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ASEAN countries' GHG emissions per capita are relatively low compared developed economies. But this region's carbon dioxide emissions growth has been the fastest in the world between 1990 and 2010, due to its rapid economic growth and growing demand for energy. Nonetheless, experts believe that climate change raises the likelihood of larger economic losses in this region if the world fails to limit the global temperature rise to 1.5°C. As the world targets to achieve net zero emissions by 2050, ASEAN has a role to play while ensuring its sustainable economic growth in the years to come.

In this Decarbonising ASEAN series, we highlight three key sub-themes that we believe will gain momentum over time:

Circularity or circular economy

A circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use and regenerating natural systems. It has been a very popular theme across steel, aluminium, paper, textile and plastic etc in terms of reducing waste, pollution and increase sustainability as well as profitability.

Decarbonisation of power

Government policies/regulations are in place to raise renewable mix and manage carbon emissions from existing conventional sources. Rapid technology developments have improved energy efficiency while ensuring stability of power infrastructure, aimed at helping traditional economies transition into renewable economies.

Decarbonisation of palm oil

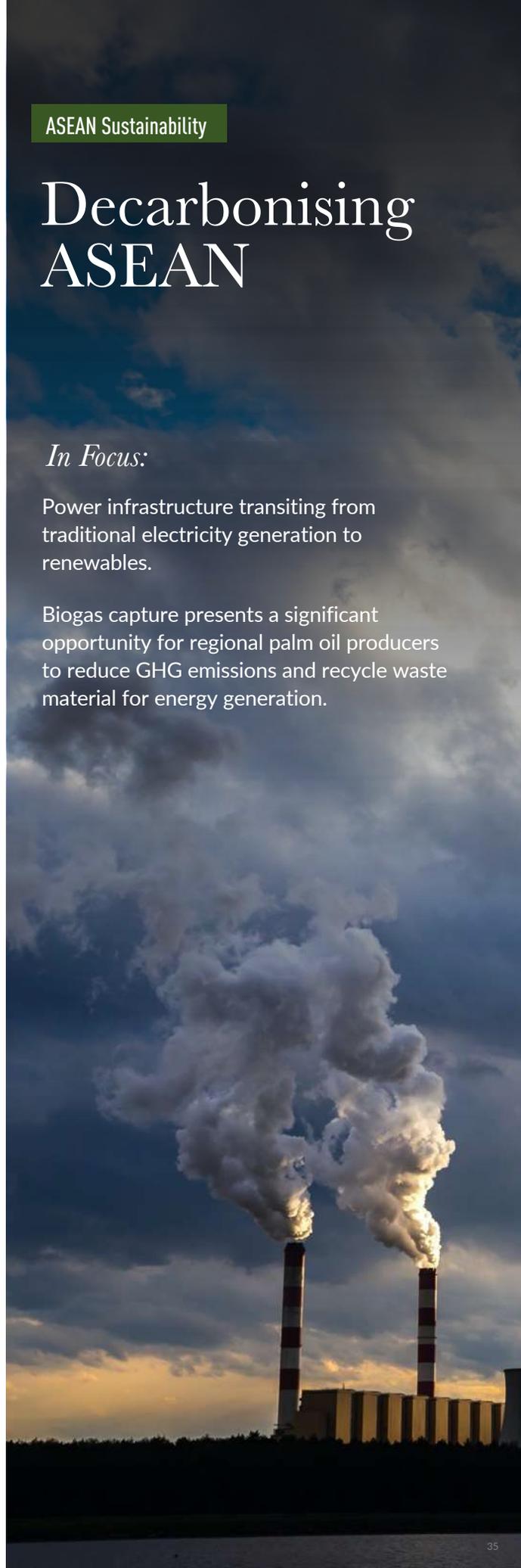
There is scope for decarbonisation of the oil palm sector, one of the region's biggest agriculture crop, via methane avoidance or methane capture, good agricultural practices, and enrichment of conserved landscapes.

Decarbonising ASEAN

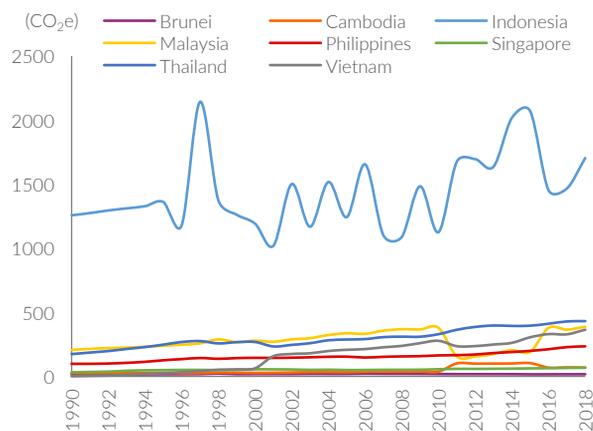
In Focus:

Power infrastructure transiting from traditional electricity generation to renewables.

Biogas capture presents a significant opportunity for regional palm oil producers to reduce GHG emissions and recycle waste material for energy generation.



Historical GHG emissions



Source: CAIT; Countries/Regions: Brunei, Cambodia, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam; Sector/Subsectors: Total including LUCF; Gases: CO₂; Calculation: Total; Show Data by Countries

A massive number of investments are needed in ASEAN in the years ahead to decarbonise the region.

Decarbonising initiatives are enabled by the availability of advanced technologies and significant reduction in investment costs over the past years. Yet, the economic returns of investing in similar technologies can vary across the different countries in ASEAN. Some may yet be financially viable while others are on the borderline.

Hence, some incentives in the form of carbon credits, extra tax breaks by the government, and/or low green funding costs may just be the final push needed to make these investments viable while helping to green the economy.

Circularity or circular economy

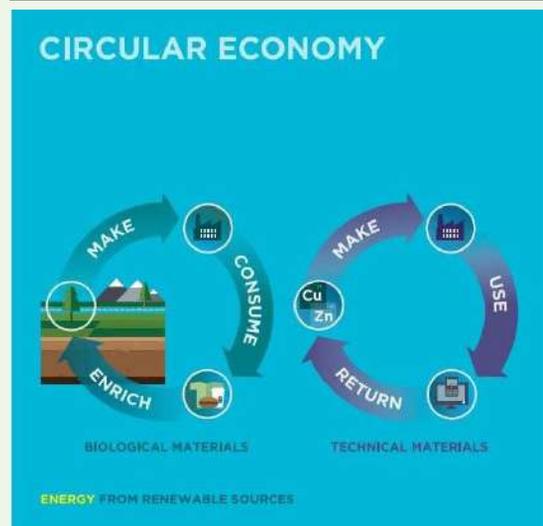
With a growing income comes increased consumption. The linear model has worked very well as low income economies shift to middle and higher income. Median waste generation rates in high income countries are 6x that of low income countries. The annual estimated global waste is 3.8b tonnes.

If the traditional 'take-make-waste' model is converted into a 'circularity' model it could provide multi-trillion dollar opportunity apart from saving the cost of managing the waste.

These opportunities could come from:

- Collecting and reusing waste material into production, packaging or energy generation
- Recycling water and using it for internal purpose instead of discharge
- Extending the life of products through re-design
- Selling products as service

The 'circularity' model ensures optimization of all resources and prevents the need for extracting additional natural resources. It reduces emission by reusing the waste and even controlling the demand to an extent.



Source: Ellen Macarthur Foundation

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Decarbonisation of power

The power sector is the leading emitter of GHG emissions, accounting for 30% of global emissions according to the World Resource Institute.

Decarbonising the power sector will be a critical lever to meet Paris Climate Agreement goals, more so for ASEAN which is expected to see a blistering pace of electricity consumption for the next decade at 5-6% while its energy mix remains geared towards on coal and gas (70%).

In accordance with the Paris Climate Agreement, ASEAN governments have set ambitious renewable targets, raising renewables as % of energy mix, generally to the cost of coal. Indonesia has raised its target to 23% (2025), Thailand 36% (2037), Vietnam 21% for non-hydro (2030) and Malaysia doubling their renewable capacity to 4GW by 2030. Significant drop in LCOE (70-90%) for renewables over the last decade, both in the region and globally has been critical to supporting these targets.

Governments have rolled out supportive policies (attractive renewable tariffs, auctions, renewable dispatch priority etc), but it is clear some countries like Vietnam have been more effective, while others like Indonesia lag. Between 2018-2020, Vietnam added 15GW of renewable capacity, significantly outpacing the rest (see chart below). We believe countries in the region will look towards Vietnam's success to further manage their renewable goals.

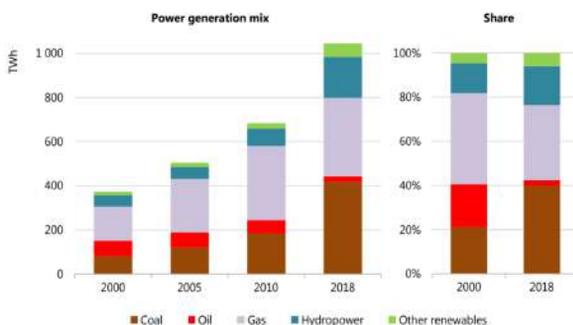
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In 2018, coal and gas accounted for roughly 80% of Southeast Asia's energy mix

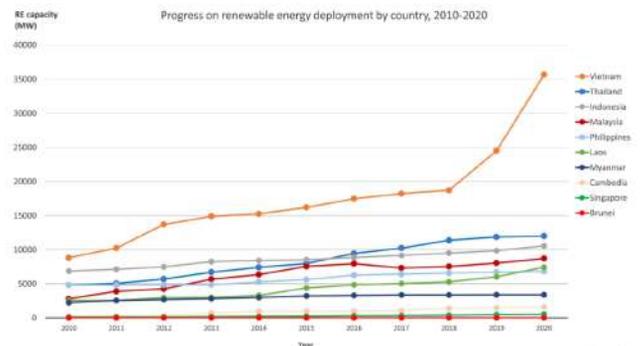
Power generation mix and shares by fuel in Southeast Asia, 2000-18



Source: IEA

Vietnam leads the region in renewable deployment

Progress on renewable energy deployment by country, 2010-2020



Source: IRENA

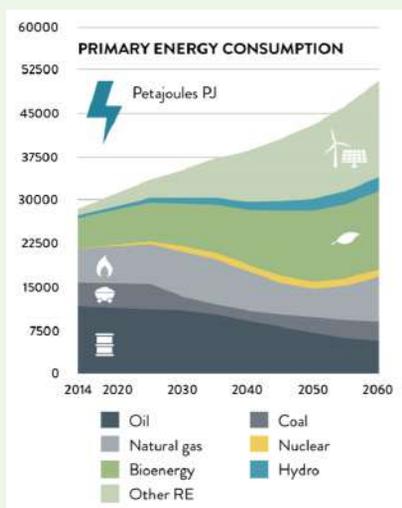
Secular development in technology will inevitably drive decarbonisation. Renewables are already at cost parity with conventional (coal and gas) sources in various regions and will continue to get more competitive. Southeast Asia is expected to invest USD9.8b in smart grid infrastructure between 2018 and 2027.

Singapore and Malaysia are clear leaders in the region, while Thailand has demonstrated a real commitment (various pilot projects with renewables). Smart grids will enable effective management and distribution of renewables and improve overall efficiency in the power system. Energy Storage Systems (ESS), which are increasingly being considered to be feasible for Southeast Asia can mitigate intermittency issues for renewables and overall improve efficiency. Fluence is working on 500+ MW worth of energy storage systems in Southeast Asia, the largest in the region and expects more to come.

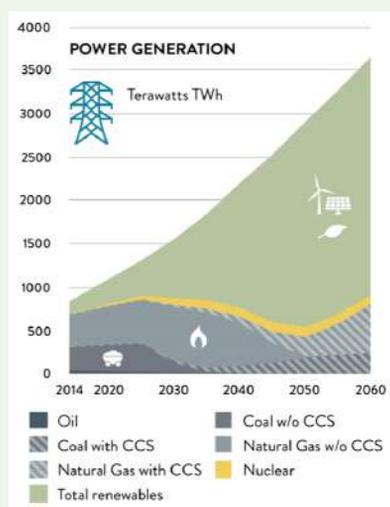
We note widespread and growing adoption of High Efficiency Low Emissions (HELE) technology for coal plants in the region. HELE operations reach 40-50% efficiency and have an important role in reducing emissions. IEA estimates that combined with Carbon Capture Storage (CCS), HELE technologies can cut CO₂ emissions from coal-fired power plants by 90% to less than 100g/KWh. Nevertheless, CCS for the most part remains economically unviable. There are no operating or planned projects in ASEAN.

Power players such as BGRIM (BGRIM TB, BUY, TP:THB65), BCPG (BCPG, TB, HOLD, TP:THB15.2), and AC Energy (ACEN PM, SELL, TP: PHP5.40) have a history of operations in renewable energy with sizeable renewable portfolios across Southeast Asia ASEAN. We flag players GPSC (GPSC TB, BUY TP:THB100) as we see high upside potential of renewable capacity additions in the next 5 years.

Under the 1.5 degree scenario, renewables will drive new capacity additions in ASEAN member states



Source: IEA



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Decarbonisation of palm oil

In ASEAN, oil palm is planted mainly in Indonesia (c.15m ha), Malaysia (c.6m ha) and Thailand (c.1m ha) which collectively produces 66.3mt of palm oil and accounts for approximately 88% of global palm oil output.

While the crop itself is not a major GHG emitter (see chart) even relative to other oils, it does produce waste during the milling process. The biggest GHG emissions in the palm oil sector is palm oil mill effluent (POME; basically waste) that emits methane gas. There are available technologies to help avoid methane gas or help methane gas capture for conversion into renewable energy via electricity generation or bio-CNG to fuel trucks in estates.

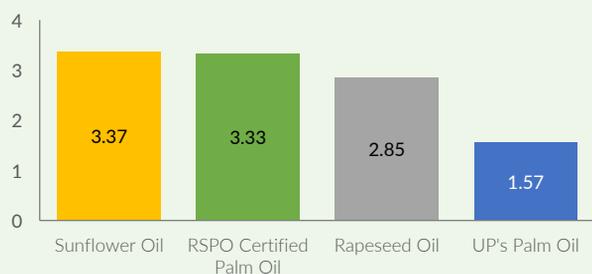
For instance, according to the Malaysian government statistics in 2017, out of 454 palm oil mills, 104 of them were fully equipped with biogas capture facilities.

Through this initiative, an emissions reduction of 2,377.84 Gg CO₂ eq was achieved in 2016. There is therefore immense potential for GHG savings from the remaining palm oil mills (see chart).

Among the palm oil planters, Kuala Lumpur Kepong (KLK MK, BUY, TP: MYR29.60), PT Dharma Satya Nusantara (DSNG IJ, Not Rated), United Plantations (UPL MK, Not Rated), Sime Darby Plantations (SDPL MK, HOLD, TP: MYR4.71), IOI Corporation (IOI MK, BUY, TP: MYR4.71), and Bumitama Agri (BAL SP, BUY, TP: SGD0.65) are among some of the leaders in low GHG emissions intensity (per CPO tonne) which can be emulated by peers.

Sustainably produced palm oil have comparable, if not lower, GHG emissions

The 2020 GHG emissions from UP's Palm Oil Production have been compared with industry averages of RSPO certified palm oil (Malaysia/Indonesia), rapeseed oil (Europe) and sunflower oil (Ukraine). The industry averages are based on Schmidt and De Rosa (2020) and Schmidt (2015).



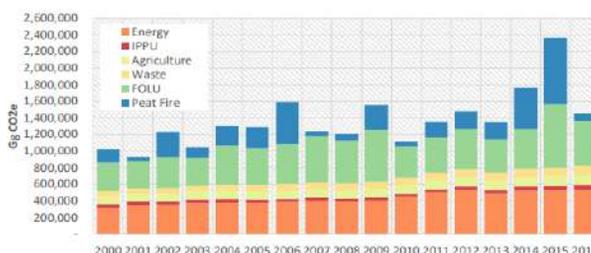
Source: United Plantations Annual Report 2020

Malaysia: Total GHG emissions for 2016 were 316,833 Gg CO₂ eq. for emissions without LULUCF, and 75,488 Gg CO₂ eq. with LULUCF

Sector	Emissions/Removals (Gg CO ₂ eq.)
Energy	251,695.02
Industrial Processes and Product Use	27,348.83
AFOLU – Agriculture	10,627.72
AFOLU – LULUCF (Emissions)	17,801.27
AFOLU – LULUCF (Removals)	-259,146.03
AFOLU – LULUCF (Sub-total)	-241,344.75
Waste	27,161.66
Total Emissions (without LULUCF)	316,833.23
Total Emissions (with LULUCF emissions part only)	334,634.51
Total Emissions (with LULUCF)	75,488.48

Note: AFOLU = Agriculture, Forestry and Other Land Use; LULUCF = Land Use, Land-Use Change and Forestry
Source: Malaysia Third Biennial Update Report to the UNFCCC 2020

Indonesia: Total GHG emissions from 2000 – 2016 by category



Source: Indonesia Second Biennial Update Report to the UNFCCC 2018