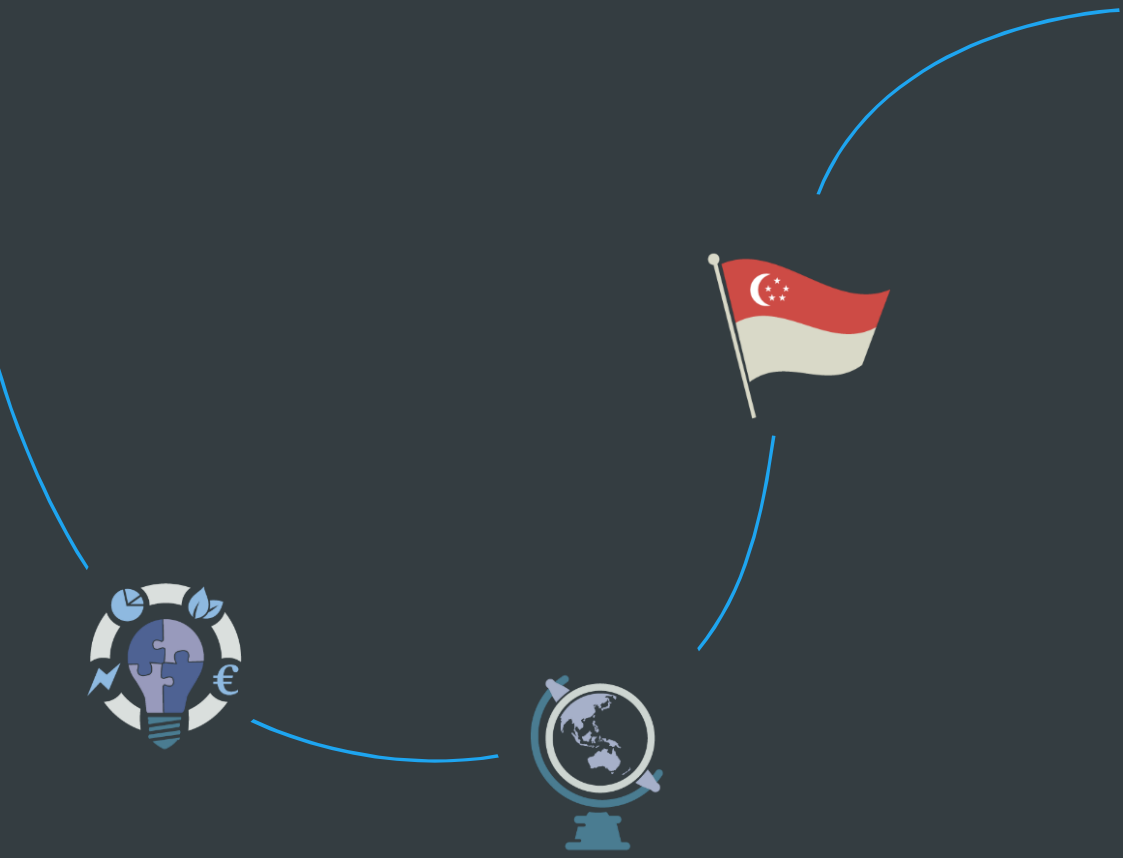
Bird & Bird ATMD & Energy Trends in Singapore and Asia



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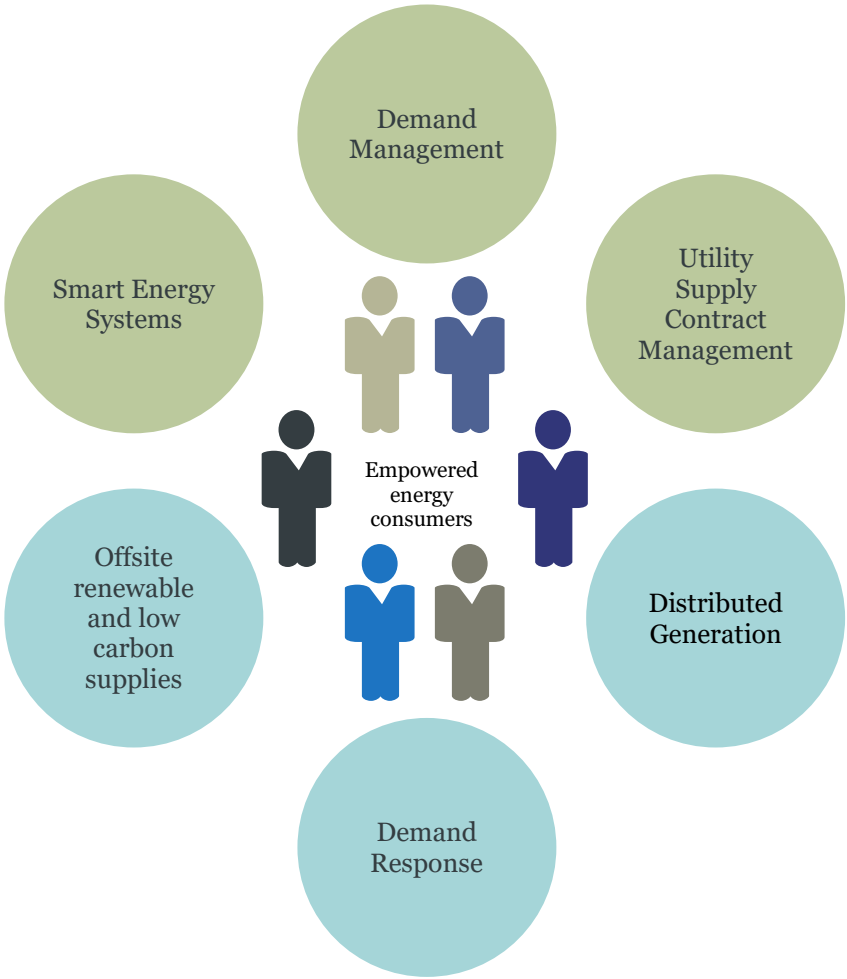


Key trends in Singapore

Targeted policies include: **market actions**, such as minimum performance standards; **economic actions**, such as government grants; **financial actions**, such as underwriting lenders' risks.

Energy Efficiency Fund (E2F) supports the efforts by businesses to improve energy efficiency of industrial facilities via: (i) Resource Efficient Design of New Facilities and Major Expansions, (ii) Energy Assessment of Existing Facilities and (iii) Adoption of Energy Efficient Equipment Technologies.

S$100 million **Green Mark Incentive Scheme** for Existing Buildings encourages developers and building owners to adopt energy efficient retrofitting design, technologies and practices in their existing building to achieve a significant improvement in the building energy efficiency. There is a 50% co-funding for upgrading and retrofitting and a 50% co-funding of energy audit to determine the efficiency of air-conditioning plants.

Bird & Bird was invited by the building regulator (BCA) and green building council (SGBC) to create a **template EnPC** (Energy Performance Contract) for industry wide usage.

Energy efficiency improvement works involve high upfront capital. Bird & Bird drafted the **BREEF** scheme for BCA to facilitate financing for the purchase and installation of energy efficient equipment or renewable energy system with BCA underwriting part of the default risks for the Participating Financial Institutions

Good **potential for investment** in Singapore: KKR & Co has just completed a S$45 million stake in our client Barghest Building Performance (BBP) a Singapore-based provider of energy savings solutions to Heating, Ventilation and Air Conditioning (HVAC) systems in commercial and industrial buildings.

Key trends in Asia

The **Southeast Asian Building Energy Management Systems market** is expected to grow strongly at a compound annual growth rate of 10 to 15% from 2015 and 2020. The market is expected to be worth more than $180 million by 2020. Singapore and Malaysia will be the biggest markets in terms of revenue, Indonesia and Thailand are expected to be the fastest growing markets.

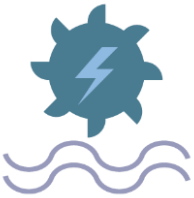
Growing demand for space cooling and interest in net zero energy buildings are driving regional uptake of **energy efficient building solutions.** Market Revenue for Energy Efficient Buildings in Asia Pacific Expected to Exceed $111 Billion in 2026.

The installed **distributed power generation** (DPG) capacity in Southeast Asia is expected to reach 34,747 MW by 2020, up from the 20,450 MW in 2015. This includes key types of DPG power plants such as biomass, waste-to-energy and solar photovoltaic.

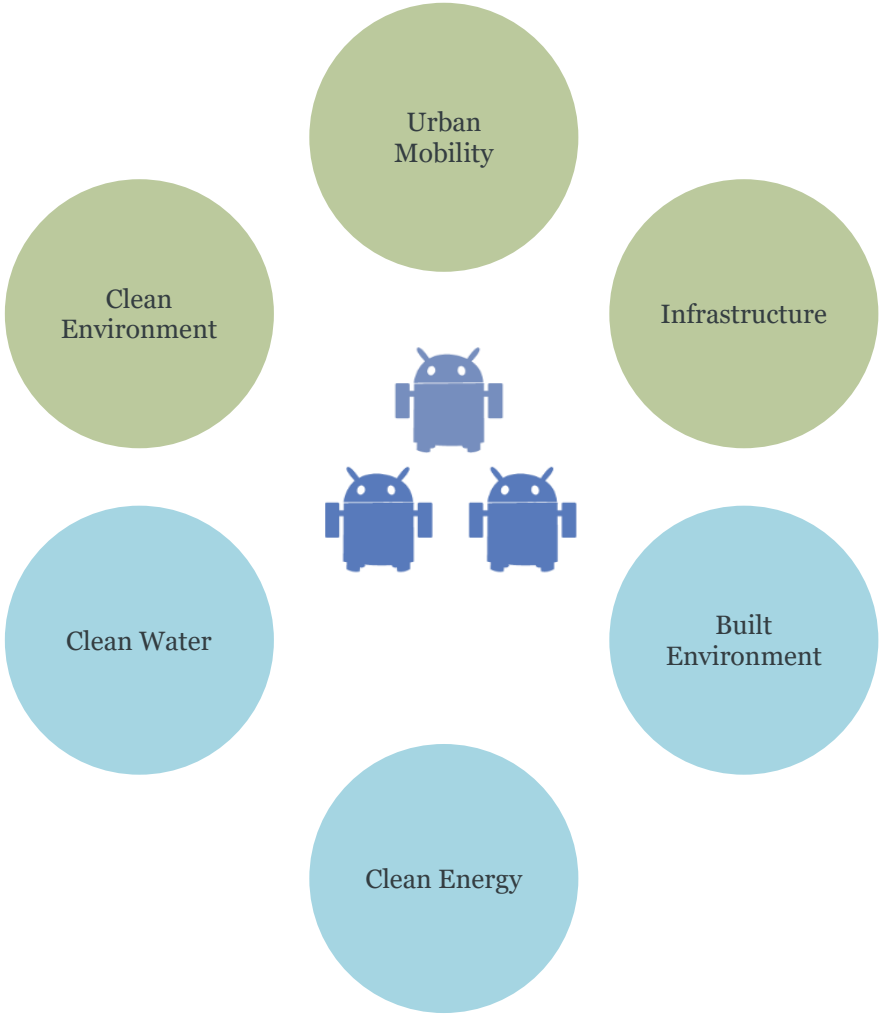
Germany's GIZ Gmb the New Energy **Nexus Southeast Asia** (Nexus SEA), a smart energy startup support initiative aimed at investing and connecting local incubators to facilitate the creation of smart energy startups in Southeast Asia. It aims to engage 1000 entrepreneurs, incubate 100 teams, and partner with 10 incubators across Southeast Asia by 2020.

In Malaysia, the **Energy Performance Contracting Fund** helps finance projects with a target financing size of no higher than US$3.8 million and a tenure of no longer than seven years.

Thailand's latest **building energy code**, which came into effect in mid-2018, applies to 10,000 square-metre buildings and regulates how lighting, hot water, and air conditioning systems are to be set up. The new codes are expected to increase energy efficiency by up to 10%



Smart City & Infrastructure



Key trends in Singapore

Singapore is positioning itself as a smart & sustainable city and making dedicated efforts to harness solutions across industries to ultimately create **green, digital and efficient urban spaces**.

Singapore is well placed to export **urban solutions** in areas like built environment and city management, urban mobility, energy, safety and security and environment and water.

Foreign companies are also attracted by Singapore's incentives and living lab opportunities to test and develop **smart city technologies** in Singapore that will serve to boost efficiencies and comfort of lives of millions in Asia.

18,000 workers are employed by the infrastructure sector. **15** of the top 20 global engineering consultancies have their regional operations based out of Singapore. **60%** of project financing in the Southeast Asia region is managed through Singapore.

Bird & Bird advised the energy regulator (EMA) on the recent **Energy Storage Systems testbeds in Singapore** for CW Group and Red Dot Power, including drafting the first floating charge over a new asset class in Singapore.

We advised EMA on the test-bed at Pulau Ubin to assess the reliability of electricity supply within a **microgrid infrastructure** using intermittent renewable energy sources such as solar photovoltaic (PV) technology.

We routinely work on commercial arrangements for collaborations, joint ventures and test beds including an **EV test-bed** programme to evaluate hypotheses on the levels and types of infrastructure required to support an EV population in Singapore.

Bird & Bird worked on the Request-for-Proposal for Singapore regulator to appoint a **Charging Service Provider** to Implement Electric Vehicle Charging Infrastructure in Singapore.

Key trends in Asia

Formation of the **ASEAN Smart Cities Network,** a collaborative platform where ASEAN cities can learn from one another's experiences in adopting smart technology, identifying solutions and engaging industry and global partners.

Indonesia launched the **'100 Smart City Movement'** in 2017, aimed to develop 100 smart cities by 2019. The construction of smart and green buildings is projected to reach up to 25% of the market by 2025.

Ho Chi Minh City will become the first smart city in Vietnam by 2020, focused on cloud computing infrastructure, big data, building data warehouses /data centres and security-monitoring centre, and developing an open data ecosystem. The city also plans to introduce smart solutions in healthcare, food safety, education, traffic management, flood control, and law enforcement.

China's central government has selected over 200 cities to pilot smart city projects. These cities include Beijing, Shanghai, Guangzhou, and Hangzhou beside others. Over 90% of China's provinces and municipalities have listed IoT as a pillar industry in their development plans.

Bangkok has emerged as a potential smart city as s part of **Thailand**'s 'Thailand 4.0 initiative '. One aspects this smart city initiative is the construction of energy efficient buildings, such as Park Ventures Ecoplex in Bangkok's Central Business district which was the first building in the city to be accorded the **Leadership in Energy and Environmental Design** platinum rating.

The market for **microgrids** and **battery storage** in Asia will experience high levels of growth as countries seek solutions for remote and island communities.

Renewables

Solar

Tidal

Wind

Hydroelectric

Biofuels

Geothermal

Key trends in Singapore

With an average annual solar irradiance of 1,580 kWh/m2/year and about 50% more solar radiation than temperate countries, solar photovoltaic (PV) generation has the **greatest potential** for wider deployment in Singapore

The energy regulator of Singapore (EMA) has enhanced the regulatory framework to accommodate the injection of **IGS (intermittent generation sources)** into the national electricity market of Singapore.

Singapore is the **solar hub** for Asia, with over 50 international and local solar companies across manufacturing, project development and financing.

Bird & Bird is advising on an S$11million floating photovoltaic testbed which has been launched in Singapore – it is the world's **largest floating photovoltaic (PV)** testbed and will be constructed by DNV GL in Singapore's Tengah reservoir.

A long-term renewable energy **power purchase agreement (PPA)** not only reduces the energy supply risks and price volatility associated with fossil fuels, but can help corporations comply with environmental regulations and mitigate carbon pricing.

Bird & Bird advises on regulations and contracts for long term PPAs (onsite and offsite). We recently advise **Macquarie Bank** on its first foray into the Singapore PPA market.

Renewable Energy Certificates (RECs) can be purchased in Singapore. RECs are a popular mechanism to offset conventional electricity consumption. Each certificate purchased and retired is equivalent to the use of 1 megawatt-hour (MWh) of renewable electricity. Firms such as APX and CRX offer quality carbon consulting services in Singapore.

Bird & Bird is the legal counsel to the **Sustainable Energy Association of Singapore (SEAS)** and routinely advise on projects spanning renewables and energy efficiency. We also run legal clinics for SEAS' Startup Workgroup.

Key trends in Asia

ASEAN targets to secure **23%** of its primary energy from renewable sources by 2025, in fulfilment of its Paris Agreement goals, as energy demand in the region is expected to grow by 50%

In 2018, a new funding platform called **Southeast Asia Clean Energy Facility (SEACEF),** formed by a group of western governments and philanthropists will channel US$ 20 million to fund renewable projects in ASEAN.

Greater emphasis on **geothermal energy** source in **Indonesia,** which currently has geothermal reserves of 17,506 MW and resources of 11,073 MW. International Energy Association predicts Indonesia will likely see the strongest growth in geothermal energy in the region.

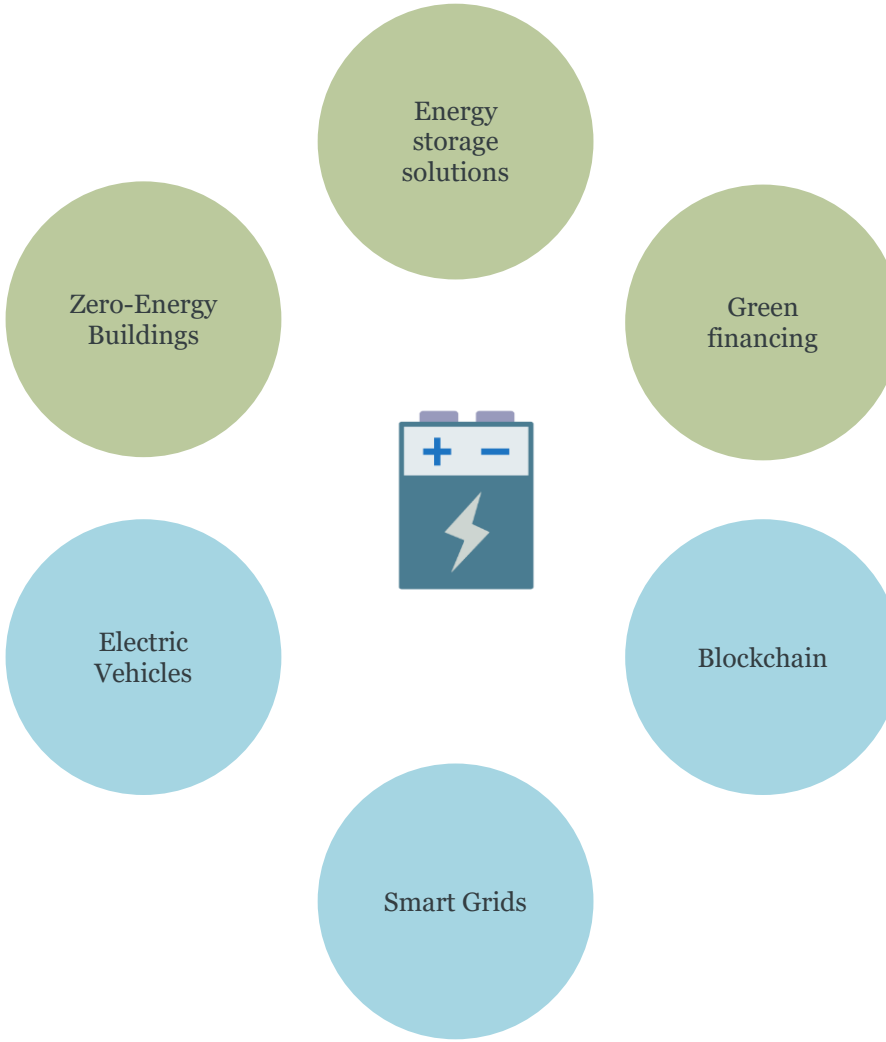
Vietnam currently has 269MW of installed **wind capacity**, with the recent completion of the 40MW Dam Nai project, the country's largest onshore windfarm. In **Indonesia**, the first wind farm was completed in 2018, the Sidrap Wind Farm, which will produce 75 MW of electricity.

Thailand has the largest usage share of **liquid biofuels** in the region, comprising almost 17% of its total transport fuels. In 2015, 36 % of the final demand for palm oil accounted for the production of biodiesel, and it intends to use biofuels to sustain 25% of its energy needs in the transport sector by 2036.

The largest **tidal power** plant in the world will be built in the Larantuka Straits in eastern Indonesia to provide energy for at least 100,000 people, and is slated for completion in 2020. Given the numerous islands that make up Indonesia, many small islands are not connected to the electricity grid so renewable energy becomes important as it can be harvested directly on small and remote islands

Hydropower in Southeast Asia holds much promise. According to the International Renewable Energy Agency, hydropower capacity in the region grew almost threefold from 16 GW to 44 GW between 2000 and 2016.

Energy Hot Topics



Singapore

EMA is working with industry partners to **deploy microgrids** for Singapore's energy systems. EMA and Singapore Institute of Technology launched the **Exploiting Distributed Generation (EDGE)** programme to give companies or researchers the chance to develop technology on micro-grid design, distributed energy optimisation and management, and differentiated power-quality systems.

The Super Low Energy Programme introduces a new rating to recognize buildings that have achieved **Super Low Energy** (building must generate 60% energy savings) or **Zero Energy** status (building must use onsite and off-site renewable energy to generate more than 100% of energy). Examples of ZeroEnergy buildings are ZEB @ BCA Academy and NZEB@SDE (slated for completion in early 2019)

To combat the intermittent nature of renewable energy sources, increased focus is on developing **energy storage systems** (ESS) and encouraging industries to deploy them. EMA is publishing policy paper to provide guidance on how ESS can be deployed, and to facilitate adoption of ESS in Singapore.

JTC Corporation and SP Group plan to implement the first **smart grid** for business in Punggol Digital District; and SP Group launched the first smart grid index to provide a framework to measure key aspects of the electricity grid like supply reliability, data analytics, security etc.

Singapore is investing heavily into **electric vehicles** (EV), by developing a comprehensive charging infrastructure across Singapore, partnering with industry leaders to electrify the public transportation system (eg. EV car-sharing partnership) and providing tax incentives to low-emissions vehicles.

Asia

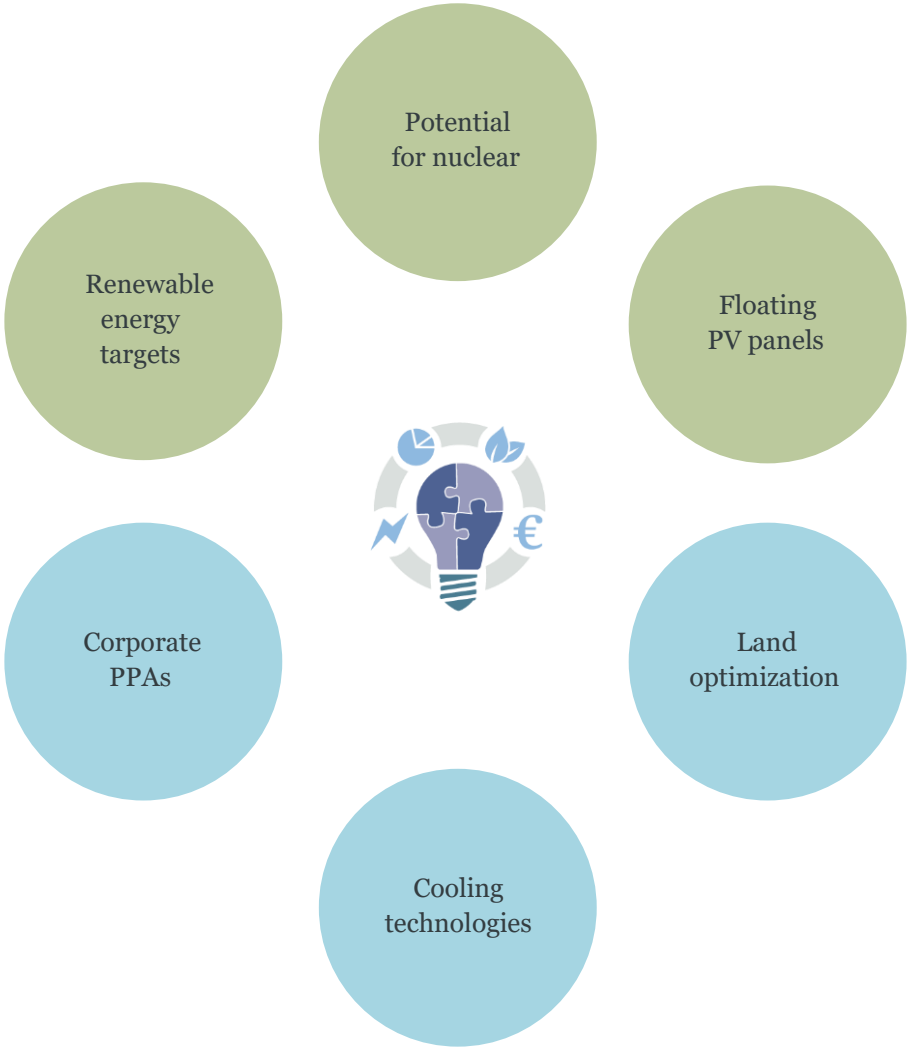
Investments into Asia's **electric vehicle** (EV) market has been pouring in as governments look to EVs to solve the country's traffic woes. **China**'s market share for EVs will grow by 40%. In Indonesia, the Government has opened up investment in electric vehicles in 2019, with at least 2 major carmakers (including Hyundai) showing interest. In **Malaysia**, the National Electric Mobility Blueprint lay out the country's ambitions for an electrified transport network, with Government and industry players collaborating to reach 125,000 charging stations by 2020.

Increased adoption of **blockchain technologies** for peer-to-peer trading of energy. In Singapore, a digital marketplace powered by blockchain technology allows companies to trade Renewable Energy Certificates (documents used to offset the use of non-renewable energy). In **Thailand**, Australian-based Power Ledger is in collaboration with Thai renewable energy developer BCPG and in partnership with Japan's Kepco to provide a blockchain based trading platform in renewable energy.

Southeast Asian countries will invest **US$9.8 billion** in **smart grid infrastructure** between 2018 and 2027. By 2027, the largest markets will be Indonesia, Malaysia, Thailand, Singapore, the Philippines and Vietnam. In **Malaysia,** state power producer, Tenaga Nasional Berhad (TNB) has invested RM 2.7 billion into **'Grid of the Future'** technologies, which introduces automation and smart solutions with lower grid costs, and would reduce blackout hours to give consumers more control over their energy bill.

Increasing interest in **funding clean energy projects** in Asia, with almost US$150 billion raised through green bonds from 2013 to 2018. DBS Bank in 2018 advised on a US$580 million sale of green bonds by Jakarta's Star Energy Geothermal to refinance bank loans used to buy two Chevron geothermal fields in Indonesia's West Java. HSBC advised the Indonesian government on its US$1.25 billion green Islamic bond - the first such instrument.

Energy Outlook



Singapore

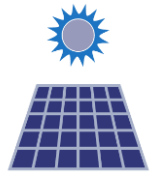
From 2019 to 2029, the annual system demand and system peak demand are **projected to grow** at a compound annual growth rate of 1.4 – 2.0% (System demand refers to gross electricity required to meet electricity consumed by all consumers)

Looking beyond 2020, Singapore plans to further raise the **adoption of solar power** in our system to 1 gigawatt-peak (GWp), to fulfil Singapore's commitment to 2030 climate change pledge of reducing emissions intensity by 36% from 2005 levels by 2030. Solar power will be increasingly deployed in residential buildings and Government buildings, with Sembcorp Solar Singapore recently winning a tender in 2018 to build, own and maintain rooftop solar panels in apartment blocks and Government buildings.

Technical studies were commissioned to look into optimizing land space for energy-related initiatives, which involves EMA's collaboration with HDB and URA for opportunities to **develop substations underground**. This would free up land space and improve aesthetics of surrounding areas. A new 230kV underground electrical substation is being planned which could generate enough power to supply the Labrador area, and is scheduled to be ready by 2025.

Singapore plans to develop **'islands' of solar panels** floating along coastal waters, to supply energy to nearby industrial zones or living areas. A floating solar panel system about 5 hectres large and located near Singapore's northern shores in the Strait of Johor will be ready in 2019, and will be able to generate 6,388 MWh of renewable energy annually.

Increased focus on **cooling technologies** in the future. The Cooling Energy Science and Technology Singapore (CoolestSG) Consortium formed in 2018 to develop and accelerate the deployment and commercialisation of cooling technologies for deployment on buildings, data centres and industries. Companies like Ascendas-Singbridge, CapitaLand and Mitsubishi Electric will be joining the consortium.



Asia

Investments in coal power market in the APAC region will continue to dwindle, as many countries redirect their focus on renewables, mainly **solar power**.

Malaysia targets for 20% of the country's electricity to be generated from renewable sources by 2030. The Government aims to promote renewable energy sources, whilst capitalizing on future technological innovations through the digitalization of services and improving customer experiences such as the use of smart grids, microgrids, systems for energy management to increase affordability, efficiency and stability of renewable energy sources.

Thailand announced plans to increase renewable energy capacity to 30% by 2030, up from the initial goal of 30% by 2036. The development of smart grids will also be a focus where the country's National Energy Policy Council approved a national smart grid plan. Under this plan, state-owned utilities will spend up to Bt200 billion (S$8.2 billion) in implementing smart grid projects through to 2036.

Vietnam is expecting solar power to be the country's main renewable energy source in the future, with installed capacity to increase from 6-7 MW at the end of 2017 to 850 MW by 2020, accounting for 1.6% of the country's total power generation. This is expected to grow to 12,000 MW by 2030 or 3.3% of the country's total power generation.

Indonesia aims to harness marine renewable energy, and is drafting a roadmap on marine energy development for a period of 2018 to 2025. It targets for renewables to make up nearly one-quarter of its energy mix by 2025 with 1,800 MW of wind projects targeted for completion.

Potential for **nuclear energy power plants** in Southeast Asia as Philippines, Indonesia and Vietnam contemplate the idea of harnessing nuclear energy. ASEAN Centre for Energy published a pre-feasibility study on establishment of nuclear power plants in ASEAN and projected that ASEAN could have its first nuclear plant in 2030, and have 3 by 2035.

Contact us

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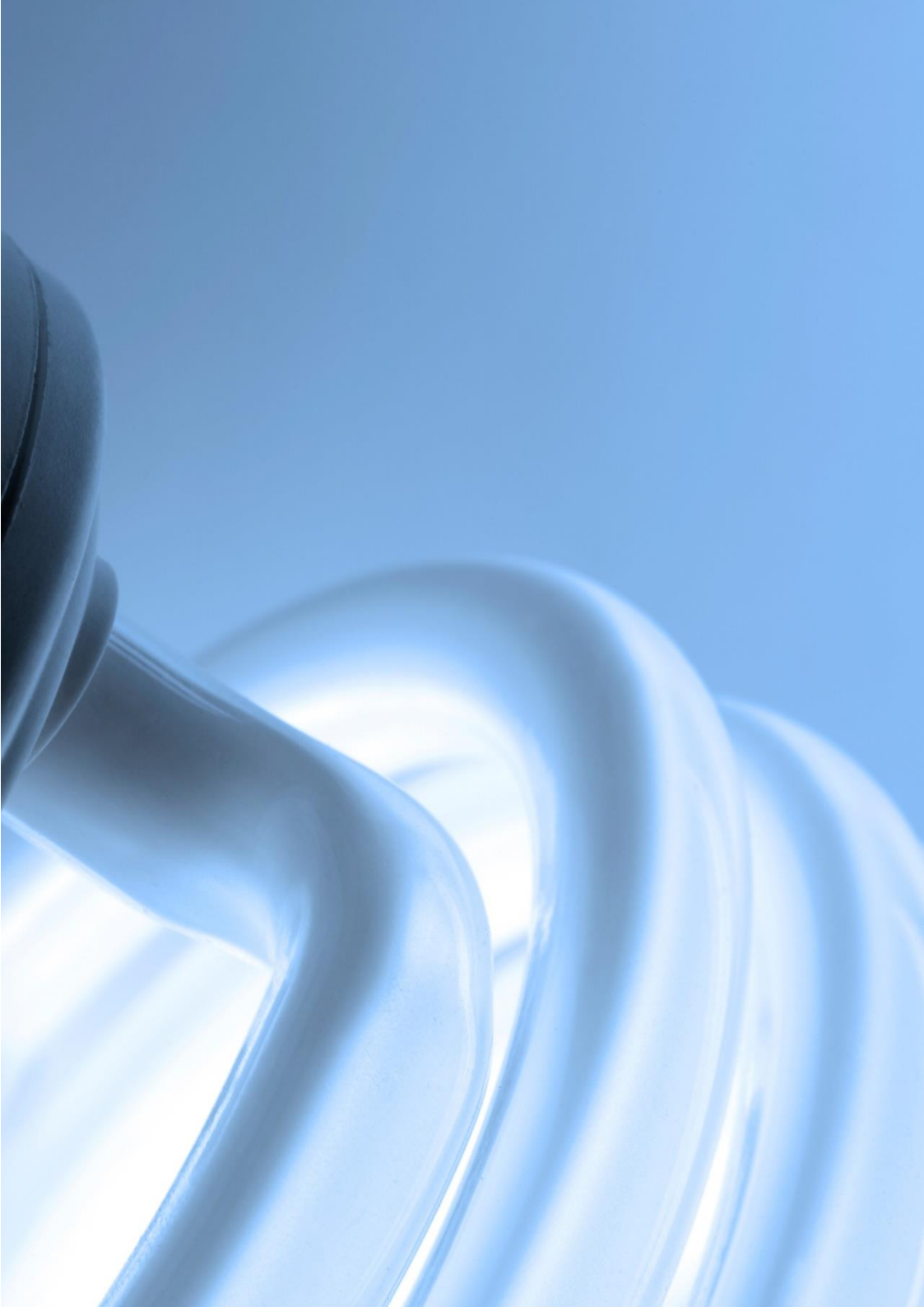

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