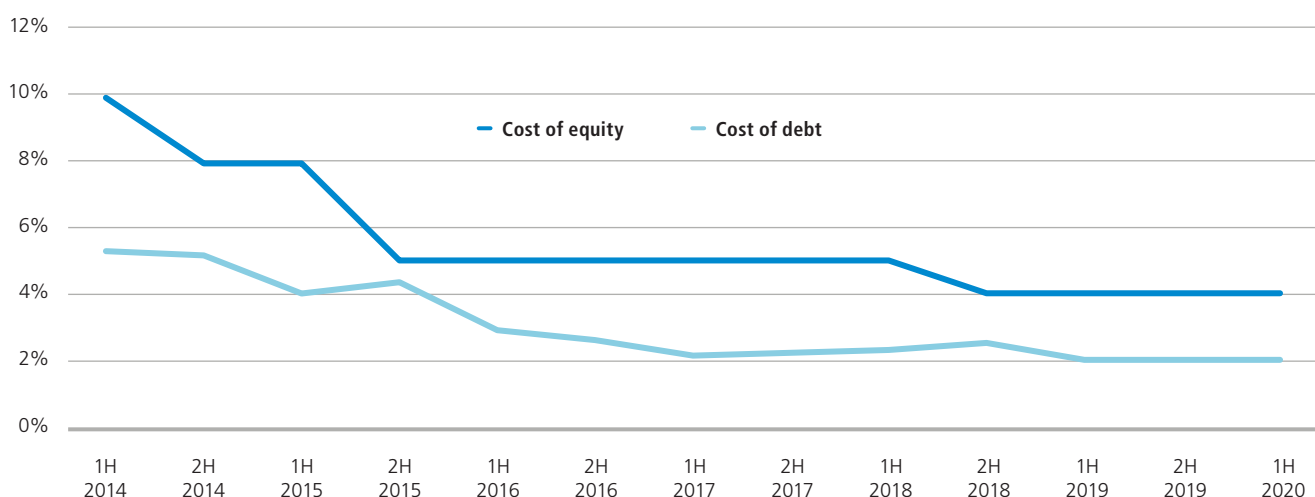


Figure 33 illustrates this development by means of the risk premiums required for equity and debt capital, which have fallen by around 60% over the period under review. The capital costs shown are attributable to the assumptions made by Bloomberg New Energy Finance for determining the LCOEs, i.e. they relate to the entire life cycle of a wind turbine, from planning to construction until decommissioning. The even more dynamic decline in the cost of debt capital compared to the cost of equity capital – favoured by the global low

interest rate phase – and an increase in the accepted debt ratios made it possible to stabilise the return on equity despite falling risk premiums.

In view of the extremely different degrees of development and the still in its infancy expansion of renewable energies in the APAC region, there are clear differences compared to Europe.

⁶² BNEF (2020)

Figure 34: Equity capital costs and market integration of solar-PV in 2020 – international comparison⁶³

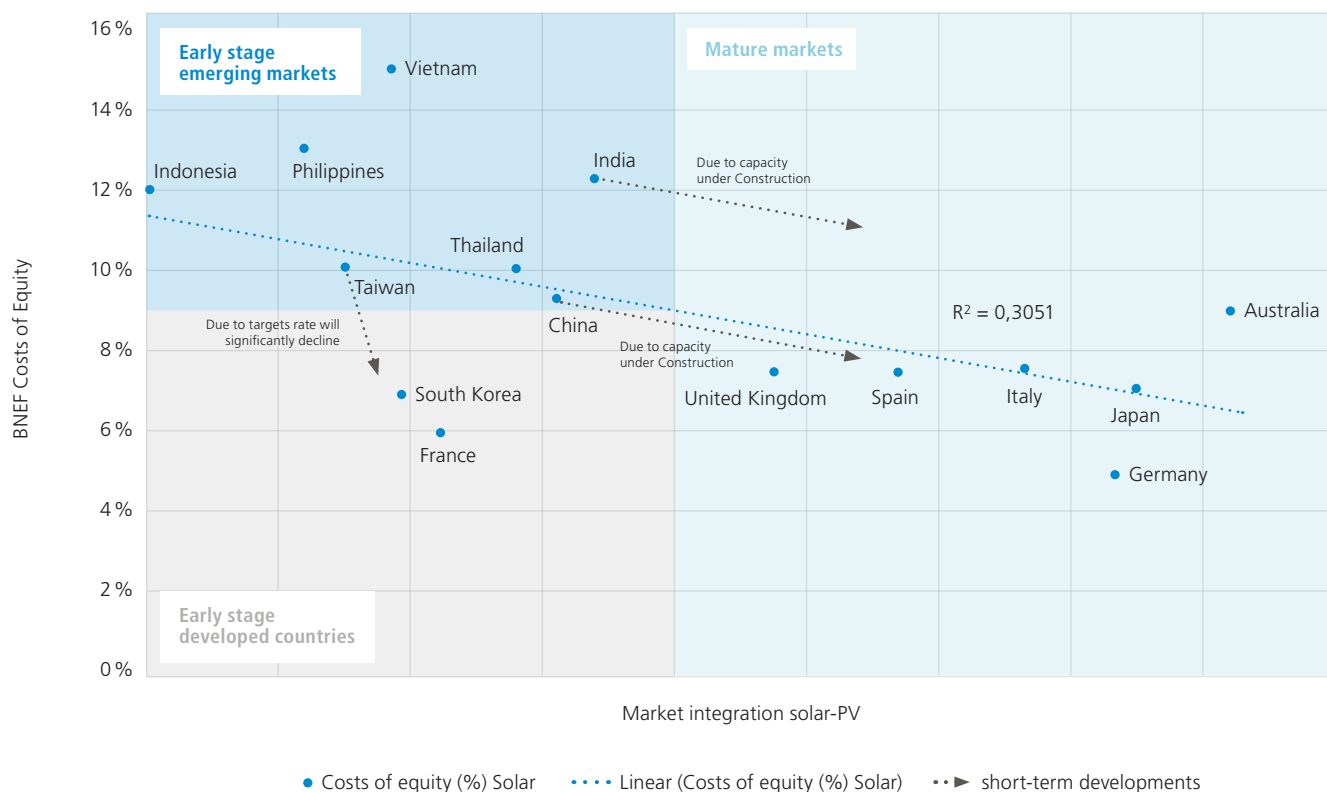


Figure 34 illustrates the relationship between the share of electricity generation from solar-PV in the total electricity mix and the respective risk premiums required for equity. The trend line shows that almost one third of the variation in capital costs can be explained by the expansion of solar capacity. Furthermore, the different risk profiles of developed and developing countries are not negligible and play a major role in terms of the required risk premium.

However, a decisive difference that will significantly accelerate the dynamics of development is the maturity of the technologies already achieved. The countries of the APAC region can benefit from countries that are already much more advanced in their development and from the experience gained.

We at Aquila Capital rely on our experience in the European market and, in combination with our team in Singapore, which is characterised by extensive local market knowledge, we see the transfer of knowledge as a significant success factor.

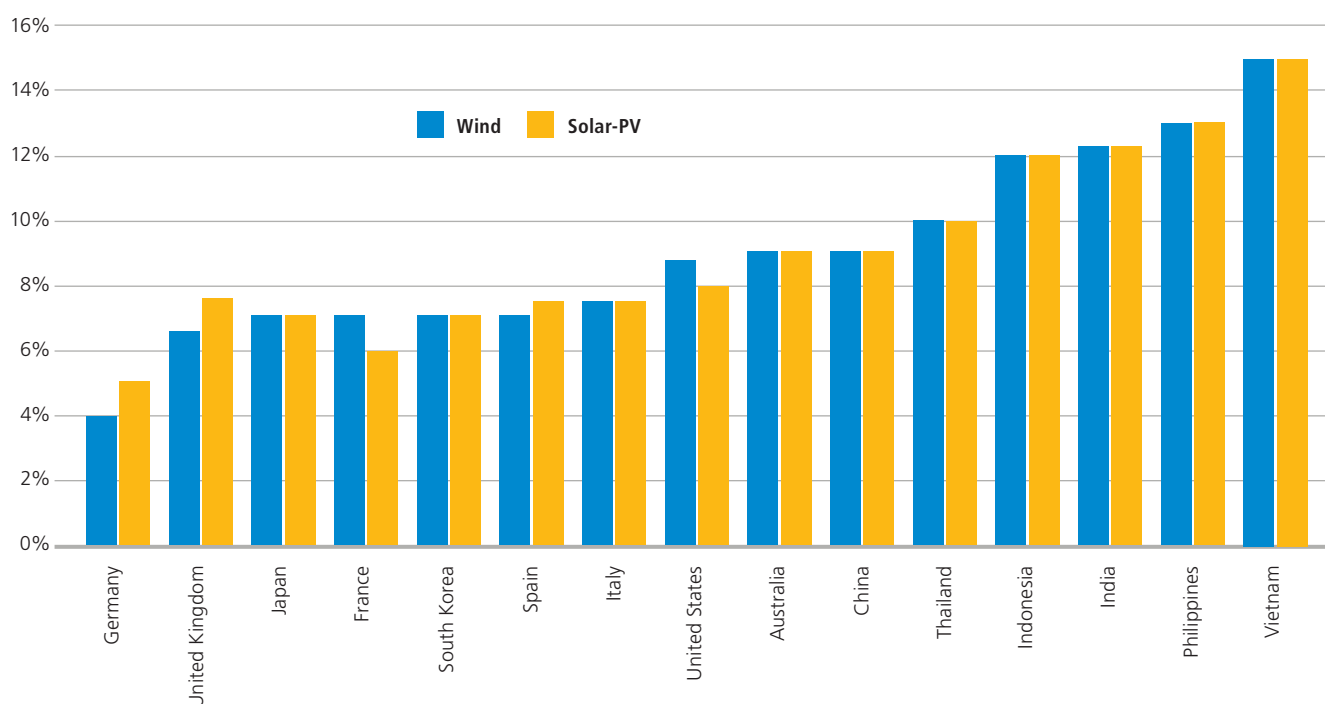
The ambitious climate targets in Japan and South Korea will, similar to Europe, provide the basis for additional investment incentives. In addition, banks and institutional investors are already very familiar with the asset class and provide debt at competitive terms, which will have a positive effect on the return on equity to be achieved. The high risk-adjusted expected returns in the developing countries offer attractive opportunities to enter the still young markets at an early stage. Given the dependence on foreign direct investment and the relocation of value-added processes by international companies, a steady improvement in the general conditions in developing countries can also be expected.

⁶³ Europe: Bloomberg New Energy Finance (2020);
APAC: Bloomberg New Energy Finance (2020) / Aquila Capital Research (2020)

Contrary to Europe, the enormous growth in energy demand is of not negligible advantage, especially with regard to electricity prices to be achieved.

In addition to our activities in Europe, we are opening up market access for investors, which offers not only enormous diversification potential but also significantly higher potential returns at a risk framework that can be assessed as relatively stable and manageable.

Figure 35: Equity costs Wind and Solar-PV in international comparison⁶⁴



7. Conclusion

APAC is one of the regions in the world most affected by the consequences of climate change. Therefore, the establishment and transformation of sustainable energy systems will be of particular importance there. At present, coal still plays an important role and seems to be the cheapest source of new generation capacity on average, with the exception of Australia.

Existing distortions caused by subsidies, import restrictions and interest groups are solely responsible for the competitiveness of coal. However, these cannot be maintained in the medium term for a number of reasons. Due to the significantly higher resources for renewable energy – especially solar energy – as a result of the geographical location compared to Europe, as well as a dynamic reduction in the costs of renewable technologies, the competitive conditions will be reorganised in the coming years.

The paper shows that even the smallest changes to the framework conditions, such as state incentive mechanisms, changes to the regulatory system (import restrictions), improvement of financing conditions, would directly change the competitive situation. The positive developments in the renewable energy sector are also strengthened by negative developments in the area of fossil fuel generation capacity. The increasing lack of necessary financing and insurance, as well as social resistance to fossil plants will further support the economic superiority of renewable energies.

A sustainable development of the energy system in the developing countries of ASEAN would have an extremely positive effect on the main goals of energy security and access to affordable energy. Furthermore, the dependence on imports would be reduced while at the same time relieving strained households. In addition, the supply

⁶⁴ BNEF / Aquila Capital Research (2020)

of renewable energy is increasingly becoming a decisive criterion for foreign direct investment. These are of fundamental importance for the further growth of the region.

The East Asian industrial nations Taiwan, South Korea and Japan already have ambitious climate targets. They offer attractive opportunities for the realisation of renewable energy projects through a mix of government incentives and the enormously growing market for private power purchase agreements. In addition, the increasing involvement in renewable energies – following the European model – offers numerous positive effects that stimulate the economy and show a sustainable way out of the crisis.

Australia, on the other hand, is strengthening fossil fuel industries which are of great national importance. However, due to the enormous wealth of resources, especially solar radiation and the availability of land required for it, the purely economic advantages will lead to the expansion of renewable energies in the long term. Increasing social debates and the outlook for future-oriented economic development (e.g. hydrogen) further support this change.

For investors a huge market is developing which is still in the early days in the field of renewable energies. The paper shows that the dominance of renewable technologies is also continuing in this region – based on a variety of advantages from different directions. There will be an increasing number of opportunities that offer attractive conditions.

Benefitting from knowledge transfer it is likely that these countries will skip some stages of development. Due to the demand for FDIs institutional frameworks will be created faster.

Amid increasing global activities to mitigate climate change – EU, Japan, South Korea, China and in perspective the US (Biden's programme) are targeting net zero emissions – the development of sustainable energy systems in APAC has no alternative. Due to this environment we see now ideal conditions to participate in the growth of renewable energies in APAC. Current developments and the still low expansion offer in comparison to Europe higher return potentials for companies that are able to manage higher risk levels.

Market access and long-term success will depend on the early identification of opportunities, the control of risks and agile action in the extremely dynamic market environment.



If you are interested in participating in these growth markets and want to learn more about Aquila Capital's strategy and solutions, don't hesitate to contact.

Happy to discuss.

For more information please contact:

Aquila Group

Valentinskamp 70
20355 Hamburg
Germany
Tel.: +49 (0)40 87 50 50-100
E-mail: info@aquila-capital.com
Web: www.aquila-capital.com

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