Supported by:

on the basis of a decision by the German Bundestag

[Final Report]

Climate Finance for Carbon Neutrality in Thailand

Project

Input

Output

Outcome

Financial & economic policies, measures, and instruments

Countries

- International review
- Thailand

x

Energy sector

- Power Sector
- Transport Sector
- Industry Sector

CASE:
Carbon Neutral 2050 Scenario

from the report *"Towards a collective vision of Thai energy transition: National long-term scenarios and socioeconomic implications"*

Gap analysis

- International VS Existing Practices
- Needs of each sector

Economic Analysis

- Size of fund from "**Carbon Neutral 2050 Scenario**"
- Policy/mechanisms/instruments to match with size of fund and technology development

Financial & economic policies, measures, and instruments to support Thailand's Carbon Neutrality Pathway

Carbon Neutrality 2050

Agenda

1. Global Landscape of Climate Finance

2. National Climate Target and Investment Trajectories

3. Needs for Public and Private Finance on the Carbon Neutrality Pathway

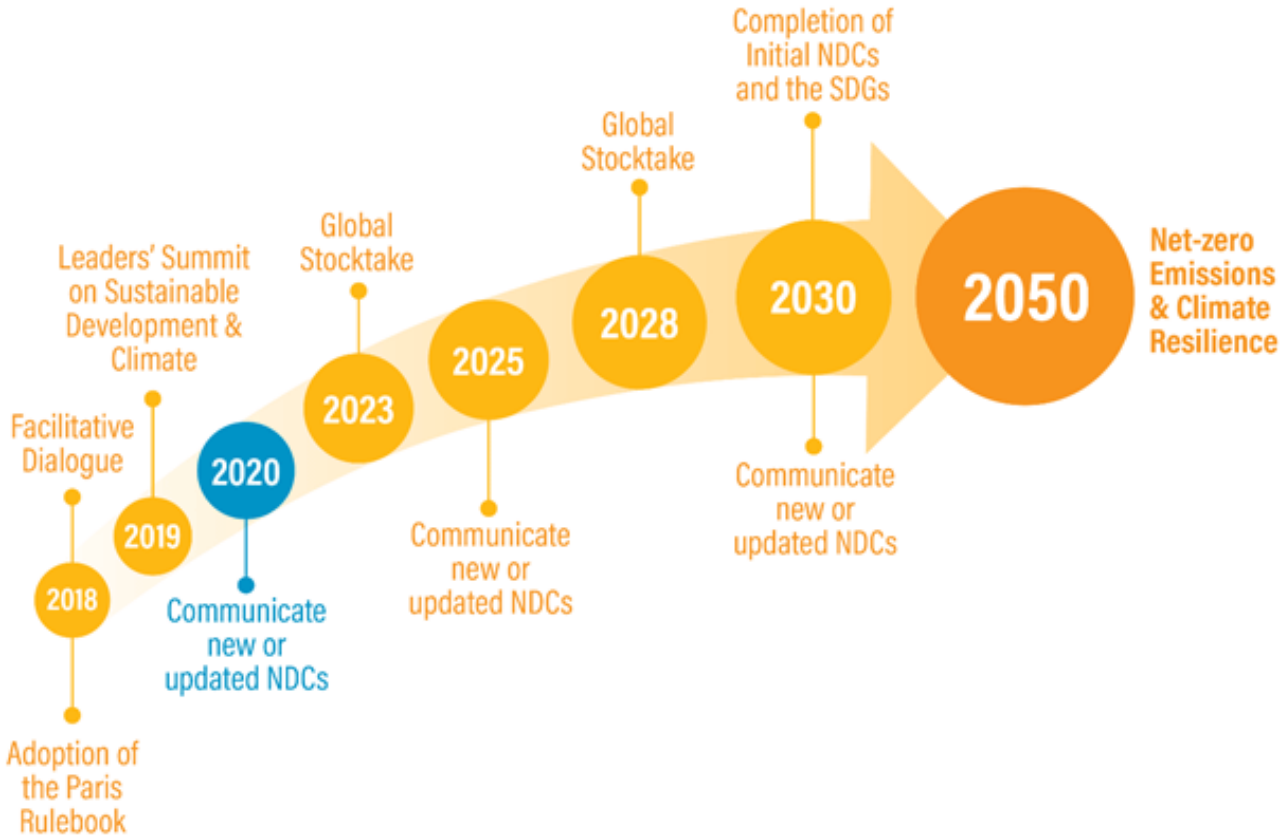
4. Crucial Tools for Guiding Investments towards Carbon Neutrality Pathways

Global Landscape of Climate Finance

Global Commitments

Paris Agreement has set a clear direction for Net-Zero economy in decades to come

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 Dec 2015. It entered into force on 4 Nov 2016.



Paris Agreement Goal

Long-term temperature (Art. 2): limiting global temperature increase to well below 2°C, while pursuing efforts to limit the increase to 1.5°C.

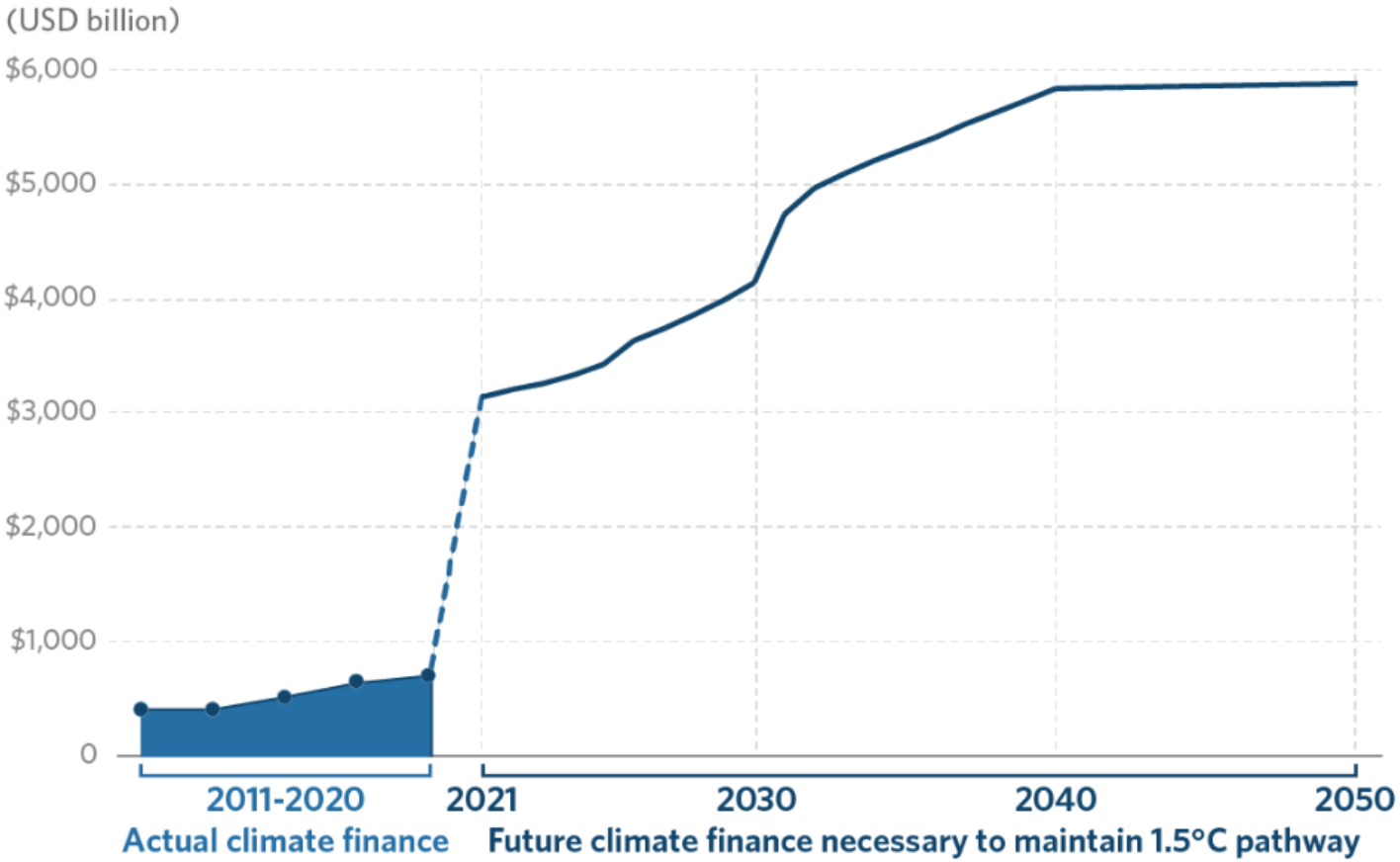
Global peaking (Art. 4): Parties aim to reach global peaking of GHG emissions as soon as possible, recognizing peaking will take longer for developing country Parties, to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHG in the second half of the century.

Support (Art. 9, 10 and 11): The Paris Agreement reaffirms the obligations of developed countries to support the efforts of developing country Parties to build clean, climate-resilient futures, while for the first time encouraging voluntary contributions by other Parties. Provision of resources should also aim to achieve a balance between adaptation and mitigation.

Source: The Creagy, 2023

What is Climate Finance?

Climate finance refers to local, national or transnational **financing**, drawn from public, private and alternative sources of financing, **that seeks to support mitigation and adaptation actions that will address climate change.**



Source: https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021

- Achieving net zero will require all public and private actors to align their finance with Paris goals.
- Current investment levels are nowhere near enough to limit global warming to 1.5 °C.
- While many institutions have started to take some action on climate change through net zero pledges and emission reduction targets, action in the real economy lags.

Global landscape of climate finance

CASE for Southeast Asia

1

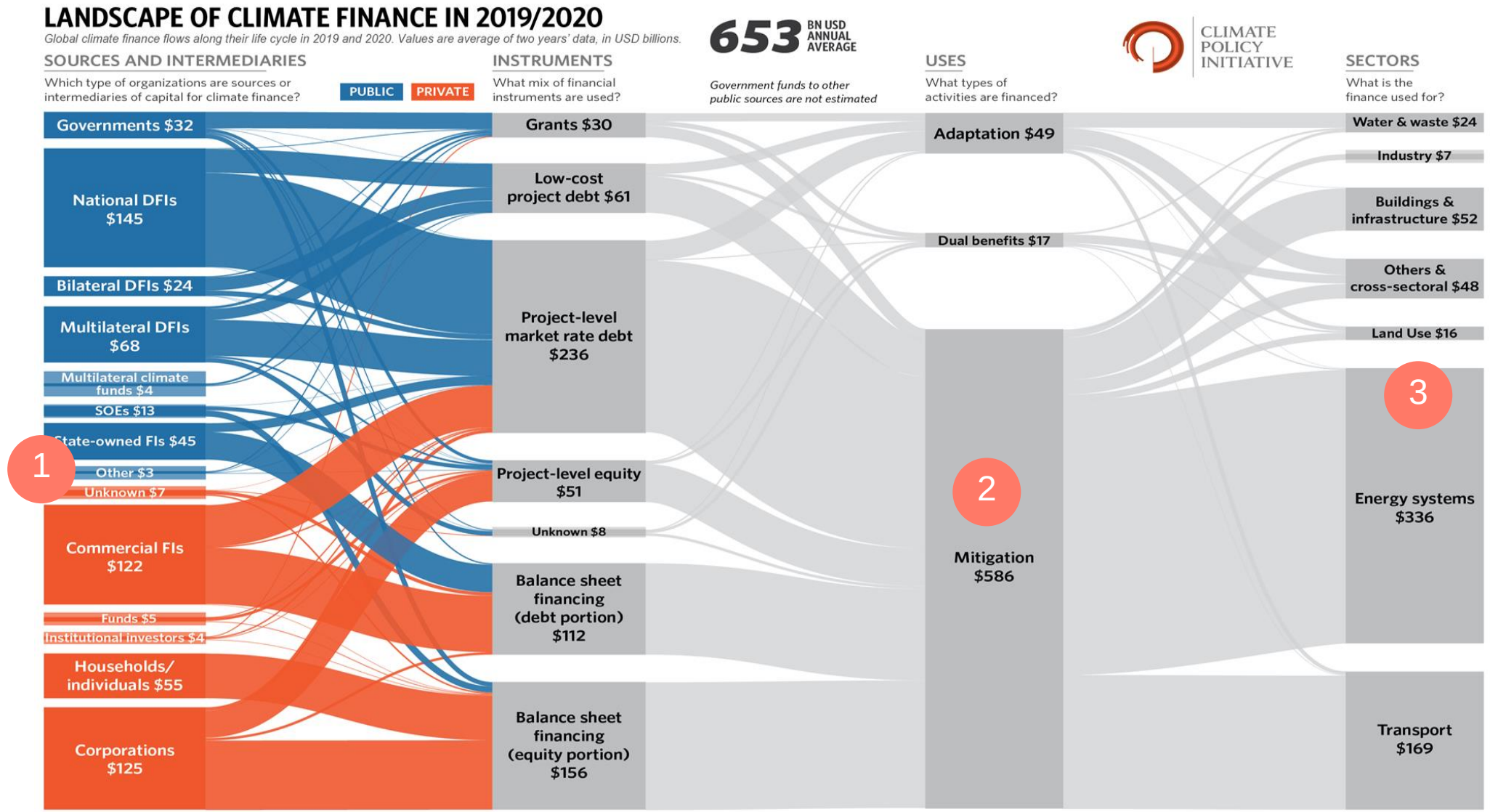
Climate finance accounts for around **653 billion USD** (annual average)

2

The share of public finance is slightly more than private finance

3

Majority of climate finance is channeled to **mitigation** (Energy & Transport sectors are the largest)



Source: https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2021/

Investment needs for climate action per year by 2030

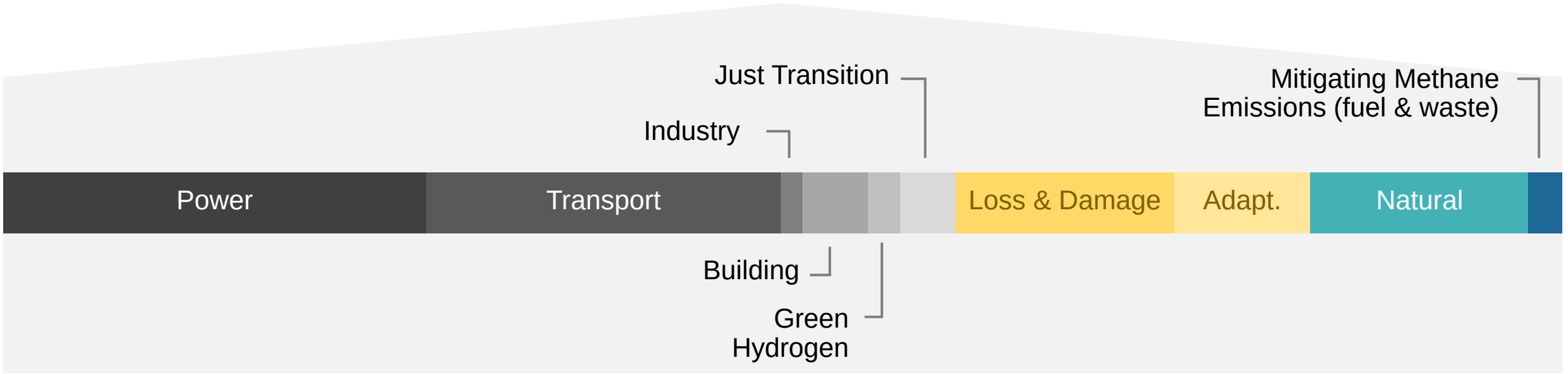
CASE for Southeast Asia

Annual Investment in 2019/2020

653 billion USD

Required Annual Investment (by 2030)

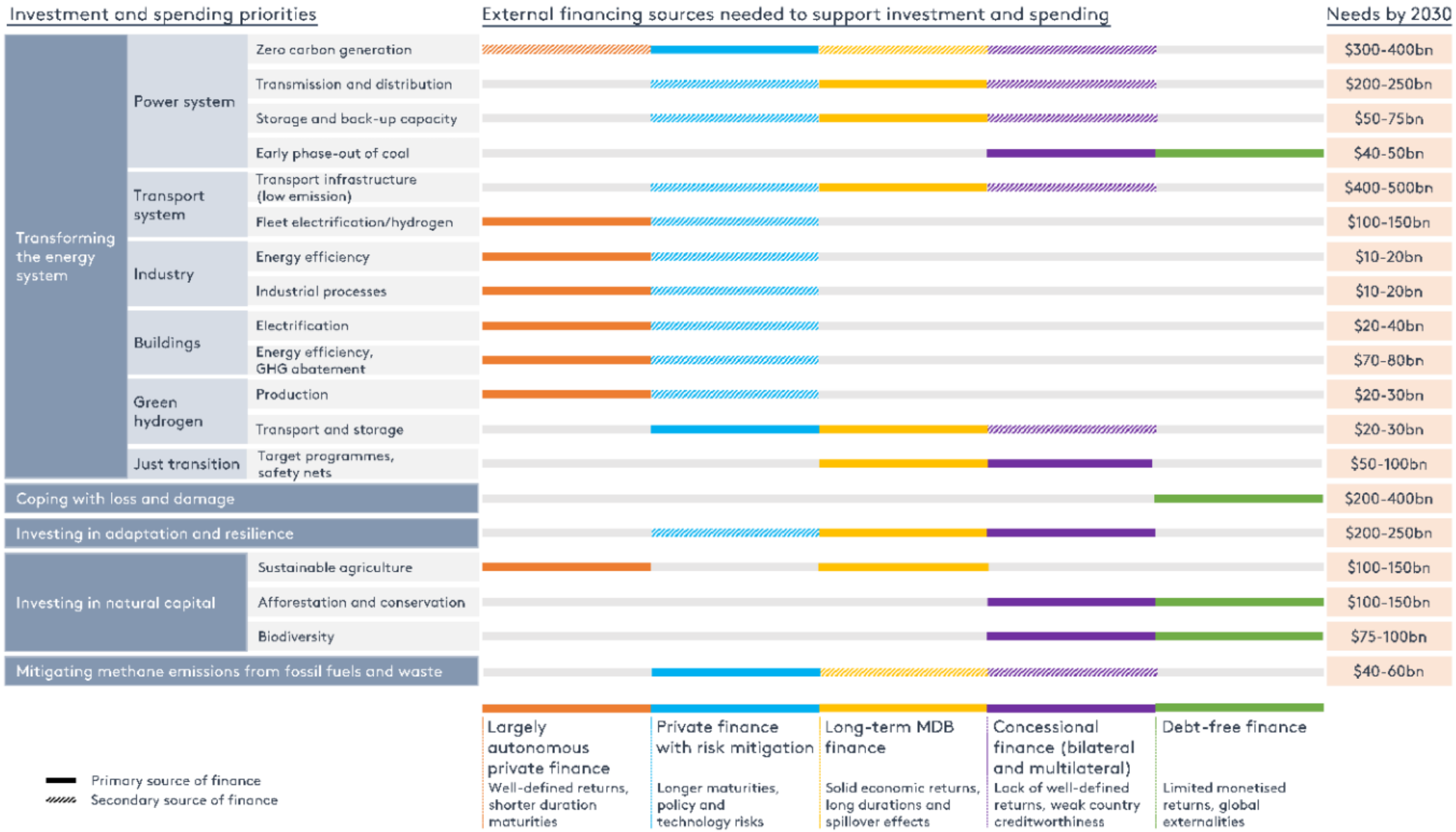
2,000 – 2,800 billion USD



Source: https://www.climatepolicyinitiative.org/publication/an-innovative-ifi-operating-model-for-the-21st-century/

Investment needed for climate action per year by 2030

CASE for Southeast Asia



Source: Report of the Independent High-Level Expert Group on Climate Finance

National Climate Target and Investment Trajectories

Thailand Net-Zero Roadmap

CASE for Southeast Asia

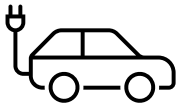
2018

Thailand National Adaptation Plan (NAP)

Vision: Thailand is resilient with adaptive capacity to climate change impacts and move toward sustainability development

2035

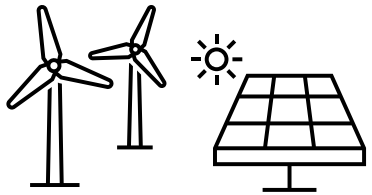
69% Share of electric vehicles of total new vehicles in the market



2050

Carbon Neutrality

50% share of RE in the total addition of generation capacity



2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | 2055 | 2060 | 2065

2021

Start the NDC implemenatation

NDC

2021

Submission of LT-LEDS (Long-term low GHG Emissions Development Strategy

2030

Aims to reduce 40% of GHG with international supports

2037

120 $MtCO_{2e}$ of CO_2 is removed

- Increase & maintain primary forest
- Regenerate natural forest areas
- Increase economic forest areas
- Increase & maintain cropland
- Reduce biomass burning

2065

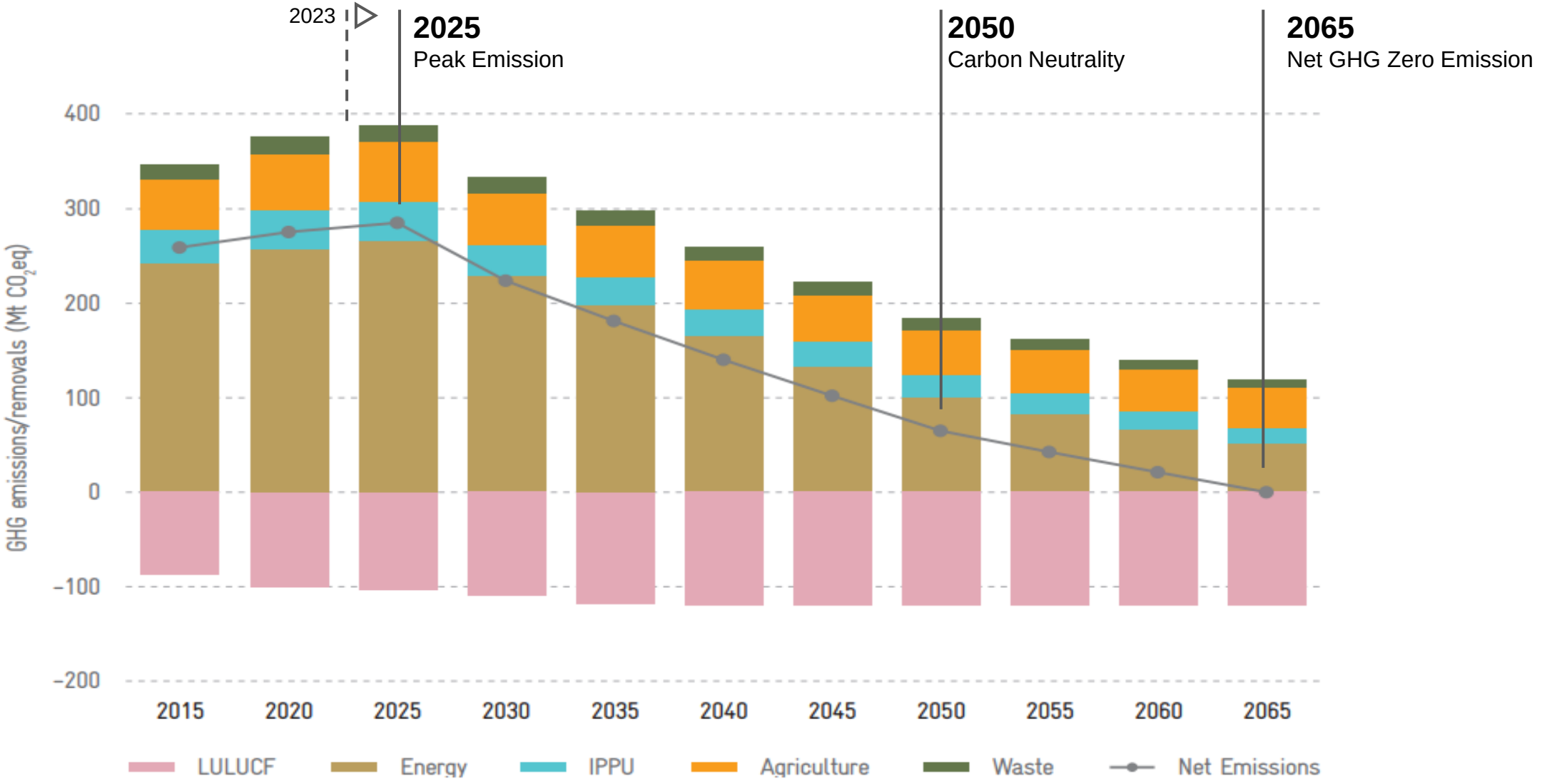
Net Zero GHG Emission

While looking forward to enhanced international cooperation and support on finance, technology, and capacity building

Source: Adapted from ONEP, 2022

Thailand's Net Zero Emission Pathway

CASE for Southeast Asia



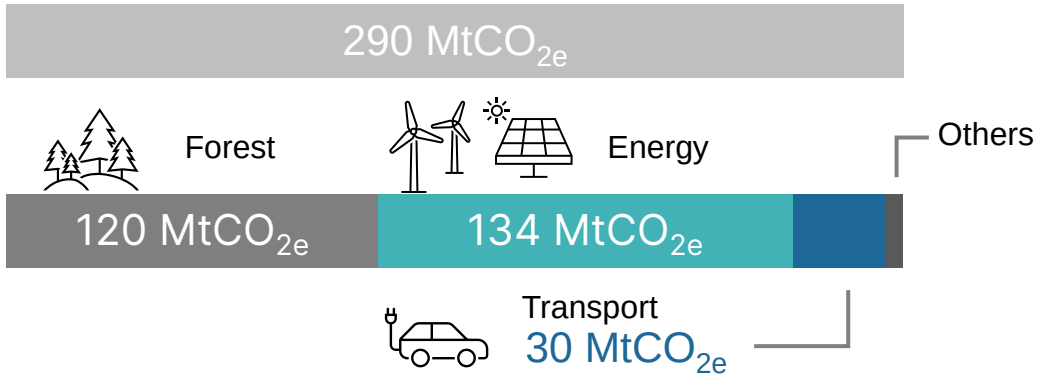
Source: Thailand LT-LEDS (November 2022)

Investment Trajectories @ 2030*

CASE for Southeast Asia

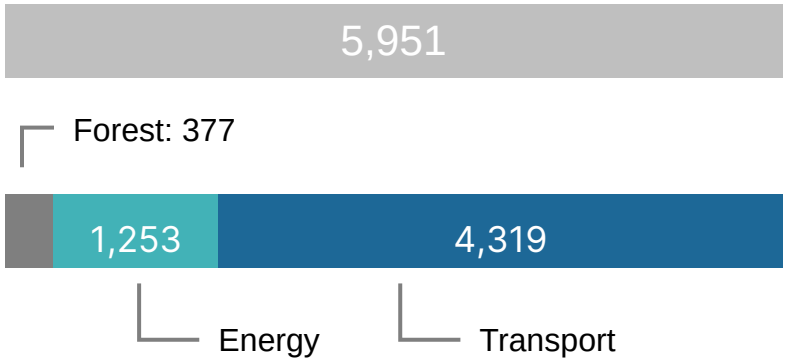
Unconditional (30%)

GHG Reduction

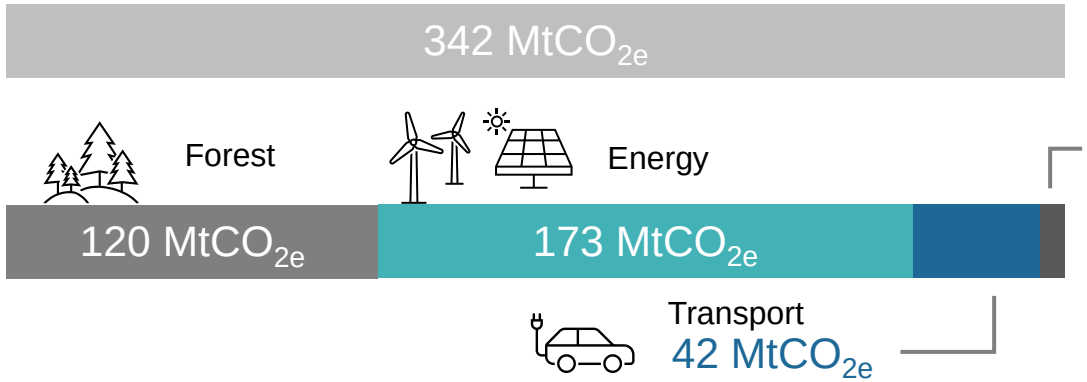


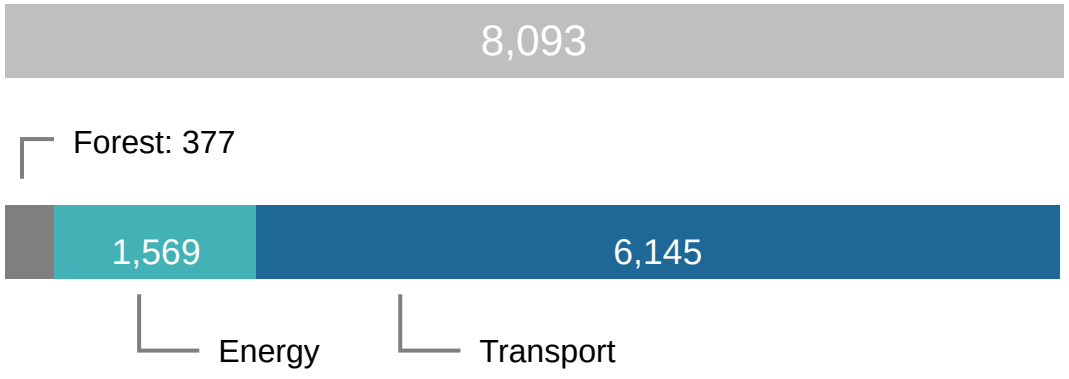
Total Investment

(All units are in billion THB)



Conditional (40%)



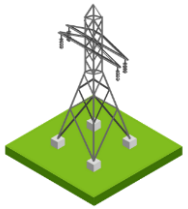


Source: GGGI – GCF Thailand Readiness Program (2023)
(*Initial estimation conducted by The Creagy)

Needs for Public and Private Finance on the Carbon Neutrality Pathway

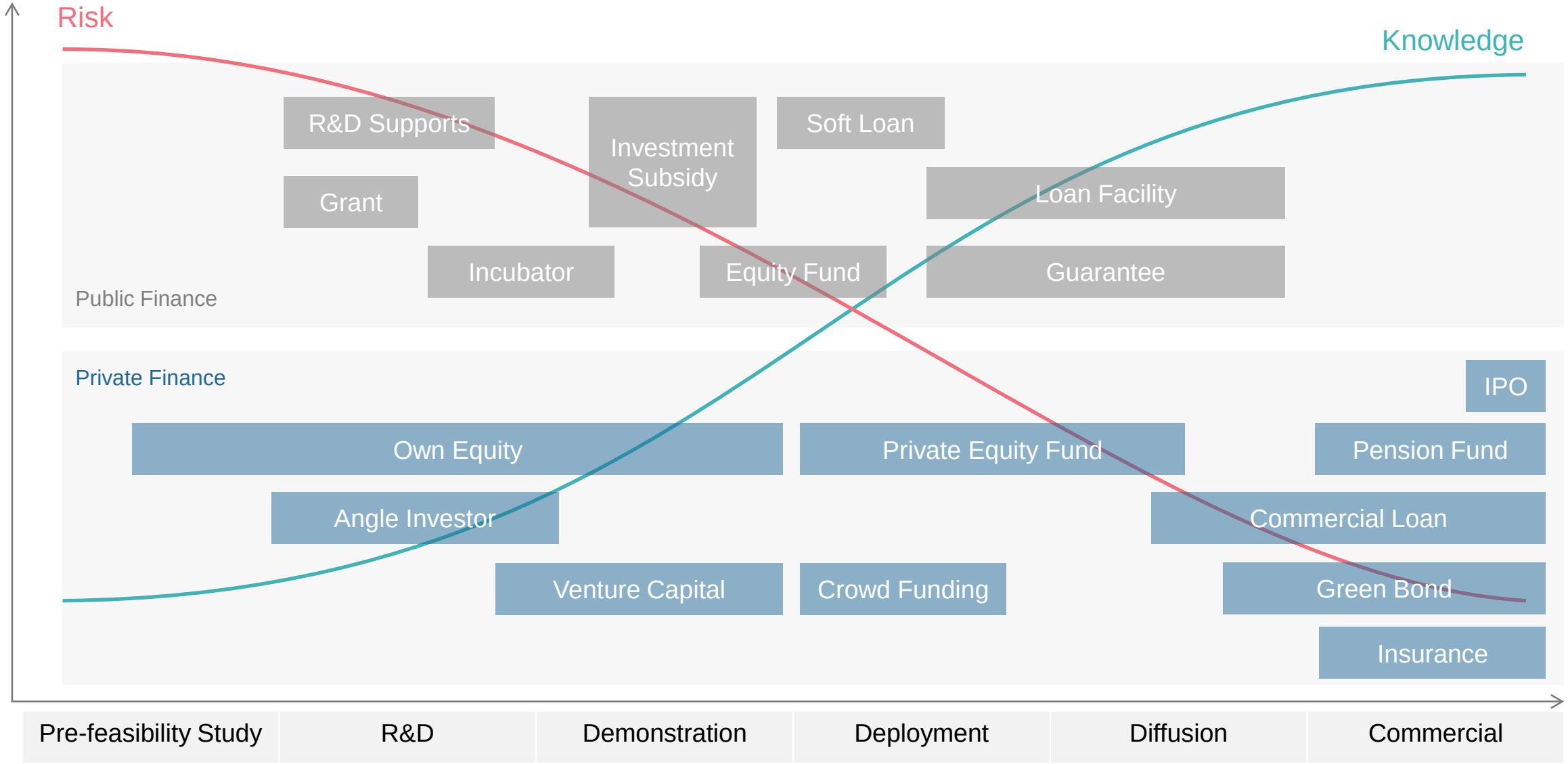
Short-, Medium-, and Long-term Targets for the CN2050 scenario

CASE for Southeast Asia

	Now to 2030 Reduce 30% from 2019 level	2030 – 2037 Reduce 50% from 2019 level	2037 – 2050 Reduce > 78% from 2019 level
Power 	44 GW Solar 20 GW Wind No new Coal	Solar + Battery Energy Storage No new Coal	80% Share of RE (Wind, Solar, Biomass) Coal Phase out Hydrogen
Transport 	Modal shift 20% Biofuel blending (2025) Increase EV	100% increase of EV sale (2035): 10 million EVs Fuel economy improvement	Increase EV, retire ICE Increase rail freight transport Decrease conventional jet kerosene
Industry 	Continue using biomass Replacing oil with electric heat pump	Ramp up electric heating Biomass allocation across sub-industry sector	Gradual coal phase out Increase use of hydrogen
GHG Mitigation	**-74 $MtCO_{2e}$** Power: -36 $MtCO_{2e}$, Industry: -35 $MtCO_{2e}$, Agriculture & Building: -3 $MtCO_{2e}$	**-66 $MtCO_{2e}$** Power: -23 $MtCO_{2e}$, Transport: -28 $MtCO_{2e}$ Industry: -12 $MtCO_{2e}$, Agriculture & Building: -3 $MtCO_{2e}$	**-65 $MtCO_{2e}$** Power: -4 $MtCO_{2e}$, Transport: -36 $MtCO_{2e}$ Industry: -19 $MtCO_{2e}$, Agriculture & Building: -6 $MtCO_{2e}$

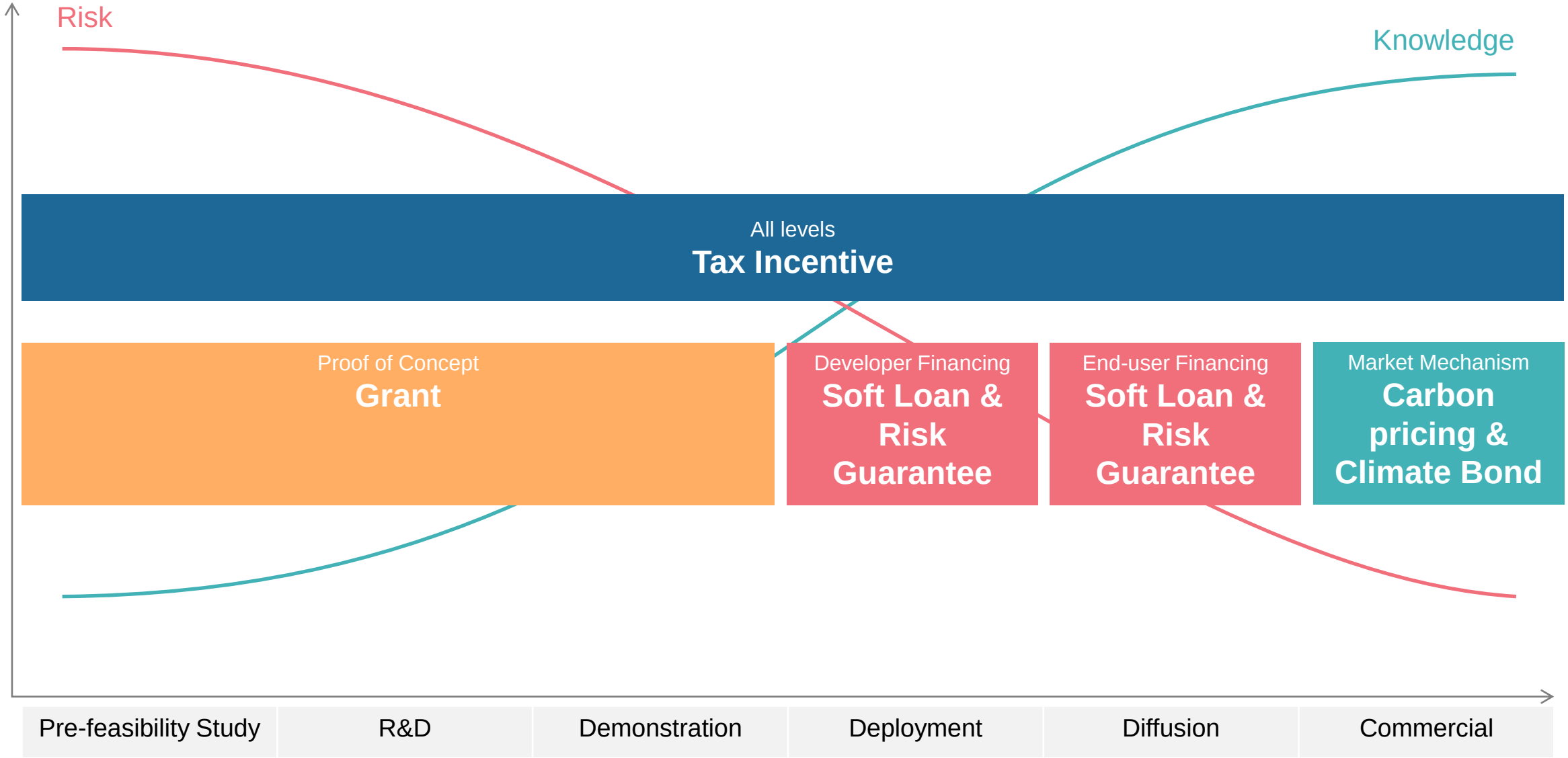
Financial instruments by level of technology development

CASE for Southeast Asia



Financial instruments by level of technology development

CASE for Southeast Asia



Characters & co-financing ratio of selected public finance

Co-financing Ratio – 1:3

Grant

- To mitigate the investment risk of low carbon technologies during the R&D, demonstration & piloting phases
- The grant can be provided at different level, .e.g 50% - 100% for R&D, 20% - 30% for demonstration & piloting projects.

Co-financing Ratio – 1:25

Soft loan & risk guarantee

- To allow SME and end-users access finance for developing low carbon projects
- The government can provide compensation or risk guarantee premium so that the commercial banks can provide low-interest loan to SME and end-users.

Co-financing Ratio – 1:10

Tax incentives

- To support investment of low-carbon technologies through tax exemption.
- A number of BOI packages already exists. These include exemption of corporate income tax, exemption of import duties on machinery, exemption of import duties for R&D purpose.
- The future tax exemption may include tax credits for buying low carbon products.

Co-financing Ratio – 1:250

Climate Bond

- To promote climate bond by providing grants for the issuance of the bond
- Cost of issuing climate bond is about 3-5 Million THB higher than other bonds since it requires monitoring, validation, verification process.
- 2 million THB grants for the climate bond issuer for issuance of at least 500 million THB climate bond

Co-financing Ratio – 1:350

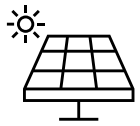
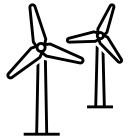
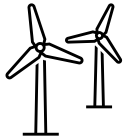
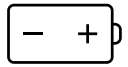
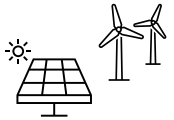
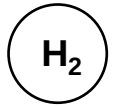
Market-based Mechanism

- To support GHG emission reduction by applying market-based mechanism.
- Carbon market can be developed for incentivizing GHG emission reduction project
- During the development of carbon market, Government can provide the floor price equivalent to 100THB/tCO2.

Power sector

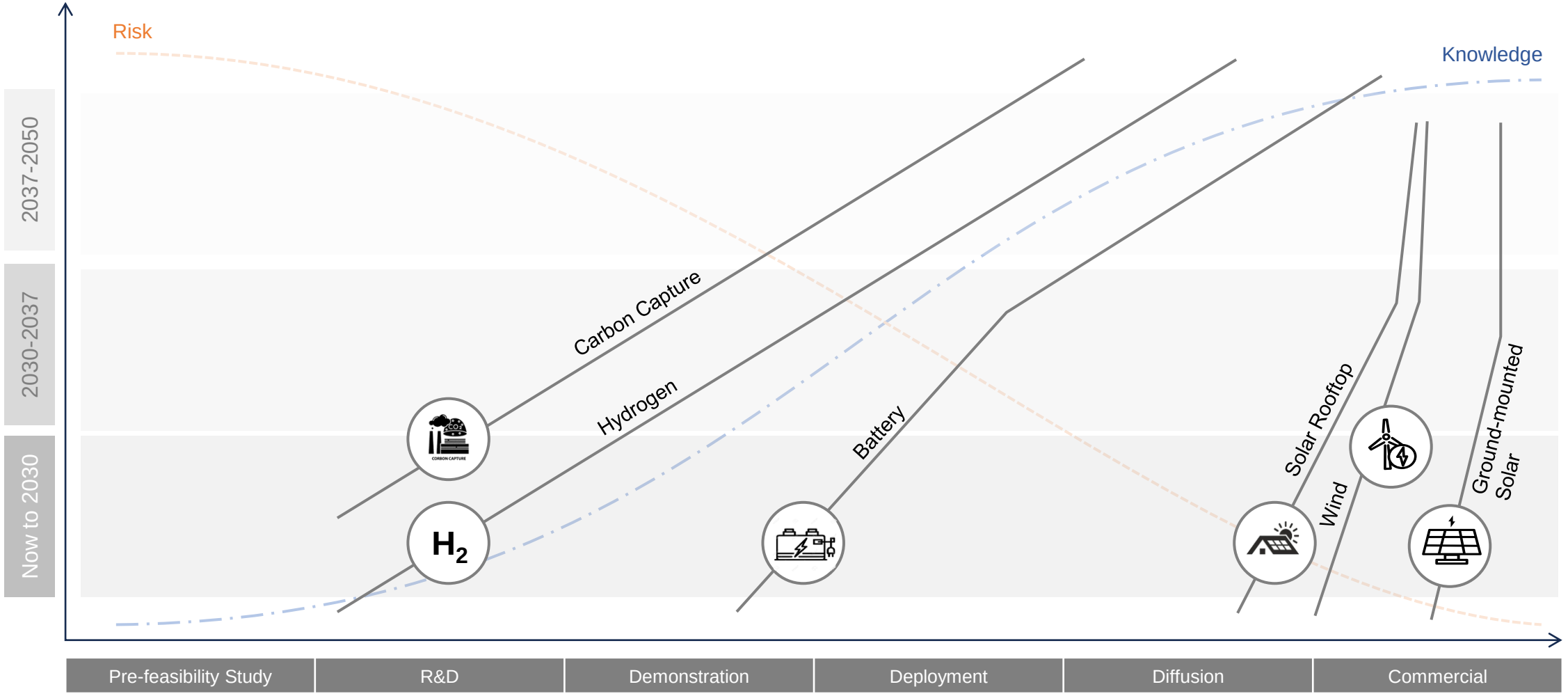
Carbon Neutrality Pathway for Power Sector

CASE for Southeast Asia

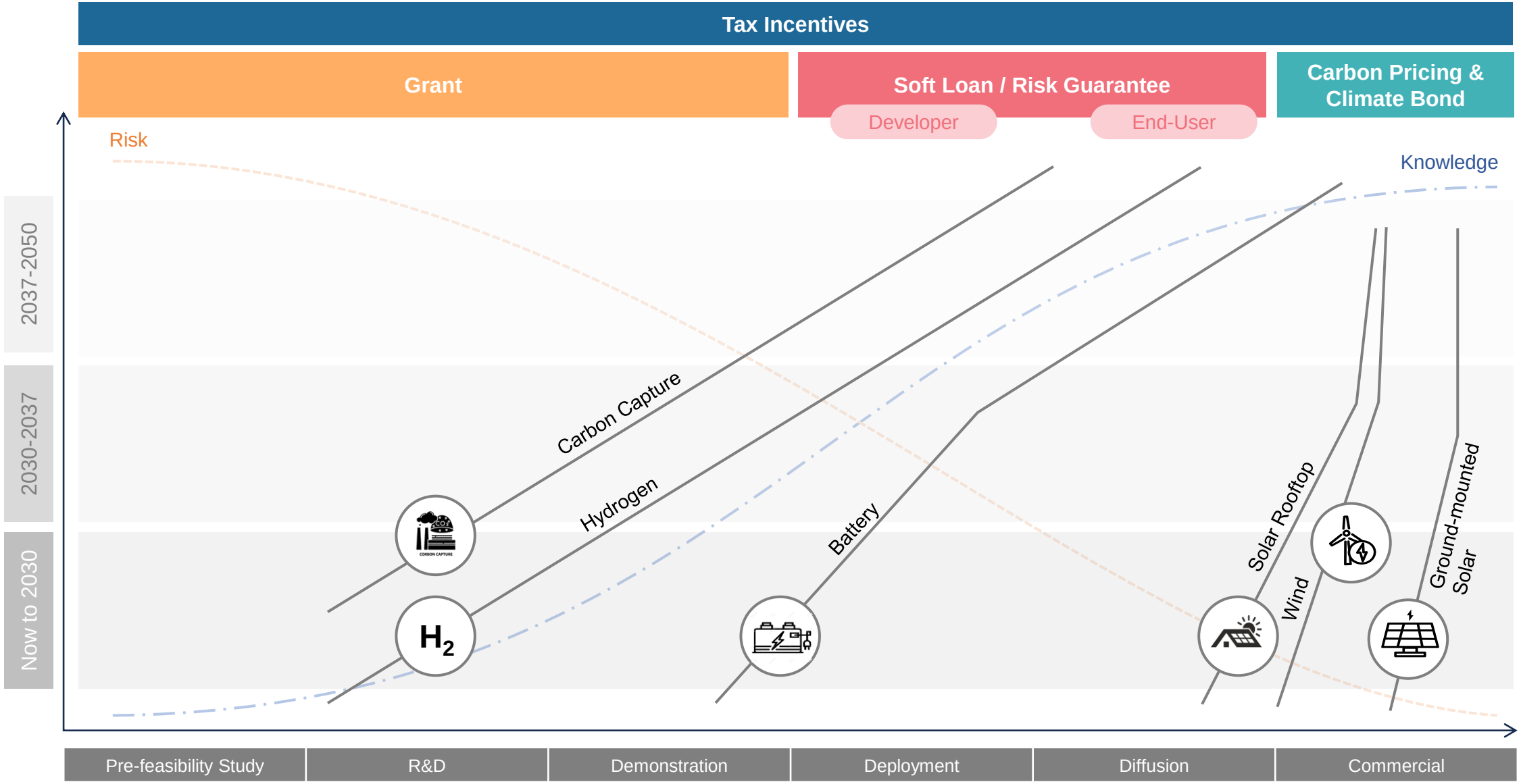
	Now to 2030 Reduce 30% from 2019 level			2030 – 2037 Reduce 50% from 2019 level		2037 – 2050 Reduce > 78% from 2019 level		
Measure	44 GW Solar	20 GW Wind	No new Coal	Solar + Battery Energy Storage	No new Coal	80% Share of RE (Wind, Solar, Biomass)	Coal Phase out	Hydrogen
				 				
GHG Reduction (Cumulative during the period)	**- 291 $MtCO_2$**			**- 343 $MtCO_2$**		**- 784 $MtCO_2$**		

Mapping technologies in power sector to the level of development

The risk and knowledge of technologies selected for the Carbon Neutrality Pathway in the power sector are mapped in each period of the pathway, taking into account the level of technological development as well as the levelized cost of electricity as shown in the previous slide.



Proposed public financial instruments for power sector

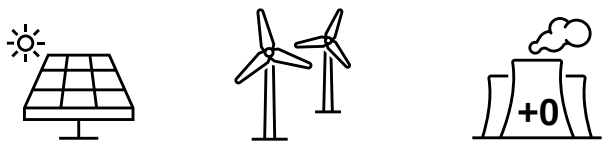
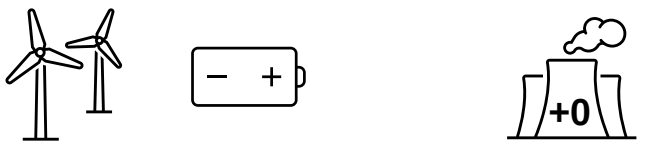
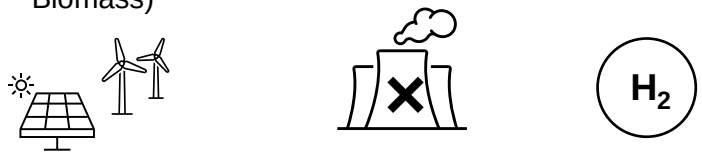


Proposed model of public finance for supporting the CN2050 Scenario in power sector

Financial instruments	Co-financing Ratio	Now - 2030		2030 - 2037		2037 - 2050	
		Size of support	Investment	Size of support	Investment	Size of support	Investment
Tax	1 : 10	20,000	200,000	2,000	20,000	6,000	60,000
Soft loan	1 : 25	43,000	1,075,000	4,000	100,000	12,000	300,000
Climate bond	1 : 250	20	5,000	20	5,000	100	25,000
Market-based mechanism	1 : 350	2,900	1,018,308	3,426	1,199,159	11,764	4,117,352
Total		**65,929**	**2,298,308**	**9,446**	**1,324,159**	**29,864**	**4,502,352**
Total investment needed (MB)		**2,298,308**		**1,324,159**		**4,502,352**	
Average co-financing ratio		1 : 35		1 : 144		1 : 150	
Cumulative GHG emission reduction during the period (MtCO2)		291		343		784	
Support per GHG emission reduction (THB/tCO2)		227		28		38	

Estimation of financial support from government to encourage private financing in power sector

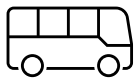
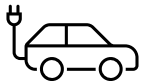
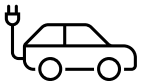
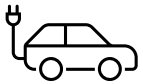
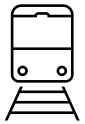
CASE for Southeast Asia

	Now to 2030 Reduce 30% from 2019 level	2030 – 2037 Reduce 50% from 2019 level	2037 – 2050 Reduce > 78% from 2019 level
Measure	44 GW Solar 20 GW Wind No new Coal 	Solar + Battery Energy Storage No new Coal 	80% Share of RE (Wind, Solar, Biomass) Coal Phase out Hydrogen 
GHG Reduction (Cumulative during the period)	**- 291 $MtCO_2$**	**- 343 $MtCO_2$**	**- 784 $MtCO_2$**
Investment	**2.30 trillion THB** **65.93 billion THB** (from Government)	**1.32 trillion THB** **9.45 billion THB** (from Government)	**4.50 trillion THB** **29.86 billion THB** (from Government)
Support per CO_2 Reduced	227 THB/tCO_{2e}	28 THB/tCO_{2e}	38 THB/tCO_{2e}

Transport sector

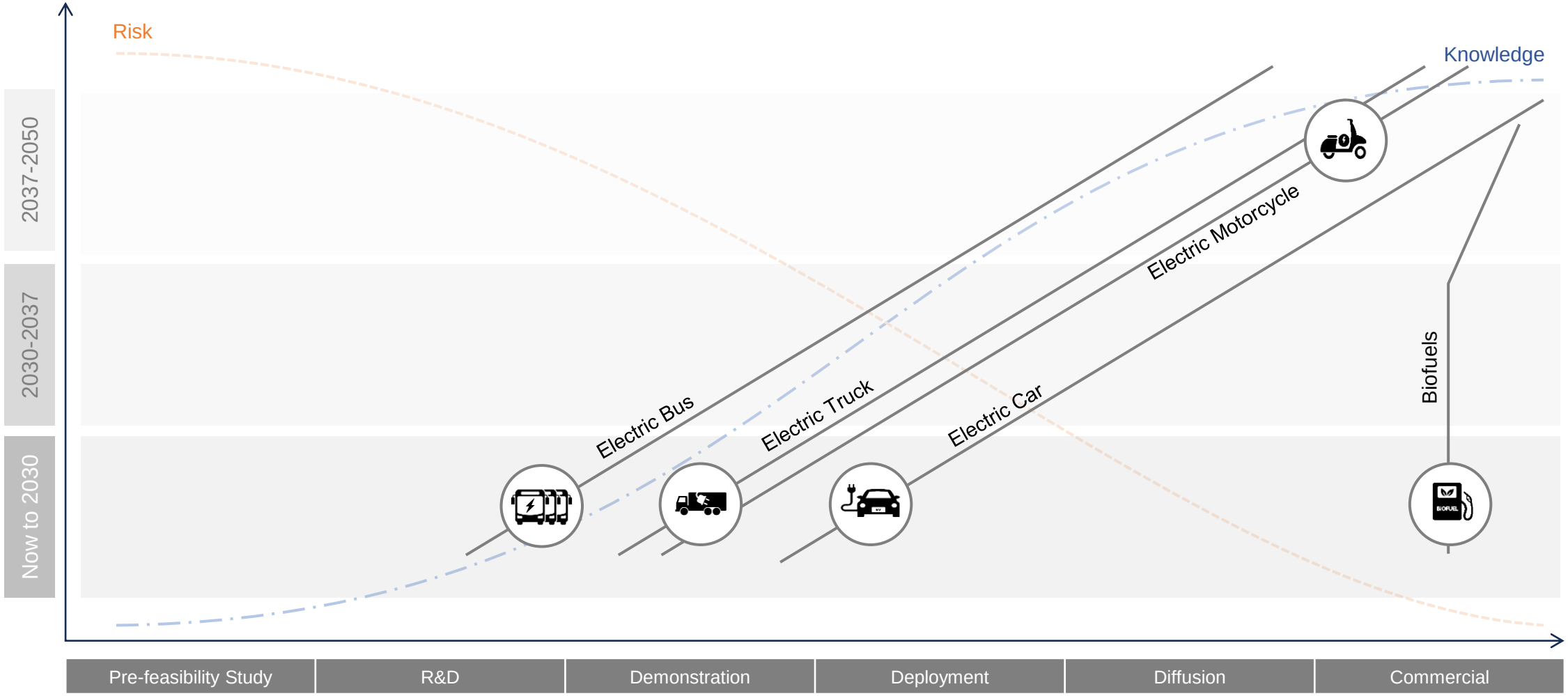
Carbon Neutrality Pathway in Transport Sector

CASE for Southeast Asia

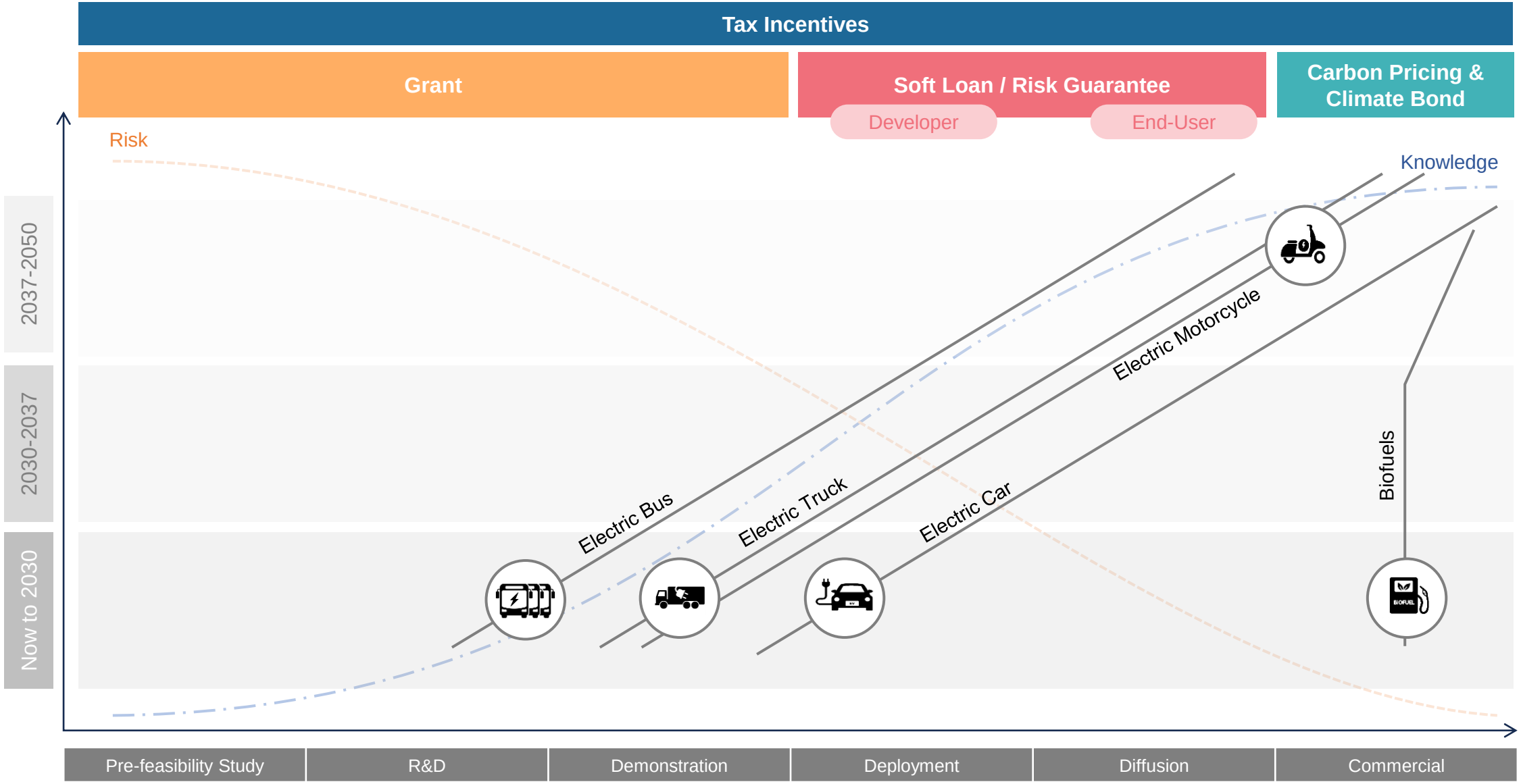
	Now to 2030 Reduce 30% from 2019 level	2030 – 2037 Reduce 50% from 2019 level	2037 – 2050 Reduce > 78% from 2019 level
Mesure	Modal shift  20% Biofuel blending (2025)  Increase EV 	100% increase of EV sale (2035): 10 million EVs  Fuel economy improvement 	Increase EV, retire ICE  Increase rail freight transport  Decrease conventional jet kerosene 
GHG Reduction (Cumulative during the period)	**24 $MtCO_2$**	**- 111 $MtCO_2$**	**- 635 $MtCO_2$**

Mapping technologies in transport sector to the level of development

The risk and knowledge of technologies selected for the Carbon Neutrality Pathway in the transport sector are mapped in each period of the pathway, taking into account the level of technological development as well as the TCO as shown in the previous slides.



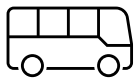
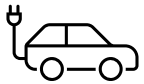
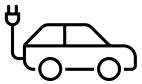
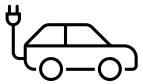
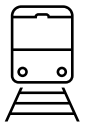
Proposed public financial instruments for transport sector



Proposed model of public finance for supporting the CN2050 scenario in transport sector

Financial instruments	Co-financing Ratio	Now - 2030		2030 - 2037		2037 - 2050	
		Size of support	Investment	Size of support	Investment	Size of support	Investment
Grants	1 : 3	20,000	60,000	50,000	150,000	10,000	30,000
Tax	1 : 10	40,000	400,000	50,000	500,000	10,000	100,000
Soft loan	1 : 25	40,000	1,000,000	110,000	2,750,000	20,000	500,000
Climate Bond	1 : 250	-	-	-	-	100	25,000
Market-based mechanism	1 : 350	-	-	-	-	12,710	4,448,475
Total		**100,000**	**1,460,000**	**210,000**	**3,400,000**	**52,810**	**5,103,475**
Total investment needed (MB)		**1,460,000**		**3,400,000**		**5,103,475**	
Average co-financing ratio		1 : 15		1 : 16		1 : 96	
Cumulative GHG emission reduction during the period (MtCO2)		-24		111		635	
Support per GHG emission reduction (THB/tCO2)		n/a		1,886		83	

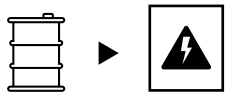
Estimation of financial support from government to encourage private financing in transport sector

	Now to 2030 Reduce 30% from 2019 level	2030 – 2037 Reduce 50% from 2019 level	2037 – 2050 Reduce > 78% from 2019 level
Mesure	Modal shift  20% Biofuel blending (2025)  Increase EV 	100% increase of EV sale (2035): 10 million EVs  Fuel economy improvement 	Increase EV, retire ICE  Increase rail freight transport  Decrease conventional jet kerosene 
GHG Reduction (Cumulative during the period)	**24 $MtCO_2$**	**- 111 $MtCO_2$**	**- 635 $MtCO_2$**
Investment	**1,460 billion THB** **100 billion THB** (from Government)	**3,400 billion THB** **210 billion THB** (from Government)	**5,103 billion THB** **53 billion THB** (from Government)
Support per CO_2 Reduced	**n.a.**	1,886 THB/tCO_{2e}	83 THB/tCO_{2e}

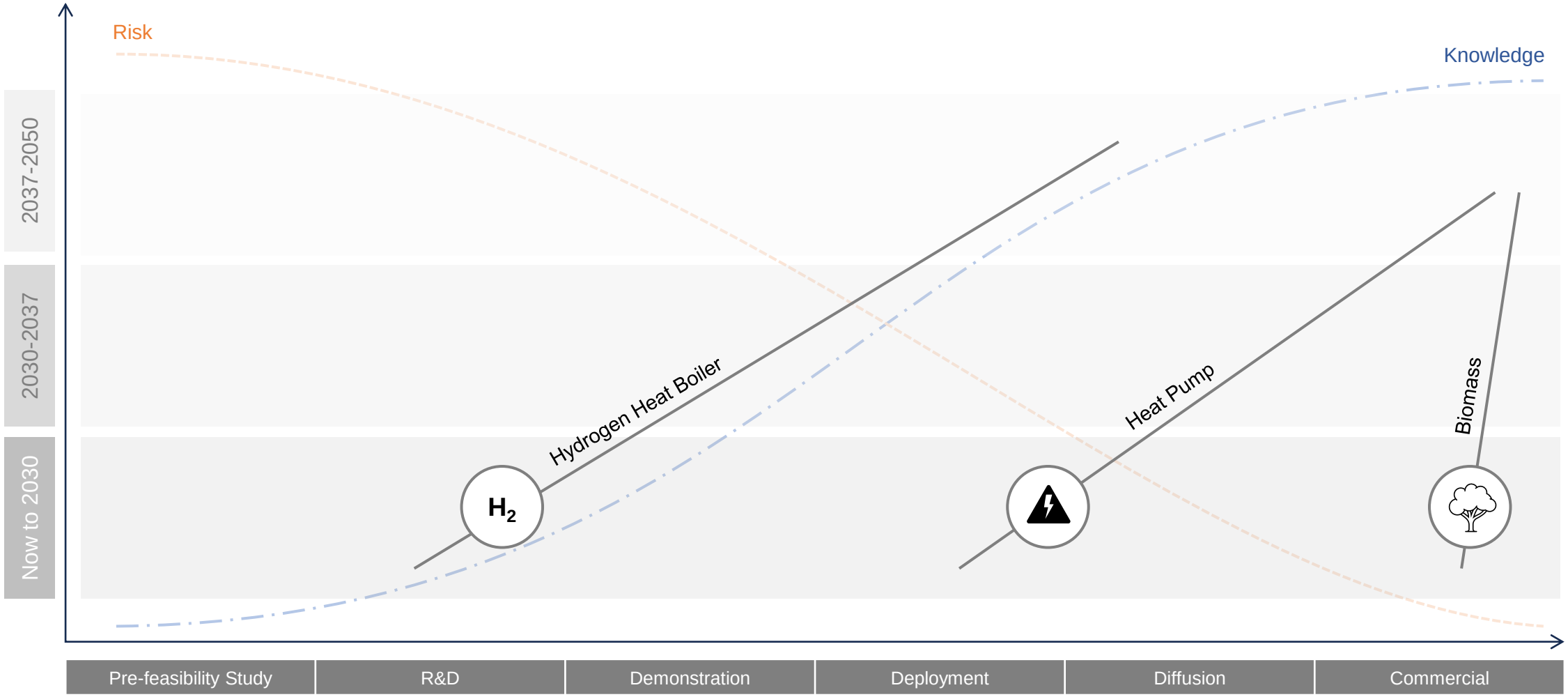
Industry sector

Carbon Neutrality Pathway in Industrial Sector

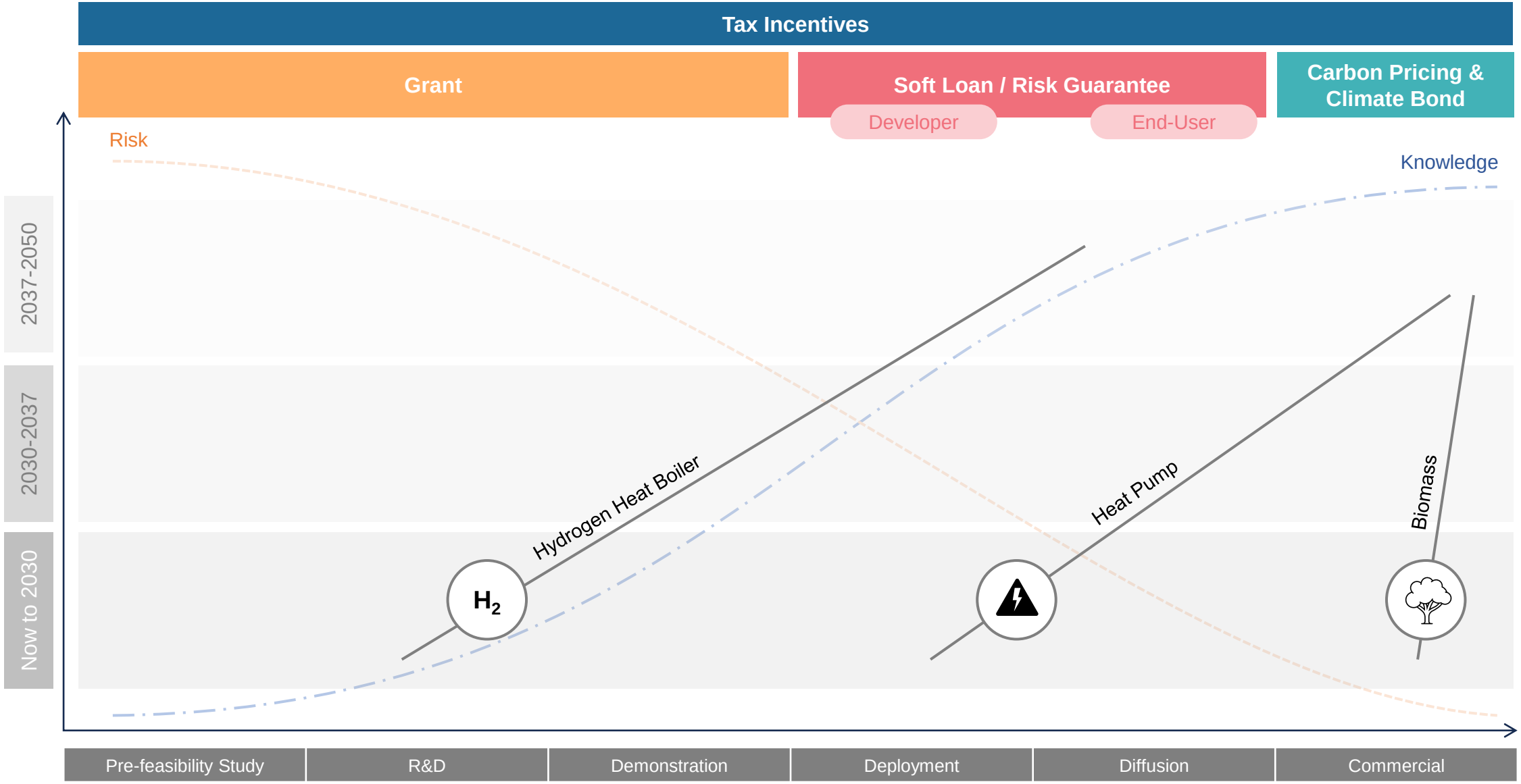
CASE for Southeast Asia

	Now to 2030 Reduce 30% from 2019 level	2030 – 2037 Reduce 50% from 2019 level	2037 – 2050 Reduce > 78% from 2019 level
Measure	Continue using biomass  Replacing oil with electric heat pump 	Ramp up electric heating  Biomass allocation across sub-industry sector 	Gradual coal phase out  Increase use of hydrogen 
GHG Reduction (Cumulative during the period)	**- 236 $MtCO_2$**	**- 291 $MtCO_2$**	**- 761 $MtCO_2$**

Mapping technologies in industrial sector to the level of development



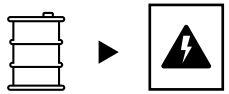
Proposed public financial instruments for industrial sector



Proposed model of public finance for supporting the CN2050 scenario in industrial sector

Financial instruments	Co-financing Ratio	Now - 2030		2030 - 2037		2037 - 2050	
		Size of support	Investment	Size of support	Investment	Size of support	Investment
Grants	1 : 3	10,000	30,000	15,000	45,000	5,000	15,000
Tax	1 : 10	10,000	100,000	15,000	150,000	5,000	50,000
Soft loan	1 : 25	24,000	600,000	50,000	1,250,000	10,000	250,000
Market-based mechanism	1 : 350	2,364	827,533	5,812	2,034,169	15,219	5,326,794
Total		46,364	**1,557,533**	**85,812**	**3,479,169**	**35,219**	**5,641,794**
Total investment needed (MB)		**1,557,533**		**3,479,169**		**5,641,794**	
Average co-financing ratio		1 : 35		1 : 41		1 : 160	
Cumulative GHG emission reduction during the period (MtCO2)		236		291		761	
Support per GHG emission reduction (THB/tCO2)		196		295		46	

Estimation of financial support from government to encourage private financing in industrial sector

	Now to 2030 Reduce 30% from 2019 level	2030 – 2037 Reduce 50% from 2019 level	2037 – 2050 Reduce > 78% from 2019 level
Mesure	Continue using biomass  Replacing oil with electric heat pump 	Ramp up electric heating  Biomass allocation across sub-industry sector 	Gradual coal phase out  Increase use of hydrogen 
GHG Reduction (Cumulative during the period)	**- 236 $MtCO_2$**	**- 291 $MtCO_2$**	**- 761 $MtCO_2$**
Investment	**1,558 billion THB** **46 billion THB** (from Government)	**3,479 billion THB** **86 billion THB** (from Government)	**5,642 billion THB** **35 billion THB** (from Government)
Support per CO_2 Reduced	196 THB/tCO_{2e}	295 THB/tCO_{2e}	46 THB/tCO_{2e}

Crucial Tools for Guiding Investments towards Carbon Neutrality Pathways

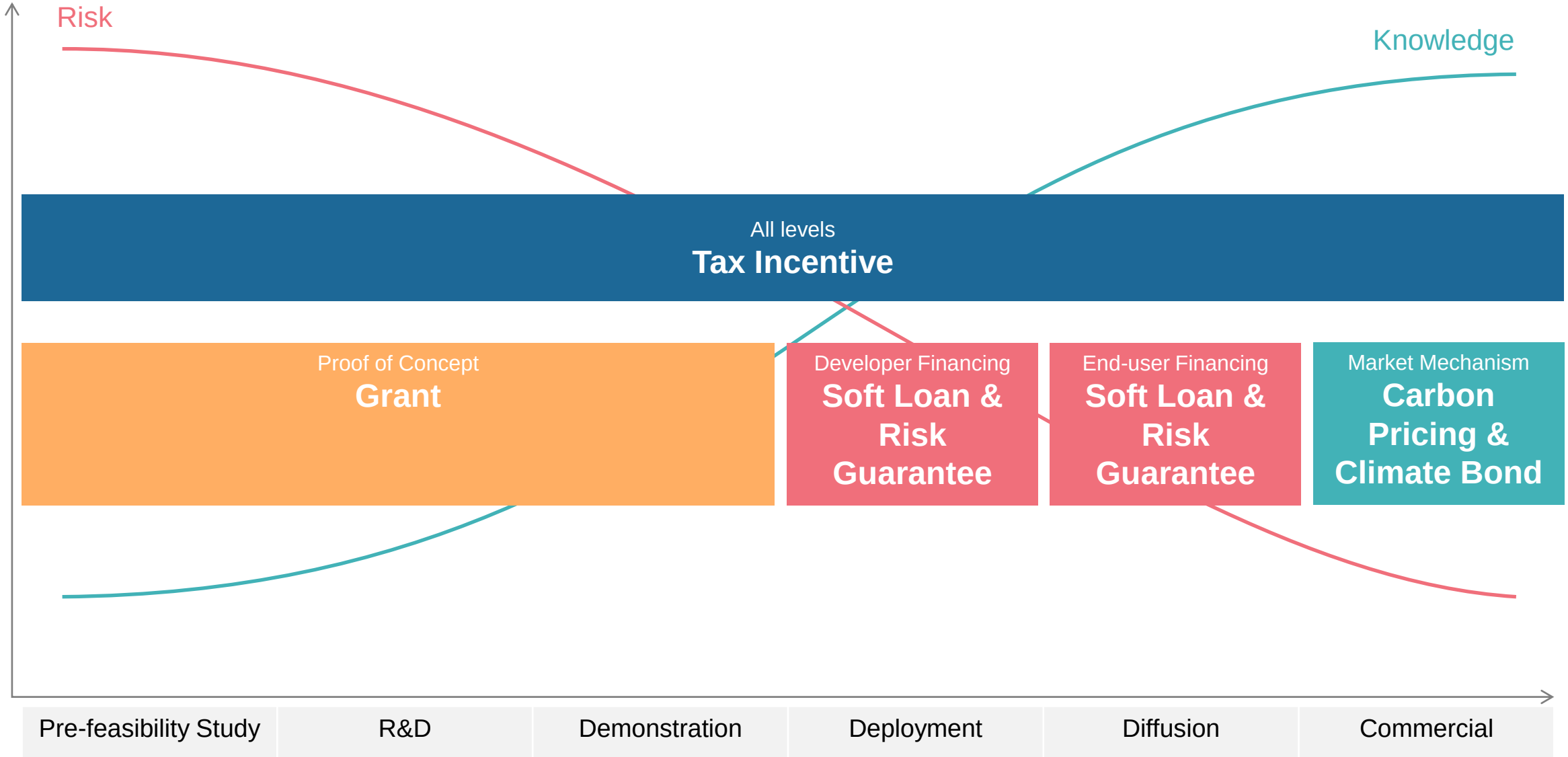
Financing needed to achieve Carbon Neutrality Pathway in power, transport, and industrial sectors

CASE for Southeast Asia

	Now to 2030 Reduce 30% from 2019 level	2030 – 2037 Reduce 50% from 2019 level	2037 – 2050 Reduce > 78% from 2019 level
GHG Reduction (Cumulative during the period)	**- 503 $MtCO_2$**	**- 745 $MtCO_2$**	**- 2,181 $MtCO_2$**
Total Investment (Billion THB)	**5,400 Billion THB** 43% 28% 30%	**8,200 Billion THB** 16% 41% 43%	**15,200 Billion THB** 30% 34% 37%
Public Finance (Billion THB)	**210 Billion THB** 31% 47% 22%	**300 Billion THB** 3% 69% 28%	**120 Billion THB** 25% 45% 30%
Average Co-financing Ratio	**1:24**	**1:26**	**1:128**
Support per CO_2 Reduced	422 THB/tCO_{2e}	410 THB/tCO_{2e}	54 THB/tCO_{2e}

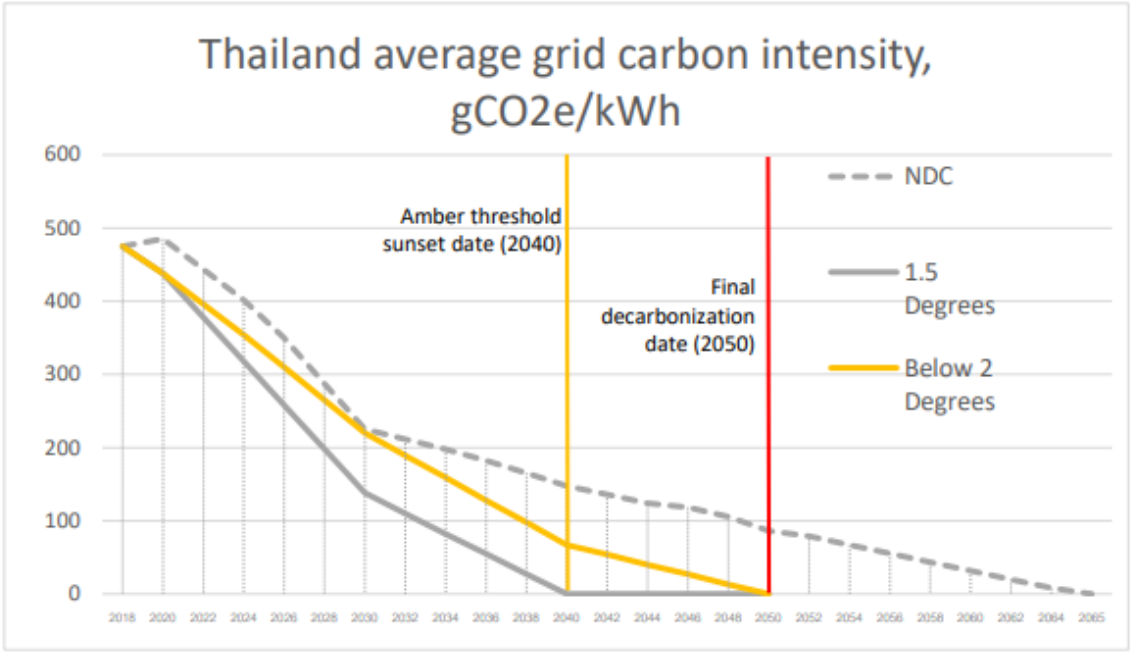
Financial instruments by level of technology development

CASE for Southeast Asia



Thailand taxonomy plays a pivotal role in guiding investments towards carbon neutrality pathways

CASE for Southeast Asia



Source: TPI, BOT data

	2022-2025	2026-2030	2031-2035	2036-2040	2041-2045*	2046-2050*
Green Activities	100	100	100	100	50	
Amber Activities	381	225	191	148	N\A	N\A
Red Activities	>381g	>225g	>191g	>148g	>50g	>50g

NB: all thresholds are subject to review every five years in accordance with new data and technological development

Source: https://www.bot.or.th/en/financial-innovation/sustainable-finance/green/Thailand-Taxonomy.html

Summary & Recommendation

CASE for Southeast Asia

Achieving a net-zero emission target is a complex and multi-faceted challenge that requires a comprehensive approach to climate finance. Here is our recommendation

Increase the Scale of Climate Finance

Strategic Alignment: Develop a comprehensive financial roadmap that aligns with Thailand's Nationally Determined Contributions (NDCs) and Long-term Low Greenhouse Gas Development Strategy (LT-LEDS).

Sectoral Focus: Prioritize high-impact sectors such as energy, transportation, and agriculture for targeted climate investments. These sectors are crucial for Thailand's transition to a sustainable, net-zero economy.

Blended Finance: Utilize a diversified portfolio of public and private funding mechanisms, including international grants, green bonds, and climate-specific funds, to meet the scale of investment required.

Public-Private Partnerships (PPPs): Leverage PPPs to catalyze investments in green technologies, renewable energy, and sustainable infrastructure, thereby accelerating Thailand's economic and social transformation towards sustainability.

Structural Changes for Economic and Social Development

Holistic Approach: Adopt a multi-dimensional strategy that considers environmental, economic, and social factors in unison.

Just Transition: Prioritize the needs of vulnerable communities and create fairness and equity in climate finance initiatives.

Real Economy Impact: Align the financial sector's efforts towards net-zero with broader economic goals, including job creation and social welfare, to ensure an inclusive transition.

Planetary Boundaries: Incorporate considerations for preserving natural capital and biodiversity in all climate finance decisions. This is crucial for Thailand, a country rich in natural resources and biodiversity.

Prioritize Data & Coordination on Climate Action

Data Centralization: Establish a centralized database to track climate investments across various sectors. This will enable effective policy-making and targeted financial allocations in Thailand.

Coordinated Planning: Set clear interim goals and transition plans that are in line with Thailand's LT-LEDS. Establish a common framework for defining and measuring climate finance to ensure coherence and effectiveness.

CASE
for Southeast Asia