The Economist Corporate Network

ASEAN IN A CLIMATE OF CHANGE

Spotlight on sustainable energy in Malaysia, Thailand and Vietnam

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Preface

ASEAN in a climate of change: spotlight on sustainable energy in Malaysia, Thailand and Vietnam is an Economist Corporate Network (ECN) report, sponsored by Siemens. ECN performed the research, conducted the interviews and wrote the report independently. The findings and views expressed in this report are those of the ECN alone and do not necessarily reflect the views of the sponsor.

This paper is informed by a survey conducted online between June and July 2016. Further insights were gleaned through interviews and are included in this paper. These remain anonymous unless specifically quoted. We would like to thank all participants and interviewees for their time and insights.

August 2016

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1. Introduction

Decarbonising the energy system will not only have climate benefits, but energy security and economic dividends as well

The Association of South-East Asian Nations (ASEAN) is a US$2trn economic region with a population of over 600m. Its GDP growth is well above the global average and its growing population is also experiencing rising living standards, generating in turn robust growth in energy consumption. As a result ASEAN's greenhouse gases (GHG) emissions are also increasing. Regional policymakers are also aware that South-east Asia is vulnerable to the detrimental impacts of climate change.

This white paper from The Economist Corporate Network (ECN) assesses the climate challenge faced by ASEAN member states in the light of the landmark agreement adopted at the Paris Climate Conference (COP21) in December 2015. The paper puts climate policy in a South-east Asian context as the region faces not only rapid energy demand growth, but also a high rate of dependence on fossil fuels which will be increasingly imported. Although this seems daunting, the paper argues that a policy trajectory of decarbonising the energy system will not only have climate benefits, but energy security and economic dividends as well.

Having put the South-east Asian energy scenario into context, the paper then examines the climate and energy policies of three major ASEAN economies: Malaysia, Thailand and Vietnam. Every ASEAN member state submitted an Intended Nationally Determined Contribution (INDC) in the run-up to COP21, and the INDCs of these three countries are examined. Even though emissions will continue to rise in the region, efforts are being made to reduce the absolute level of emissions from a business as usual (BAU) scenario, or to reduce the emissions intensity of GDP.

The ECN also completed an extensive survey of relevant players in the Asian region (including businesses in traditional and alternative energy, financial and professional services, and the industrial goods and chemicals sectors) to gauge attitudes to climate policy and the role the private sector can play in it. The survey revealed that climate policies of governments in the region need to be better communicated, and that commitments to addressing climate change were lagging behind global efforts. We also conducted seven in-depth interviewers with regional stakeholders to gauge a more qualitative understanding of private-sector views on the direction of climate policy, which largely echoed the attitudes reflected in the survey. In particular, it was revealed that in order for higher levels of clean investment in ASEAN to become a reality there needs to be more clarity from governments in establishing the right regulatory and legislative frameworks as part of their climate and energy policy implementation.

The paper then concludes by outlining factors that will influence the approach to climate policy in ASEAN, covering emissions trends, energy investment trade-offs, the current regional energy mix, and addressing climate adaptation as well as mitigation.

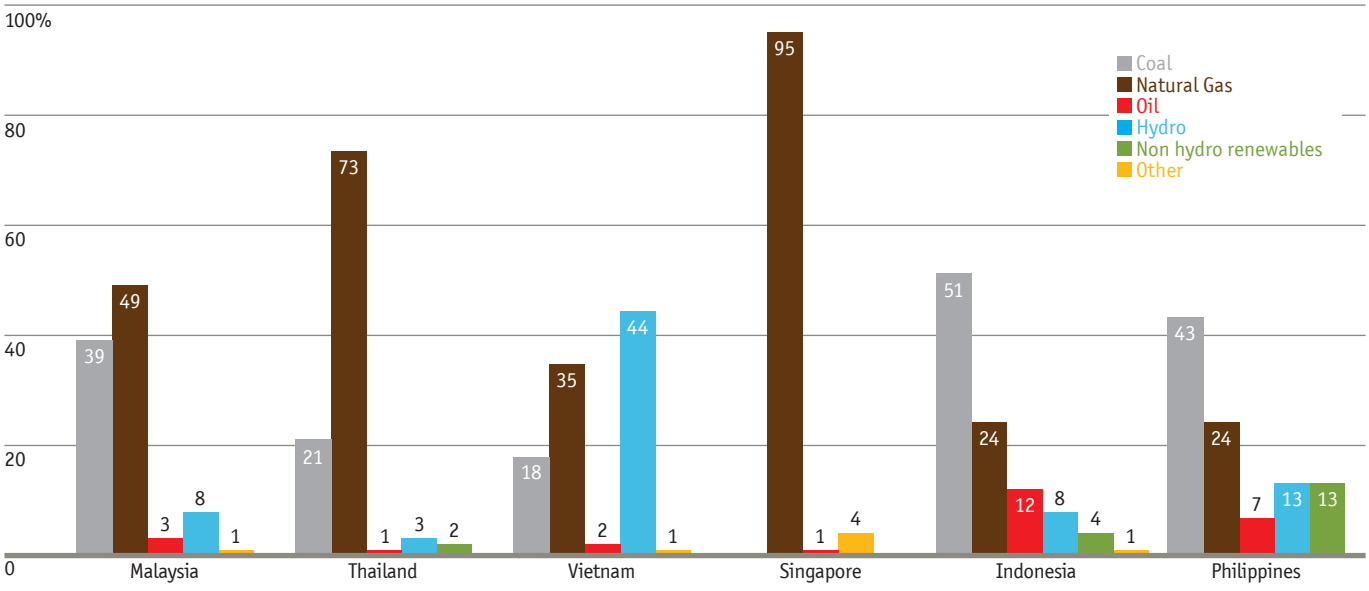
2. Climate policy and the ASEAN energy context

ASEAN's growing appetite for energy has global implications

While understandably China receives considerable attention when discussing the role of Asia in tackling climate change, the role of South-east Asian nations should also be considered. ASEAN's GDP is well over US$2trn, larger than India, and its population is just over 600m, greater than the EU. It is also a region that will experience continued robust economic growth: The Economist Intelligence Unit forecasts average annual economic growth of 4.6% among ASEAN economies between 2016 and 2020, which is well above the global average. This rate will continue into the next decade. Strong economic growth, combined with rising per capita income, continued population growth, and higher energy consumption means that the region's GHG emissions will continue to increase, and not peak anytime soon. Therefore ASEAN's role in the trajectory of climate policy at a global level will be important in realising a lower emissions solution.

The top six ASEAN economies (Indonesia, Malaysia, Philippines, Singapore, Thailand,

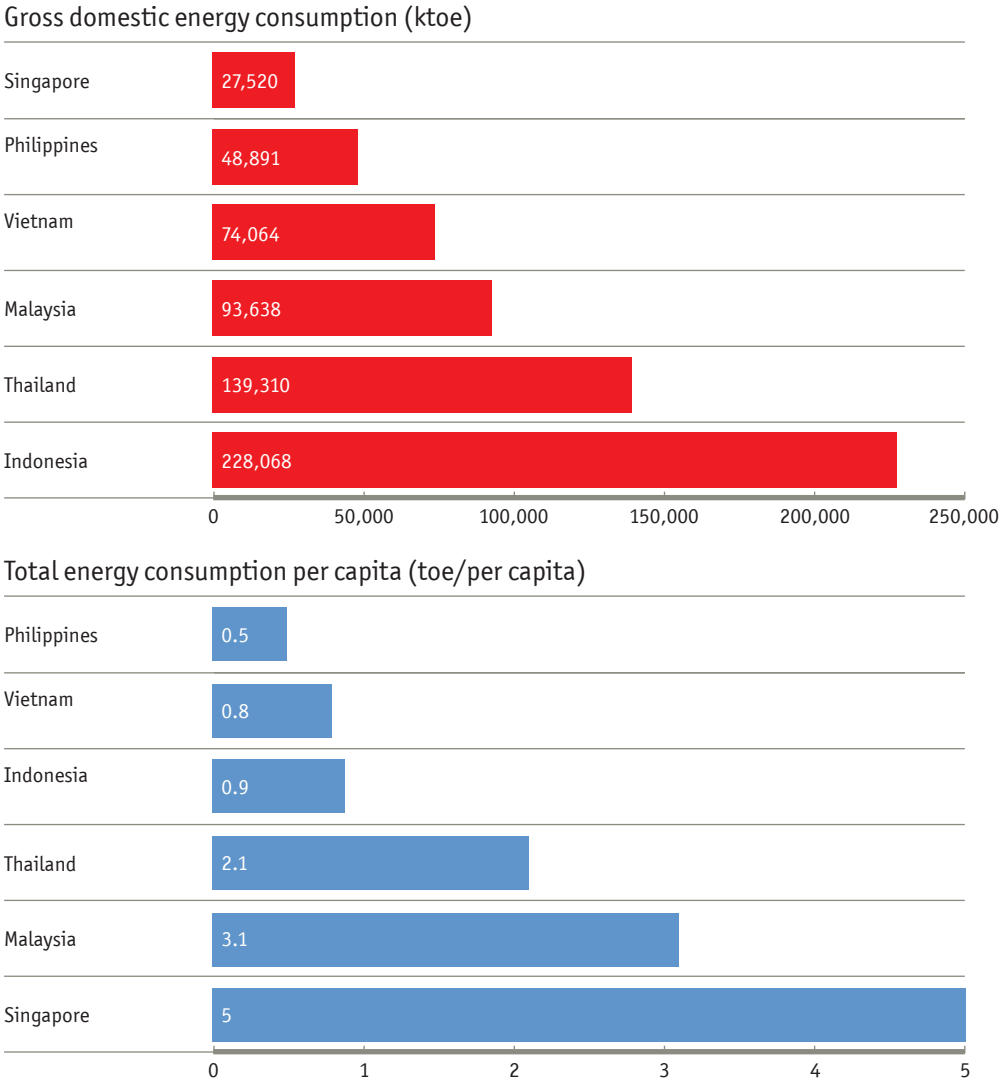
Figure 1: Power generation in ASEAN by source in 2014



Source: Economist Intelligence Unit estimates.

Note. "Other" includes combustible fuels such as biomass

Figure 2: Energy consumption in ASEAN in 2015



Source: The Economist Intelligence Unit.

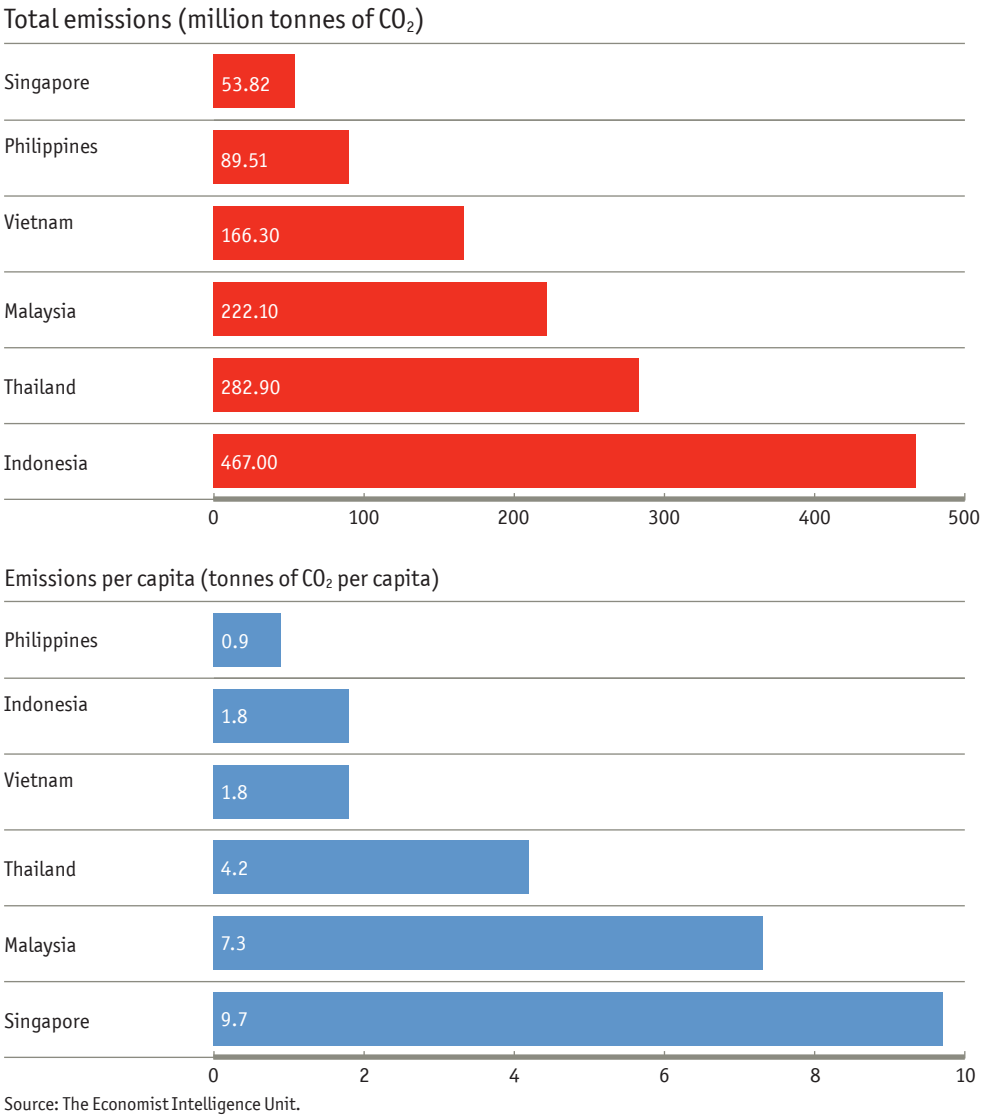
and Vietnam, which comprise 95% of its GDP) accounted for only 5% of global carbon dioxide (CO_2) emissions and just over 4% of global energy consumption in 2015, but the growth rate of both in the ASEAN region has been strong. Between 2000 and 2013 both energy consumption and CO_2 emissions in the ASEAN region grew by around 60%, while electricity generation more than doubled over the same period. In 2015 alone CO_2 emissions from the top six ASEAN economies increased by 6% while global emissions

stalled. It is therefore not surprising that the International Energy Agency (IEA), in its *South-east Asian Energy Outlook 2015*, stated that the region is "asserting an increasingly important influence on world energy trends." Indeed, these trends present several challenges for ASEAN policymakers as they seek to address climate change.

ENERGY CONSUMPTION GROWTH

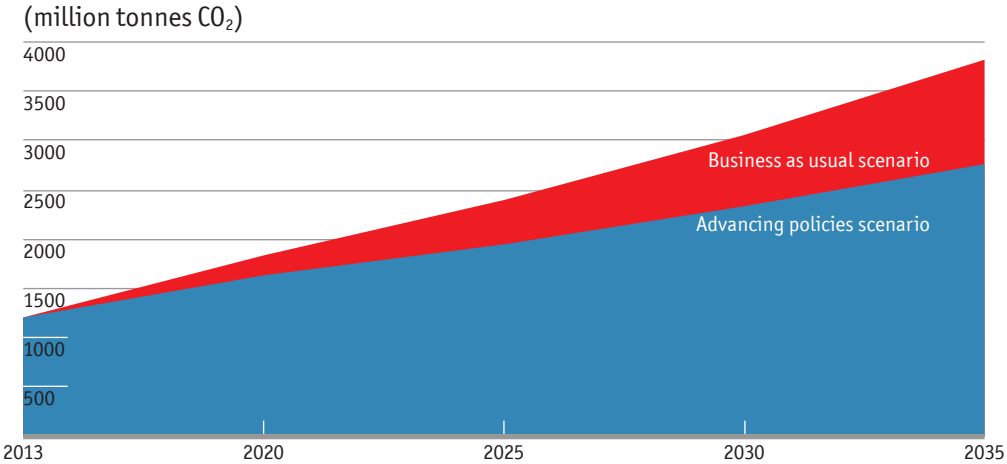
Unlike in OECD economies where energy consumption is forecast to either stagnate or increase incrementally, the robust energy consumption growth seen in the ASEAN region over the last few decades will continue. The ASEAN Centre for Energy forecasts average annual growth in energy consumption of 4.3% between 2013 and 2035 in its BAU scenario, or 3.5% in its advancing policies scenario (APS), which assumes that "stronger targets" for renewable energy deployment and lowering energy intensity are met. These growth rates, even in the lower APS scenario, will be above the global average. As ASEAN policymakers seek to meet the increasing demand for energy they will face the challenge of realising this objective while also trying to substantially lower the carbon intensity of the energy system, leading to a fall in the absolute level of emissions in the longer term. Furthermore, ASEAN's high energy consumption growth stresses the importance of implementing demand side solutions, such as improving energy efficiency and phasing

Figure 3: CO_2 emissions from fuel combustion in ASEAN in 2015



Source: The Economist Intelligence Unit.

Figure 4: ASEAN CO_2 emissions forecast



Note. Business as usual scenario reflects continuation of existing trends. Advancing policies scenario takes into account official policy measures such as renewable energy and energy efficiency targets.

Source: ASEAN Energy Centre.

out subsidies of fossil fuel consumption. If successfully achieved, these measures will bring economic and climate-related dividends as energy demand growth is slowed.

FOSSIL FUEL DEPENDENCE

As ASEAN energy consumption increases, the region's dependence on fossil fuels will remain entrenched in the absence of significant policy intervention. Although this dilemma is not unique to the region, a growing share of energy supply will be sourced from hydrocarbons, especially coal (the most carbon intensive fossil fuel). In 2013 fossil fuels (coal, gas and oil) accounted for 74% of South-east Asia's primary energy demand, and this is forecast by the IEA to rise slightly to 78% by 2040. This increase will be driven by coal consumption tripling by 2040, mainly for use in power generation. The IEA states that South-east Asia will be one of the few regions in the world where coal's share in the energy mix will actually increase in the coming decades. Lower- and middle-income South-east Asian economies rightfully seek to secure affordable and reliable energy supplies to guarantee rising living standards. The challenge therefore lies ahead to realise this goal while also shifting the balance in the energy mix towards lower carbon sources in order to facilitate a lower emissions pathway. The projected increased reliance on coal for power generation will be problematic for policymakers' efforts to decarbonise the energy system in the region.

ENERGY IMPORT DEPENDENCY

South-east Asia is a significant energy trading region, being a net exporter of coal and gas and

a net importer of oil. Indonesia was the largest global coal exporter in 2014, while Malaysia and Indonesia are significant exporters of liquefied natural gas (LNG). Malaysia is also a significant exporter of crude oil. However South-east Asia will increasingly rely on energy imports as consumption grows while domestic production declines (in the case of oil) or does not keep pace with demand (in the case of coal and gas). South-east Asia faces growing oil import dependency and by 2040 the IEA states that the region will also be a net importer of gas. Net exports of coal are expected to fall as a greater share of domestic output is earmarked for growing local needs. Therefore if South-east Asia remains heavily dependent on fossil fuels a greater share of this will be met by imports. While it is daunting for policymakers to address the energy security and economic challenges of growing import dependency, it does present an opportunity to focus on low carbon and demand management solutions to mitigate this problem. Doing so will also contribute to lowering emissions from the region.

Reducing energy import dependency creates opportunities for low carbon and demand management solutions

The Paris Agreement

In December 2015 delegates representing over 190 countries at the Paris climate conference (also known as COP21) formally adopted the Paris Agreement, which set the tone for international action to tackle climate change. The agreement reinstated a global consensus on the need for broader action to reduce greenhouse gas (GHG) emissions, among both developed and developing economies, and provided an agreed framework for increasingly ambitious future action.

The outcome of the Paris conference will not solve the problem of climate change—it was never intended to—but the trajectory towards more interventionist policies aimed at reducing emissions could become irreversible as a result of it. What is less certain, however, is the pace at which countries will move along that trajectory.

The Paris Agreement included four key elements:

- to hold the increase in the global average temperature to well below 2 °C above pre-industrial levels;
- to aim to reach global peaking of GHG emissions as soon as possible, while recognising that peaking will take longer for developing countries;
- to put in place an ongoing framework that will encourage countries to communicate and update their climate policy targets, in the form of Intended Nationally Determined Contributions (INDCs), on a regular five-yearly basis; and

- to guarantee continued and enhanced climate finance from high income countries t o assist developing countries to adopt a lower emissions pathway and build climate resilience into their economies.

The agreement was opened for signature by the by the UN secretary-general, Ban Ki-moon, in New York in April, with 179 signatories including, crucially, the US, China and the EU. However, for the Paris Agreement to enter into force at least 55 countries covering at least 55% of emissions need to then ratify it (as of the end of July only 21 countries accounting for less than 1% of global emissions had ratified, although it is expected that the 55% threshold from 55 countries will be reached by 2017).

Over the past few years there had been a noticeable shift in the approach towards tackling climate change among the world's biggest emitters, namely the US and China, and this was reflected in the success at Paris. Promises of additional climate financing by developed countries and commitments by China and India to reduce the carbon intensity of their economies also reflected a more co-operative approach between developed and emerging economies since the failure of the Copenhagen climate conference in 2009. While the agreement tactfully states that it will allow for a longer period of time before developing economies reach a peak in their emissions, there is also recognition that they have to act to curb emissions, and will be able to do so with financial and technical help from advanced economies. Countries are also called on to submit progressively stronger commitments, although there is no specific emissions reduction target for countries to reach by a certain year. Progress on these commitments will instead be facilitated through a collective (but largely voluntary) framework.

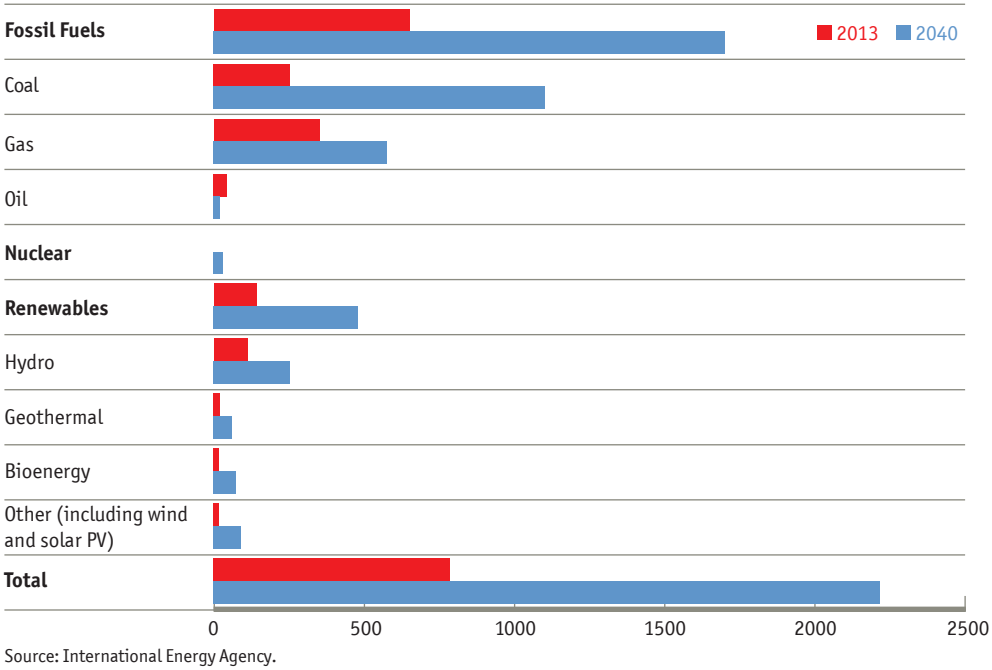
The Paris Agreement is fundamentally different from previous ones: it is less about specifying targets and more about agreeing a process for action and monitoring. This approach may bring about an inflection point in global efforts to reduce emissions. The policy environment on climate change, which is shifting towards more intervention, has now been given a workable global framework under which collective action can be taken. The trajectory of climate policy has been set, and only what remains to be seen is the pace of it.

3. Tackling climate change in ASEAN

As the global shift towards more policy intervention on climate change gains momentum, it is important to put the role of ASEAN in global efforts to reduce emissions in context. At a regional level ASEAN states have adopted a series of strategies in the ASEAN Plan of Action for Energy Co-operation (2016-25). These include commitments to:

- increase the component of renewable energy (hydro, geothermal and other sources such as solar and wind but not traditional biomass) to 23% of ASEAN's energy mix by 2025 (from around 10% currently);
- reduce energy intensity by 20% from 2005 levels by 2020, and by 30% by 2025;
- promote clean coal technologies; and
- build policy, technology and regulatory capabilities to develop nuclear energy.

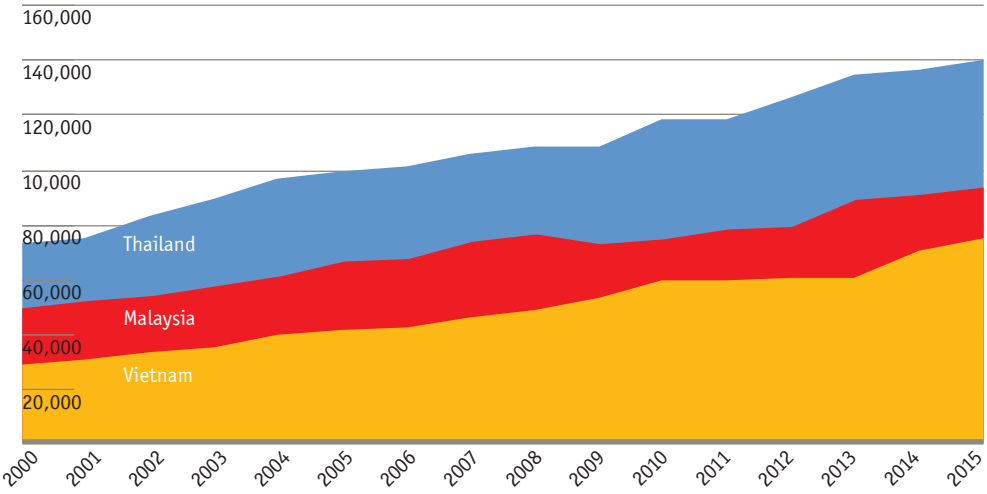
Figure 5: Electricity generation by fuel in South-east Asia (TWh)



Source: International Energy Agency.

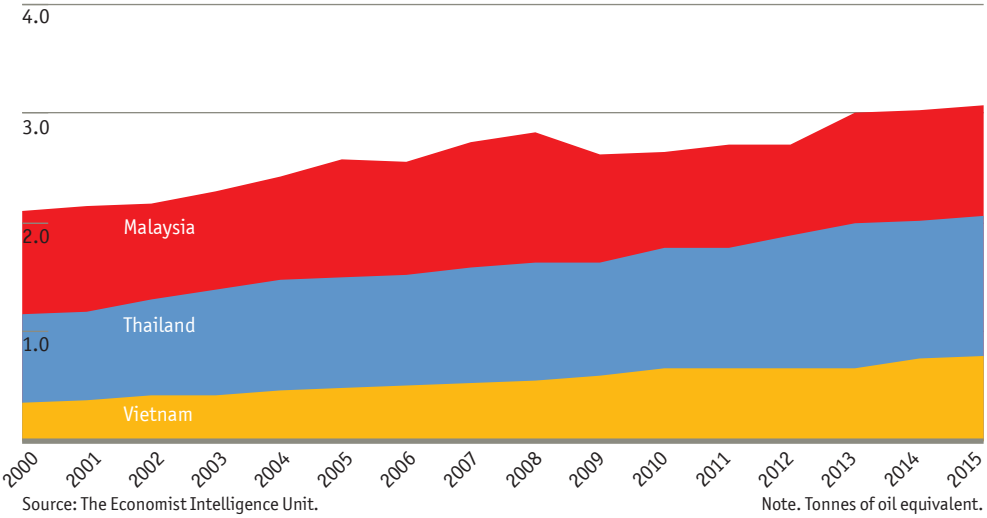
Figure 6: Energy consumption in Malaysia, Vietnam and Thailand, 2000-15

Gross domestic energy consumption (ktoe)



Source: The Economist Intelligence Unit. Note. Thousand tonnes of oil equivalent.

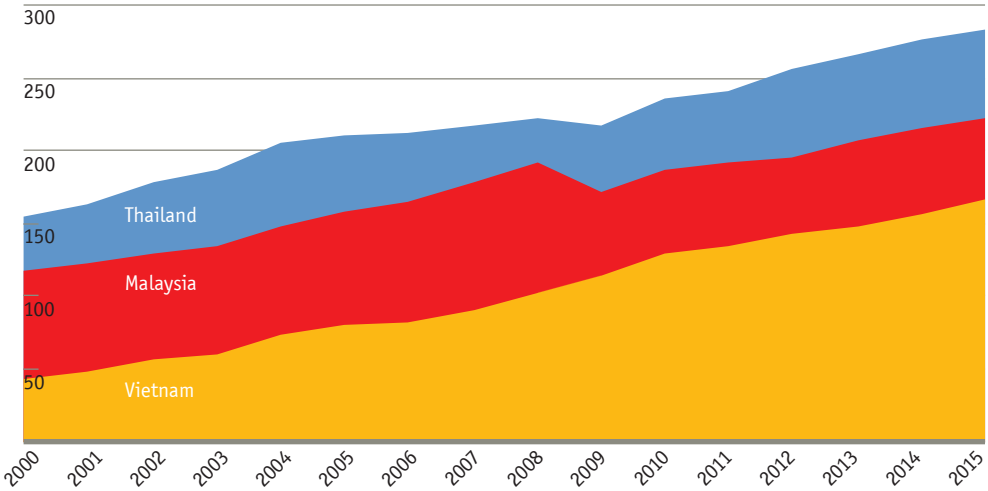
Total energy consumption per capita (toe/per capita)



Source: The Economist Intelligence Unit. Note. Tonnes of oil equivalent.

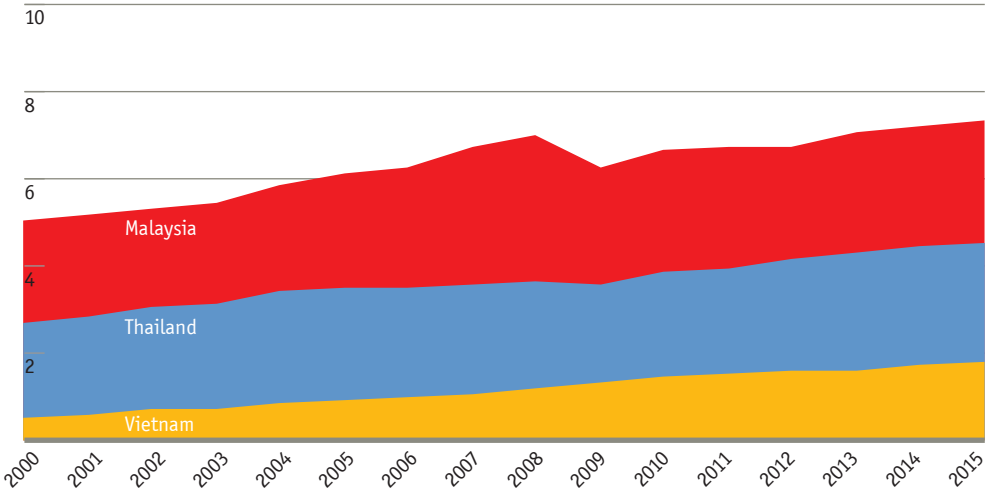
Figure 7: CO_2 emissions from fuel combustion in Malaysia, Vietnam and Thailand, 2000-15

Total emissions (million tonnes of CO_2)



Source: The Economist Intelligence Unit.

Emissions per capita (tonnes of CO_2 per capita)



Source: The Economist Intelligence Unit.

The plan of action states that due to the Paris climate conference the region has entered "a crucial time to improve policy frameworks for encouraging responsible energy consumption, higher efficiency, and international standards on emissions, while supporting the growth of energy markets and ensuring security of supply." Although the commitments are not binding they do provide a framework for ASEAN states to diversify the energy mix, guarantee energy supply and cut emissions.

In addition every ASEAN member state submitted an INDC as part of the COP21 process, including the three member states that this white paper focuses on: Malaysia, Thailand and Vietnam. This section outlines the INDCs submitted by these countries and assesses their respective commitments to implementing cohesive climate policies.

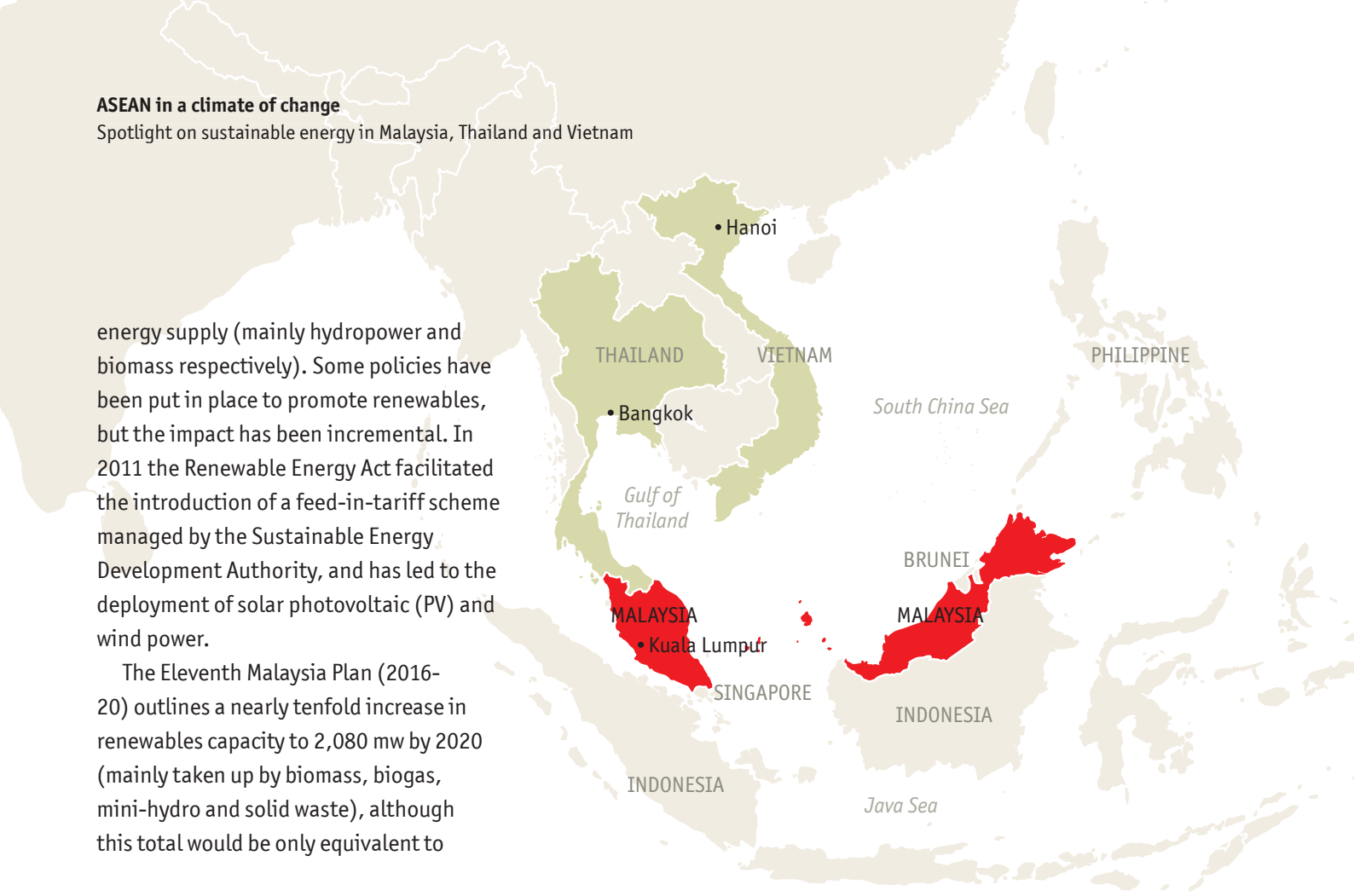
MALAYSIA

Malaysia is defined as a high middle-income country by the World Bank. Its per capita GDP and energy consumption are above the ASEAN average and second only to Singapore. In line with GDP growth Malaysia's emissions have been increasing, with The Economist Intelligence Unit estimating average annual growth in energy-related CO_2 emissions of 3.6% between 2006 and 2015. Malaysia's per capita emissions doubled over the last 20 years and are now at the same level of some European economies.

Malaysia's INDC pledged to reduce the GHG emissions intensity of GDP by 45% by 2030, relative to the level in 2005. A 35% reduction in emissions intensity is "unconditional", while a further 10% reduction is based on the "receipt of climate finance, technology transfer and capacity building" from high-income countries. Malaysia's pledge to reduce emissions intensity does not equate with actual emissions reduction: emissions will still rise if GDP grows faster than the rate that emissions intensity declines. Malaysia's emissions will therefore increase even though GDP emissions intensity will fall.

Malaysia's INDC is not ambitious, and does not specify how the targeted reduction in energy intensity will be achieved. The submission also cites barriers to curbing emissions that need to be addressed, including the cost of deploying low carbon technologies, the need to build institutional framework and capacity, and poor forest management.

It would be unrealistic to expect Malaysia to reduce its absolute level of emissions in the short to medium term, yet a more ambitious target to reduce emissions intensity of GDP could have been adopted. Nevertheless in Malaysia fossil fuels dominate the energy mix, and renewables account for a very small share of power generation and



energy supply (mainly hydropower and biomass respectively). Some policies have been put in place to promote renewables, but the impact has been incremental. In 2011 the Renewable Energy Act facilitated the introduction of a feed-in-tariff scheme managed by the Sustainable Energy Development Authority, and has led to the deployment of solar photovoltaic (PV) and wind power.

The Eleventh Malaysia Plan (2016-20) outlines a nearly tenfold increase in renewables capacity to 2,080 mw by 2020 (mainly taken up by biomass, biogas, mini-hydro and solid waste), although this total would be only equivalent to

Malaysia

	2015	2016	2017	2018	2019	2020
Real GDP (% change)	5.0	4.3	4.5	4.7	4.4	4.8
Nominal GDP (US$ bn)	296.3	300.4	321.5	344.5	376.1	422.2
GDP per head (US$)	9,768.3	9,768.2	10,316.2	10,913.2	11,762.9	13,041.2
Population (m)	30.3	30.8	31.2	31.6	32.0	32.4
Urban population (% of total population)	74.9	75.9	76.9	77.8	78.8	79.8
Nominal gross fixed investment (US$ bn)	77.6	78.1	82.7	88.4	97.2	109.2
Gross fixed investment (% real change)	3.7	4.0	4.2	5.0	5.3	5.4
Inward direct investment (US$ bn)	11.0	10.0	11.6	12.5	12.1	13.8
Consumer prices (% change; av)	2.1	2.0	2.4	2.8	1.7	1.4
Gross domestic energy consumption (ktoe)	93,638.0	96,246.0	99,538.0	103,345.0	106,746.0	111,198.0
Total energy consumption (per US$1m of real GDP)	393.2	387.4	383.6	380.4	376.4	374.1
Total CO_2 emissions from fuel combustion (million tonnes of CO_2)	222.1	229.4	236.1	246.3	255.2	266.9
Total CO_2 emissions from fuel combustion (tonnes per head)	7.3	7.5	7.6	7.8	8.0	8.2

A holistic approach to meeting targets must include energy efficiency, transportation and construction

around 7% of Malaysia's total electricity capacity in 2014. Penetration of renewables in power generation will need to be much more rapid in the following decade if growth in dependence on coal-fired power is to be mitigated. Other measures in the Plan include promotion of energy efficiency in the transport and buildings sectors, promoting low carbon mobility (public transport) and waste reduction.

Malaysia faces some challenging trade-offs in efforts to reduce GHG emissions intensity, given projected growth in power generation and the use of coal to supply it. Promoting renewables is essential, but investment may also be needed to build capacity of modern, more efficient "ultra-supercritical" coal-fired power as well. As a major gas producer nearly 50% of Malaysia's power generation is gas-fired, although this is down from 80% in 2000. In the last decade there has been displacement of natural gas for power generation by coal. If coal-fired capacity is to continue to increase, which is likely, it would need to involve the construction of modern plants that are more efficient in their emissions performance. However a shift from coal to renewables would require the international assistance that Malaysia states it needs to adopt a more ambitious reduction in emissions intensity.

Definition	Sources
Percentage change in real GDP, over previous year.	Derived from Department of Statistics, Malaysia.
Gross domestic product (GDP) at current market prices in US$.	Department of Statistics, Malaysia.
Nominal GDP divided by population.	Derived from IMF, *International Financial Statistics* and World Bank, *World Development Indicators*.
Mid-year population.	UN population data.
Mid-year population of areas defined as urban in each country as a percentage of the total population.	World Bank, *World Development Indicators*; UN.
Gross fixed investment expenditure at current market prices in US$.	Derived from Department of Statistics, Malaysia.
Percentage change in real gross fixed investment, over previous year.	Derived from Department of Statistics, Malaysia.
Net flows of direct investment capital by non-residents into the country.	IMF, *International Financial Statistics*.
Percentage change in consumer price index in local currency (period average), over previous year.	Derived from Department of Statistics, Malaysia.
Gross domestic energy consumption: production plus imports minus exports minus international marine and aviation bunkers and stock changes.	International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Energy intensity: total energy consumption measured in tonnes of oil equivalent per million dollars of real GDP.	Derived from International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Total CO_2 emissions from fuel combustion.	International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Total CO_2 emissions from fuel combustion measured in tonnes per unit of constant 2005-price US$ GDP.	Derived from International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.

ASEAN in a climate of change
Spotlight on sustainable energy in Malaysia, Thailand and Vietnam

THAILAND

Thailand, with a population of 68m, is an upper middle-income country with higher per capita emissions and energy consumption than its ASEAN neighbours in Indo-China. Thailand's GDP, and GDP per capita, have accelerated since the early part of the last decade, as have its emissions. The Economist Intelligence Unit estimates that Thailand's per capita CO_2 emissions have doubled over the last two decades, while total CO_2 emissions have grown by an annual average of 3.1% between 2006 and 2014. Thailand's GHG emissions will continue to increase, with policy efforts aimed at lowering this growth rate compared to what is forecast in its BAU projection.

Thailand's INDC opens with the statement that it is a "developing country highly vulnerable to

Thailand

	2015	2016	2017	2018	2019	2020
Real GDP (% change)	2.8	2.7	2.9	3.0	2.8	3.3
Nominal GDP (US$ bn)	395.2	391.8	390.1	408.8	422.9	444.7
GDP per head (US$)	5,862.9	5,801.1	5,766.3	6,035.6	6,255.6	6,588.7
Population (m)	67.4	67.5	67.7	67.7	67.6	67.5
Urban population (% of total population)	50.8	52.4	54.2	55.9	57.8	59.7
Nominal gross fixed investment (US$ bn)	98.5	94.4	95.4	102.2	105.6	110.3
Gross fixed investment (% real change)	4.7	4.2	2.3	3.2	2.9	3.8
Inward direct investment (US$ bn)	8.0	7.5	3.5	7.0	8.8	9.8
Consumer prices (% change; av)	-0.9	0.3	1.2	1.6	2.4	2.8
Gross domestic energy consumption (ktoe)	139,310.0	142,533.0	145,452.0	148,625.0	152,109.0	156,271.0
Total energy consumption (per US$1m of real GDP)	532.0	528.7	524.1	520.2	517.3	514.9
Total CO_2 emissions from fuel combustion (million tonnes of CO_2)	282.9	289.7	296.4	303.5	311.2	320.3
Total CO_2 emissions from fuel combustion (tonnes per head)	4.2	4.3	4.4	4.5	4.6	4.7

Investing in cleaner energy now can reduce tomorrow's climate change costs

the impacts of climate change." Thailand pledges to reduce its GHG emissions by 20% from the projected BAU level by 2030, with 2005 as the base year. The INDC further states that "the level of contribution could increase up to 25%" subject to international technology development and transfer, financing and capacity building. Thailand's GHG emissions under a BAU scenario are forecast to reach 555 million tonnes of CO_2 equivalent (CO_2e) by 2030.

Prior to submitting the INDC Thailand had already set out fairly ambitious targets, to be reached by 2036, in three separate plans regarding power generation, alternative energy, and energy efficiency. By 2036 Thailand targets a 20% share for renewables in power generation (not including imported hydropower), a 30% share for renewables in energy consumption, and a 30% reduction in the economy's energy intensity. Another plan addresses the development of an environmentally sustainable transport system, which would curb emissions from vehicles.

Thailand's INDC addresses climate adaptation as well as mitigation, stating that adaptation is a "top priority" that will be addressed through water resources management, safeguarding food security, promoting sustainable agriculture, and increasing forest cover.

While Thailand has several long-term targets, its INDC outlines several barriers to achieving decarbonisation of its energy system. These factors include inadequate capacity

Definition	Note	Sources
Percentage change in real GDP, over previous year.		Derived from National Economic and Social Development Board.
Gross domestic product (GDP) at current market prices in US$.	Non-seasonally adjusted; includes statistical discrepancy.	National Economic and Social Development Board; IMF, *International Financial Statistics*.
Nominal GDP divided by population.		Derived from IMF, *International Financial Statistics*.
Mid-year population estimate.		IMF, *International Financial Statistics*.
Mid-year population of areas defined as urban in each country as a percentage of the total population.		World Bank, *World Development Indicators*; UN.
Gross fixed investment expenditure at current market prices in US$.		National Economic and Social Development Board; IMF, *International Financial Statistics*.
Percentage change in real gross fixed investment, over previous year.		Derived from National Economic and Social Development Board.
Net flows of direct investment capital by non-residents into the country.	Break in series: before 2005 data from the IMF's *Balance of payments manual* 5 are used and after 2005 data from the Fund's *Balance of payments manual 6* are used.	IMF, *International Financial Statistics*.
Percentage change in consumer price index in local currency (period average), over previous year.		Derived from Department of Internal Trade, Ministry of Commerce of Thailand.
Gross domestic energy consumption: production plus imports minus exports minus international marine and aviation bunkers and stock changes.		International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Energy intensity: total energy consumption measured in tonnes of oil equivalent US$1m of real GDP.		Derived from International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Total CO_2 emissions from fuel combustion.		International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Total CO_2 emissions from fuel combustion measured in tonnes per unit of constant 2005-price US$ GDP.		Derived from International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.

of transmission lines leading to poor grid connection, insufficient support from financial institutions for investment in renewables energy and energy efficiency, and lack of domestic technological resources. While measures such as feed-in tariffs and tax incentives have been introduced to support renewables, currently non-traditional renewables are a negligible share of the energy mix (apart from hydropower). Thailand has pledged a modest reduction in its BAU scenario for emissions, but this is complemented by slightly more ambitious, albeit longer-term, targets for renewables deployment and energy efficiency.

Like Malaysia, Thailand is a major producer of gas, which supplies 75% of the country's power generation, offering a lower carbon alternative to coal. Unlike Malaysia, however, the share of natural gas in power generation has been maintained. Thailand has targeted substantial increases in capacity of solar, wind and biomass generation in its power development plan. If the 20% target for renewables in power generation is achieved, the total share of non-fossil fuel sources in Thailand's power generation could be as high as 35-40% if imported hydro-power is included. In the longer term, therefore, Thailand's relatively ambitious targets for renewables deployment, reliance on imported hydropower and broad use of natural gas will enable reliance on coal to be kept a lower level compared to other ASEAN states. Overall, full implementation of the power development, alternative energy and energy efficiency plans will make it more likely that Thailand's 2030 emissions reduction target will be reached.

Vietnam

	2015	2016	2017	2018	2019	2020
Real GDP (% change)	6.7	6.3	6.6	6.8	6.3	6.2
Nominal GDP (US$ bn)	191.4	203.8	218.6	235.9	254.2	272.3
GDP per head (US$)	2,050.0	2,160.0	2,290.0	2,450.0	2,610.0	2,770.0
Population (m)	93.5	94.4	95.4	96.4	97.3	98.2
Urban population (% of total population)	33.7	34.4	35.2	35.9	36.7	37.5
Nominal gross fixed investment (US$ bn)	47.5	51.8	57.0	63.8	71.3	79.2
Gross fixed investment (% real change)	9.6	9.8	10.1	9.6	9.2	9.0
Inward direct investment (US$ bn)	9.8	10.6	11.4	12.0	12.4	12.8
Consumer prices (% change; av)	0.9	1.5	3.2	4.8	4.4	4.4
Gross domestic energy consumption (ktoe)	74,064.0	77,892.0	81,988.0	86,705.0	91,416.0	96,238.0
Total energy consumption (per US$1m of real GDP)	709.1	701.7	692.6	685.5	679.8	674.0
Total CO_2 emissions from fuel combustion (million tonnes of CO_2)	166.3	177.6	189.7	203.3	217.1	231.6
Total CO_2 emissions from fuel combustion (tonnes per head)	1.8	1.9	2.0	2.1	2.2	2.4

VIETNAM

Vietnam, with a population of just over 90m, is a lower middle-income country. Vietnam's per capita energy consumption and per capita CO_2 emissions are well below that of other ASEAN states with higher living standards (including Malaysia and Thailand). Yet Vietnam's emissions have been rising at a robust rate over the last decade. Between 2006 and 2015 Vietnam's energy-related CO_2 emissions have risen by an annual average of 10%, due to rapid growth in its economy and in energy consumption.

Vietnam's INDC includes both a mitigation and adaptation component, with the mitigation component containing both "unconditional and conditional contributions." In identifying a GHG emissions reduction pathway for the period 2021-2030, Vietnam's INDC pledges to reduce GHG

Definition	Note	Sources
Percentage change in real GDP, over previous year.		Derived from General Statistics Office of Vietnam.
Gross domestic product (GDP) at current market prices in US$.		Derived from Vietcombank and IMF, *International Financial Statistics*.
Nominal GDP divided by population.		Derived from General Statistics Office of Vietnam.
Mid-year population estimate.		UN.
Mid-year population of areas defined as urban in each country as a percentage of the total population.		World Bank, *World Development Indicators*; UN.
Gross fixed investment expenditure at current market prices in US$.		Derived from General Statistics Office of Vietnam and Vietcombank.
Percentage change in real gross fixed investment, over previous year.		Derived from General Statistics Office of Vietnam.
Net flows of direct investment capital by non-residents into the country.	Break in series: before 2005 data from the IMF's *Balance of payments manual* 5 are used and after 2005 data from the Fund's *Balance of payments manual 6* are used.	IMF, *International Financial Statistics*.
Percentage change in consumer price index in local currency (period average), over previous year.		Derived from General Statistics Office of Vietnam.
Gross domestic energy consumption: production plus imports minus exports minus international marine and aviation bunkers and stock changes.		International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Energy intensity: total energy consumption measured in tonnes of oil equivalent per million dollars of real GDP.		Derived from International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Total CO_2 emissions from fuel combustion.		International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.
Total CO_2 emissions from fuel combustion measured in tonnes per unit of constant 2005-price US$ GDP.		Derived from International Energy Agency (IEA); Economist Intelligence Unit estimates and forecasts.

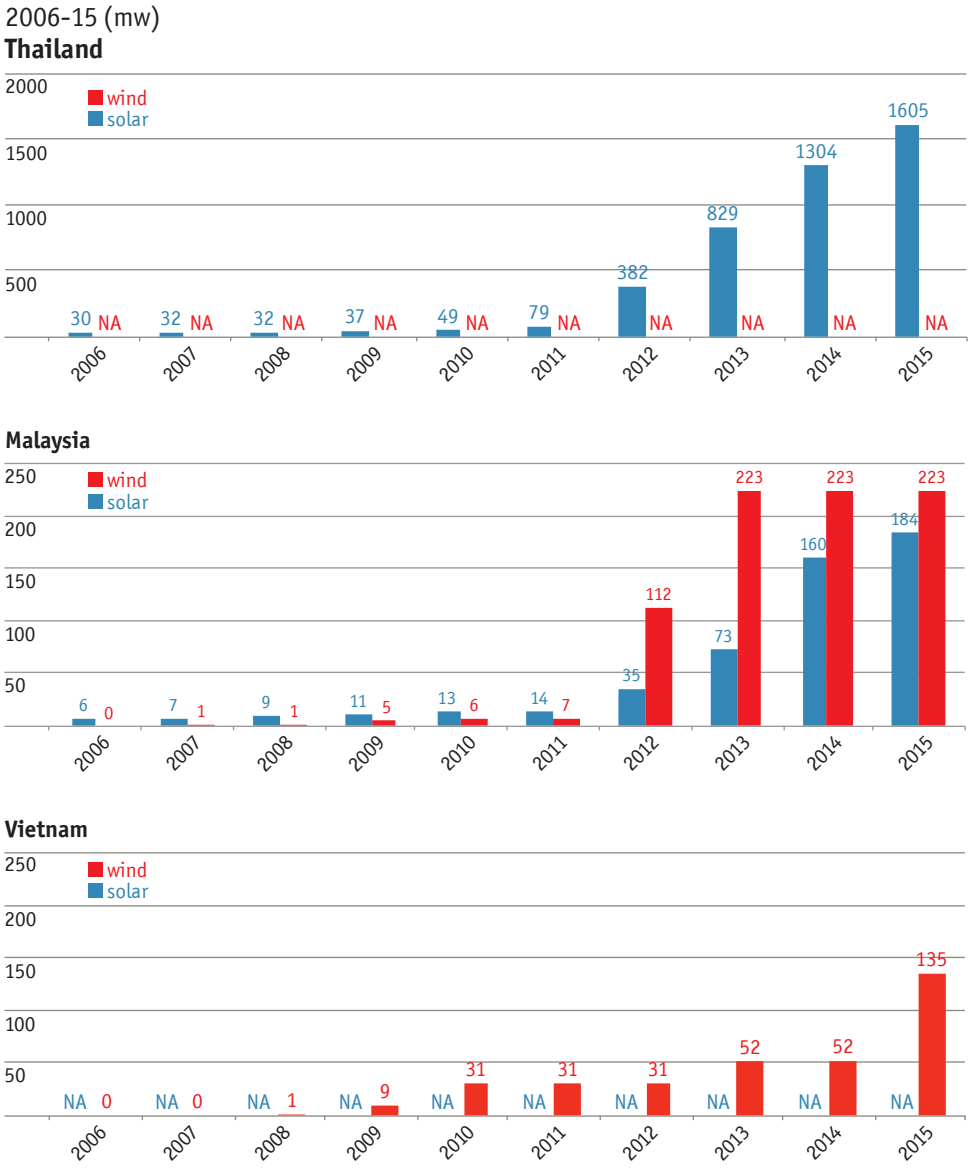
emissions by 8% by 2030 compared to its BAU scenario, with 2010 as the base year. With international support, Vietnam has pledged a 25% reduction in emissions from its BAU scenario by 2030. Vietnam calculates in its BAU scenario that GHG emissions will reach 787 million tonnes CO_2e by 2030 (to put this into context Germany's GHG emissions were around 900 million tonnes CO_2e in 2014). According to the INDC an 8% reduction in emissions would require a 20% reduction in emissions intensity of GDP. How Vietnam will reach its emissions target is not detailed, but the INDC states that a roadmap will be developed outlining how this would be achieved.

The INDC also highlights non-energy related activities in contributing to higher GHG emissions, such as agriculture, and identifies re-forestation as a way to reduce net emissions. An increase in forest cover of 45% has been pledged. Unlike other INDCs the submission by Vietnam has considerable focus on climate adaptation, reflecting that Vietnam takes the impact of climate change seriously. Vietnam cites its most vulnerable areas being "agriculture, natural ecosystems, biodiversity, water resources, public health and infrastructure."

Currently Vietnam's use of renewables, apart from hydropower for electricity and traditional forms of bioenergy for domestic use, is negligible. In recent years, however, wind power capacity has gained some momentum. Like many other ASEAN states, Vietnam appears to be on a coal-fired pathway. Under its Power Development Plan VII coal will account for just over 50% of power generation capacity by 2030 (renewables and hydro combined would account for 28% by that year). However, earlier in 2016 it was reported that the government had plans to slow down the construction of new coal plants, partly due to fears that domestic production constraints would result in higher import dependency if local demand for coal was not curbed. Although this was interpreted as a "coal phase-out", in reality Vietnam's coal-fired capacity will still increase although not as much as originally planned. The plan also anticipates that most of Vietnam's renewables capacity will be sourced from hydropower. Vietnam also has plans to develop nuclear power, although the World Nuclear Association views that planned nuclear units are unlikely to become operational until at least 2028-29.

Vietnam's ambition on emissions reduction is modest, which is to be expected given that it is a developing economy and its priority is to increase living standards. Vietnam has, however, pledged much steeper cuts to emissions from its BAU scenario if it receives the international assistance required. More rapid deployment of renewables would depend on the availability of international financing, which would become an urgent priority in the longer term should Vietnam proceed with the reported intent to stall the build out of coal-fired power.

Figure 8: Wind and solar capacity growth in Malaysia, Vietnam and Thailand



Source: International Renewable Energy Agency (IRENA).

CONCLUSION

All three countries have made relatively modest pledges to reduce the growth rate of emissions, expressed as either cuts from a BAU scenario (Vietnam and Thailand) or lowering of GDP emissions intensity (Malaysia). They have also pledged more ambitious targets if there is international assistance. While it is unrealistic to expect these countries to pledge cuts in the absolute level of emissions in the short to medium term, accelerated efforts to lower emissions intensity in the nearer term will enable these economies to reach a peak level in emissions sooner rather than later. The ability of these countries—especially Vietnam which is a lower income country—to do so may depend on the level of international assistance they receive and their ability to attract a sufficient level of investment from the private sector.

Of the three countries Thailand appears to be the most advanced in establishing the policy frameworks to cut emissions, although over time each of these countries could be able to adopt more ambitious targets. Emissions will not peak until after 2030 in each of the three countries examined in this section, with efforts in the nearer term focused on cutting the rate of emissions growth.

4. The private sector and climate change in ASEAN

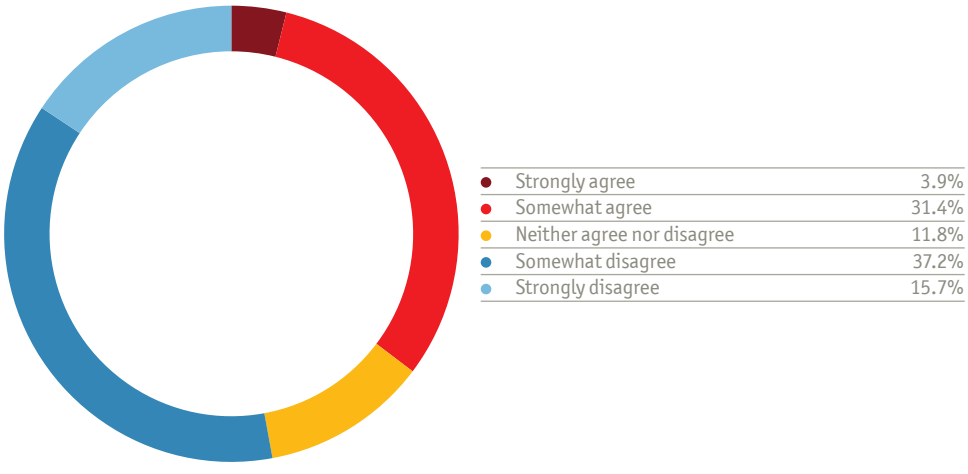
The importance placed by national governments, etc. in tackling climate change to tackle climate change is well documented. INDCs have been submitted, plans for the energy sector have been made, authorities have been established, and legislation has been enacted, all of which are meant to facilitate a lower carbon energy system. ASEAN too has its own plan of action on energy policy co-operation. So, while it has been clear that at the policymaking level there is a need to tackle climate change, the key to the success of any policies adopted so far will be in their implementation. This in turn will require the active participation of a myriad of actors outside government circles, such as the financial community and the private-sector.

61% of survey respondents view climate change as an opportunity for their organisation

In recognition of this The Economist Corporate Network conducted a survey of relevant players in the Asian region (including businesses in traditional and alternative energy, financial and professional services, and the industrial goods and chemicals sectors) to gauge attitudes to climate policy in the region and the role the private-sector can play in it. The survey revealed some striking results.

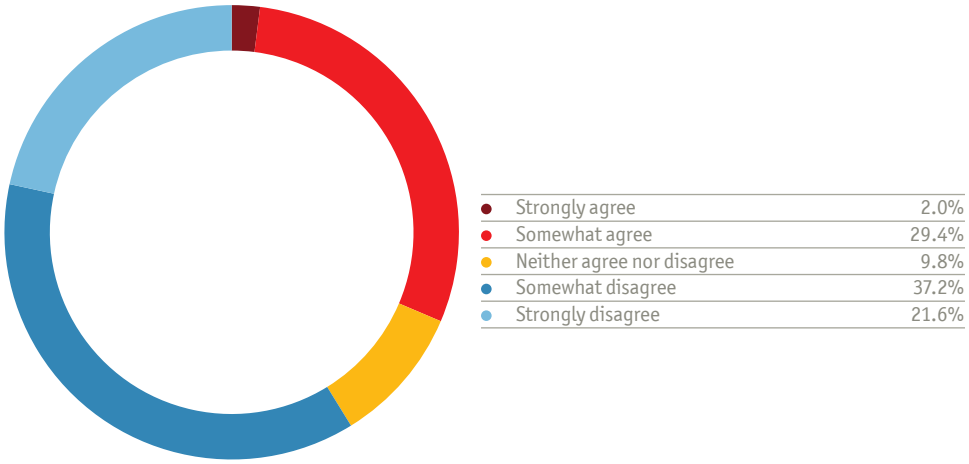
An interesting revelation of the survey was the perception that climate policy needed to be better communicated by national governments in the region. While 35% of respondents either agreed or strongly agreed that climate and energy policies were being effectively communicated, around 53% of respondents either disagreed or strongly disagreed that this was the case. Even though governments appear to recognise that the

Figure 9: The government's climate change and energy policies are effectively communicated to the private sector



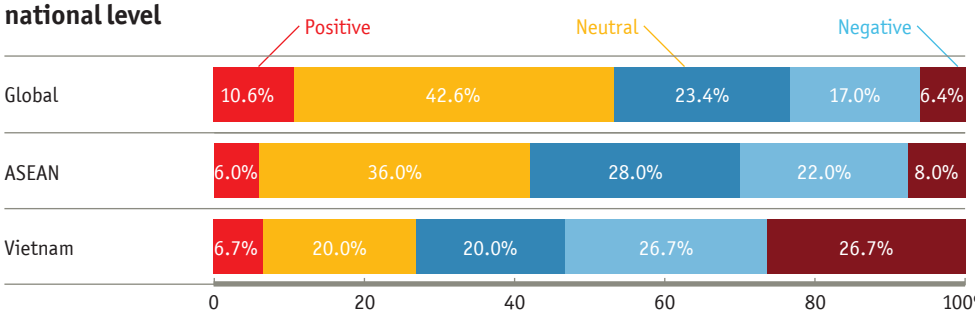
Source: The Economist Corporate Network.

Figure 10: I am confident that ASEAN governments will meet their COP21 commitments



Source: The Economist Corporate Network.

Figure 11: The Paris Climate Conference (COP21) will facilitate a significant and sustained change in direction in climate and energy policy at the global, ASEAN and national level



Source: The Economist Corporate Network.

Note. Business as usual scenario reflects continuation of existing trends. Advancing policies scenario takes into account official policy measures such as renewable energy and energy efficiency targets.

ASEAN region is vulnerable to the impacts of climate change, it is interesting to note that just over one-half of respondents thought that policies designed to address this issue were not being well communicated.

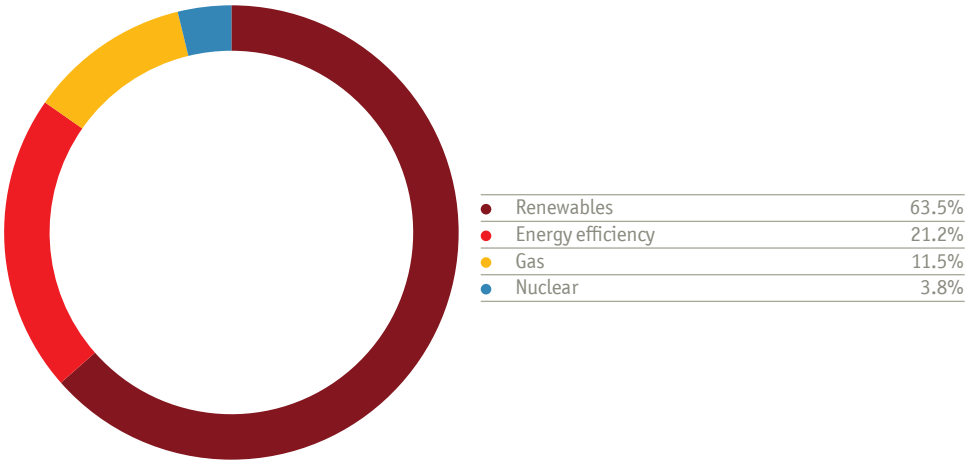
There also appeared to be scepticism about the commitment of governments in the region to addressing climate change itself. Nearly 59% of respondents did not view that ASEAN governments would be able to meet their COP21 commitments, as modest as they are in ambition. Indeed, only 31% of respondents agreed that ASEAN governments would be able to carry out these pledges.

The survey also revealed that respondents were more confident that COP21 would result in a sustained change in direction of climate policy at a global level compared to South-east Asia. While 52% of respondents thought that sustained policy change would occur globally, only 42% thought that this would occur within the ASEAN region itself. The result for Vietnam was particularly telling, with just 27% of respondents viewing that COP21 would lead to sustained change in Vietnam's climate policies.

Although renewables comprise a relatively small share of the ASEAN energy mix, an overwhelming majority of respondents (64%) though that promoting renewables would be the most efficient way of decarbonising energy systems, far outpolling energy efficiency, natural gas and nuclear. This indicates that the private sector could be generally supportive of more active policy intervention by ASEAN government to promote low-carbon sources of energy.

The sense that can be taken from this survey, and from qualitative interviews also conducted with stakeholders as part of the research for this white paper, is that there is willingness for the private sector to be involved in addressing climate change provided that governments are able to implement the appropriate frameworks and communicate their strategies. Private-sector involvement can be enhanced if governments are able to facilitate higher flows of clean energy investment, encourage business practices with a lower-carbon footprint, prioritise climate change adaptation as well as mitigation, and develop regulatory environments that encourage renewables penetration and encourage energy efficiency. However, the results of the survey show that ASEAN governments need to do more to enlist participation from the private sector, which would be a willing partner to governments on climate issues given the right circumstances.

Figure 12: What do you think is the most efficient way to decarbonise the energy sector?



Source: The Economist Corporate Network.

Fewer than 40% of survey respondents expect the private sector to play a "primary" role in mitigating climate change

This view was echoed in some of our in-depth interviews with stakeholders which stressed the need to the public sector to build confidence among private-sector actors, and to engage them more proactively on climate mitigation and adaptation. Indeed, there were several barriers highlighted that were preventing a greater role for businesses in contributing to a lower emissions pathway. These barriers include not fully using the resources that private investment can provide, regulatory systems that are not designed for timely approval of clean energy projects, the lack of technical capacity within governments to foster a lower-carbon energy system, and the absence of appropriate policy and legislative frameworks for renewables deployment and energy efficiency.

Sharad Apte of Bain Company expressed doubts that governments in the region had the capacity to see implementation of climate policies through. Although governments were addressing these issues in statements of intent, to date this represented little more than paying "lip service". Governments are "talking about it, but what are they actually doing about it?" was the question asked. Many interviewees stated that governments needed to be more proactive and work more collaboratively with industry on the

direction of climate and sustainability issues. Moreover, private-sector interviewees suggested that specific commitments have not filtered down to industry players and that there is a lack of clarity coming from governments.

Gavin Smith of Dragon Capital, said that in Vietnam in particular, while there is a high-level commitment to renewables, there has not yet been the change in policy that would facilitate clean energy investment. Furthermore, developments such as better access to the grid were needed, but the dominance of the system by publicly-owned utilities makes it difficult to achieve this. All in all, the reduction of risk and removal of barriers is needed to facilitate greater private investment.

There is cause for some optimism, however. According to a report from Clean Energy Pipeline sponsored by the legal firm Bird & Bird, the compound annual growth rate of investment in clean energy projects (wind, solar, biomass and geothermal) in South-east Asia was 19% between 2010 and 2015 (although investment did fall to US$2.7bn in 2015 from US$3.2bn the year before). Over 60% of clean energy investment in the region has been directed towards solar energy. The trend since 2010 is therefore somewhat encouraging¬–despite last year's dip–but the region still accounts for a very small share of clean energy investment globally (according to Bloomberg New Energy Finance global clean energy investment in 2015 was US$270bn). Furthermore, 85% of clean energy investment in South-east Asia between 2010 and 2015 has been directed to just three countries: Thailand (34%), Indonesia (26%) and the Philippines (25%), while Vietnam and Malaysia have attracted just 7% each over the same period. It is perhaps not surprising that Thailand has attracted the largest share of investment. Mr Smith of Dragon Capital believed that Thailand had a good regulatory environment for renewables deployment, and that it had a better developed investment platform for wind and solar power than other countries in the region.

In Malaysia at least, there is evidence that government policy not only recognises the importance of tackling GHG emissions, but regards it as a national strategic opportunity. Ahmad Hadri Haris, group chief executive officer of Green Tech Malaysia[1], points to how successive policy developments have led to concrete measures, such as fiscal incentives, designed to encourage firms to adopt green technology and develop green products. The expectation is that domestic firms, from small and medium-sized enterprises (SMEs) upward, will play a central role in realising national commitments, and go on to find markets in neighbouring economies and beyond. While recognising that incentives cannot become perpetual subsidies, Mr Haris notes that multilateral efforts, such as the Green Bank Network established in December 2015, offer access to deep and growing pools of private capital.

Additionally, Dr Mohd Yusoff Sulaiman, president and chief executive officer of the

[1] Malaysian Green Technology Corporation (GreenTech Malaysia) is an organisation under the purview of the Ministry of Energy, Green Technology and Water (KeTTHA), charged with catalysing green technology deployment as a strategic engine for socio-economic growth in Malaysia in line with the National Green Technology Policy 2009.

Malaysian Industry- Government Group for High Technology references Malaysia's emergence as the third-largest manufacturer of photovoltaic equipment (behind China and the EU) and initiatives as the Green Building Index as evidence of a clear commitment to climate change from both government and industry in Malaysia.

There is therefore recognition from stakeholders in the region that the task lies ahead for ASEAN governments to provide clear policy direction to accelerate deployment of renewables, to promote energy efficiency, and to reduce the growth rate of fossil fuel consumption. Part of this involves encouraging greater participation from the private sector. In particular private investment can be a crucial source of the financing necessary to decarbonise the region's energy system. While it may not appear that policy implementation is matching statements of intent, the submission of the INDCs by Malaysia, Thailand and Vietnam at least signals that there is willingness to take a more active approach on climate policy, even if it may take time for the effects of this to filter through.

Peter Hefele from Konrad Adenaur Stiftung said that COP21 represents a "turning point" in the region on climate policy, in that it "really changed the discussion" on climate change among policymakers. While it is clear that there is frustration from stakeholders in the private sector that policy implementation has been slow, this may be about to change. Malaysia, Thailand and Vietnam have all pledged more ambitious climate pledges with international assistance, which if forthcoming means that there will be more global scrutiny on their progress. Judging from our survey and qualitative interviews taken for this research, however, the message from businesses is that governments need to be more proactive in accelerating the pace of change.

Governments need to be more proactive in accelerating the pace of change

5. Factors and Trends Influencing Climate Policy in ASEAN

There are several issues highlighted by this white paper that will influence the approach to climate policy in ASEAN. These are outlined below. Over 190 countries at COP21 have agreed to tackle climate change, but the approach taken by each country will be partly influenced by the characteristics and trends that apply to their geographic region.

Get ready to capitalise on South-east Asia's transition towards a lower carbon energy system

Summary of key issues and actions points

- **GHG emissions will continue to rise** in ASEAN due to continued economic growth, rising living standards, increased energy consumption, and high carbon intensity of regional economies. Even under the APEC Energy Centre's more conservative APS, CO_2 emissions will double between 2013 and 2035. The best that can be expected in the short to medium term, therefore, are policies that will reduce this growth rate, enabling a peak in emissions in the region sooner rather than later.
- **Non-traditional renewables account for a small share** of the ASEAN mix (around 10%) and it is unlikely that the group's Plan of Action target of a 23% share of 2025 will be reached. However, given the recent surges in capacity of wind and solar power in China, Europe and the US, the ASEAN region should not be left behind in renewables deployment: decarbonising the power sector is key to lowering emissions intensity. There is also a need to phase out traditional forms of biomass, such as firewood, which in some ASEAN countries such as Vietnam and Thailand is still commonly used for cooking.
- **Dependence on coal needs to be addressed** in the ASEAN region as the forecast growth in coal consumption will frustrate efforts to lower emissions. Coal is cheap and reliable but diversifying the energy mix will prevent the region's energy system from being locked in to a carbon intensive paradigm. The best that can be expected in the short to medium term, however, is to curb the rate of growth in coal-fired capacity, with a goal of reducing it in the longer term.

- **Demand-side solutions can also be deployed** to address climate change, such as phasing out fossil fuel subsidies and promoting better use of energy efficiency. The fall in oil prices has enabled some ASEAN governments (Malaysia in particular) to push through reforms that wind back fuel subsidies which, if kept in place, should reduce demand for fossil-fuels. Fossil-fuel subsidies cost the region US$36bn in 2014, but such funds could be better targeted elsewhere as long as low income earners are protected. Investment in energy efficiency in the transport and buildings sectors can also lower fossil fuel consumption growth while also improving air quality in urban centres.
- **ASEAN governments face energy investment trade-offs** as they balance the need to secure reliable energy supplies while achieving emissions reduction. Investment in renewables is needed, but other options such as carbon capture and storage, nuclear power, and clean-coal technologies will also be considered going forward. In particular some ASEAN governments may eventually decide on whether it is worth making coal "cleaner" with modern low-emission technologies or simply to phase out coal-fired power itself.
- **Clean energy investment in ASEAN forms a small share** of investment globally, despite the fact the region's population is large and its energy needs are growing. Although ASEAN governments are keen to seek international assistance for emissions reduction the role of the private sector should not be overlooked. Examining ways in which clean energy finance in the region can be facilitated needs to be undertaken.
- **Low-carbon solutions have spin-off benefits** other than a positive impact on climate change, such as enhancing energy security and improving economic performance. The deployment of renewables and energy efficiency measures can mitigate the region's growing dependence on fossil fuel imports, reduce energy import bills, cut public spending, and enable resilience to external supply shocks.
- **Climate adaptation as well as mitigation** is important for ASEAN policymakers to consider given that the region's environment and economy are vulnerable to the impact of climate change. Investment in protecting infrastructure, agriculture and water supply systems, and safeguarding coastal zones and forest areas, are just some areas that can be targeted by climate adaptation strategies that could involve partnerships with the private sector.

Appendix

Data on the respondents that took part in our survey

Our survey was conducted online in June and July 2016 and targeted at a range of actors in both private and public sectors in South-east Asia. A total of 37.3% of respondents, the largest grouping, were in energy-related sectors: 23.4% in oil and gas, 15.6% in alternative and renewable energy, and a further 1.6% in coal. Financial services accounted for 31.3% of respondents, perhaps reflecting the huge pipeline and expected investments to be made in energy related infrastructure and beyond in the coming years. Government accounted for 6.3% of respondents.

Respondents in large companies with revenues of US$10bn or more accounted for 20.8% of the total but 13.2% also came from companies with less than US$10m. Just less than two-thirds of respondents (64.2%) indicated that their global HQ is located in Asia with a further one-quarter (24.5% headquartered in Europe. Vietnam accounted for the largest single group of respondents (26.3%) with a further 64.8% fairly evenly distributed between Indonesia (17.5%), Singapore (17.5%), Thailand (15.8%) and Malaysia (14%).

In which sector do you operate?

Financial services	31.3%
Oil & gas	23.4%
Alternative & renewable energy	15.6%
Professional services / Consultancy	12.5%
Government	6.3%
Other	4.7%
Industrial goods & services	3.1%
Coal	1.6%
Chemicals	1.6%
	100.0%

What was your firm's global revenue for its latest full financial year?

Answer options	Response %
Less than US$10m	13.2%
US$10m to US$50m	9.4%
US$50m to US$100m	17.0%
US$100m to US$500m	20.8%
US$500m to US$1bn	7.5%
US$1bn to US$5bn	7.5%
US$5bn to US$10bn	3.8%
US$10bn or more	20.8%

Where is your firm's global HQ?

Answer options	Response %
Asia	64.2%
Australasia	1.9%
Europe	24.5%
N America	9.4%

Where are you based?

Answer options	Response %
Vietnam	26.3%
Indonesia	17.5%
Singapore	17.5%
Thailand	15.8%
Malaysia	14.0%
Cambodia	3.5%
Australia	1.8%
India	1.8%
The Philippines	1.8%
	100.0%

Source: The Economist Corporate Network.

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