Chapter 3

The Strategy of Selected NOCs in the ASEAN Region

November 2022

This chapter should be cited as

ERIA Study team (2022), 'The Strategy of Selected NOCs in the ASEAN Region', in ERIA (eds.), *The Strategies of National Oil Companies in Southeast Asia under Energy Transition.* ERIA Research Project Report FY2022 No. 15, Jakarta: ERIA, pp.12-24.

Chapter 3

The Strategy of Selected NOCs in the ASEAN Region

In response to the CN declarations by ASEAN national governments, NOCs, whose major shareholders are national governments, are expected to be required to develop business strategies and initiatives in line with national policies. This section introduces and analyses ASEAN NOCs' energy transition strategies and initiatives.

1. Major Oil Companies of ASEAN

Amongst the NOCs representing ASEAN countries, we selected three companies (Table 3.1) interested in climate change countermeasures.

Table 3.1. Selected NOCs in ASEAN

Country	Malaysia	Indonesia	Thailand
Company	PETRONAS	Pertamina	PTT

Source: Author.

2. Decarbonisation Efforts by the Major NOCs in ASEAN

Table 3.2 overviews the decarbonisation efforts of selected ASEAN NOCs.

Table 3.2. Decarbonisation Activities of Selected ASEAN NOCs

	PETRONAS	**Pertamina**	**PTT**
GHG emission net-zero target	Net zero (Scopes 1＋2) by 2050 Announced in October 2020 Oral declaration by the CEO	No net-zero targets by 2050	Net-zero GHG emission by 2050 (Scopes 1+2)
Decarbonisation activities	Solar power, ammonia, hydrogen, CCS, etc.	Solar power, geothermal, biorefinery, CCS, etc.	EV, charging station, battery, biofuels, etc.

CCS = carbon capture and storage, CEO = chief executive officer.
Source: Author.

3. The Relationship between ASEAN Governments and NOCs regarding CN Targets and Strategies

3.1. Importance of NOCs' role in government GHG emission reduction targets

Data on GHG emissions from ASEAN countries are unavailable, but NOCs' GHG emissions are expected to account for a large proportion of energy-related GHG emissions. Therefore, to reduce GHG emissions nationwide, it is necessary to reduce NOC GHG emissions. Since the government is a major NOC shareholder and has a great influence on NOCs, the government can actively instruct NOCs to reduce GHG emissions.

3.2. Hearing ASEAN NOCs

We asked the three NOCs (Pertamina, PETRONAS, and PTT) about the relationship between the government and NOCs regarding CN targets and strategies. The PTT and Pertamina responded as follows**.**

The government of Thailand has set the country's target for GHG emission reduction but did not allocate a specific target on the PTT. The government does not impose any GHG emission reduction targets on the PTT, leaving the PTT to set a target for itself. The government gives the PTT the right to set its own CN target and strategy, with the country's CN target as a reference and guide. The PTT then sets its target and strategy to align with and contribute to the national target. The government assigns the Ministry of Natural Resources to collect the data from the NOCs at some level of audit (not a full-scale one).

On the other hand, the government of Indonesia has already set GHG emission reduction targets for the energy, forestry, waste, industrial processes, and product use, and agriculture sectors. It will set a target for each subsector, including NOCs, through the Ministry of Environment and Forestry (MOEF) regulation. The government will impose GHG emission reduction targets reached by NOCs, as stated in the MOEF regulation. NOCs are obliged to develop a CN strategy. A target and strategy shall be designed to meet the GHG reduction target and NZE aspiration of the government. NOCs will contribute to achieving the country's CN target by reaching each subsector's GHG emission reduction target through NOCs' NZE road map, decarbonisation initiatives (including carbon offset), and initiating carbon trading activity. The government will apply a cap-trade-tax mechanism that will trigger NOCs to meet the GHG emission reduction target.

4. GHG Emission and GHG Emission–Reduction Activities by Segment

4.1. GHG emission at a glance

Various industries emit GHGs in each ASEAN country, but the oil, gas, and chemical companies emit more GHGs. The supply chains or segments of these companies are roughly divided into upstream, downstream, and others. Which segment of these companies emits the most GHGs?

From 2021, British Petroleum (BP) and Pertamina would disclose GHG emissions by segment. Shell has released figures by segment since 2017 and total energies since 2015. The definition

of the 'segment' may differ for each company, so it is impossible to make a simple comparison. But the published figures (Scope 1) are summarised in Table 3.3.

Naturally, different business portfolios have different segments that emit a lot of GHGs. However, as a major trend, the ratio of upstream and refinery and petrochemical sectors is high, and the major segments of oil companies emit a large amount of GHG. Therefore, the NOC must select and implement effective strategies and measures for upstream and refinery and petrochemical to reduce GHG emissions from existing businesses through its efforts.

Table 3.3. GHG Emissions Scope 1 Comparison by Segment

GHG Emissions Scope 1	**Segment**	**Pertamina**	**Shell**	**BP**	**TotalEnergies**
Emission Amount (Million tonnes CO_2e) in 2021	Total	23.26	60.0	33.2	34.0
	Upstream	11.59	11.7	15.5	14.0
	Integrated Gas	-	15.5	-	5.0
	Refining and Petrochemical	8.52	31.1	16.9	15.0
	Others	3.16	1.6	0.8	>0
Proportion By segment	Upstream	50.0%	19.5%	46.7%	41.1%
	Integrated Gas	-	25.8%	-	14.7%
	Refining and Petrochemical	36.6%	51.8%	50.9%	44.1%
	Others	13.4%	2.7%	2.4%	-

Notes: Shell's integrated gas: The Integrated Gas business manages liquefied natural gas (LNG) activities and the conversion of natural gas into gas-to-liquids fuels and other products, as well as our New Energies portfolio. TotalEnergies Integrated gas includes integrated gas, renewables, and power, excluding upstream gas operations.
Source: Author.

4.2. PETRONAS, Malaysia

1) GHG reduction targets

In October 2020, PETRONAS's CEO, Tengku Muhammad Taufik, declared the realisation of CN (Scopes 1+2) by 2050. He set a target for realising renewable generation capacity of 3,000 MW and GHG emissions of no more than 49.5 million tonne-CO_2 eq by 2024 (PETRONAS, 2021). As

shown in Table 3.4., PETRONAS disclosed the GHG emission performance (total GHG emission and GHG intensity by segment).

Table 3.4. GHG Emission and GHG Intensity, PETRONAS

Million tonne-CO_2e	2017	2018	2019	2020	2021
Malaysia operation	53.6	48.1	51.6	46.3	43.8
International operation	2.9	2.0	2.2	2.0	1.4
Total GHG emission	56.5	50.1	53.8	48.3	45.2
GHG intensity	2017	2018	2019	2020	2021
Upstream (tCO_2e/kboe)	88.7	74.2	64.6	65.9	47.9
Refineries (tCO_2e/bbl)	0.017	0.018	0.018	0.019	0.018
Petrochemicals(tCO_2e/tonnes)	0.77	0.68	0.68	0.66	0.67

Source: PETRONAS (2021, pp.218–19).

2) Major efforts

a) Upstream

PETRONAS reduced 340,000 tonne-CO_2 eq GHG emissions in its upstream businesses in 2020 and became a signatory member of the Methane Guiding Principles (PETRONAS, 2020).

b) Product

PETRONAS is engaged in the marketing of biodiesel-blended light oil and other products.

c) CCS/hydrogen/ammonia/methanation/CO_2 transport

Hydrogen

In February 2021, PETRONAS signed an MoU relating to low-carbon energy, such as hydrogen and ammonia, with JERA, Japan. This signing resulted from both companies' shared vision of achieving net-zero carbon emissions. PETRONAS signed an MoU on renewable energy and green hydrogen fields with Masdar, United Arab Emirates (UAE), in March 2021. Both companies explore renewable energy opportunities across Asia and beyond. PETRONAS also signed a comprehensive and strategic collaboration agreement on hydrogen and CCS fields with the Abu Dhabi National Oil Company (ADNOC), UAE, in March 2021. Both companies explore opportunities for collaboration across the full oil and gas value chain and hydrogen and CCS.

In September 2021, PETRONAS subsidiary PETRONAS Gas & New Energy Sdn Bhd (PGNESB) and ENEOS, Japan, signed an MoU for joint research on the hydrogen supply chain. Its objective

is to establish a procurement and supply network for transporting hydrogen produced in Malaysia to ENEOS' refineries. The duration of the joint research is 1 year.

Ammonia

In August 2021, PETRONAS Energy Canada, a wholly owned subsidiary of PETRONAS, and Itochu agreed to research ammonia production in Alberta, Canada, jointly by 2026.

In October 2021, PETRONAS, Malaysian state-owned utility Tenaga Nasional Berhad, and Japan's IHI agreed on project research for ammonia co-combustion at coal-fired power plants. The study ran through February 2022.

Methanation

In November 2021, PETRONAS, Sumitomo Corporation, and Tokyo Gas agreed to conduct project research to synthesise carbon-neutral methane by methanation of green hydrogen and CO_2 in Malaysia and introduce it to Japan.

Carbon Capture and Storage

In November 2021, PETRONAS and ExxonMobil agreed to conduct the feasibility study of a CCS project off the Malay Peninsula. Furthermore, in December 2021, PETRONAS announced that it would cooperate (CCS technology-related cooperation) with Posco International and Posco Engineering & Construction, subsidiaries of Korean steelmaker Posco.

In January 2022, PETRONAS announced a CCS joint research with Sarawak Shell Berhad (Shell).

CO_2 transport

In February 2022, PETRONAS signed an MoU with Mitsui O.S.K. Lines to develop a business for the marine transportation of liquefied CO_2.

d) Renewables

According to the PETRONAS Integrated Report 2020, PETRONAS plans to introduce 3,000 MW of renewable energy generation by 2024. According to the report, the total solar power generation capacity is 600 MW (including the capacity of those under construction).

In April 2019, PETRONAS acquired Amplus Energy Solutions Pte Ltd (M +), a Singaporean renewable energy venture company, to establish M+by PETRONAS.

As shown in Table 3.5, PETRONAS is increasing its solar power generation in Malaysia and abroad.

Table 3.5. Solar Power Generation by PETRONAS

MWh	2016	2017	2018	2019	2020	2021
Malaysia	671.6	582.5	581.5	687.2	1,789.3	1,878.9
Overseas	261.0	285.0	274.0	444.4	386.0	442.3

Source: PETRONAS (2021).

4.3. Pertamina, Indonesia

1) GHG reduction target

In April 2021, a press release reported that Pertamina reduced GHG emissions by 27.08% in 2020. However, the press release did not mention the base year and scenario in which the reduction ratio was calculated. Pertamina aims to lower GHG emissions by 30% in 2030 (baseline: 2010), following Indonesia's commitment to reduce emissions based on the Paris Agreement. Pertamina also targets an increase in new relationship energy total capacity to 10.2 GW by 2026.

Pertamina is committed to reducing GHG emissions by 8.1 million tonnes to realise the Indonesian government's CN goal by 2060. As part of its efforts, PERTAMINA will invest US$8.3 billion CAPEX to expand its utilisation of new renewable energy.

Pertamina (2021) again recalculated the baseline for total CO_2 eq emissions for Scopes 1 and 2 for all sub-holdings and their respective subsidiaries, services, and portfolio subsidiaries, as well as operating units/business units under the Pertamina Group. Table 3.6 shows the GHG emissions by segment under Pertamina.

Table 3.6. GHG Emission by Segment under Pertamina

Beban Emisi GRK Cakupan 1 berdasarkan Parameter [305-1] [CCE-4] [CCE-5]
GHG Emission Scope 1 based on Parameter

Cakupan 1 *Scope 1*	Satuan *Unit*	2021	2020	2019
Emisi GRK Langsung Cakupan 1 *Direct GHG Emission Scope 1*	Juta Ton CO_2 *Million Tonnes CO_2*	23.26	21.02	18.31
Karbon Dioksida | *Carbon dioxide (CO_2)*	Juta Ton *Million Tonnes*	20.29	19.73	15.79
Metana | *Methane (CH_4)*		0.0671	0.0397	0.0488
Nitrogen oksida | *Nitrous oxide (N_2O)*		0.0044	0.0010	0.0044
Emisi Cakupan 1 berdasarkan segmen bisnis | *Scope 1 emission by business segment*				
*Upstream**	Juta Ton *Million Tonnes*	11.59	10.29	5.52
Refining & Petrochemical		8.52	7.31	12.5
Commercial & Trading		0.14	0.54	0.21
Power New Renewable Energy		0.11	0.21	0.07
Gas		0.48	0.81	0.01
Integrated Marine Logistics		2.43	1.86	-
Emisi Cakupan 1 berdasarkan sumber | *Scope 1 emission by source*				
Pembakaran | *Combustion*	Juta Ton *Million Tonnes*	14.62	12.86	13.11
Routine Flaring		2.38	1.80	0.95
Non Routine Flaring		0.27	0.22	0.10
Safety Flaring		0.27	-	-
Venting and Process		5.30	5.81	2.78
Fugitives		0.41	0.34	1.36

*Termasuk Badak LNG
Including Badak LNG

Beban Emisi GRK Cakupan 2 [305-2][CCE-4]
GHG Emissions Scope 2

Segmen *Segment*	Satuan *Unit*	2021	2020	2019
Upstream	Ribu ton CO_2eq *Thousand ton CO_2eq*	188.20	171.22	28.01
Refining and Petrochemical		46.02	52.73	37.17
Commercial and Trading		74.29	94.48	110.21
Power & New and Renewable Energy		1.85	1.60	-
Gas		9.44	19.77	11.09
Total		319.80	339.81	186.49

Beban Emisi GRK Cakupan 3 [305-3] [CCE-4] [11.1.7]
GHG Emissions Scope 3

Cakupan 3 *Scope 3*	Satuan *Unit*	2021	2020	2019
Penggunaan Produk yang Dijual – Kategori 11 *Use of Sold Product – Category 11*	Juta ton CO_2eq *Million ton CO_2eq*	154.05	144.24	160.41

Source: Pertamina (2021, pp.93–94).

2) Scenarios for realising CN

In December 2021, Pertamina presented the Indonesian government's scenario for realising CN by 2060. The company states that it can significantly reduce CO_2 emissions by, amongst other things, sharing renewable energy in the power generation sector and increasing the use of EVs. It will reduce the use of oil and coal while continuing the use of natural gas. The company analysed CO_2 emissions under three scenarios: low transition, market driven, and green transition. Of these, only the green transition scenario could achieve CN by 2060. Under this scenario, the share of renewable energy in primary energy would be 82% in 2060. Most vehicles travelling domestically will be EVs, and the fossil fuels used will be mainly natural gas, reducing the use of oil and coal. Under this scenario, oil demand peaks out in 2028, while domestically produced natural gas alone may be insufficient. Under this scenario, GHG emissions will peak at 670 million tonnes in 2030 and decrease to 270 million tonnes in 2060. The company is considering utilising carbon absorption techniques such as CCUS. At present, however, the high cost of their introduction and the inability to accurately calculate the amount of carbon that can be absorbed are obstacles to large-scale introduction.

3) Major efforts

a) Upstream

Pertamina is endeavouring to improve the efficiency of upstream facilities, for example, by utilising associated gas in power generation facilities in oil and gas fields. The company is also working on the effective use of flaring.

b) Refinery

Pertamina converted its Cilacap refinery into a biorefinery. In addition, the company is planning to build a new biorefinery in Plaju. Plaju and Cilacap have a strategic role in supporting the road map for the development of Indonesian biofuels, as stated in the General National Energy Plan.

c) Retail

Pertamina is reforming its service stations with a new concept, 'Green Energy Station.'

d) CCS/Hydrogen

In June 2021, Pertamina signed an MoU with JAPEX and LEMIGAS to jointly conduct the feasibility study of the CCUS project in the Sukowati oil field. For Pertamina, this collaboration will greatly support Indonesia's commitment to reducing GHG emissions.

In June 2021, Pertamina signed a joint research agreement on CCUS with a Japanese group (JANUS, JGC Corporation, and J-Power) and Institut Teknologi Bandung. The feasibility study collaboration took place from June 2021 to February 2022. Furthermore, EPC will be carried out in 2022–2024 and is expected to be operational in 2026.

In January 2022, it signed an MoU with Chiyoda Corporation for joint technology development and application in CCUS and hydrogen production.

In February 2022, it signed an MoU with Marubeni Corporation for the joint development of CCUS and other decarbonisation projects.

In the same month, PGN, a state-owned gas company under Pertamina, signed an MoU with SKE&S, a liquefied natural gas (LNG) company of the SK Group of Korea, to cooperate in CCS and hydrogen businesses.

In March 2022, Pertamina, Mitsubishi Corporation, and Pupuk Indonesia, an Indonesian state-owned fertiliser producer, will cooperate on green hydrogen, green ammonia, and CCUS technologies.

In April 2022, Pertamina launched a joint study with Mitsui & Co., Ltd. to commercialise CCUS in Indonesia.

In May 2022, Pertamina signed an MoU with ExxonMobil on CCS candidate sites off the coast of Indonesia and on transportation methods.

e) Renewables/Others

In June 2021, Pertamina set targets for the energy supply mix in 2030 to reduce petroleum-based fuels and liquefied petroleum gas to 64% while increasing natural gas and renewable energy to 19% and 17%, respectively. The company plans to make 17% of its overall energy businesses green energy portfolios by 2030. In addition, it plans to allocate 9% of its capital-investment spending for 2020–2024 to renewable energy development.

In November 2021, Pertamina NRE planned to have total clean energy installed capacity of 3.2 GW by 2022. The breakdown is 1.8 GW of gas electric power generation, 908 MW of geothermal power generation, and 480 MW of Energi Baru dan Terbarukan (EBT). In Indonesian, EBT means renewable energy (power generated by geothermal, hydro, solar, wind, biomass, and other energy sources).

In November 2021, Pertamina NRE and Masdar of the UAE signed an MoU on developing clean energy solutions (solar and wind power plants, as well as green and blue hydrogen).

4.4. PTT, Thailand

1) GHG reduction target

According to the 56-1 One Report 2021 (PTT, 2021), PTT reviewed long-term GHG emission targets (Scopes 1 and 2 including national and international operations) to be 15% reduction in 2030 compared to GHG emission in 2020 and set a target to achieve carbon neutrality within 2040 and net-zero GHG emission by 2050. According to the 56-1 One Report 2020 (PTT, 2020), the company had set its carbon pricing at US$20/tonne-$CO_2$. In November 2020, PTT was targeting an electricity generating capacity of 16 GW by 2030 – 8 GW from fossil-based sources and 8 GW from renewables. In August 2021, PTT was increasing its renewable power target to 12 gigawatts (GW) by 2030, from 8 GW.

Table 3.7 shows GHG emissions from 2018 to 2021 by PTT.

Table 3.7. GHG Emission by PTT

Million tonne-CO_2	2018	2019	2020	2021
GHG emission Scope 1	29.88	29.94	29.03	31.73
GHG emission Scope 2	1.91	1.98	1.66	1.42
GHG emission Scope 3	127.05	126.36	116.15	113.48

Source: PTT (2021, p.150).

2) Major activities

a) Upstream

PTT withdrew from its coal business while strengthening its LNG value chain. The company is working on flare reduction and methane leakage reduction.

b) Product

The company markets petroleum products that reduce GHG emissions, such as gasohol 91, gasohol 95, gasohol E20, gasohol E85, diesel B10, diesel B20, and diesel ultra-force.

c) CCS/Hydrogen/Ammonia

In April 2022, PTT Exploration and Production (PTTEP), INPEX, and JGC Holdings signed an MoU for CCS development in Thailand. This is expected to lead to the creation of energy transition–related businesses involving hydrogen, ammonia, and other clean energy sources.

In May 2022, PTT and Saudi Arabian Oil Company (Aramco) signed an MoU including clean energy (blue and green hydrogen), carbon capture, and EVs.

d) EVs, batteries, and charging points

PTT aims at comprehensive businesses ranging from EVs to charging stations.

Electric vehicles

In May 2021, PTT signed an MoU for EV development and manufacturing with Taiwan's Foxconn. In July 2021, PTT established a new EV business company, EVME Plus. In September 2021, they established a joint venture company. They are also embarking on EV production and development of storage batteries and charging stations, with a plan for local initial public offerings in 2025. PTT's EV subsidiary Arun Plus and Foxconn's subsidiary Lin Yin International Investments are planning to go on a joint venture. The EV plant in Thailand designs, manufactures, assembles EVs, and produces the main EV components. It plans to start production of 50,000 units per year over the next 2 to 3 years, increasing to 150,000 units.

In March 2022, PTT exhibited its products for the first time at the Bangkok International Motor Show and unveiled a prototype vehicle developed with its partner Foxconn. The company plans to construct a plant in Thailand and start production in 2024. In April 2022, PTT launched a joint venture with Foxconn for the commissioned production of EVs in China.

Batteries

PTT will widely expand its battery business with a focus on passenger car–type EVs, motorcycles, buses, trucks, boats, etc. In January 2022, PTT established Nuovo Plus, a company handling its EV battery business. Nuovo Plus plans to be responsible for EV batteries and construct energy storage systems. PTT will reorganise its battery business structure for EVs. In February 2022, Global Power Synergy Public Company, Limited (GPSC) will transfer its battery plant and all related assets to Nuovo Plus. The battery-related business will be integrated into Nuovo Plus, producing batteries and taking charge of the energy storage system business.

Charging facilities

PTT Oil and Retail Business (PTTOR), PTT's retail business company, has set a target of constructing 300 EV-charging stations by 2022.

e) Solar power

In July 2021, PTT's power generation subsidiary GPSC acquired a 41.6% stake in Avaada Energy, an Indian solar power company. The GPSC considers India as a focus country for renewable energy expansion. Avaada has built India's largest portfolio of solar power projects,

aggregating to 1 GW capacity. Another 11 GW project pipeline has been developed across emerging African and Asian countries.

5. Summary of Chapter 3

5.1. CN declaration status of ASEAN countries and NOCs

Chapter 3 discussed the relationship between the government and NOCs regarding CN targets and strategies, GHG emissions by a segment of oil and gas companies, and the strategies and initiatives of the three NOC companies representing ASEAN.

Here, the CN declaration status of the governments of ASEAN countries and the CN declaration status of the three representative NOC companies are summarised. Table 3.8 shows the relationship between the CN target of NOCs and each government. Malaysia and PETRONAS and Thailand and PTT have the same CN target year 2050. Meanwhile, Indonesia has announced a CN for 2060, but Pertamina has not yet set a CN target year. Regarding the interim target for 2030, Malaysia submitted an NDC (Table 3.8). But PETRONAS has not set a GHG reduction target for 2030. Thailand has set the 2030 NDC (Table 3.8), but the 2030 reduction rate of PTT and the base year do not match the NDC. On the other hand, Indonesia's 2030 NDC and Pertamina's 2030 reduction targets are almost the same. The Pertamina Sustainability Report 2021 cites a provision supporting the national GHG emission reduction target of 2030, suggesting the Indonesian government's NDC-conscious goal setting.

Table 3.8. Year of CN and 2030 Interim Target, Nationwide and NOC

	Malaysia	**Indonesia**	**Thailand**
Year of CN (Nationwide)	2050	2060	2050
Year of CN (NOC)	PETRONAS 2050 (Scopes 1+2)	Pertamina NA	PTT 2050 (Scopes 1+2)
2030 Target (NDC)	▲45% (Unconditional) (Baseline: 2005) Economy-wide carbon intensity (against GDP) reduction	▲41% (Conditional) ▲29 % (Unconditional) (Baseline: BAU scenario of emission projection started in 2010)	▲25% (Conditional) ▲20% (Unconditional) (Baseline: BAU projection from reference year 2005)
2030 Target (NOC)	PETRONAS NA	Pertamina	PTT

		▲30 % GHG reduction (Baseline: 2010) Supporting the national GHG emission reduction target of 2030	▲15 % GHG reduction (Baseline: 2020)

Source: Author.

5.2. How to set the CN strategy for NOCs

The Thai government does not impose any GHG emission reduction targets on PTT. Instead, PTT must decide and set a target by itself. The government gives PTT the right to set its own CN target and strategy.

On the other hand, the government of Indonesia has already set the GHG emission reduction targets for each sector and will set the target for each subsector, including NOCs. NOCs are obliged to develop a CN strategy. NOC's target and strategy shall be developed to meet the GHG reduction target and NZE aspiration stated by the government. NOCs will contribute to achieving the country's CN target by reaching each subsector's GHG emission reduction target through the NOCs' NZE road map, decarbonisation initiatives (including carbon offset), and initiation of carbon-trading activities.

Whether the government imposes GHG reduction targets on the NOCs, the NOCs need to develop a CN strategy. So, how should NOCs formulate the CN strategy?

The 'Strategy Matrix' helps formulate the CN strategy: the markets are taken on the horizontal axis and classified into the existing and new markets. Products are taken on the vertical axis and classified into existing and new products. Measures to become existing products in the current market include reducing methane and flaring, and improving energy efficiency of upstream platforms, refineries, and chemical plants. Sustainable aviation fuel (SAF) is a new product in the existing aviation fuel market. Renewable energies have already entered the market by various companies. Although these are existing products, a new market for oil and gas companies is created. Hydrogen, ammonia, CCS, etc. are energies and sectors that will be new as the market develops. Since each company has a different business portfolio, the position of each measure in the strategy matrix should also be different.

Table 3.9 is an example of a 'Strategic Matrix for Energy Transition.'

Table 3.9. Example of a Strategic Matrix for Energy Transition

		Markets	
		Existing	**New**
Products	Existing	Methane reduction Zero flaring Energy efficiency	Renewables (Solar power) (Wind power) (Geothermal)
	New	SAF Biofuel, biogas, bioplastic EV and battery productions EV fluid Charging point	Hydrogen Ammonia CCUS, DAC Carbon credit

CCUS = carbon dioxide capture, utilisation, and storage; DAC = direct air capture; EV = electric vehicle; SAF = sustainable aviation fuel.
Source: Author.

Which markets or products the business portfolio is devoted to from the above strategic matrix depends on the company's management resources and the geographical situation of the operating countries. Therefore, it is necessary to assemble the optimal strategy matrix for the company.

Examples comprising a basic strategy are (i) reduction of emissions from existing facilities (methane, flaring, improvement of energy efficiency); (ii) utilisation of negative emissions such as CCUS and DAC; (iii) challenge to new energy, innovative technology, and renewable energy such as hydrogen, PV, and wind power; (iv) utilisation of offsets such as plantation and credit and so on.

Once a strategy has been formulated, it is necessary to go through the plan-do-check-action cycle to see if the concrete measures that support the strategy are working well.

An example is in Table 3.10: a cycle of completing an intermediate target for the next 10 years or so converted into million tonnes CO_2e and a reduction target matrix for each strategy, breaking down numerical targets and reviewing the progress results of each year in the Sustainability Report.

Table 3.10. Strategic Matrix of GHG Emission Reduction Initiative Form

Million tonnes CO_2e	**Total GHG Emission Reduction Target**	**Methane and Flaring**	**Energy Efficiency**	**CCUS DAC**	**Renewables and New Energy**	**Offset**
2025						
2030						
2035						

Source: Author.