International Energy Agency

The future of energy in Southeast Asia

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はじめに　－　エネルギー選択は不確実性の時代へ

- 再生可能エネルギー、電動車への期待感が、国際的に大きく上昇
- とりわけ太陽光、風力は産業分野として確立しつつあり、補助金なしでも国際的に導入が進む
- これを追い風に野心的な政府目標や、新技術の躍進を伝えるニュースが日々世界を巡るが、そのうちの何れが実現し、全体として何処へ向かっているのか？
  - 現実には、パリ協定に参加する各国とも諸目標を高く掲げる一方、足元政策による裏打ちは不十分
  - 市場では新技術、新ビジネスへの挑戦と失敗、漸進と停滞が混じり合う

World Energy Outlook の役割

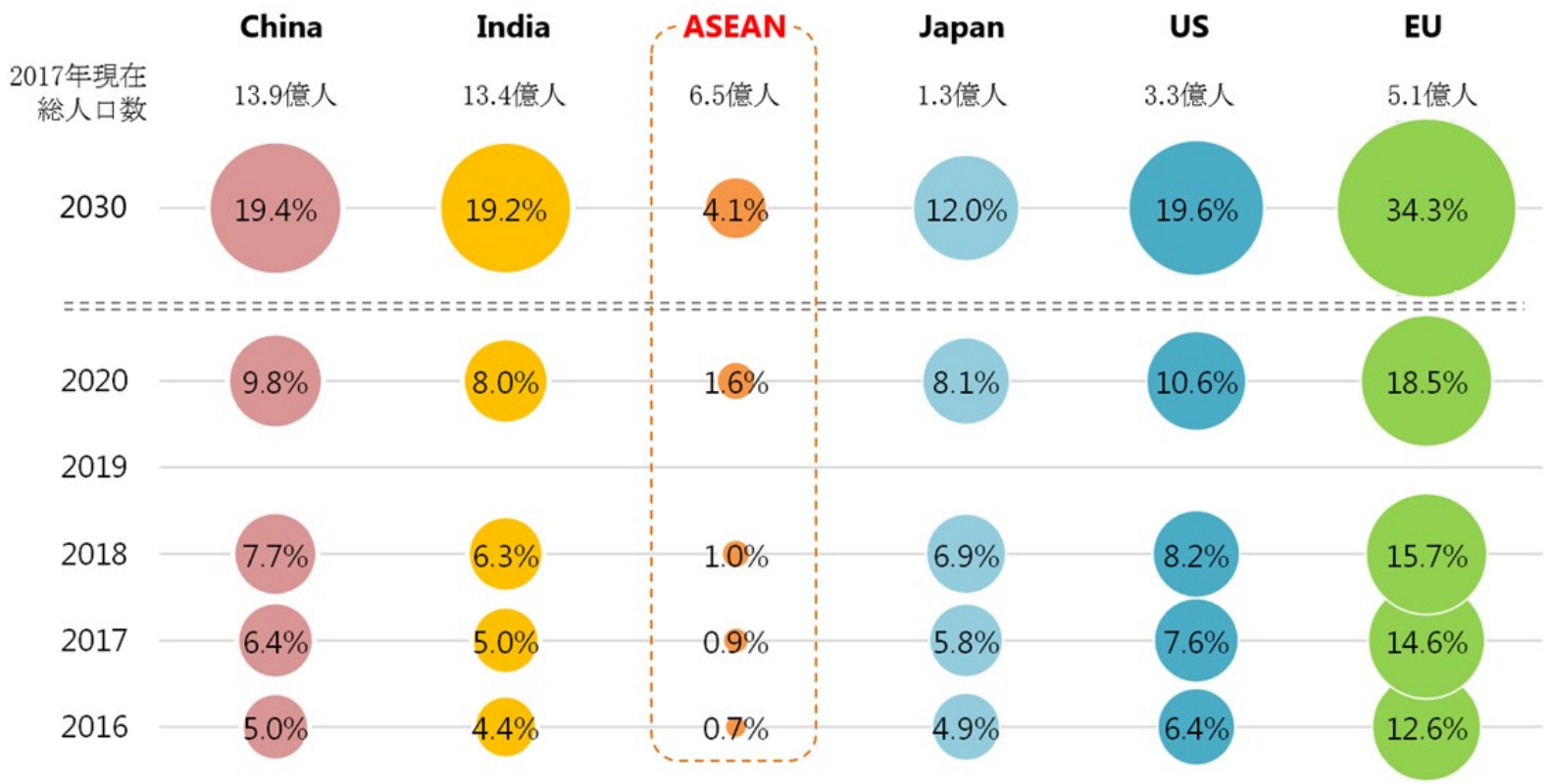
- 近年の状況からは、むしろ「長期見通しは不確実」、が持つべき基本認識
- 不確実な時代ほど、情報と分析力が必要
- World Energy Outlook (WEO)は将来を予測するための貴重なデータブック
  - 今までの見方が正しいのか、国際エネルギーの最新動向に照らして確認
  - 注目される革新的ニュースは、全体視点から真贋を見極め
- ただし、World Energy Outlook は将来像を“予測（forecast）”しない
- 今日の政策、技術の動向を前提に組み上げた、一シナリオに過ぎない。そして現在は、その“前提”が日々揺れ動く転換期（不確実性の時代）

東南アジア（ASEAN）特集の位置づけ

- 東南アジアの理解は、世界動向の理解に直結（新興国の課題は共通）
  - 巨大な人口を背景にエネルギー需要が急増、しかしインフラは未成熟であり、投資資金は常に不足
  - 石油・ガス輸入量の膨張はエネルギー安全保障、貿易収支上の懸念点
  - 安定供給のため低コストなエネルギー源（化石燃料）に依存するが、他方でＣＯ２排出、大気汚染などの環境問題が顕在化
  - コスト低下が著しい再生可能エネルギーの位置付け見直しが進む
  - エネルギー安全保障の文脈で、電動車をどう捉えるか？

各国総発電量における太陽光、風力発電のシェア

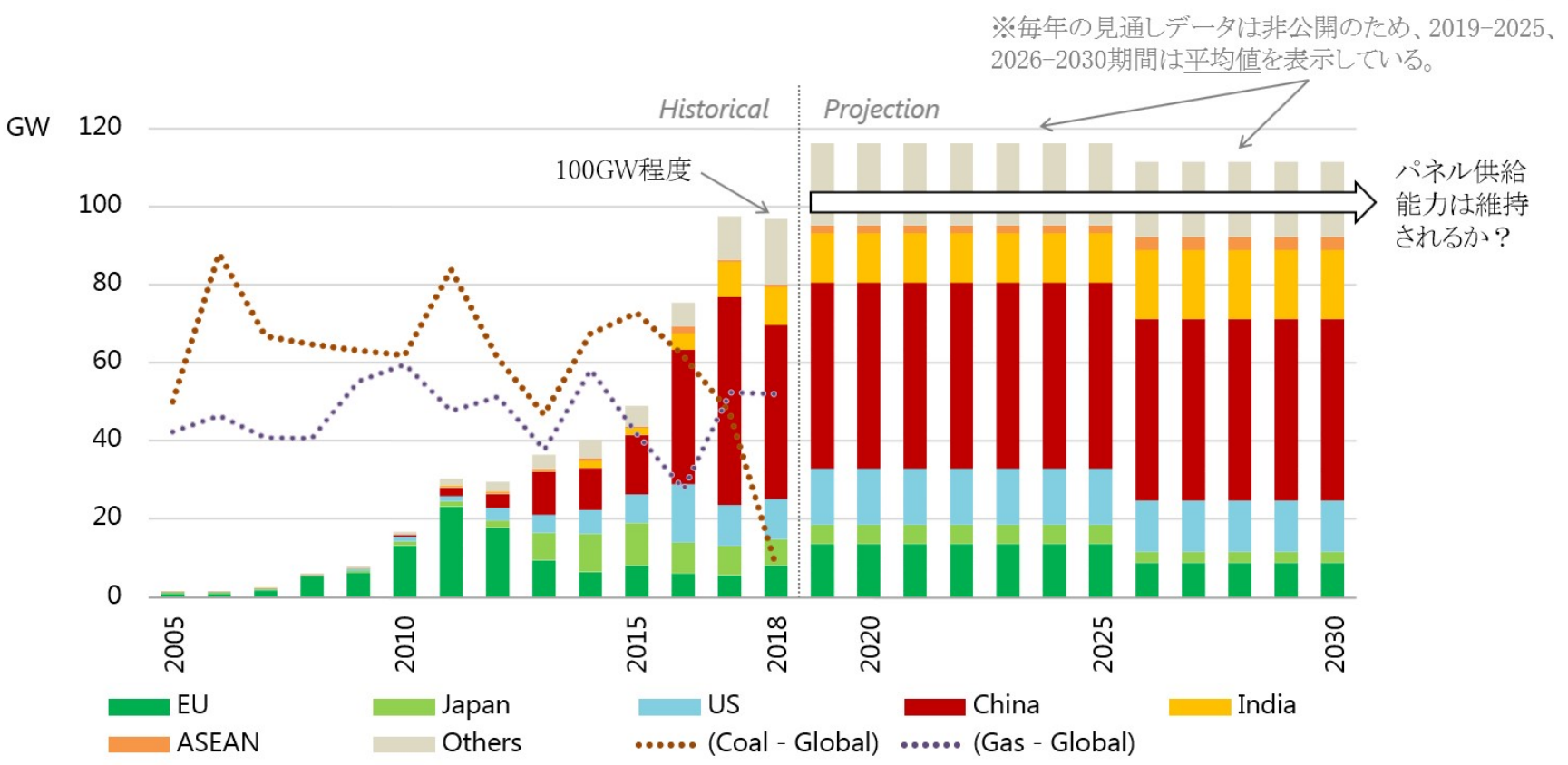
※WEO2019（本年版）暫定データを使用



※数値は総発電量に占める太陽光及び風力の発電量シェア（%）、円の面積は数値に対応する。

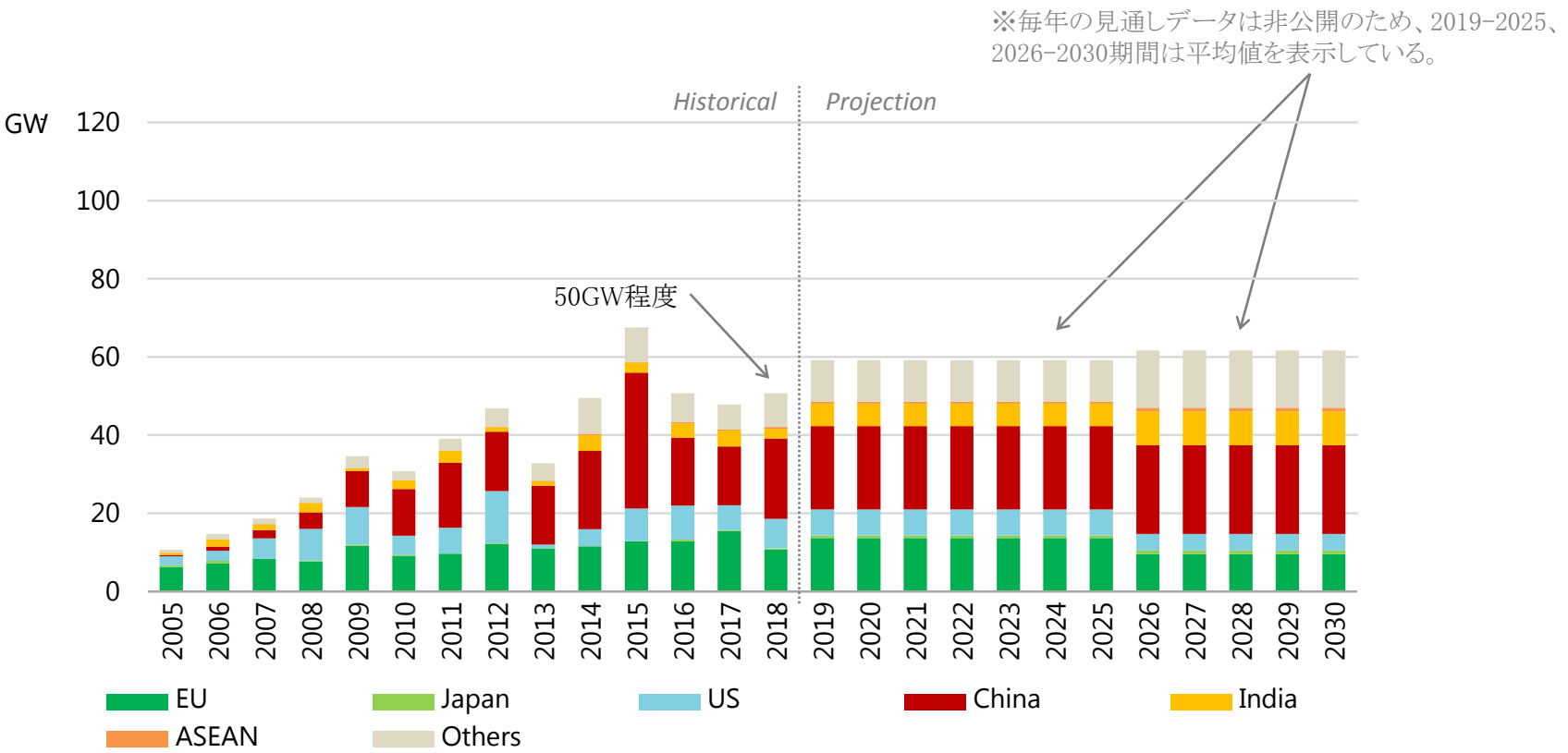
世界の太陽光発電の年間導入量

※WEO2019（本年版）暫定データを使用



世界の風力発電の年間導入量

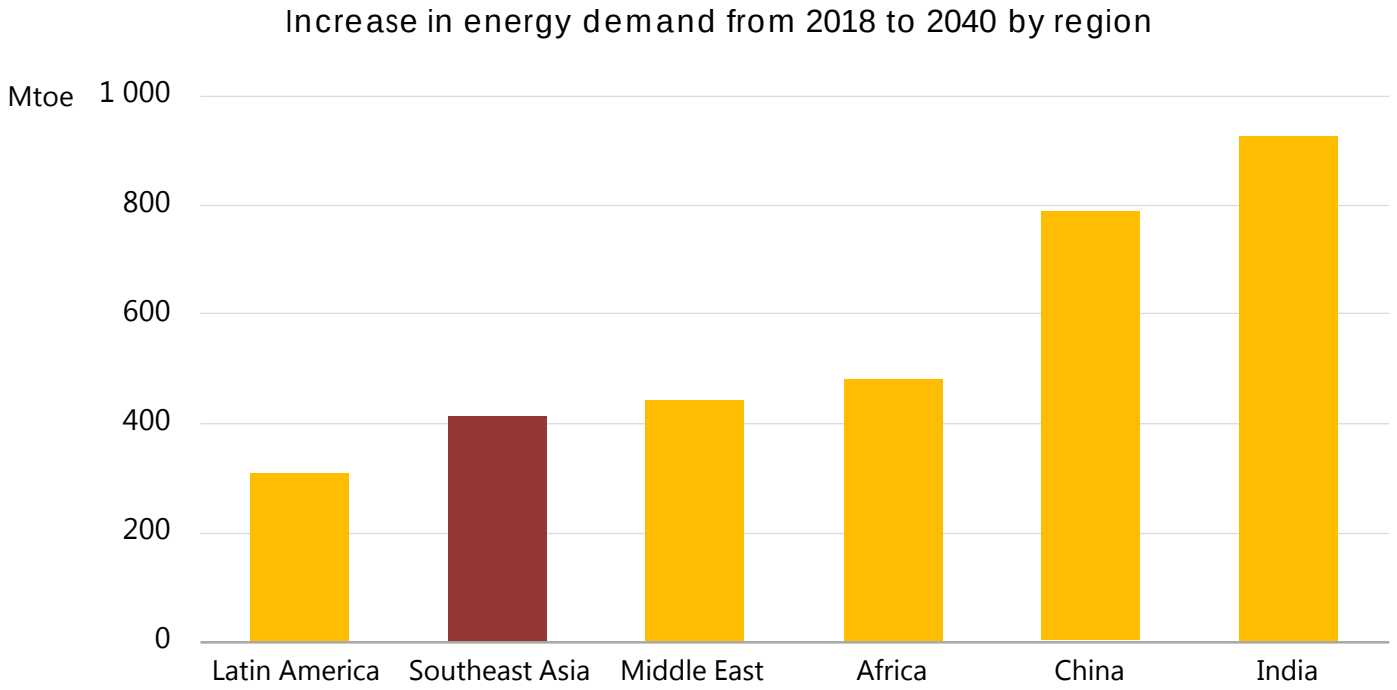
※WEO2019（本年版）暫定データを使用



1. 東南アジアのエネルギー需給動向　2000－2040

ASEAN’s energy landscape, 2000 - 2040

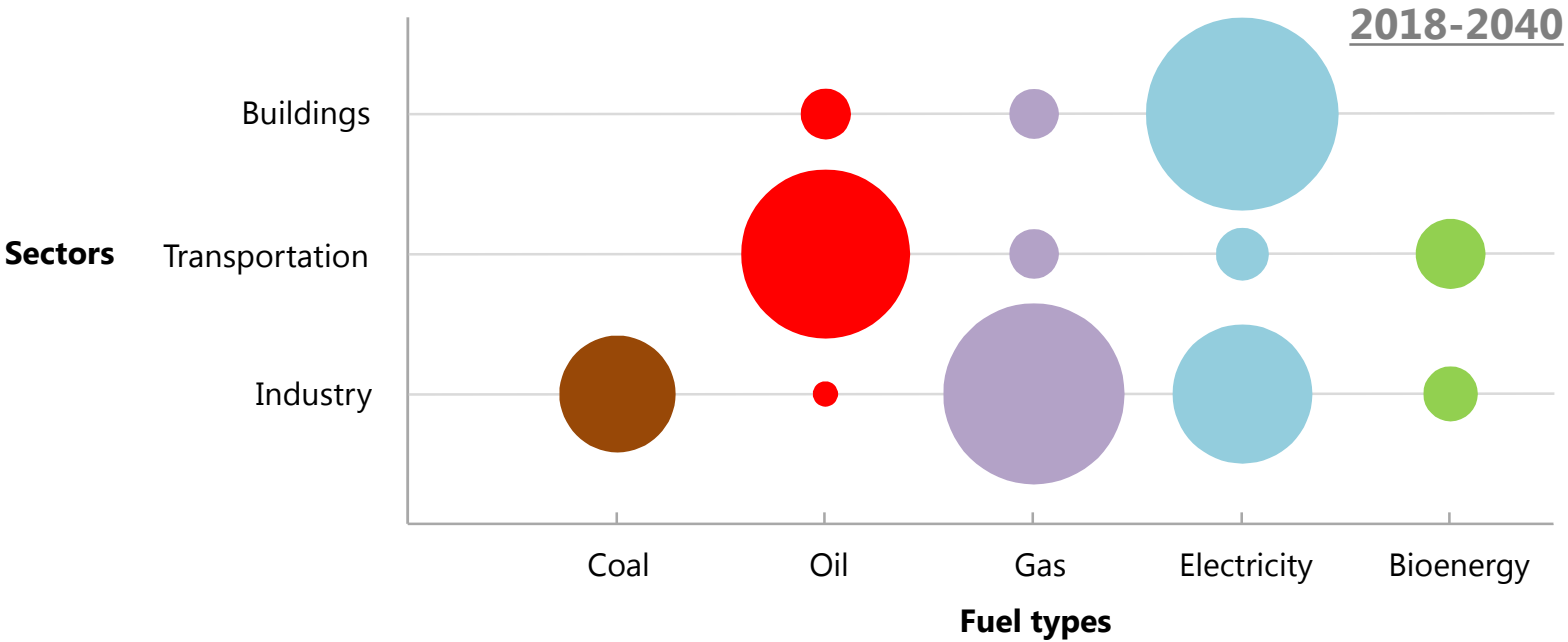
Southeast Asia is an emerging heavyweight in global energy



Based on today's policy settings, the pace of energy demand growth in Southeast Asia to 2040 is double the global average, spurred by rising incomes, industrialisation and a rising urban population

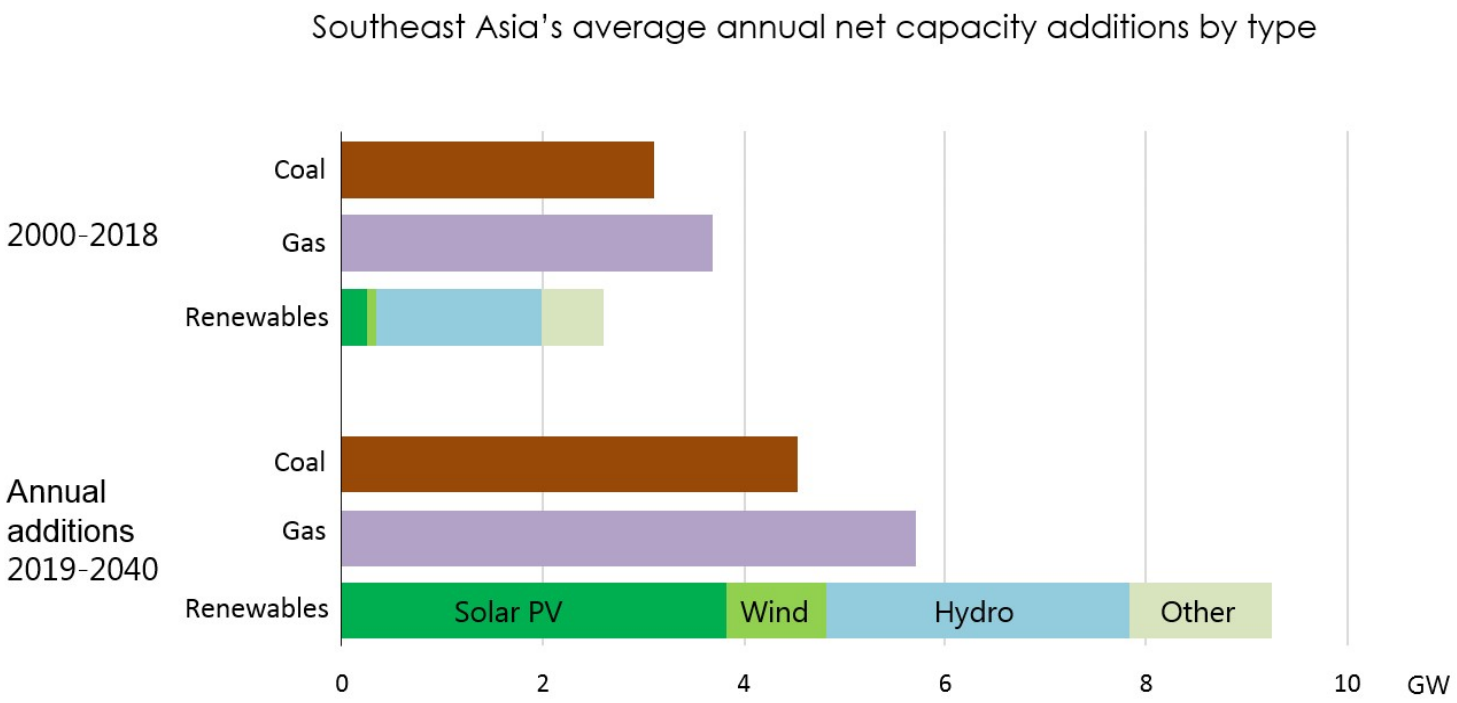
Economics and demographics are driving energy consumption

Growth in final energy consumption by sector and by fuel type in Southeast Asia



Oil for transport has led end energy use past 2 decades. Next two decades embraces continued growth of oil, but also rapid electrification of energy consumption, as well as switch-to-gas in Industrial sector.

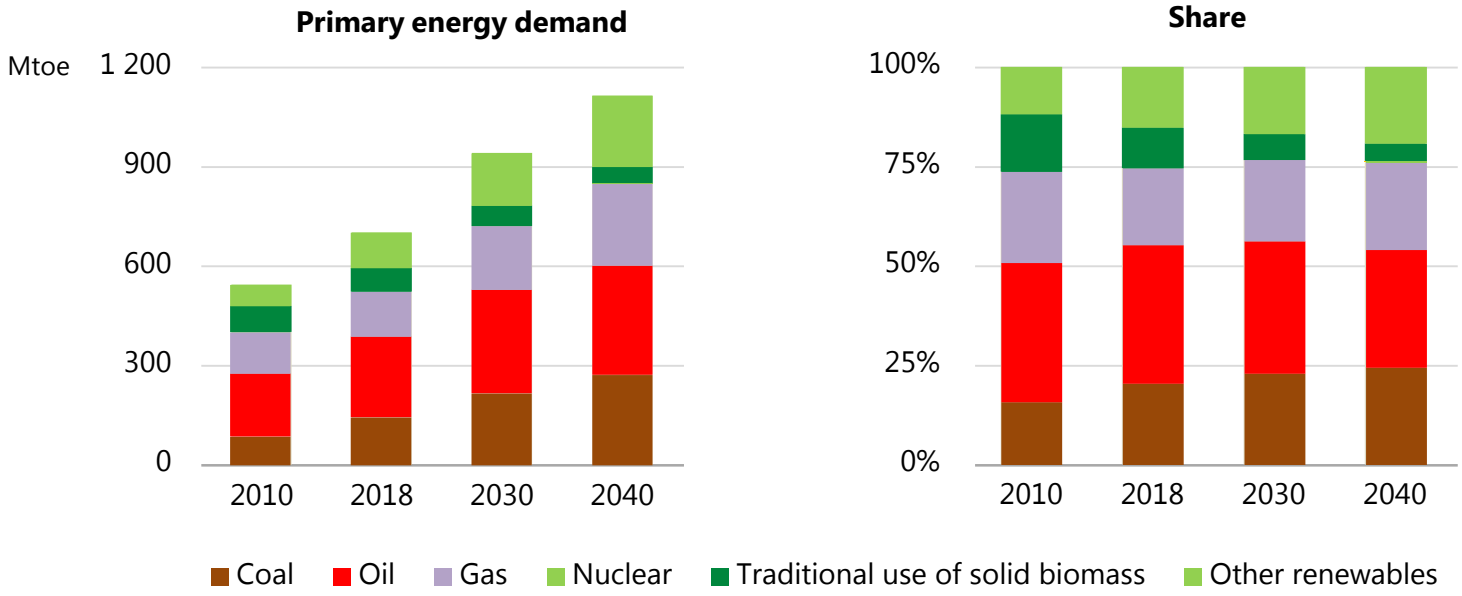
Renewables are gradually gaining momentum in the power sector



Policy support and investor appetite for renewable electricity projects are picking up but, as things stand, the growth in renewables would cover only about a third of rapid overall growth in electricity demand.

The region mobilises all fuels to meet rising demand

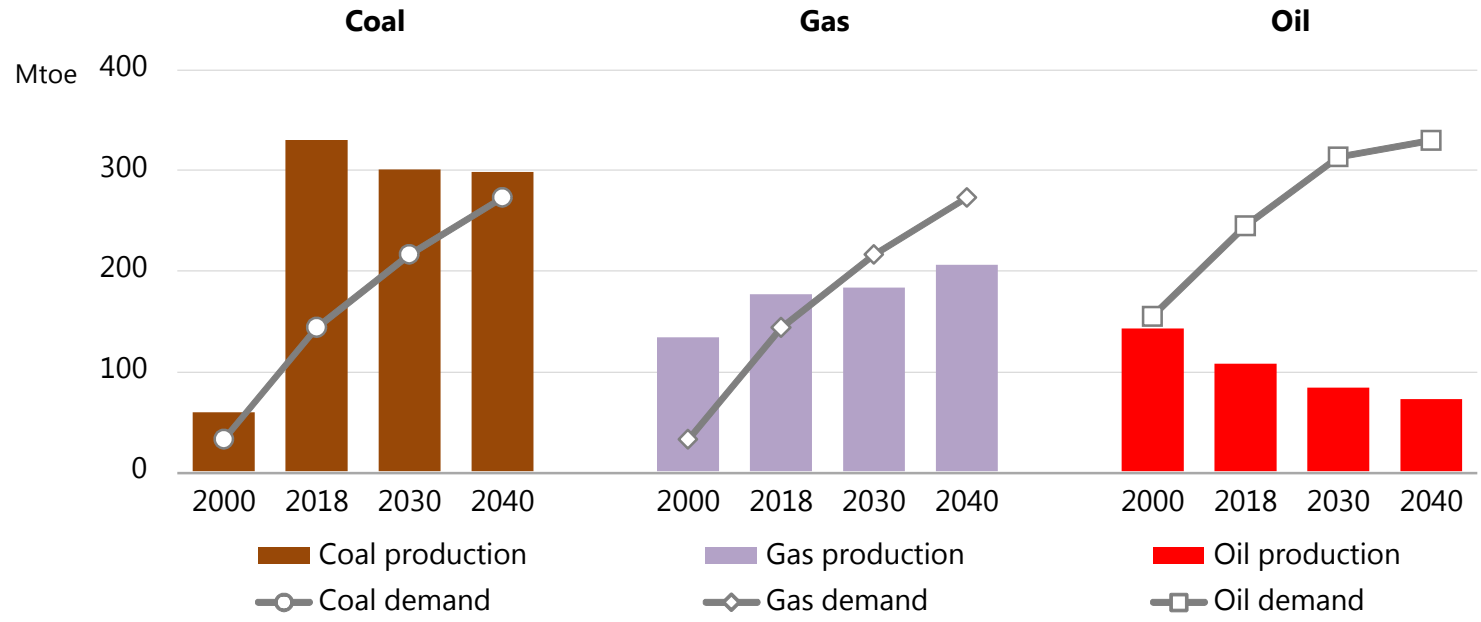
Primary energy demand in Southeast Asia in the Stated Policies Scenario



The region's longstanding reliance on oil, coal and natural gas is diluted only slightly by increased deployment of modern renewable technologies over the coming decades

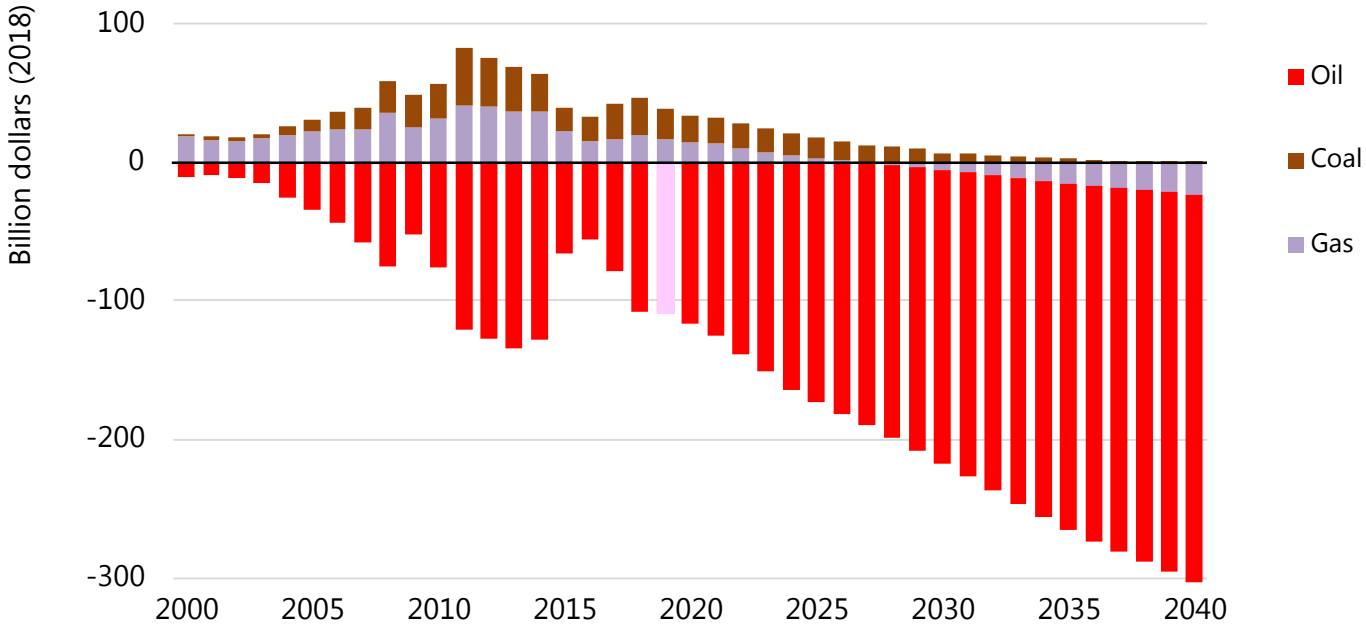
Rising fossil-fuel needs are increasingly met by imports from outside the region, with exception of coal

Change in fossil fuel supply and demand in Southeast Asia in the Stated Policies Scenario



Note: Mtoe = million tonnes of oil equivalent.

Today's policy settings push energy imports deep into the red

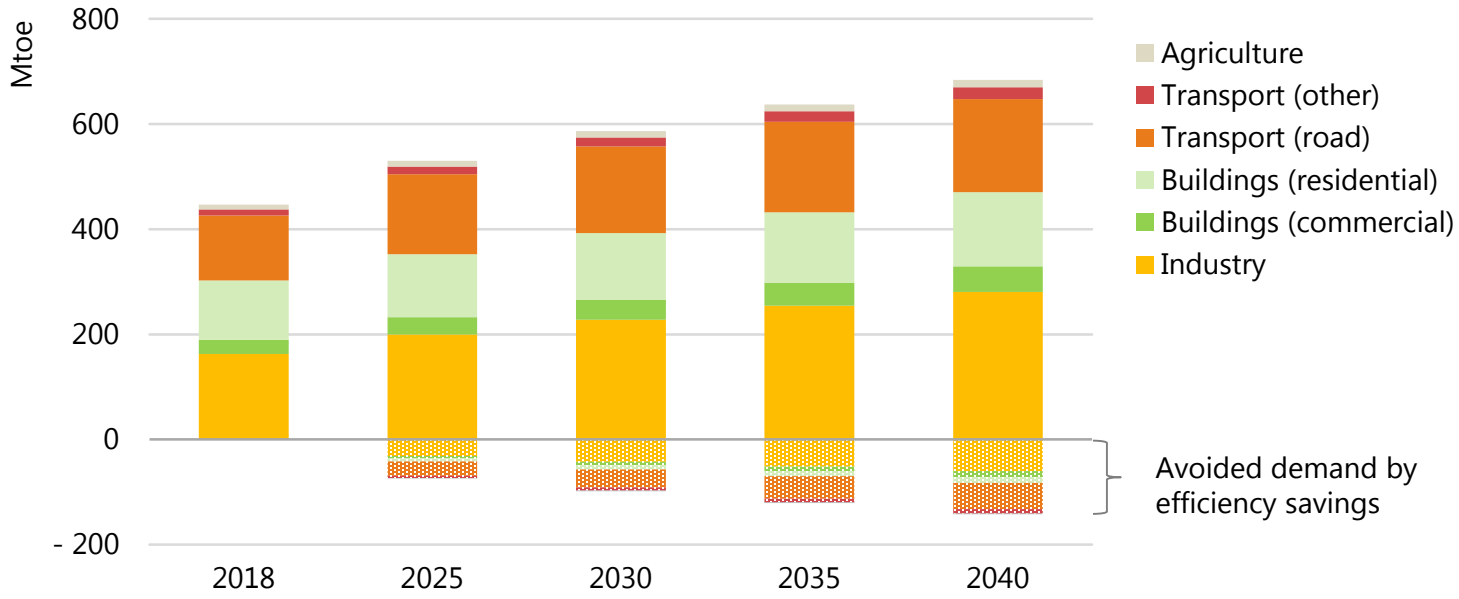


Southeast Asia faces an energy import bill of over $300 billion/year by 2040, largely due to soaring oil imports; the region would also become a net importer of LNG by the late 2020s

2. 東南アジアにおけるエネルギー転換の機会
ASEAN’s opportunities for energy transitions

Efficiency improvements constrain the rise in final energy consumption

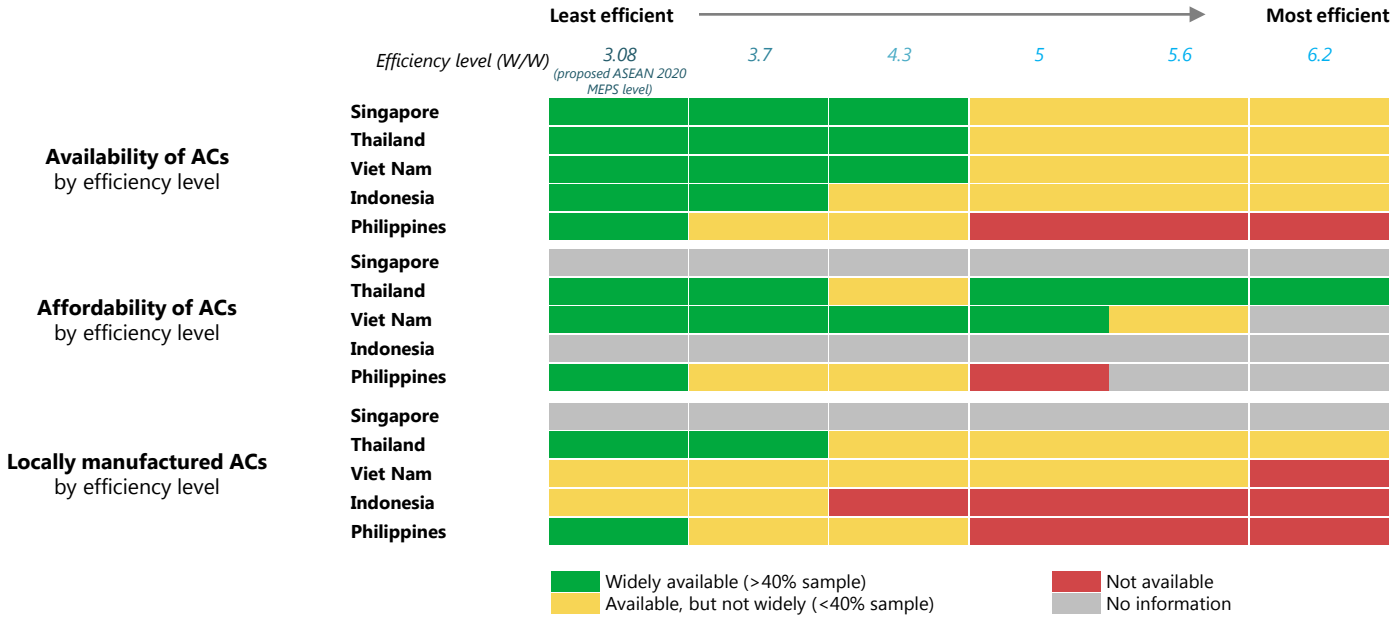
Final energy consumption and energy savings by sector in Southeast Asia in the Stated Policies Scenario



Note: Mtoe = million tonnes of oil equivalent.

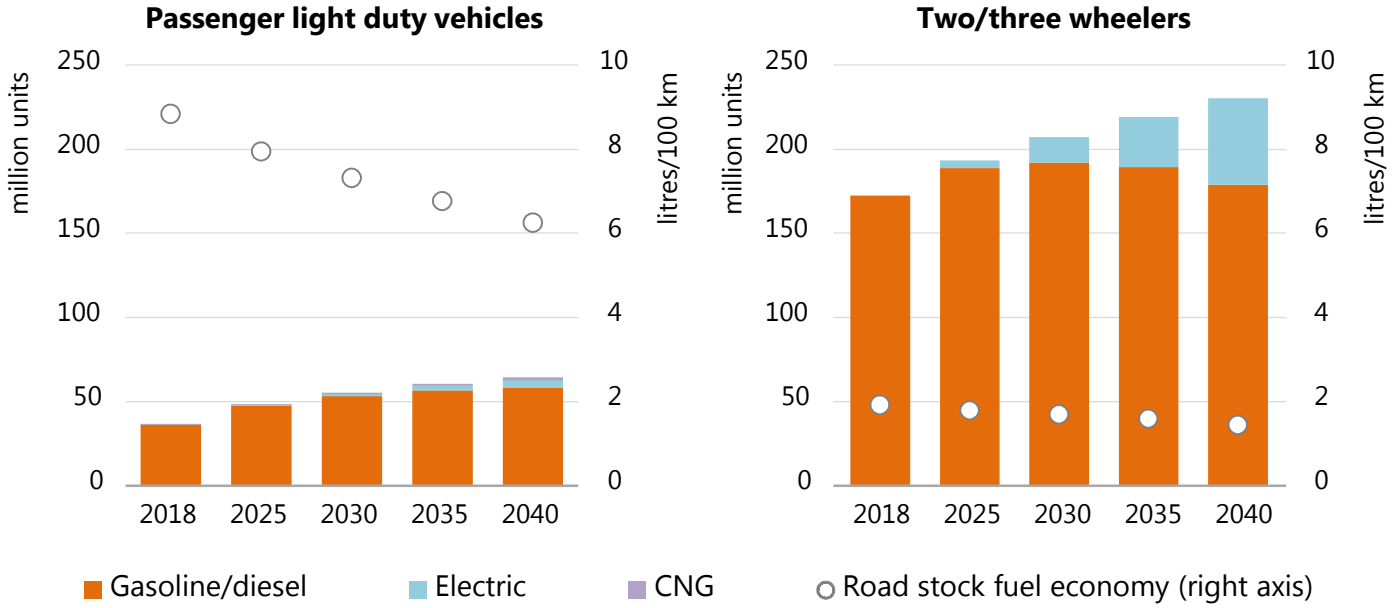
More efficient air conditioners are not always more expensive or necessarily imported

Results of IEA air conditioning market analysis in selected Southeast Asian countries



Fuel efficiency improves and electricity starts to gain ground for two/three- wheelers

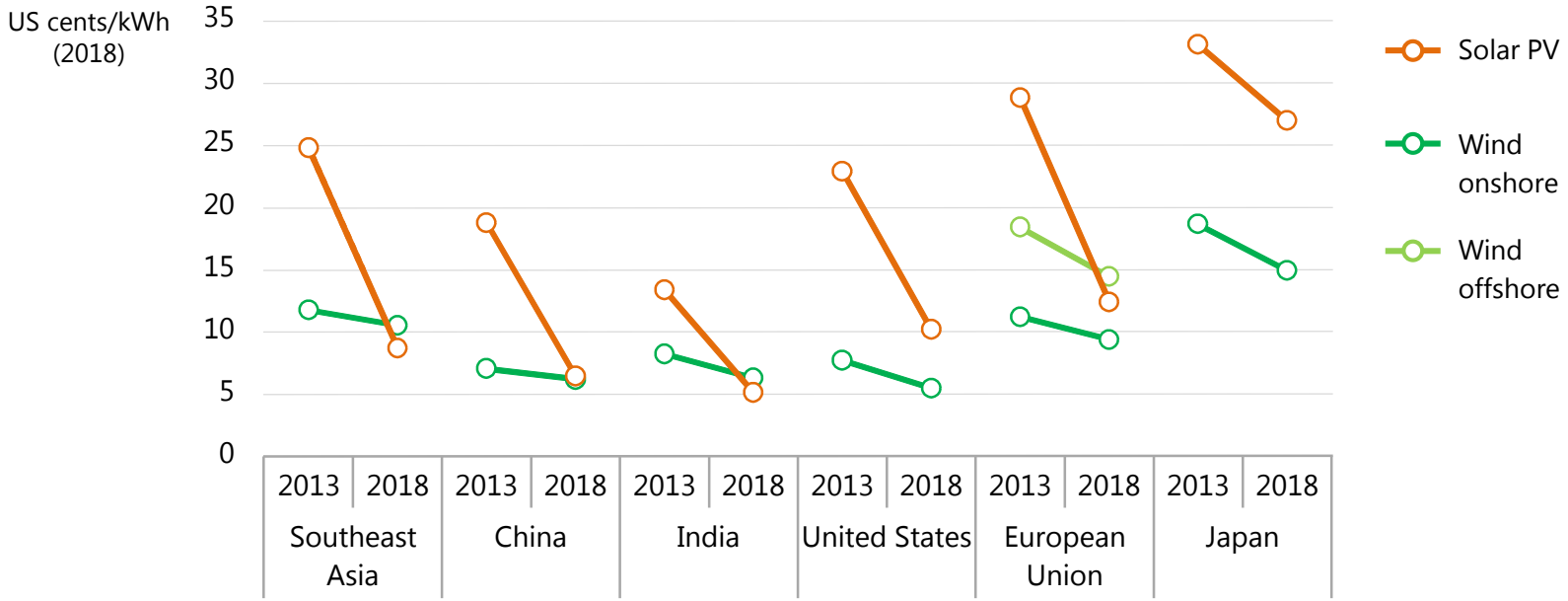
Stock and fuel economy of road vehicles in Southeast Asia in the Stated Policies Scenario



Note: CNG = compressed natural gas; km = kilometres.

Falling costs are expanding opportunities for renewable electricity

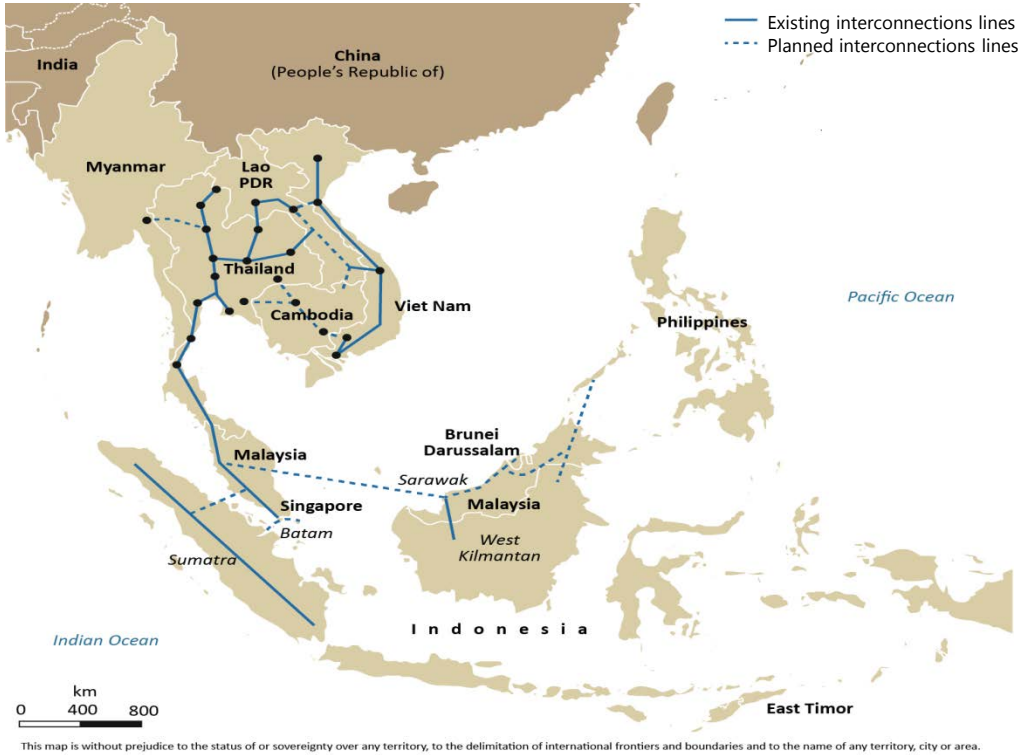
Levelised cost of electricity in selected regions and countries, 2013-18



Note: MWh = megawatt-hour. Economic life time of solar PV and wind is assumed to be 25 years.

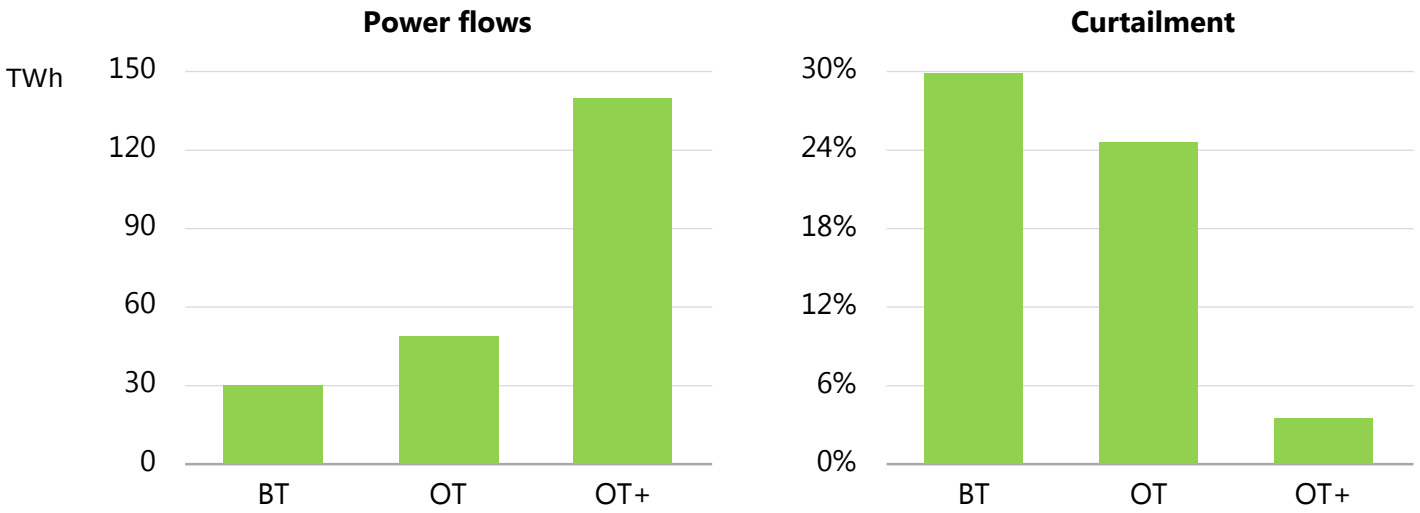
Power integration efforts in Southeast Asia promote sharing rich renewable energy resources and optimise electricity flows in its grid system

Southeast Asia power grid plans



Expanded cross-border trade reduces curtailment of generation from wind and solar PV

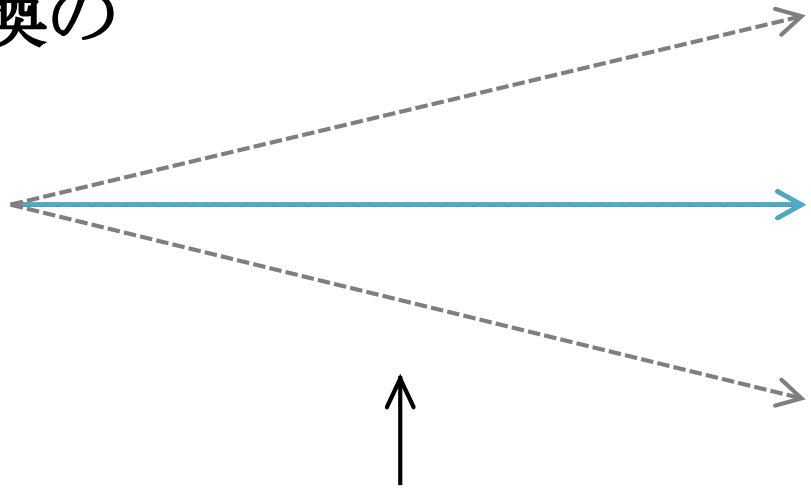
Annual power flows from east to central region (left) and curtailment of variable renewable output (right) by case in 2035 based on the Sustainable Development Scenario



Notes: BT = bilateral trade; OT = optimised trade; OT+ = optimised and expanded trade; VRE = variable renewable energy. See Annex for modeling methodology.

エネルギー転換の

「機会」



「将来」

公表政策
シナリオ

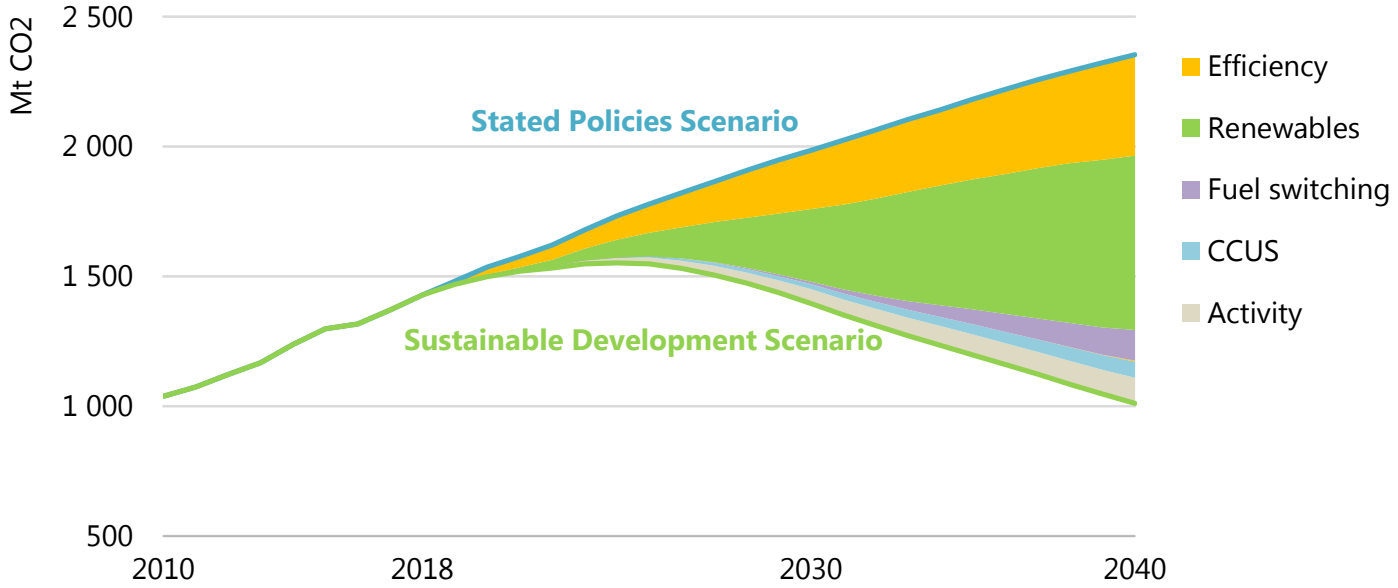
「将来」

各国の政策・目標
＋履行・実施能力

3. 持続可能開発シナリオに向けて
Sustainable Development Scenario

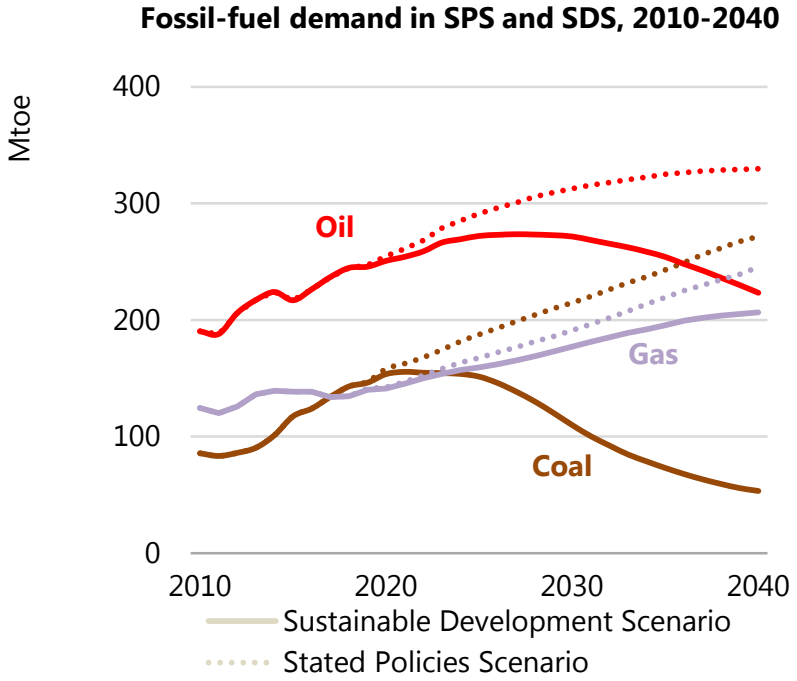
There is no simple solution to Southeast Asia's rising emissions

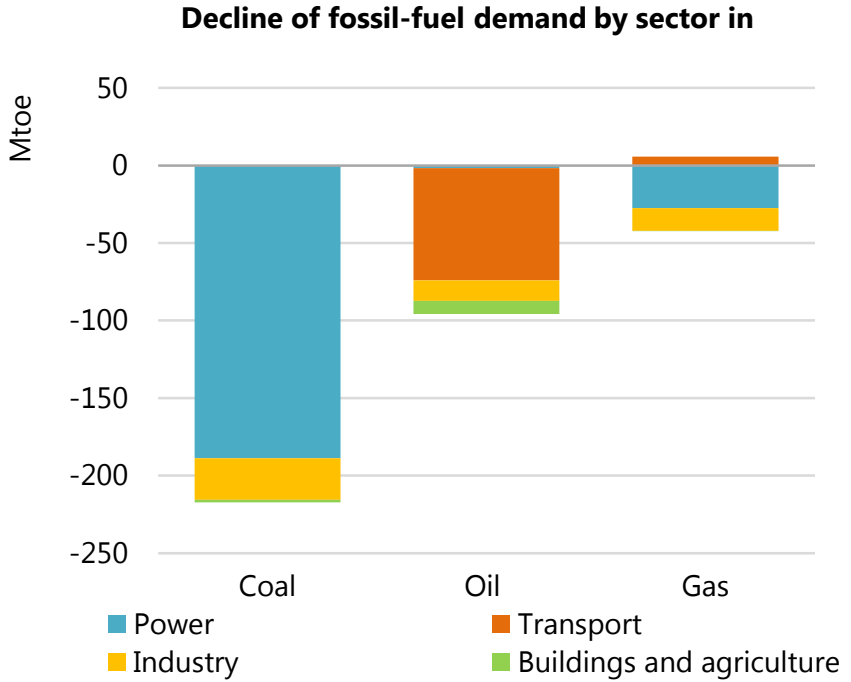
CO_2 emissions reductions in the Sustainable Development Scenario relative to the Stated Policies



Southeast Asia is on track to achieve full electrification in the early 2030s, but reversing the rising trend for air pollutant and CO_2 emissions would require a major acceleration in energy transitions across all sectors

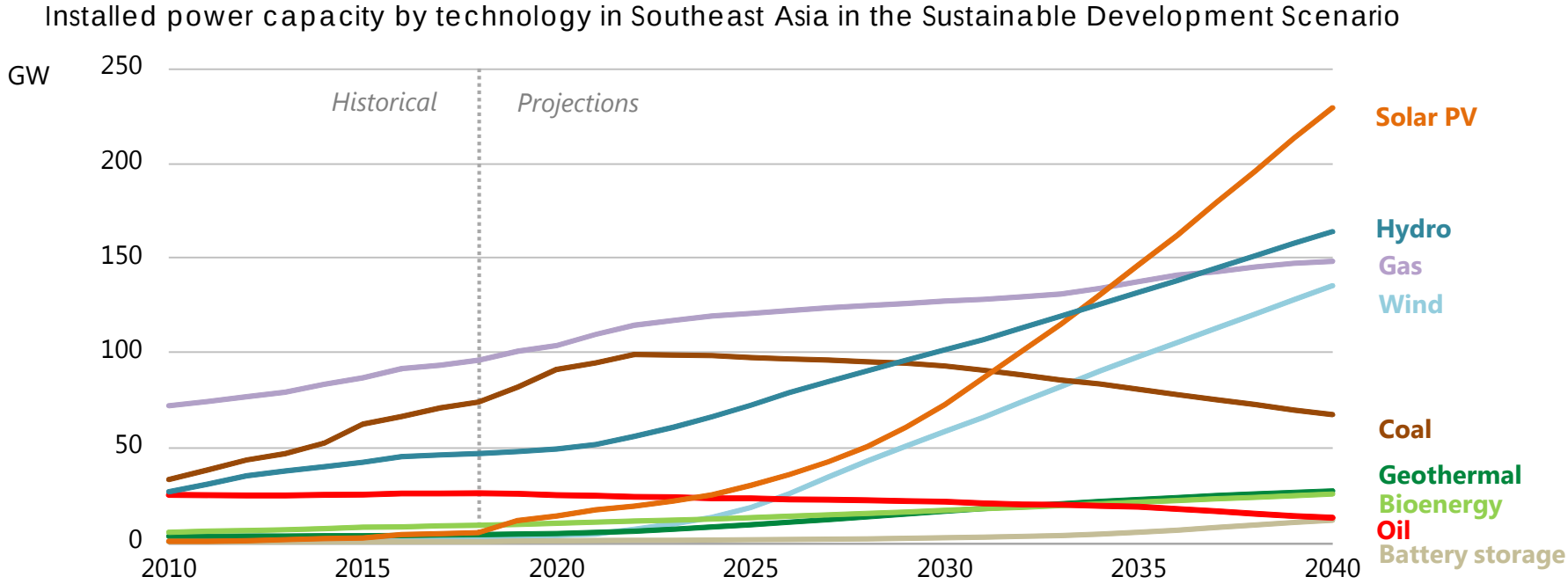
Fossil fuel use needs to fall significantly





Achieving clean transition objectives will require a decrease in coal use of 80% and a decrease in oil use of 30% vis-à-vis the current energy demand trajectory

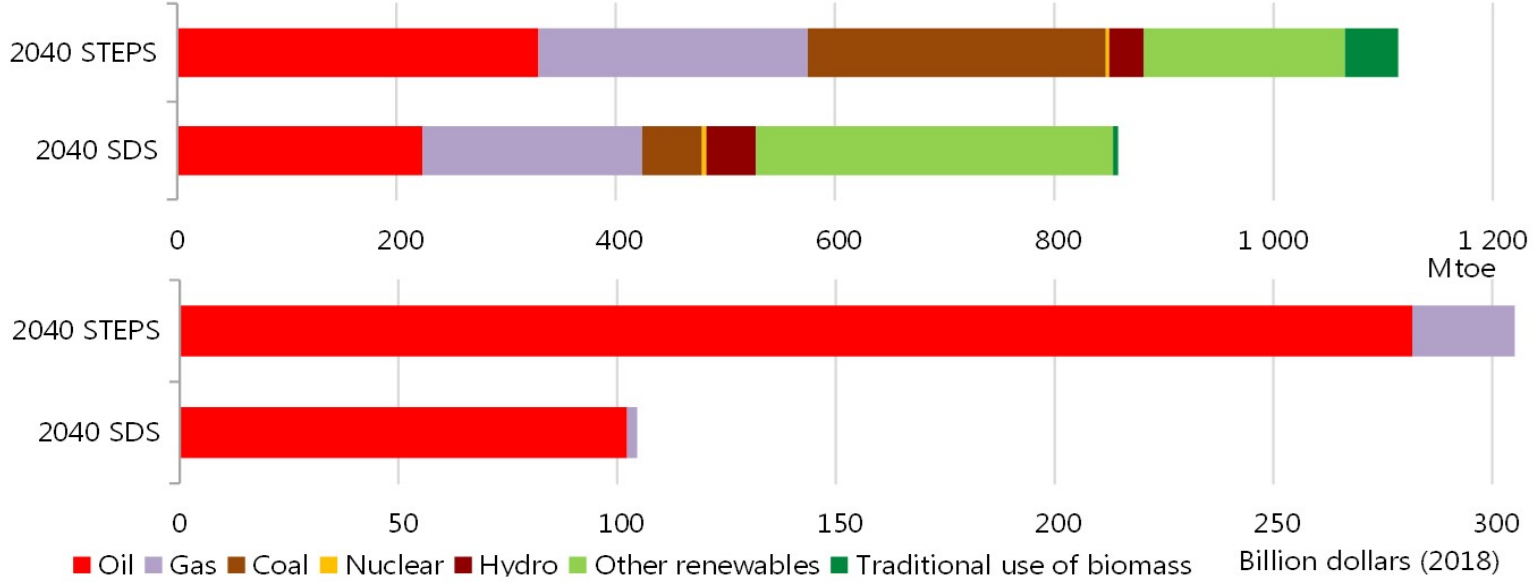
Solar and hydrogen lead the way in the new power mix



Three-quarters of power supply is renewable by 2040, requiring supportive policy frameworks and intensive efforts to integrate renewables, including through power trade

The energy transition has huge financial upsides

Total primary energy demand (top) and energy import bill (bottom) by scenario in Southeast Asia



Multiple approaches and technologies are required

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