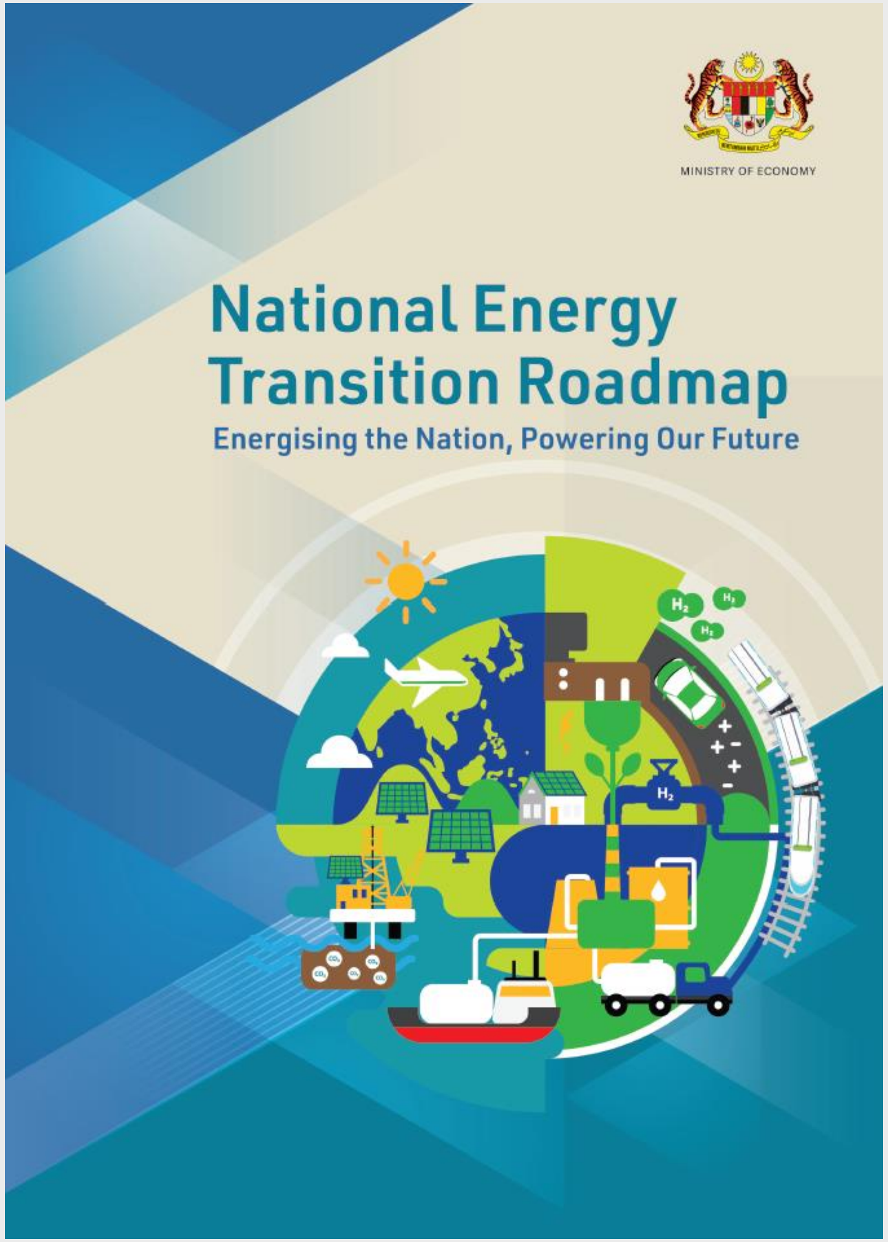


Ministry of Economy

National Energy Transition Roadmap (NETR)

Conference on Government Assistance for Circular and Low-Carbon Economy

Organised by: Malaysian Plastics Manufacturers Association
Date: 26 June 2024

Outline of Briefing

- National Energy Policy, 2022-2040 (DTN)

- National Energy Transition Roadmap (NETR)

NATIONAL ENERGY POLICY, 2022-2040

NATIONAL ENERGY POLICY, 2022-2040 (DTN)

1. **Streamline and harmonise** various existing energy-related policies, roadmaps, and targets for alignment and consistency.

2. Ensure a coherent and coordinated energy sector response **aligned to forward-looking national aspirations and agenda**.

3. Create a **shared long-term vision and a coordinated response** across energy-related stakeholders to meet challenges and capture opportunities from energy transition and other global megatrends.

4. Provide **enhanced clarity on Malaysia's forward-looking and future-proof energy sector ambitions and plans for various stakeholders** including the *rakyat*, businesses, and investors to inform long-term investment decisions required to attract FDI, spur GDP and job creation growth.

5. Strengthen **energy sector enablers and governance** to drive planning, development and implementation of **comprehensive and integrated energy policy**.

STAKEHOLDERS ENGAGEMENTS, FEBRUARY 2020 TO NOVEMBER 2021

The DTN was the product of an extensive engagement over the course of **22 months** with extensive stakeholder engagement at federal and state level.

DTN Study Steering Committee members:

- EPU
- KeTSA
- KASA
- MOSTI
- MOF
- MITI
- KPDNHEP
- MPIC
- MOT
- KPLB
- KPKT
- UPEN (SB)
- UPEN (SK)
- ST
- PETRONAS
- BNM

Other Technical Committee members:

- MIDA
- MARii
- MPOB
- MPRC
- SEDA
- TNB
- Single Buyer
- MyPower

100+

1:1 engagements and cluster workshops with public sector entities

Extensive engagement of private sector industry players[1]

Extensive global benchmarking on best practices and trends[2]

1. Including local banks, energy industry players in supply chain, industry associations
2. Global benchmarks of country energy policies, technology curve outlook, etc.

BACKGROUND

CHALLENGES

Twelfth Malaysia Plan, 2021-2025 identified the need to effectively address the **energy trilemma of security, affordability and environmental sustainability.** At present, Malaysia's energy sector is still facing challenges such as **fragmented policies and governance, impediments in the domestic oil and gas market and non-competitive fuel procurement in the electricity subsector.**

GLOBAL MEGATRENDS

Major **energy transition** is on-going, i.e. a shift from fossil fuel-reliant systems of production and consumption to clean energy solutions. **COVID-19 and Russia-Ukraine conflicts have destabilised the global energy market and outlook**. Demand dwindled, prices skyrocketed and supply was tight.

MALAYSIA'S RESPONSE

- The National Energy Policy, 2022-2040 (DTN) was launched on 19 September 2022 by YAB Prime Minister.
- DTN will **spearhead Malaysia's energy transition journey** by providing a forward-looking direction of the energy sector, promoting efficient demand-side management, encouraging the R&D&C&I and adoption of green technologies and upskilling of energy workforce.

KEY OUTPUT

Establishment of the **National Energy Council (MTN)** to be chaired by

YAB Prime Minister to align and coordinate the various energy-related policies and objectives.

DTN will be reviewed every 3 years to ensure targets and strategies are in line with the country's needs.

COUNTRY POLICY BENCHMARKING

(As at January 2022)

	Germany	Norway	India	Thailand	Indonesia	Japan	United Kingdom	Sweden	Malaysia
Energy Policy Lead Entity	Federal Ministry for Economic Affairs and Energy	Ministry of Petroleum and Energy	National Institution for Transforming India (NITI Aayog)	Ministry of Energy	National Energy Council	Ministry for Economy, Trade and Industry	Department for Business, Energy and Industrial Strategy	Ministry of Enterprise, Energy and Communication	**Economic Planning Unit, Prime Minister's Department (EPU)**
Energy Policy Time Horizon	40 years	15 years	23 years	16 years	33 years	29 years	33 years	28 years	**18 years**
Timeline	2010-2050	2015-2030	2017-2040	2015-2036	2017-2050	2021-2050	2017-2050	2017-2045	**2022-2040**
Aspiration	Net zero emission by 2045	**N/A**	**N/A**	**N/A**	Carbon neutral by 2060	**N/A**	**N/A**	**N/A**	**Low Carbon Nation 2040**

ENERGY GOVERNANCE LANDSCAPE AS AT OCTOBER 2022

KEY ENERGY-RELATED MINISTRIES

Ministries with direct energy-related responsibilities

- Economic Planning Unit, Prime Minister's Department (EPU)
- Ministry of Energy and Natural Resources (KeTSA)
- Ministry of Primary Industry and Commodities (MPIC)
- Ministry of Domestic Trade and Consumer Affairs (KPDNHEP)

Ministries related to key final energy demand sectors

- Ministry of Transport (MOT)
- Ministry of International Trade and Industry (MITI)
- Ministry of Federal Territories (KWP)
- Ministry of Housing and Local Government (KPKT)
- Ministry of Rural Development (KPLB)
- Ministry of Agriculture and Food Industry (MAFI)

Cross-cutting influence

- Ministry of Finance (MOF)
- Ministry of Water and Environment (KASA)
- Ministry of Science, Technology, and Innovation (MOSTI)

State-specific entities

- State Economic Planning Unit (UPEN) Sabah
- State Economic Planning Unit (UPEN) Sarawak
- Ministry of Utility and Telecommunication (Sarawak)

KEY ENERGY-RELATED ORGANISATIONS

Power-related

- Single Buyer (SB)
- Grid System Operator (GSO)
- MyPOWER

Oil and gas-related

- Malaysia Petroleum Resources Corporation (MPRC)

Renewable energy-related

- Sustainable Energy Development Authority (SEDA)

Cross-cutting influence

- Malaysian Green Technology and Climate Change Corporation (MGTC)
- Malaysian Investment Development Authority (MIDA)
- Malaysia Automotive, Robotics and IoT Institute (MARii)

REGULATORS

Electricity and piped gas

- Suruhanjaya Tenaga (ST)

Upstream oil and gas

- Petroliam Nasional Berhad (PETRONAS)

ENERGY-RELATED ACTS

1974 | 1990 | 1993 | 2001 | 2011

Petroleum Development Act (1974)

- Vests the **entire ownership in and the exclusive rights** for the exploration and exploitation of petroleum resources in PETRONAS
- PETRONAS shall be subject to the control and **direction of the Prime Minister**
- Sets up the **National Petroleum Advisory Council** to advise the Prime Minister on national policy, interests and matters pertaining to petroleum, petroleum industries, energy resources and their utilisation

Electricity Supply Act (1990)

- **Regulation of the electricity supply industry**
- Electricity supply at **reasonable prices, licensing of electrical installations** and promotion of safe and efficient systems for electricity-related operations

Gas Supply Act (1993)

- Mandates the **licensing of natural gas** supply to consumers at reasonable prices, with continuous supply and good quality
- Ensures the **safe and efficient operation** of natural gas pipelines, installations and appliances

Energy Commission Act (2001)

- **Establishment of the Energy Commission**
- Authorises the Energy Commission to **regulate energy supply activities** including the enforcement of energy supply laws

Renewable Energy Act (2011)

- Establishment and implementation of a **feed-in tariff (FiT) system** to catalyse the generation of electricity from renewable sources

Sustainable Energy Development Authority Act (2011)

- **Establishment of the Sustainable Energy Development Authority (SEDA)**
- SEDA is responsible for **sustainable energy laws and to promote the use of sustainable energy**

ENERGY-RELATED POLICIES

1975 · 1979 · 1980 · 1981 · 2000 · 2002 · 2006 · 2009 · 2010 · 2015 · 2020 · 2021

National Petroleum Policy 1975
- **Efficient utilisation** of petroleum resources
- **PETRONAS** exclusive rights to explore, develop and produce Malaysia's petroleum resources

National Energy Policy 1979
- **Supply** – adequate, secure, cost effective energy supply
- **Utilisation** – promote efficient utilisation of energy
- **Environment** – minimise negative environmental impact

National Depletion Policy 1980
- **Prolong life span** of national oil and gas reserves

Four Fuel Diversification Policy 1981
- **Reliability and security of supply** through fuel source diversification (oil, gas, coal and hydropower)

Five Fuel Diversification Policy 2000
- **Renewable energy** as the 5th fuel in energy supply mix
- Encourage efficient energy utilisation

National Policy on the Environment 2002
- Stewardship of **environment,** continuous improvement of environment quality
- **Sustainable use** of natural resources

National Biofuel Policy 2006
- **Reduce dependency** on depleting fossil fuels with biofuels

National Green Tech Policy 2009
- **Energy independence** and efficient utilisation
- Enhance **economic development** with Green Technology
- Conserve, minimise environment impact and improve **quality of life**

National Renewable Policy & Action Plan 2010
- 20% **RE in power capacity mix** by 2025
- RE **industry growth,** reasonable RE costs, enhance RE awareness, and conserve environment

National Policy on Climate Change 2009
- Development on sustainable path, **conserve environment and natural resources**

National Energy Efficiency Action Plan 2015
- 8% **reduction in energy demand** vs. baseline with energy efficiency initiatives
- Institutional framework, capacity development for energy efficiency (EE)

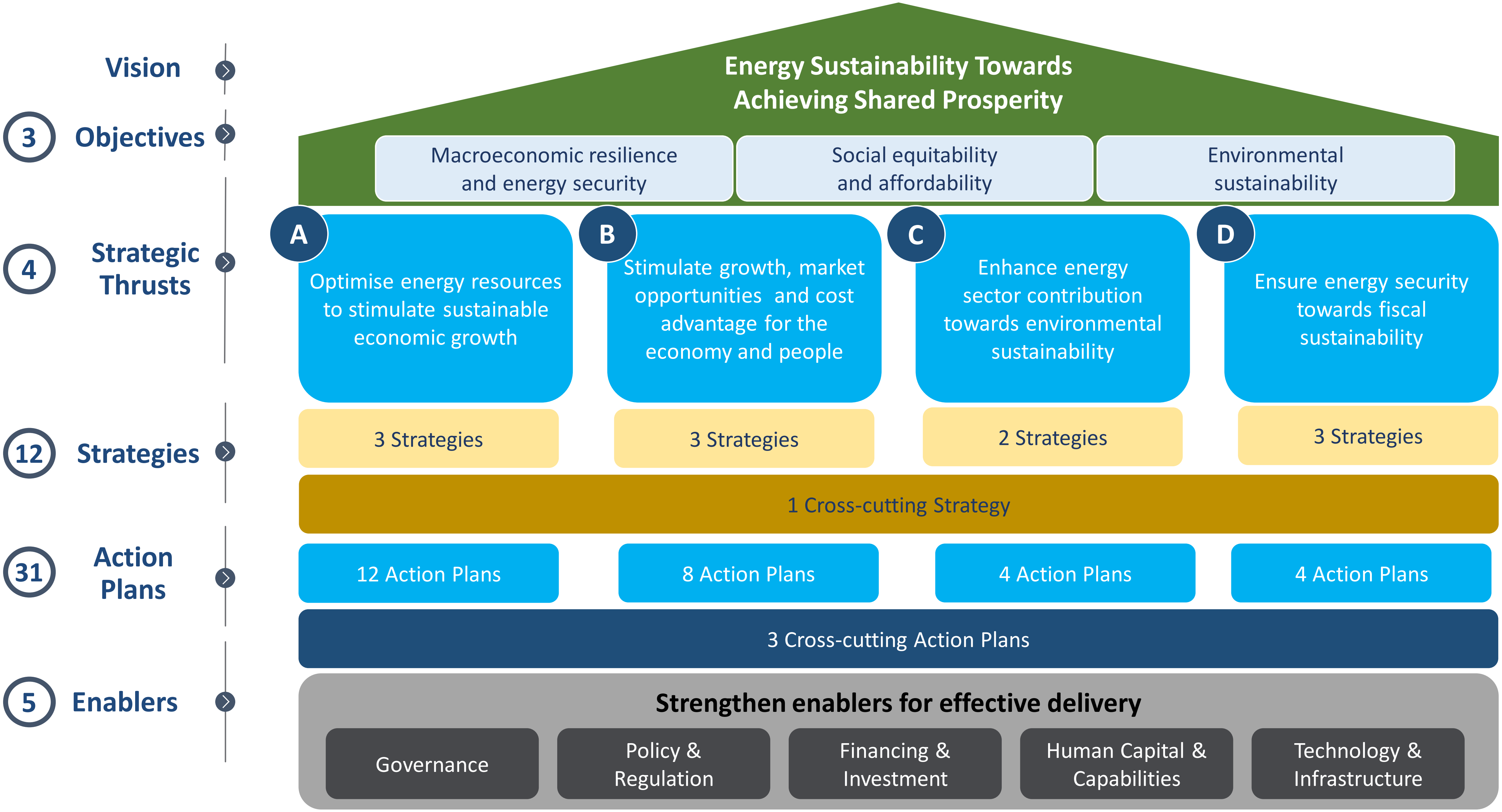
Nationally Determined Contribution 2021
- **Decrease in GHG intensity** of GDP by 45% (unconditional) by 2030 as compared to 2005

Nationally Automotive Policy 2020
- Sustainable development of automotive industry

Legend: Energy equity · Energy security · Environmental sustainability

Note: List is non-exhaustive. Highlights of most relevant policies and objectives taken
Source: *Government of Malaysia websites and publications*

FRAMEWORK OF DTN



DTN
PLAN OF ACTION

Strategic Thrust 1	Strategic Thrust 2	Strategic Thrust 3	Strategic Thrust 4
Optimise energy resources to stimulate sustainable socioeconomic growth	Capture growth, market opportunities and cost advantage for the economy and the people	Enhance energy sector contribution towards environmental sustainability	Ensure energy security towards fiscal sustainability
Strategy 1 Utilise the location of petrochemical hubs and gas infrastructure	**Strategy 1** Seize opportunities in the environmentally friendly light and heavy vehicle market	**Strategy 1** Promote the use of clean fuels in industries and determine GHG emissions reduction target in energy sector	**Strategy 1** Rationalise energy subsidies
Strategy 2 Optimising value added from oil and gas, bio-based energy, solar, hydroelectric and new clean energy sources	**Strategy 2** Seize market opportunities from the implementation of international regulations such as clean fuel for ships and aircrafts	**Strategy 2** Encourage businesses to implement carbon footprint accounting, reporting and certification as well as access to RE	**Strategy 2** Ensure smart investments in energy infrastructure development
Strategy 3 Improving energy demand management with enablers in the industrial, residential and commercial sectors	**Strategy 3** Optimising the mix of energy generation sources		**Strategy 3** Establish boundary conditions and implement safeguards to enhance national energy security

BENEFITS TO ECONOMY ACROSS THE ENERGY TRILEMMA

Economic Development

Increase contribution to GDP
1.0 – 1.5% added to GDP totaling ~RM260b

Jobs creation
207,000 added jobs, majority in green economy sectors

New FDIs
Prospects and growth sector opportunities related to low carbon economy

Energy Security

Lesser reliance on energy import
Increased penetration of indigenous energy sources

Fuel diversification
Enhanced energy source diversification and lower HHI of primary energy mix (HHI of 0.5 in 2020 and HHI of 0.30 in 2040)

Energy Affordability

Wider energy access
Continuity of rural electrification programme

Environment Sustainability

Less CO_2 emission
CO_2 emission reduction, based on NDC and LT-LEDS, in support of climate change commitment

Greater RE penetration
17% of renewable penetration in primary energy mix from 7.2% in 2018

IMPACT OF LOW CARBON NATION ASPIRATION 2040

National Low Carbon Aspiration 2040

Emphasis on low carbon **policies and investments to increase adoption and pursue selective leadership in low carbon sectors**, such as:

- Endeavour to **no new coal power plant** and increasing renewables share
- Providing financing and incentives to drive **energy efficiency practices** to meet the targets
- Incentivise **adoption of EVs**, increasing public transport modal share, and fuel economy standards

Impact of implementation

Contribution to GDP (RM/year)	13 billion
Total job creation	207,000
Energy self-sufficiency	48% to 72%
Fiscal outlay (RM/year)	4.3 billion
Total Investments (RM/year)	9.2 billion
CO_2 emissions reduction	*

* To be finalised by the Ministry of Environment and Water by end-2022 in the Long-Term Low Emissions Development Strategies (LT-LEDS)

Note: At COP26 (2021), Malaysia committed to a 45% of carbon intensity reduction by 2030, relative to 2005 level.

Source: NEP Project Team Analysis

SELECTED TARGETS OF LOW CARBON NATION ASPIRATION 2040

Selected Targets	2018	2040
1. Percentage of urban public transport modal share	20%	**50%**
2. Percentage of electric vehicle (EV) share	<1%	**38%**
3. Alternative fuel standard for heavy transport	B5	**B30**
4. Percentage of Liquefied Natural Gas (LNG) as alternative fuel for marine transport	0%	**25%**
5. Percentage of industrial and commercial energy efficiency savings	<1%	**11%**
6. Percentage of residential energy efficiency savings	<1%	**10%**
7. Total installed capacity of RE	7,597 MW	**18,431 MW**
8. Percentage of coal in installed capacity	31.4%	**18.6%**
9. Percentage of RE in TPES	7.2%	**17%**

Legend: Energy security Energy affordability Environmental sustainability

GENERAL TIMELINE OF LOW CARBON NATION ASPIRATION 2040

Twelfth Plan (2021 – 2025)

- Improve rural electricity supply to achieve 99% coverage
- Implement step change in industry EE through enforcement of EECA, energy audits and MEPS
- Increase usage of smart meter and smart grid as well as upgrade grid
- Improve Sabah power supply reliability
- Improve fuel economy standard for vehicle

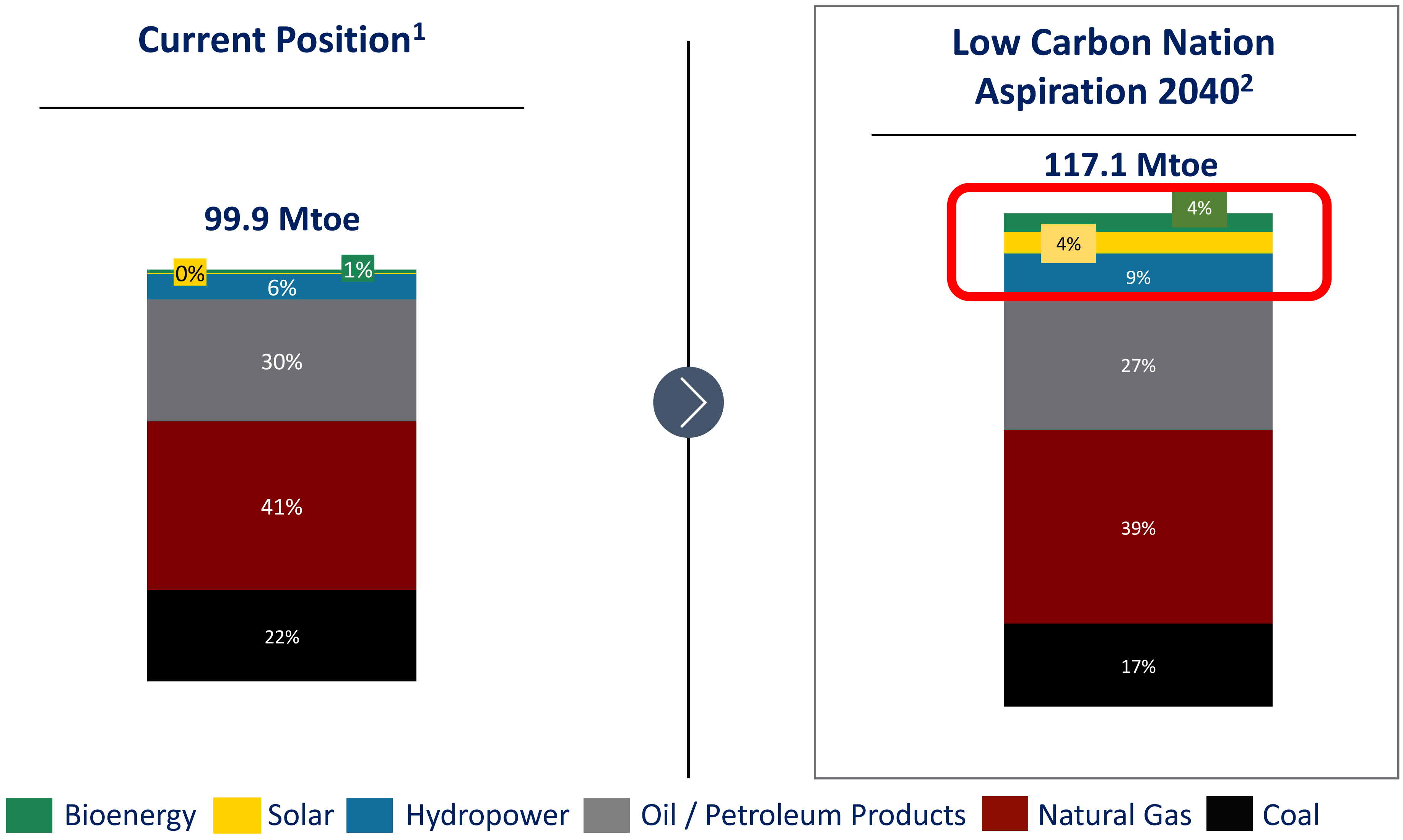
Thirteenth Plan (2026 – 2030)

- Growth of gas-based petrochemical hubs
- Thrive TPA gas market, investments in RGT for energy security
- Increase upstream investments to develop deepwater, marginal, sour gas fields[4]
- Enhance OGSE players capacity through consolidation and international participation
- Phase down of broad-based energy subsidies, move to market-based pricing
- Capture growth with LNG uptake in marine bunkering

Fourteenth & Fifteenth Plans (2031 – 2040)

- Thrive domestic EV ecosystem, with at scale EV penetration
- Adopt large scale energy storage for RE
- Implement pilot and market entry programmes of hydrogen as well as next generation bioenergy
- H_2 Establish globally competitive hydrogen export hub in Sarawak
- Enhance energy efficiency with digital technology adoption
- Capture growth opportunities of biofuels in marine and aviation sectors

PRIMARY ENERGY MIX TARGET



Source: 1. Suruhanjaya Tenaga
2. NEP Project Team Analysis

NATIONAL
ENERGY TRANSITION
ROADMAP

ENERGY GOVERNANCE LANDSCAPE AS AT FEBRUARY 2024

KEY ENERGY-RELATED MINISTRIES

Ministries with direct energy-related responsibilities

- Ministry of Economy
- Ministry of Energy Transition and Water Transformation
- Ministry of Plantation and Commodities
- Ministry of Domestic Trade and Cost of Living

Ministries related to key final energy demand sectors

- Ministry of Transport
- Ministry of Housing and Local Government
- Ministry of Investment, Trade and Industry
- Ministry of Rural and Regional Development
- Ministry of Agriculture and Food Security

Cross-cutting influence

- Ministry of Finance
- Ministry of Natural Resources and Sustainability
- Ministry of Science, Technology and Innovation

Sabah / Sarawak

- Chief Minister's Department, Sabah
- Economic Planning Unit, Sabah
- Ministry of Energy and Sustainability, Sarawak
- Min. of Utility and Telecommunications, Sarawak
- Economic Planning Unit, Sarawak

KEY ENERGY-RELATED ORGANISATIONS

ENERGY COMMISSION OF SABAH

GRID SYSTEM OPERATOR

MGTC

MIDA MALAYSIAN INVESTMENT DEVELOPMENT AUTHORITY

mprc malaysia petroleum resources corporation

MyPOWER CORPORATION

PETRONAS

PETROS

SABAH ENERGY CORPORATION SDN BHD

SMJ

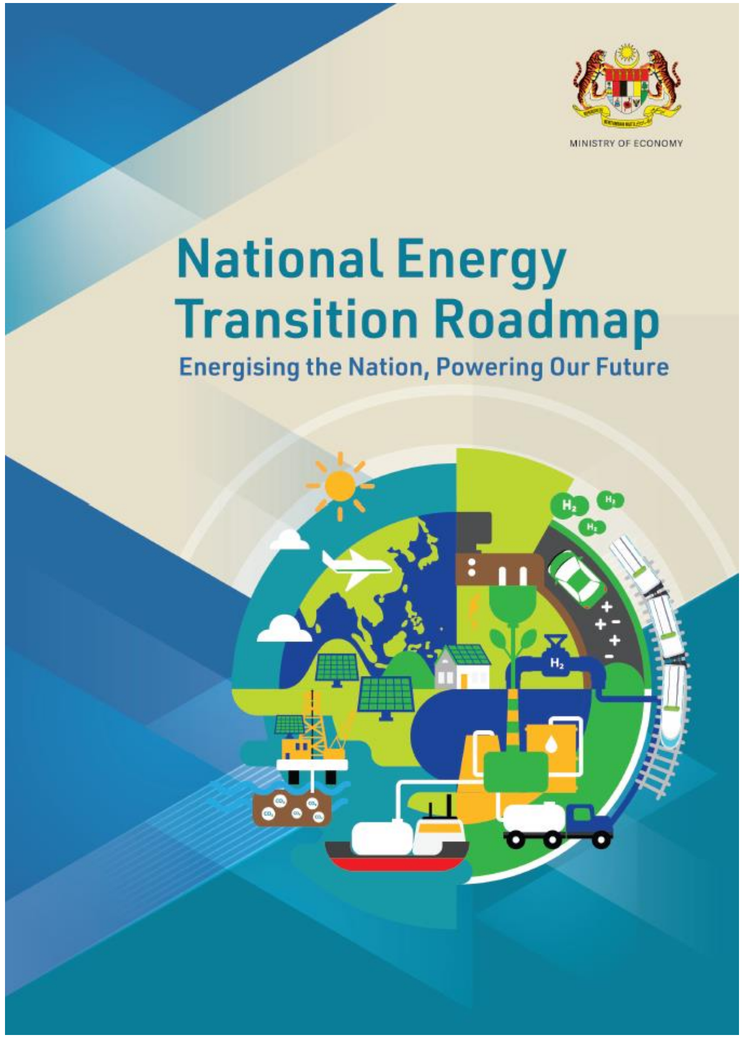
sarawak energy

Single Buyer

Suruhanjaya Tenaga Energy Commission

seda Sustainable Energy Development Authority MALAYSIA

TENAGA NASIONAL Better. Brighter.



Ministry of Economy

10
Flagship Catalyst Projects and Initiatives

Investments of more than RM25 billion, potential creation of 23,000 jobs, and reduce at least 10,000 GgCO_2 eq. annually

50
Key Initiatives and Enablers

Spurring Malaysia's green growth for climate resilience. To uplift GDP value from RM25 billion in 2023 to RM220 billion and generate 310,000 jobs by 2050

0
Net-Zero GHG Emissions as Early as 2050

NETR's Responsible Transition 2050 outlines the energy sector's low carbon pathway to reduce 32% GHG emissions from 259 MtCO_2eq. (2019) to 175 MtCO_2eq (2050)

Across 6 Energy Transition Levers

- Energy Efficiency
- Renewable Energy
- Hydrogen
- Bioenergy
- Green Mobility
- CCUS

NETR Building Blocks

Energy Transition ambition and macro position

Macro national aspiration
Net-zero GHG emissions as early as 2050

Energy system pathway
Responsible Transition 2050 Pathway

Impact of chosen pathway
Investment opportunities, socioeconomic outcomes, projected emissions reduction

6 Energy Transition levers

- **Energy Efficiency**
- **Renewable Energy**
- **Hydrogen**
- **Bioenergy**
- **Green Mobility**
- **CCUS**

5 Cross-cutting enablers

- **Financing and Investments**
- **Policy and Regulations**
- **Human Capital and Just Transition**
- **Technology and Infrastructure**
- **Governance and Implementation**

Ambition

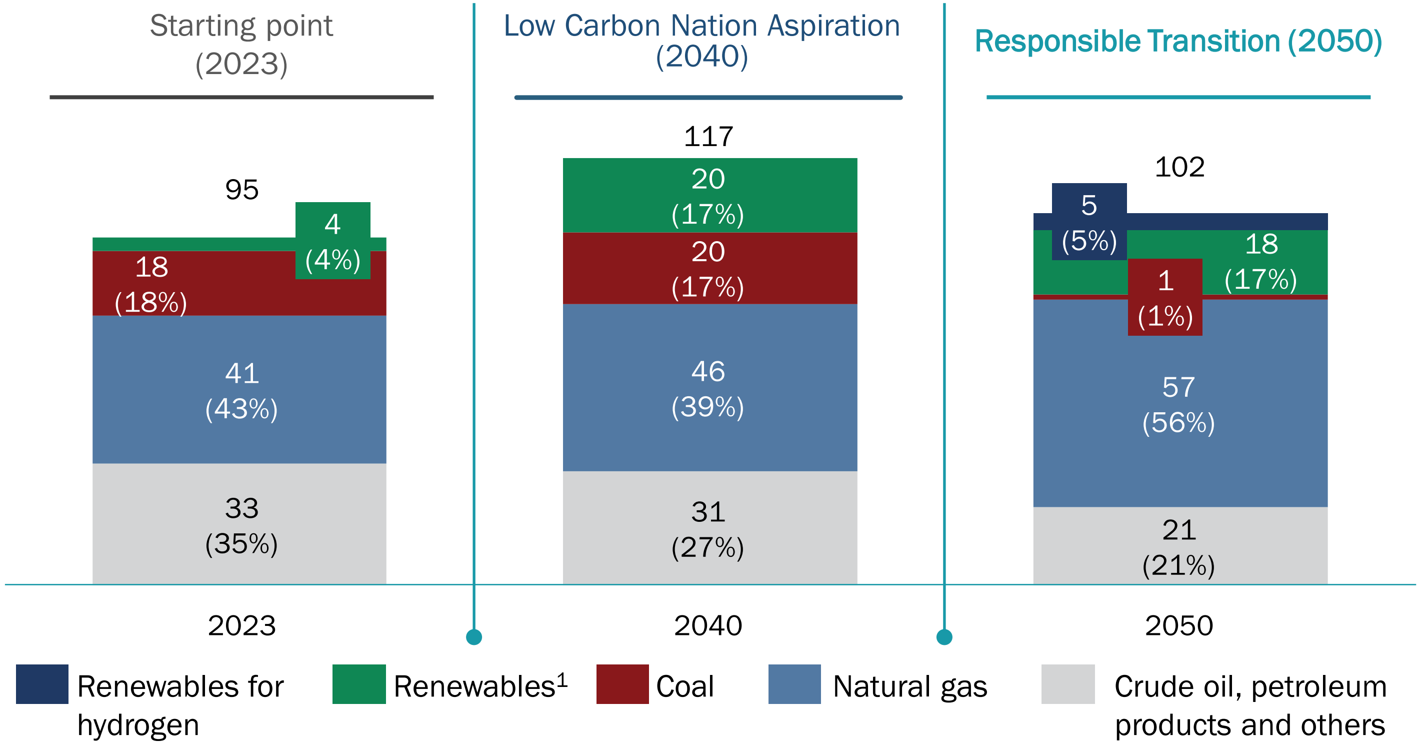
Responsible Transition (RT) Pathway 2050

RT Pathway 2050 is the best-fit scenario developed in consideration of current technology developments, global trends and national circumstances

The RT pathway aims to:

- **increase RE**
  Increased use of RE in the power generation mix
- **phase out coal**
  Close to fully phased-out coal from the power generation mix
- **pursue EE**
  Broad based energy efficiency initiatives pursued
- **expedite green mobility**
  Shift to electrification and biofuels expedited in the transport sector

Total Primary Energy Supply (Mtoe), by energy source



1 includes bioenergy, solar, hydropower and hydrogen

Ambition

RT Pathway 2050 Targets

The targets will guide the nation towards the RT pathway ambition, striking the right balance between environmental mitigation and the need to bolster net socioeconomic values

Sector and Key Driver		2050 NETR Responsible Transition
Energy Efficiency	Industry and Commercial energy efficiency savings (%)	23%
	Residential energy efficiency savings (%)	20%
Renewable Energy	Coal share of installed capacity (%)	0%
	RE share of installed capacity (%)	70%
Hydrogen	Green hydrogen production (MTPA)	Up to 2.5 MTPA
	Grey hydrogen feedstock phase off (%)	100%
	Hydrogen hubs (#)	3
Bioenergy	Biofuel capacity (billion litres)	3.5
	Bioenergy power generation (GW)	1.4

Sector and Key Driver			2050 NETR Responsible Transition
Green Mobility	Land	Urban public transport modal share (%)	60%
		xEV (4W) share of fleet (%)	80%
		E2W share of fleet (%)	80%
		Light vehicle fuel economy	~30%
		Heavy transport fuel economy	~24%
		Biofuel blending for heavy transport (%)	B30
		Hydrogen penetration for heavy transport (%)	5%
	Marine	Green fuel penetration in marine transport (%)	40%
	Av.	SAF blending mandate by 2050 (%)	47%
CCUS		Number of CCUS clusters (#)	3-6
		CO_2 storage capacity (Mtpa)	40-80

Ambition

Investment Opportunities

The realisation of these investments through **blended financing and public-private partnership** will spur Malaysia's low carbon economy while ensuring climate resilience

	2030		2040		2050	
Energy Efficiency	**~RM2 b** in smart devices installation	**~ RM2 b** into retrofitting gov. buildings	**~RM6 b** in smart devices installation	**~RM 7b** into retrofitting gov. buildings	**~RM7 b** in smart devices installation	
Renewable energy	**~7 GW** of solar PV (31% RE of installed capacity)		**~27 GW** of solar PV (52% RE of installed capacity)		**~57 GW** of solar PV (70% RE of installed capacity)	
Hydrogen	Establishment of **1 hydrogen hub**		Establishment of **2 additional hubs**			**Up to 2.5Mtpa** local green H_2 production
Bioenergy	**0.6 bil liters** of biofuel production	**~500 MW** of bioenergy installed capacity	**1.8 bil liters** of biofuel production	**~600 MW** of bioenergy installed capacity	**3.5 bil liters** of biofuel production	**~1,400 MW** of bioenergy installed capacity
Green Mobility	**20%** of 4W fleet as **xEVs**	**20%** of 2W fleet **electrified**	**50%** of 4W fleet as **xEVs**	**50%** of 2W fleet **electrified**	**80%** of 4W fleet as **xEVs**	**80%** of 2W fleet **electrified**
CCUS	**3** CCUS hubs	**Up to 15 MTPA** of CO_2 storage capacity	**1 carbon** capture hub	**40 Mtpa** of CO_2 storage capacity	**2 additional** carbon capture hubs	**80 MTPA** of CO_2 storage capacity

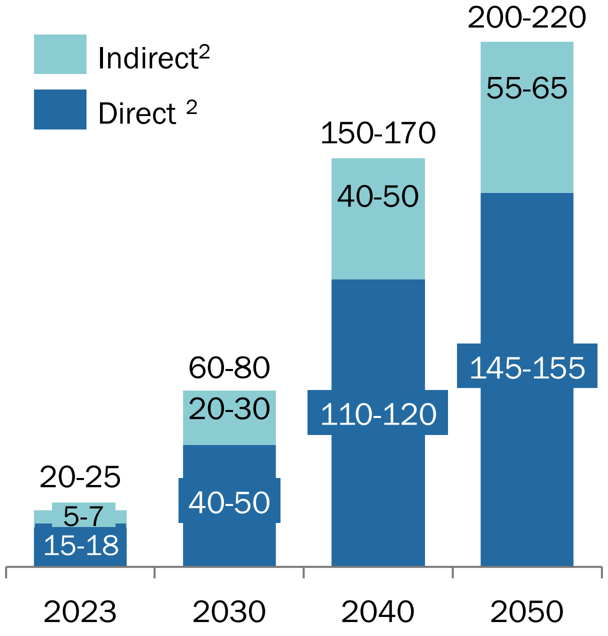
Ambition

Expected Socioeconomic Outcomes

Additional RM220 billion in GDP and the creation of 310,000 green jobs, and **income gains** for the **medium- and low-income households**

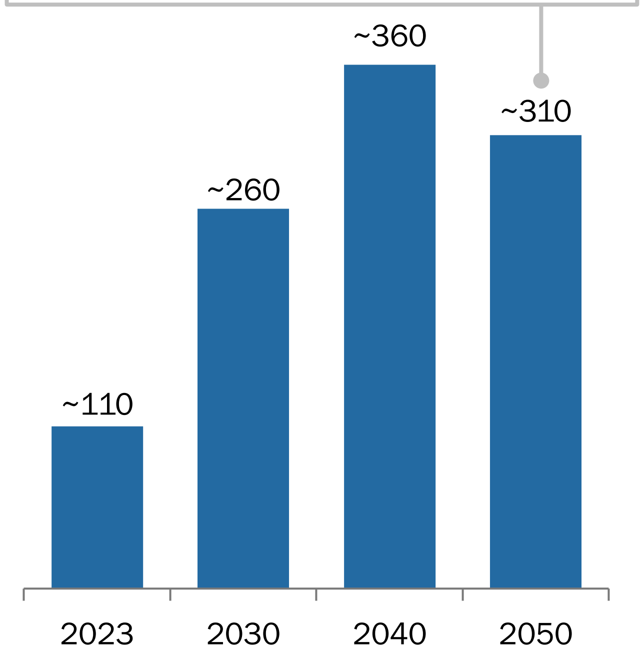
Annual GDP impact vs. 2022 baseline[1] (RM b)

Cumulative GDP value of RM1.7 trillion



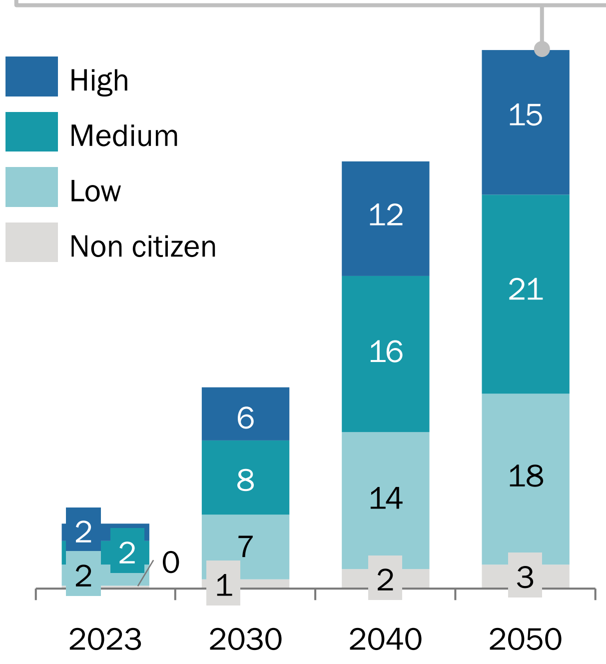
Direct jobs created vs. 2022 baseline (FTE '000)

Job impact levels off towards 2050 due to slowdown in CAPEX and therefore, direct jobs created



Income impact by household segment vs. 2022 baseline (RM b)

Medium-income segment to benefit most, followed by low-income households

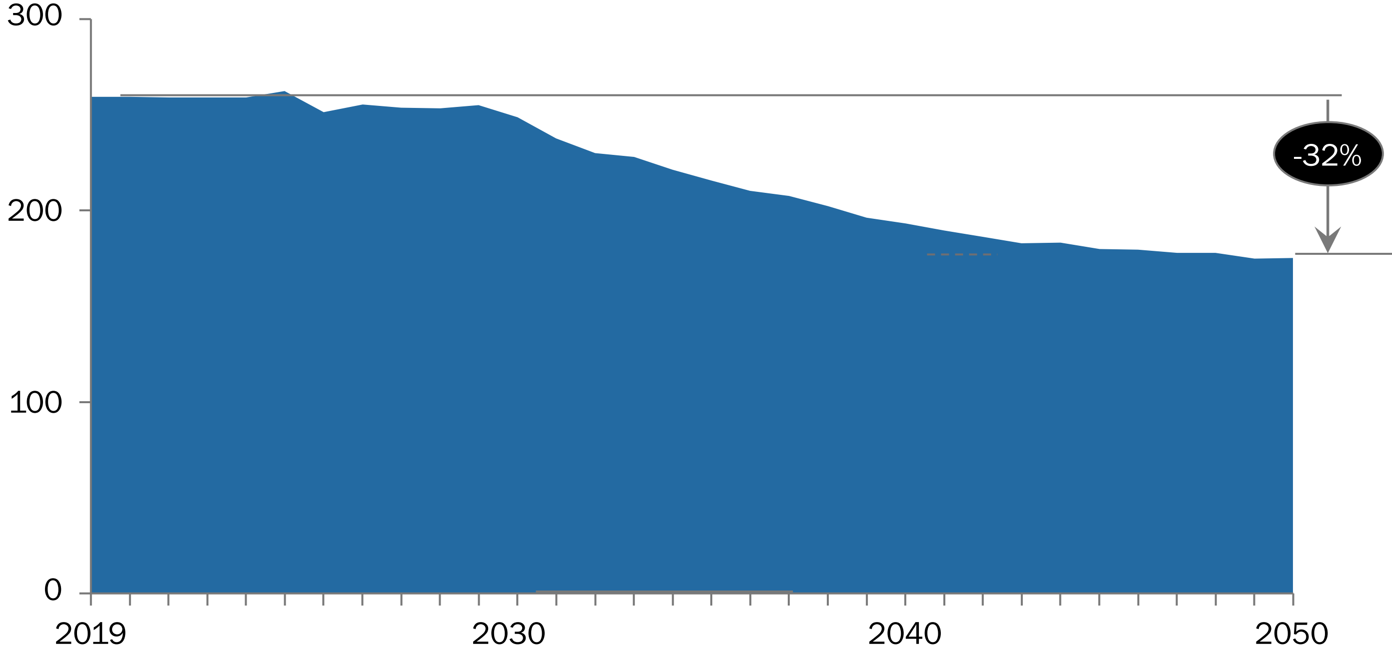


1. Cumulative GDP for 2023-2029, 2030-2039 and 2040-2050 are ~RM115 b, ~RM520 b and ~RM1,030 b totaling up to ~RM1,700 b by 2050; 2. Indirect impact includes induced (resulting increase in incomes to households due to the increased labor and capital demand from the direct and indirect effects) and indirect effects (subsequent ripple effects in the interlinked sectors of the economy resulting from changes in demand and production induced by the initial direct shock on the primary sector)

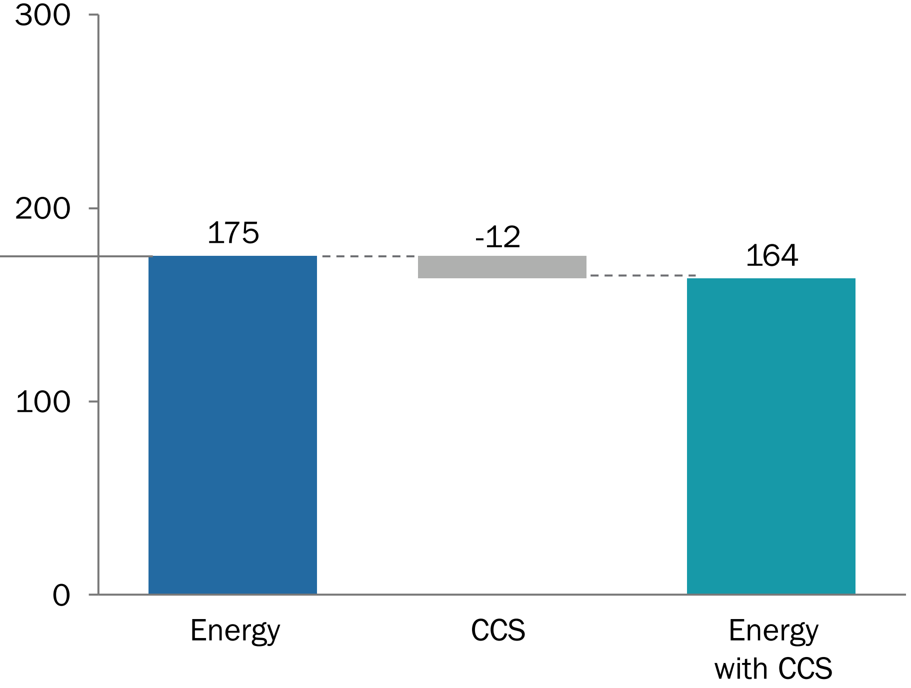
Projected GHG Emissions Reduction

Projected **32% reduction of GHG emissions** for the energy sector from 259 $MtCO_2eq$. (2019) to 175 $MtCO_2eq$ (2050)

Projected GHG Emissions, 2023-2050 ($MtCO_2eq$)



Projected GHG Emissions, 2050 ($MtCO_2eq$)



Note: Emissions pathway is estimated by multiplying primary fuel source in TPES to emissions factor by primary source. The emissions factor is sourced from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The objective of this method is to provide directional guidance on policy decisions and is not intended as a submission to UNFCCC nor any other international bodies.

Overview of Benefits

Rakyat

- Addition of 310,000 jobs in future-proof sectors across the country
- Balanced economic outcomes with 70% of income gains to benefit medium- and low-income households
- Better quality of life and health outcomes with lower emissions
- Greater empowerment to reduce carbon footprint
- Up-skilling support for just transition

Business

- RM120-180 billion investment opportunities in co-funded government facility for energy transition
- Investment opportunities for green growth across energy transition value chain, up to RM1.2-1.3 trillion
- Lower carbon footprint with cleaner energy mix and energy efficiency to future-proof trade and investment position
- Enhanced talents with up-skilling of the workforce

Government

- 10-15% uplift in GDP value with spurring of new growth areas
- 32% reduction in energy sector emissions, supporting climate change commitments
- Enhanced energy self-sufficiency
- Enhanced diversification of fiscal income with new growth
- Carbon footprint reduction to future-proof industries and generate Green FDI

Levers

Flagship Catalyst Projects and Initiatives

The catalyst projects and initiatives **champions** will showcase varying **modalities** in accelerating Malaysia's energy transition journey

EE — EFFICIENT SWITCH

- Energy Efficiency and Conservation Act — NRECC
- Energy Audit for Rail Sector — MOT

RE — RENEWABLE ENERGY ZONE

- Integrated RE Zone — Khazanah
- Solar Park — TNB
- Hybrid Hydro-Floating Solar — TNB
- Residential Solar — Sime Darby Property

RE — ENERGY STORAGE

- Energy Storage System — NRECC, ST

RE — ENERGY SECURE

- Sabah Energy Security Initiative — ECoS

H_2 — GREEN HYDROGEN

- Sarawak Hydrogen Hub — SEDC Energy

H_2 — HYDROGEN FOR POWER

- Co-firing of Hydrogen and Ammonia — TNB

Bio — BIOMASS DEMAND CREATION

- Biomass Clustering — KPK, NRECC, SEDA
- Biomass Co-firing — KPK, Malakoff

GMob — FUTURE MOBILITY

- EV Charging Stations — MITI
- Mobile Hydrogen Re-fuelling Station — MOSTI
- Public Transport Electrification — MOT, Prasarana
- Solar PV Installation for Rail Operations — MOT

GMob — FUTURE FUEL

- Biofuels Hub — PETRONAS

CCUS — CCS FOR INDUSTRY

- Regulatory Framework — KE
- Kasawari and Lang Lebah CCS — PETRONAS

Ministry of Economy

Levers

Key Initiatives and Enablers

RT Pathway 2050 Targets

Energy Efficiency

Industry and Commercial EE savings	**23%**
Residential EE savings	**20%**

Renewable Energy

Coal share of installed capacity	**0%**
RE share of installed capacity	**70%**

Hydrogen

Green H_2 production	**Up to 2.5 MTPA**
Grey H_2 feedstock phase off	**100%**
H_2 hubs	**3 hubs**

Key Initiatives

Energy Efficiency

- EE1 Improve EE awareness
- EE2 Improve existing MEPS and 5-star rating bands
- EE3 Enhance mandatory audits for large commercial and industrial buildings
- EE4 Establish green building codes for energy-intensive residential and commercial buildings
- EE5 Establish an ESCO platform
- EE6 Launch a major EE retrofit initiative amongst government buildings

Renewable Energy

- RE1 Establish solar parks for accelerated deployment of utility-scale solar
- RE2 Promote floating solar and agrivoltaic technology
- RE3 Expand virtual aggregation model for rooftop solar
- RE4 Develop plan for accelerated investments of transmission and distribution
- RE5 Develop TPA framework for sourcing of RE
- RE6 Set up RE exchange hub to enable cross-border RE trading

Hydrogen

- HY1 Establish low-carbon hydrogen standards and regulations
- HY2 Develop domestic green electrolyser manufacturing capabilities
- HY3 Reduce Leveised Cost of Hydrogen (LCOH) for low-carbon hydrogen
- HY4 Stimulate demand for low-carbon hydrogen

Key Initiatives 1 – 16

Levers

Key Initiatives and Enablers

Bioenergy		Green Mobility (Light Vehicle)		Green Mobility (Heavy Vehicle)	

RT Pathway 2050 Targets

Bioenergy	Biofuel capacity	3.5 billion litres
Bioenergy	Bioenergy power generation	1.4 GW
Green Mobility (Light Vehicle)	Urban public transport modal share	60%
Green Mobility (Light Vehicle)	xEV (4W) share of fleet	80%
Green Mobility (Light Vehicle)	xEV (2W) share of fleet	80%
Green Mobility (Light Vehicle)	Light vehicle fuel economy	~30%
Green Mobility (Heavy Vehicle)	Heavy transport fuel economy	~24%
Green Mobility (Heavy Vehicle)	Biofuel blending for heavy transport	B30

Key Initiatives

Bioenergy

- BI-1 Explore alternative bioenergy feedstock
- BI-2 Enhance attractiveness of palm oil biomass
- BI-3 Address challenge of supply security
- BI-4 Catalyse local demand for bioenergy
- BI-5 Improve solid waste management policies

Green Mobility (Light Vehicle)

- GM-LV1 Drive public transport modal share shift to 40% by 2040 and 60% by 2050
- GM-LV2 Improve light vehicle fuel economy
- GM-LV3 Accelerate electrification of light vehicles segment (E4W)
- GM-LV4 Accelerate electrification of light vehicles segment (E2W)

Green Mobility (Heavy Vehicle)

- GM-HV1 Enhance demand-side management with fuel economy
- GM-HV2 Implement B30 biodiesel blending mandate
- GM-HV3 Introduce future powertrains for heavy vehicles

Key Initiatives 17 – 28

Levers

Key Initiatives and Enablers

Green Mobility (Aviation)

Green Mobility (Marine)

CCUS

RT Pathway 2050 Targets

Green Mobility (Aviation)	Green Mobility (Marine)	CCUS	
SAF blending mandate	Green fuel penetration in marine transport	CCUS clusters	CO_2 storage capacity
47%	**40%**	**3 to 6 clusters**	**40 – 80 MTPA**

Key Initiatives

GM-AV1 Establish overarching aviation decarbonization roadmap

GM-AV2 Implement SAF blending mandate

GM-AV3 Undertake palm oil-feedstock emissions study

GM-MA1 Unlock market opportunities of biofuel in marine bunkering

GM-MA2 Unlock market opportunities of future fuels in marine bunkering

CC1 Develop CCUS-specific policies and regulations

CC2 Strengthen CCUS adoption through provision of incentives across all relevant sectors and facilitate hub development

CC3 Facilitate CCUS hub infrastructure development

CC4 Establish transboundary CO_2 agreement

CC5 Promote local utilisation of CO_2 in industry

Key Initiatives 29 – 38

Key Enablers

Enablers	Initiatives
Financing and Investments	EN1 Establish National Energy Transition Facility
	EN2 Mobilise and attract private capital flow for energy transition sectors
	EN3 Roll out carbon pricing mechanism
Policy and Regulations	EN4 Launch Natural Gas Roadmap
	EN5 Rationalise energy subsidies
Human Capital and Just Transition	EN6 Establish green skills taxonomy and ensure strategic workforce planning
	EN7 Develop and roll out targeted green skilling programmes
	EN8 Develop and implement community support programmes
	EN9 Enhance energy literacy and energy efficiency awareness among students, SMEs and energy consumers
Technology and Infrastructure	EN10 Develop a National Energy Knowledge Hub for public access
	EN11 Accelerate development of domestic industries for green manufacturing and adoption of green technologies
Governance and Implementation	EN12 Establish National Committee on Energy Transition under the National Energy Council (MTN)

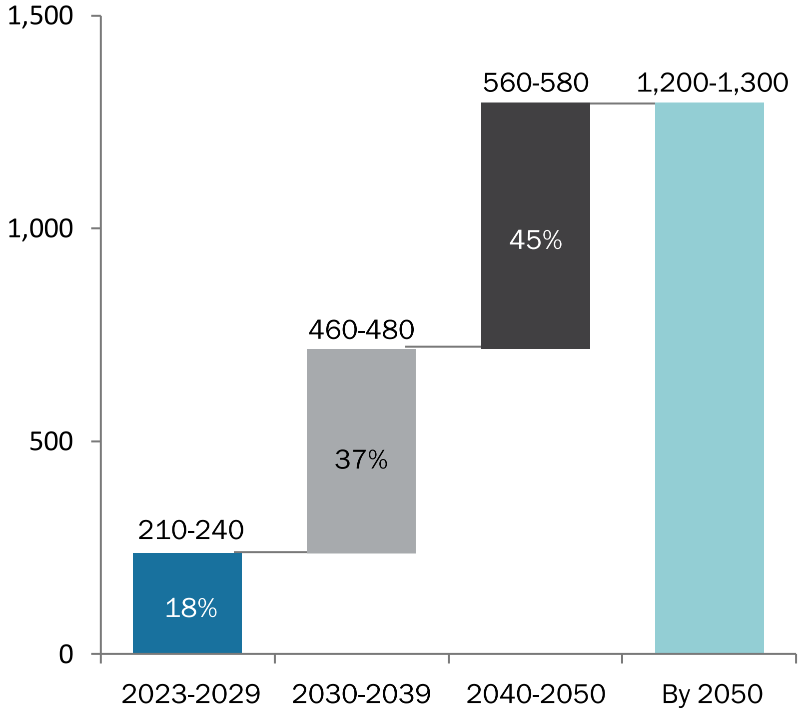
Key Initiatives 39 – 50

Enablers

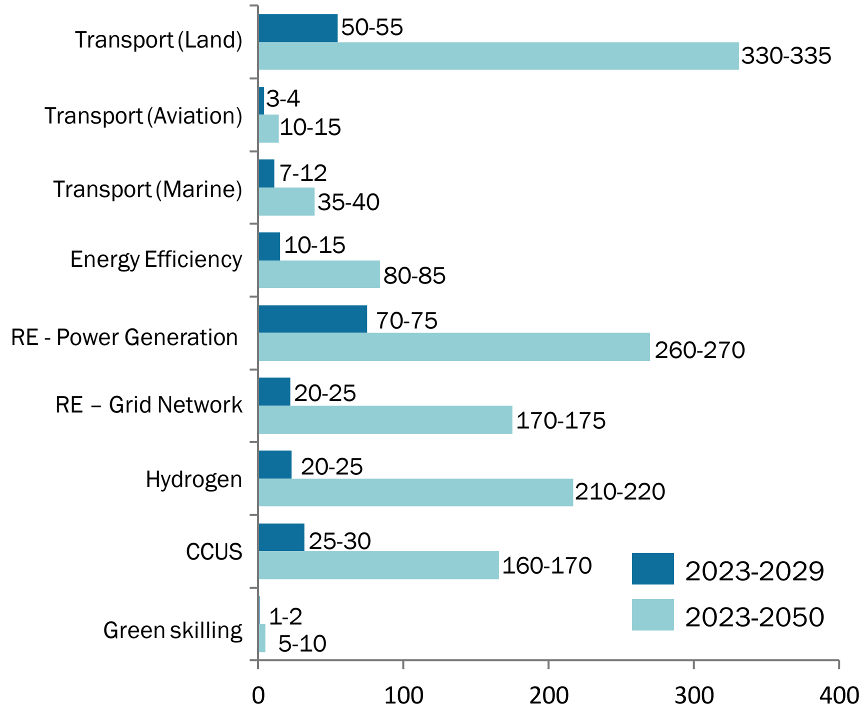
Energy Transition Financing Needs

Required investment between **RM1.2 trillion to RM1.3 trillion by 2050**. A National Energy Transition Facility (NETF) will be launched to expedite mobilisation of capital

By decade, RM billion



By categories, RM billion



Note: NETR financing needs are additive and do not include business-as-usual investment required or projects already being financed (e.g. transmission and distribution, ongoing public transport projects) Source: PLEXOS, NETR team analysis

Key Initiative EN1

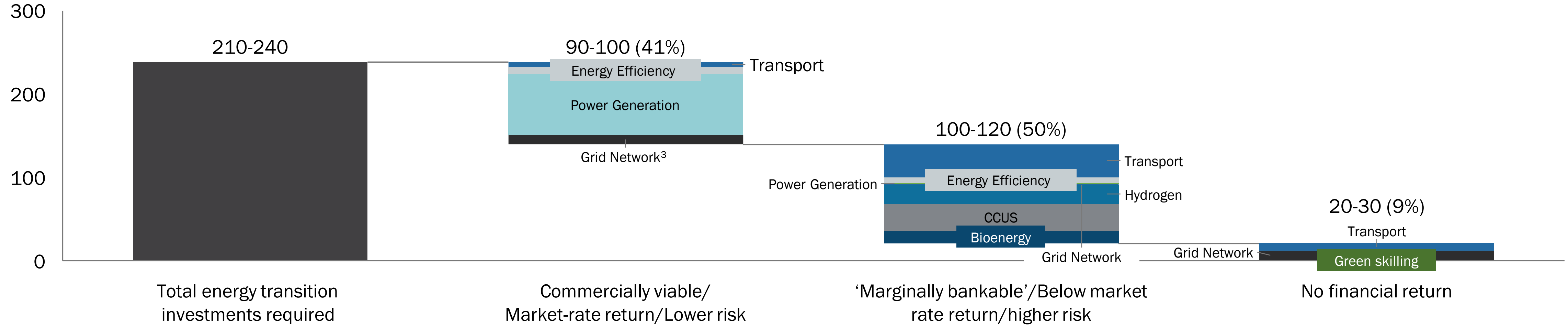
Launch a National Energy Transition Facility (NETF)

- Launch initial seed fund amounting to RM2 billion
- Explore the catalytic blended finance platform

Energy Transition Financing Needs

Diverse capital pools will be used to support energy transition projects based on their financial returns and funding type

Est. investments required (2023 – 2029), RM billion



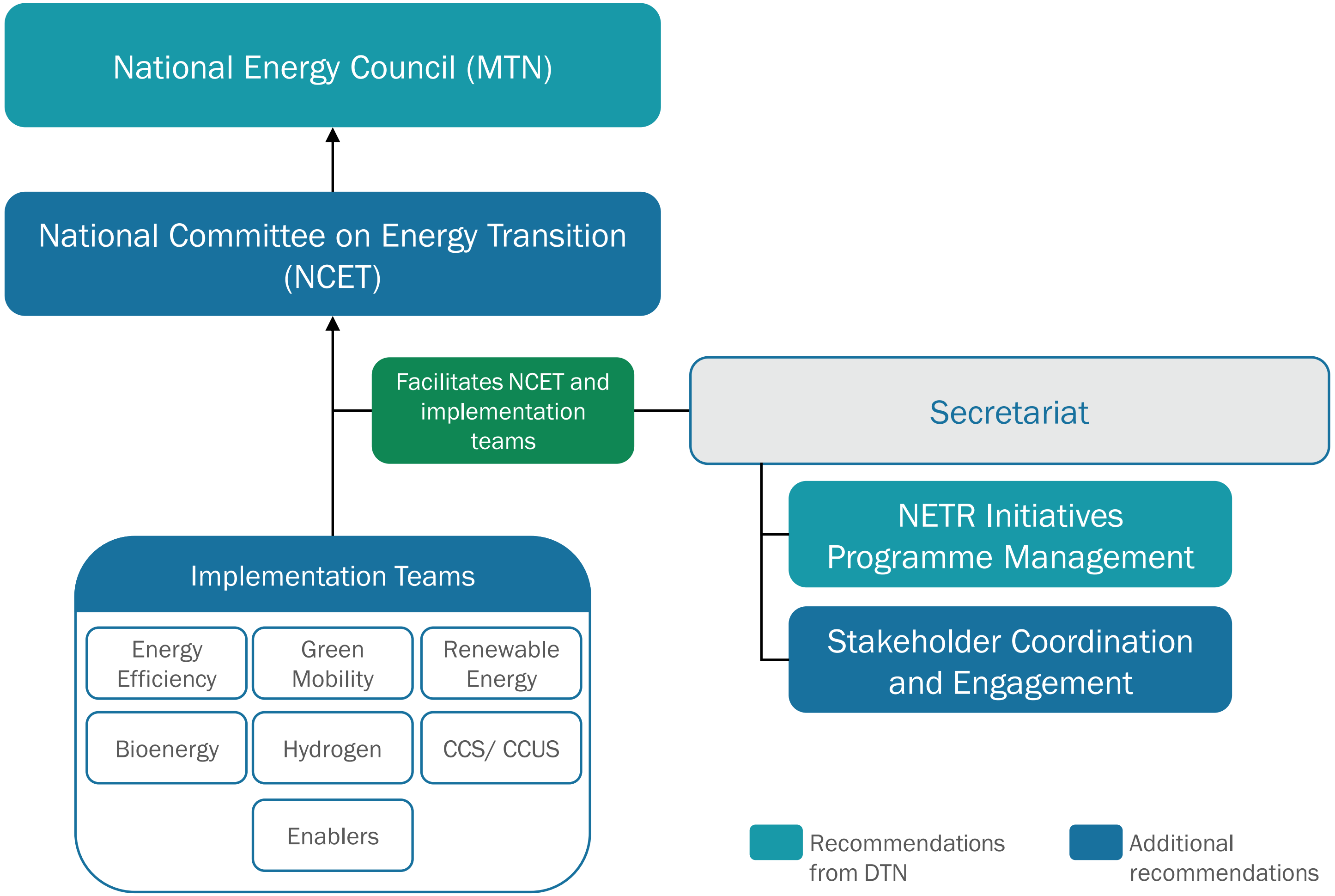
	Commercially viable/ Market-rate return/Lower risk	'Marginally bankable'/Below market rate return/higher risk	No financial return
Potential pools of capital	• Domestic banks & FIs • GLICs/SWFs • Green FDI • Large domestic corporations • VC/Early-stage funding	• Public catalytic funding (blended finance[1], innovation finance) • MDBs/DFIs • GLICs/SWFs	• Public direct funding
Enabling policy initiatives	• Sector-specific policy implementation • Attract green FDI • Mobilize sustainable finance (e.g., sustainability-linked sukuks, green taxonomies)	• National Energy Transition Facility • MDB/DFI partnerships • Rationalise fuel subsidies	• Rationalise fuel subsidies • Gradual carbon pricing

Financial Institution (FI), Government Link Investment Company (GLIC), Sovereign Wealth Funds (SWF)
Foreign Direct Investment (FDI), Venture Capital, Multilateral Development Bank (MDB), Development Finance Institution (DFI)

Governance and Implementation

YAB Prime Minister chairs the National Energy Council (MTN) to oversee Malaysia's energy sector planning and development.

The National Committee on Energy Transition (NCET) monitors the implementation of NETR and reports to MTN.



TERIMA KASIH