



**CFNT**

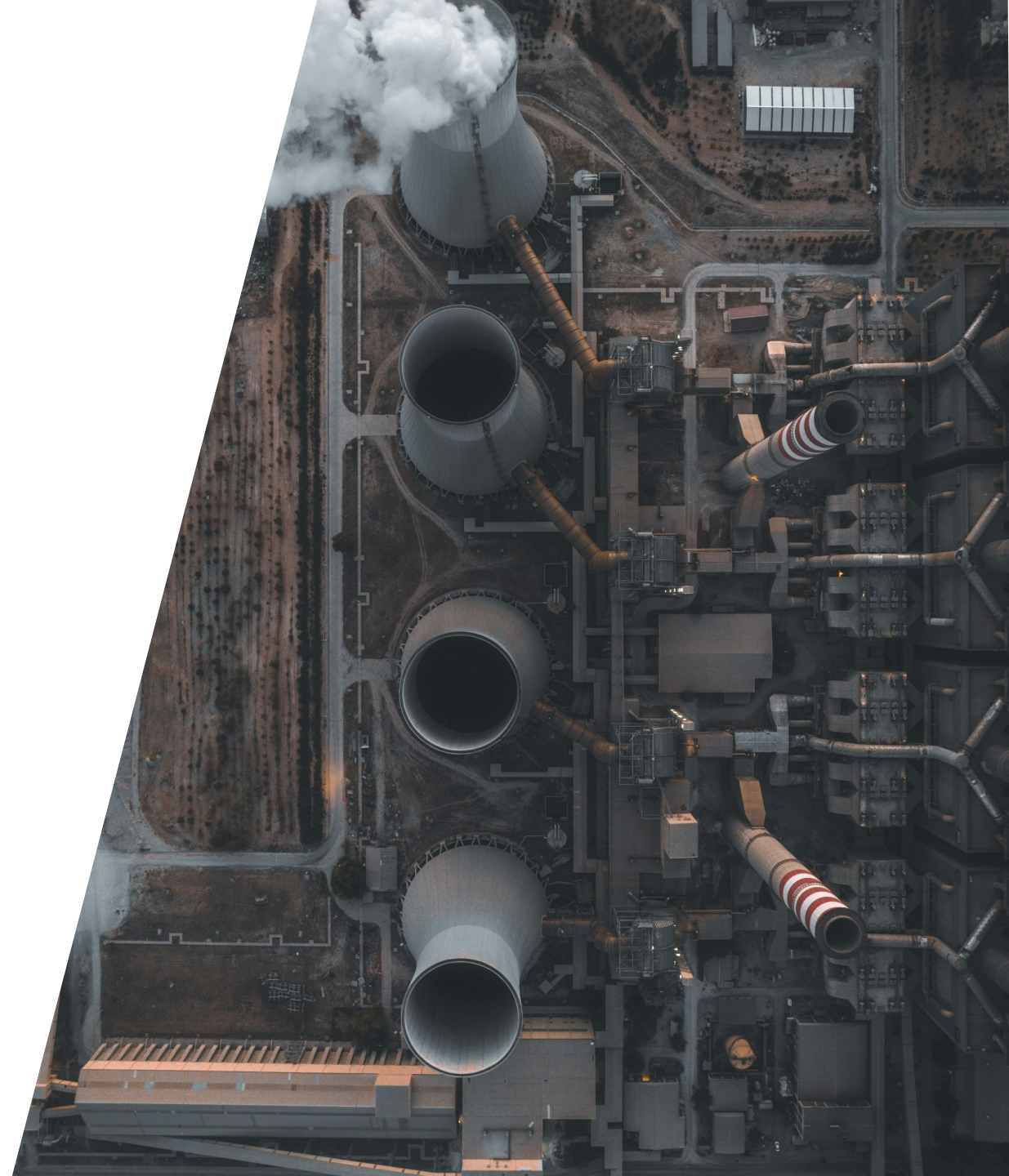
Climate Finance Network Thailand

# Fossil Reckoning: Valuation of Coal and Gas Stranded Assets in Thailand

21<sup>st</sup> June 2024

# Agenda

- Introduction
- Evaluation of Stranded Assets in Coal and Gas Supply Chain
- Policy Implications
- Some Observations on Draft PDP2024
- Q&A



# Introduction

Fossil Reckoning: Valuation of Coal and Gas Stranded Assets in Thailand

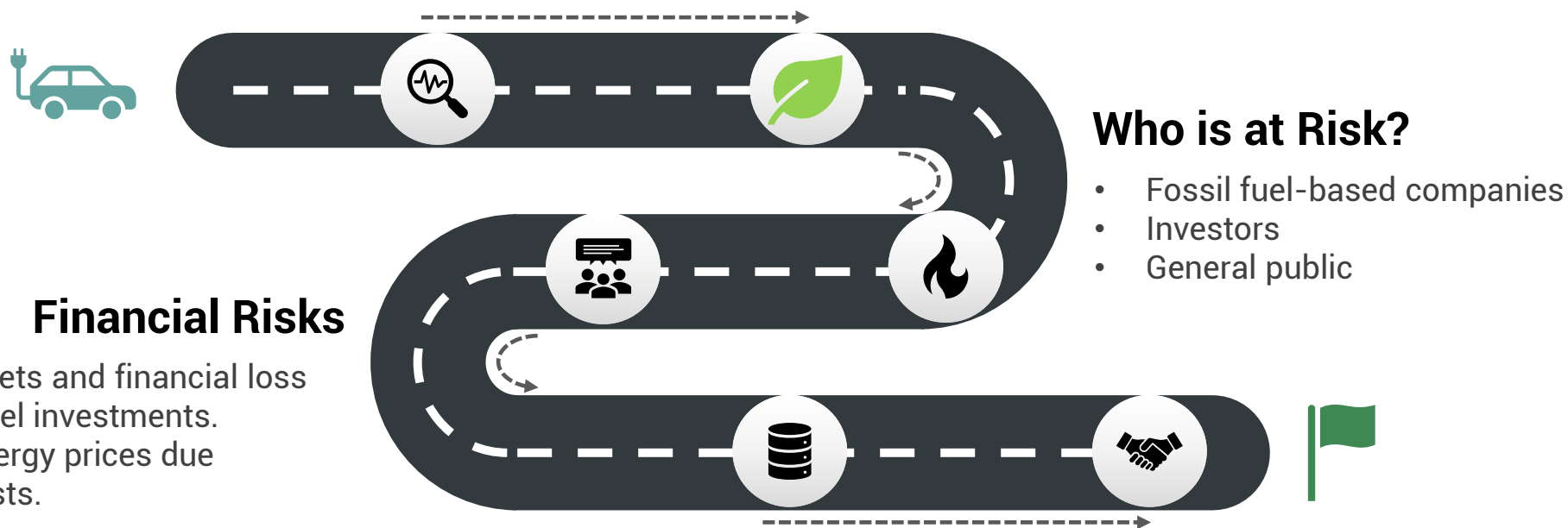


# Background

## Climate risk challenge

### Paris Agreement and NDC Compliance

- Achieve the 1.5°C climate threshold set by the Paris Agreement.
- Meet the Thailand's Nationally Determined Contributions (NDCs).



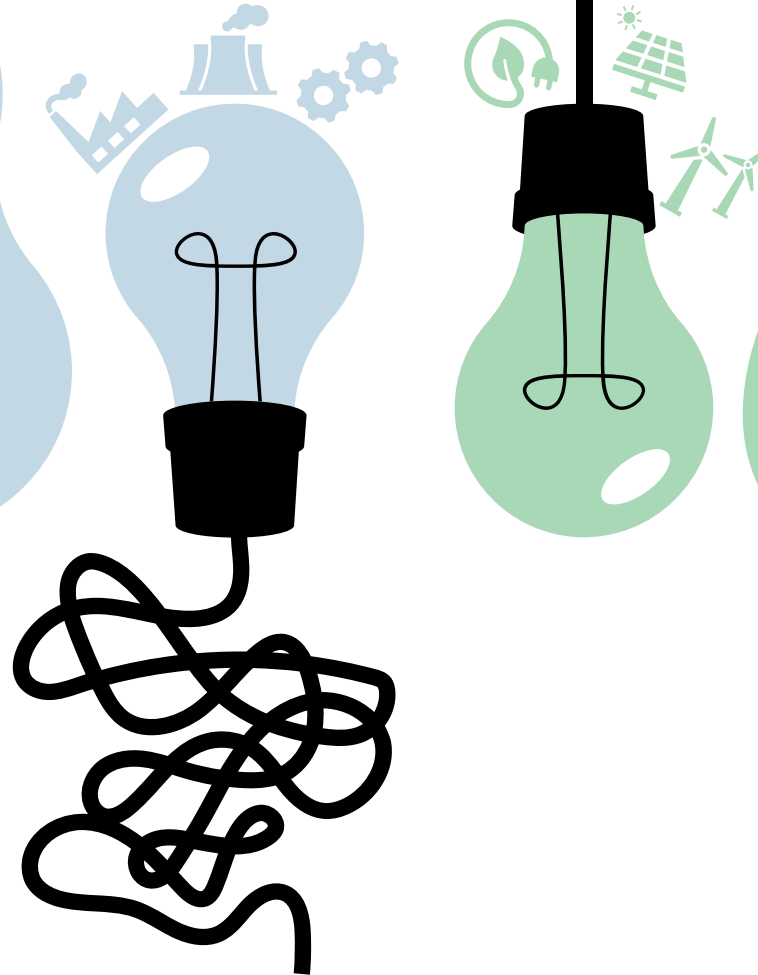
**Transition to renewable energy to avoid stranded assets and ensure economic competitiveness.**

# Background

Why energy sector?

**69%**

of Thailand's CO2 emissions come from the **energy sector**.



Renewable energy sources such as **solar and wind** offer viable solutions. These options are also **cost-competitive**.















# Background

## Stranded asset and its scenarios

### Action: Energy transition

- Sustainable future with renewable energy.
- Avoid financial pitfalls, ensure long-term economic stability, and improve competitiveness.



### No action

- Stranded assets leading to substantial financial losses.
- High risk of financial instability and economic downturn.



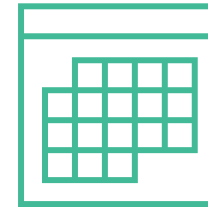
# Research Overview

Thailand's fossil fuel infrastructure risks becoming 'stranded assets' as the country strives to meet **Paris Agreement's 1.5°C goal** and **NDC targets**.



## Duration

2024 - 2050



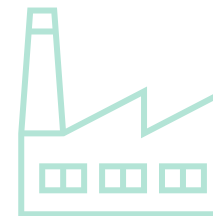
## Geographical Coverage

Thailand



## Sector

Coal and gas utilities



## Unit of Analysis

Individual power plant unit





# Literature Review

## Definition of Stranded Asset

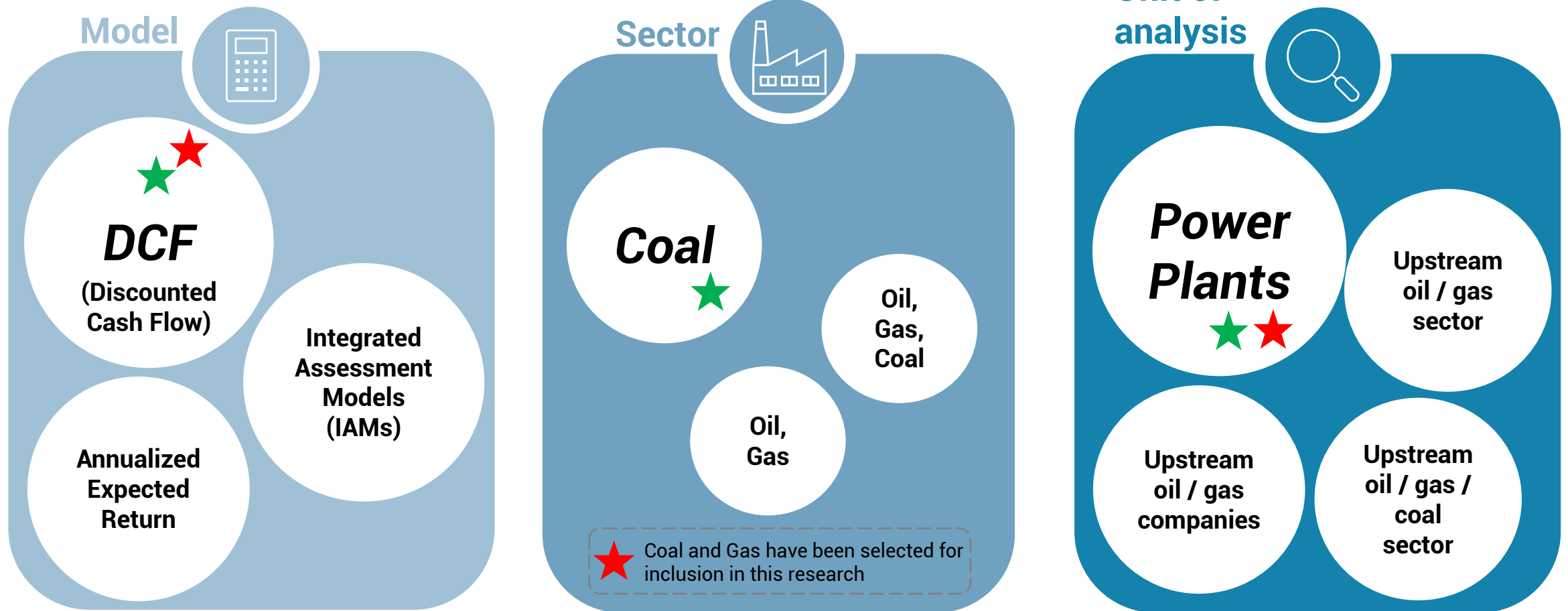




*“Stranded assets in energy production are investments that fail to generate economic returns before their expected end of life.”*

*- International Energy Agency (IEA) -*

# Literature Review

Review of studies and literature regarding the financial evaluation of stranded assets in the energy sector.

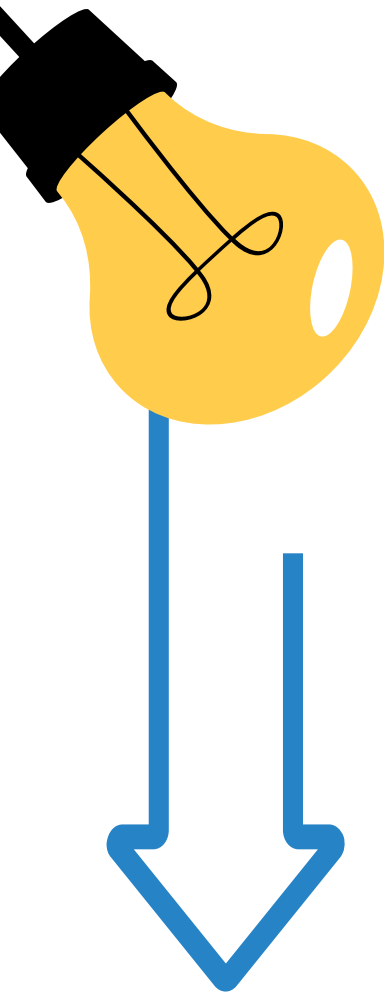


 = most used in the literature  
 = what has been selected for inclusion in this research



# Electricity structure of Thailand

Enhanced Single Buyer

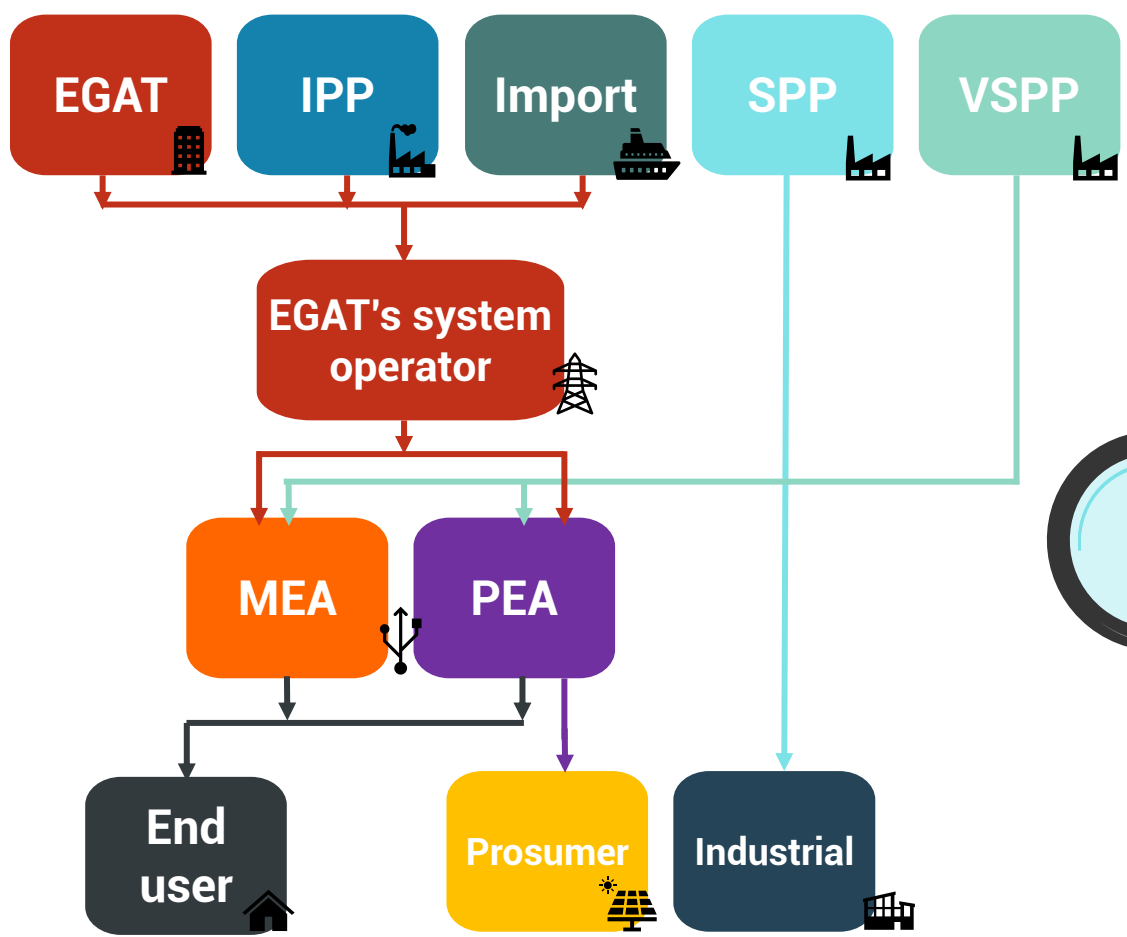


Generation

Transmission

Distribution

End Users



Policy and regulatory agencies

Source: Adapted from the Enhanced Single Buyer Model from the ERC and ThaiPublica.

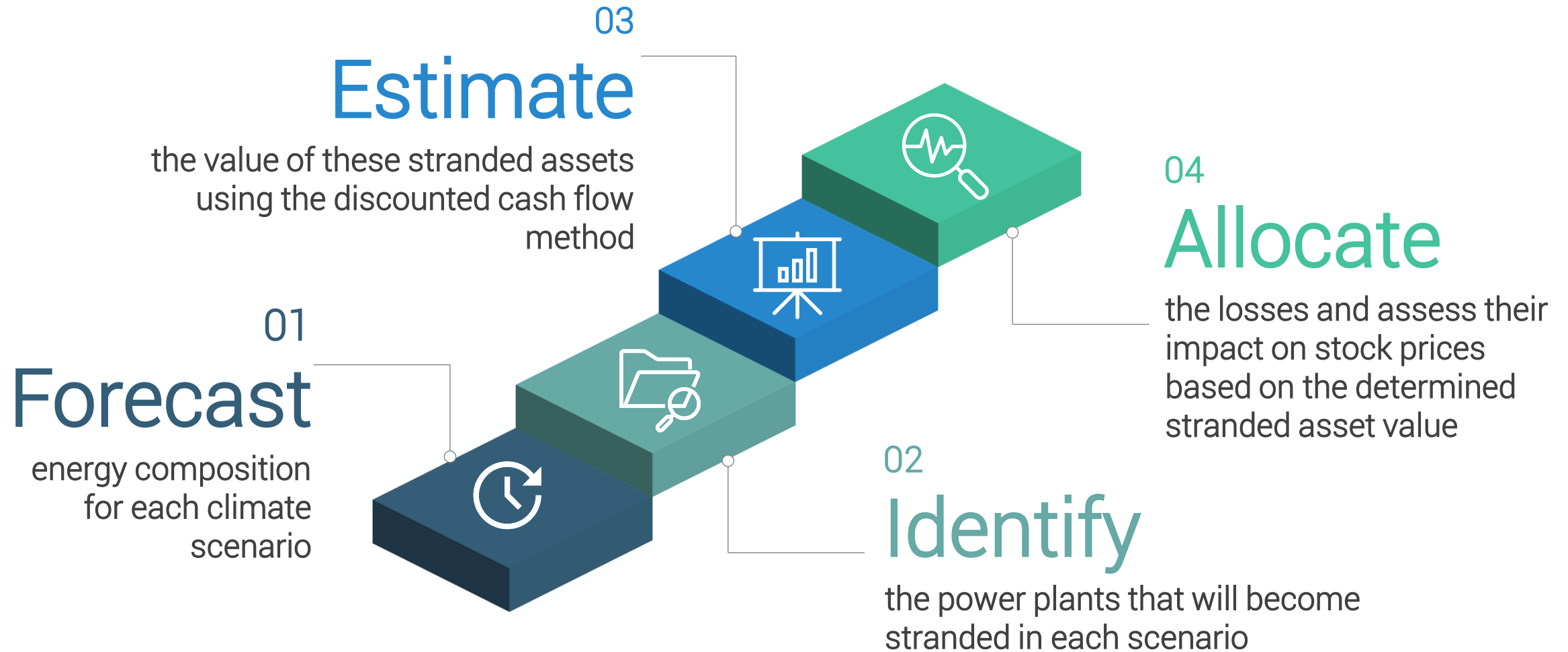
# Evaluation of Stranded Assets in Coal and Gas Supply Chain





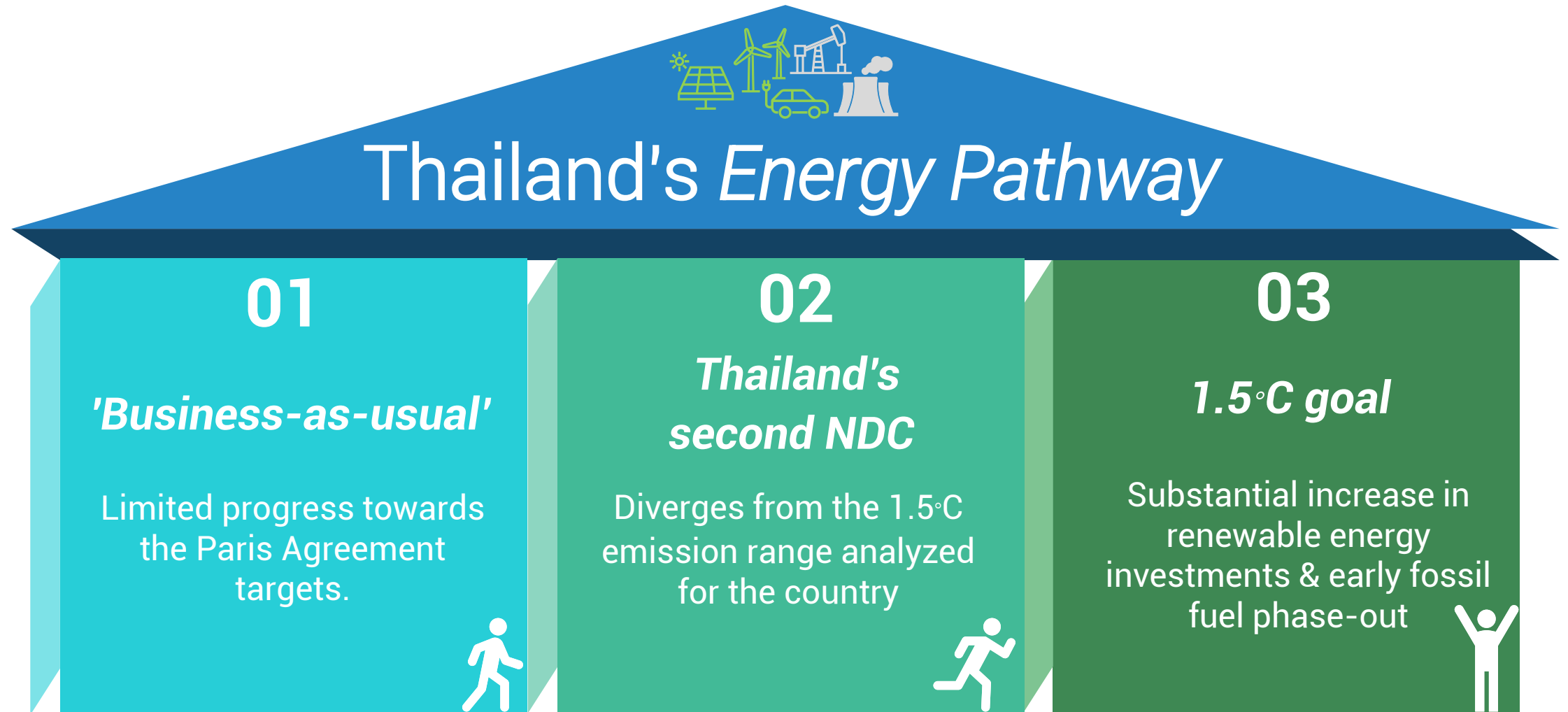
# Evaluation of stranded assets in coal and gas supply chain

4 steps of evaluation



# 1. Forecast the energy composition for each climate scenario

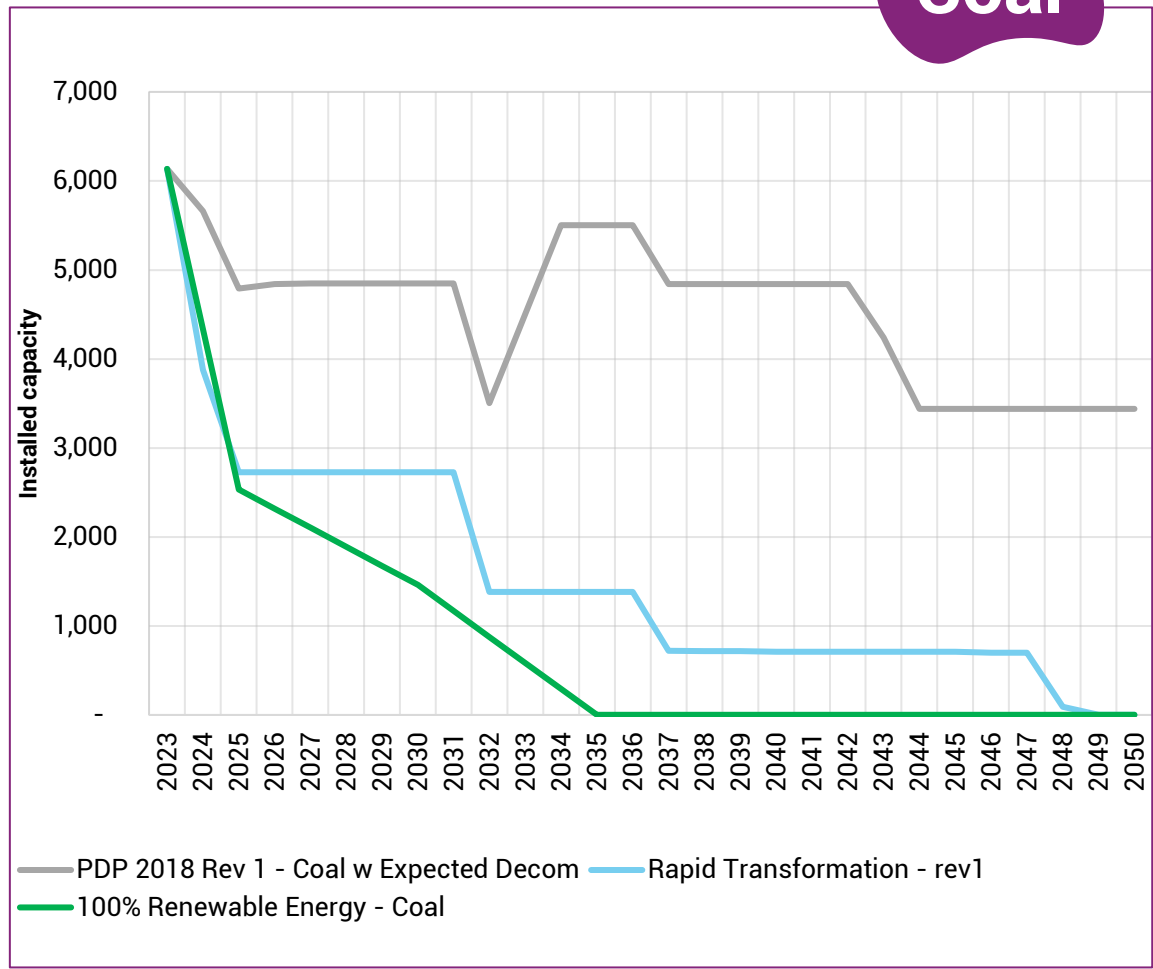
Three distinct climate scenarios



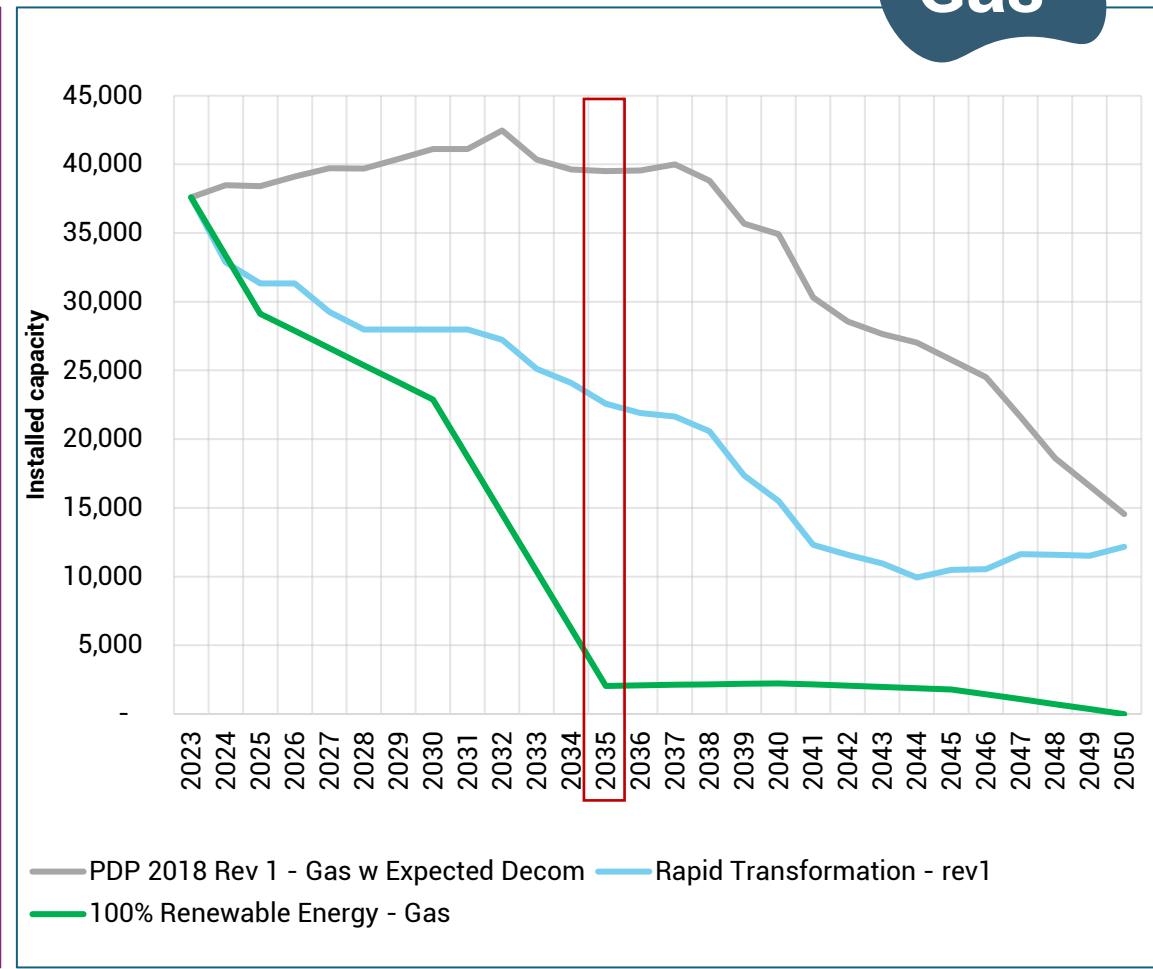
# 1. Forecast the energy composition for each climate scenario

Projected installed capacity

## Coal



## Gas





## 2. Identify the power plants that will become stranded

Sequencing stranded assets criteria



Unit capacity size (MW) 

Units with **smaller** installed capacities are **decommissioned earlier**

Plant capacity size (MW) 

**Smaller** power plants face **earlier** decommissioning due to economies of scale

Unit status 

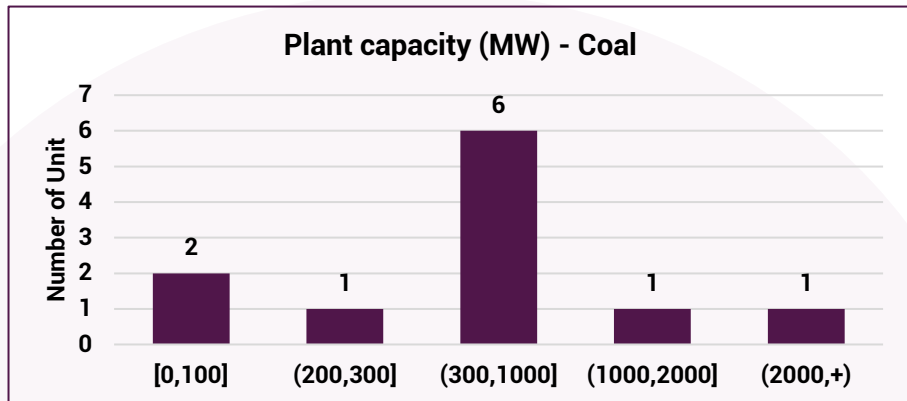
**Operating** power plants are expected to be **decommissioned earlier** compared to those in announced, pre-construction, and construction stages

Commission Date

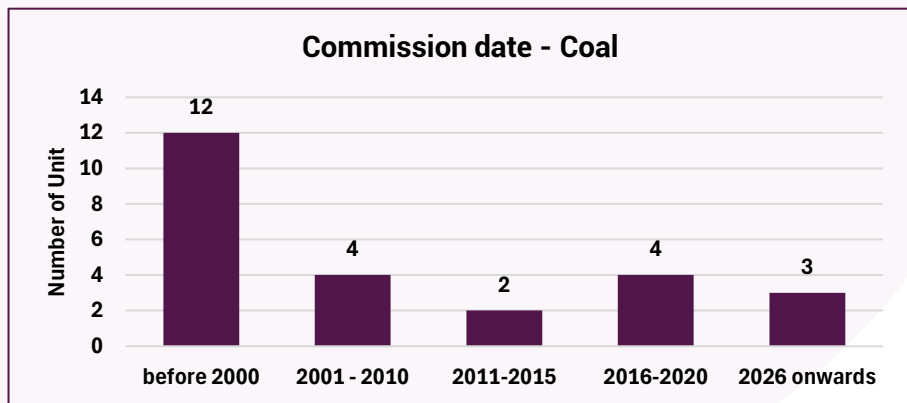
**Older** power plants encounter **earlier** decommissioning



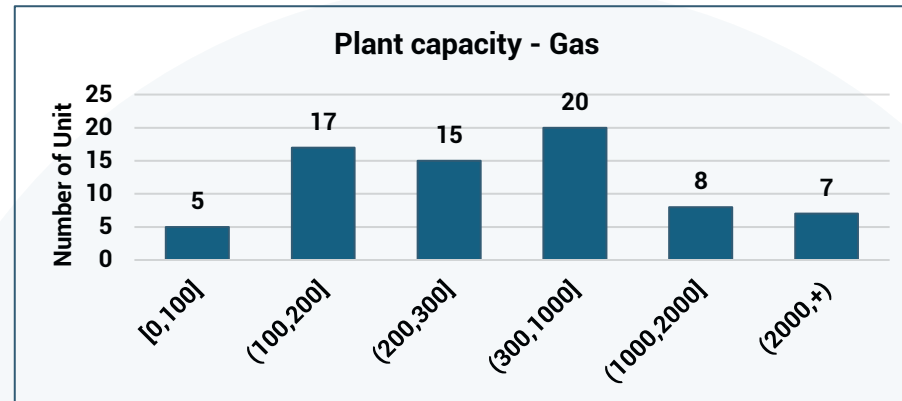
## 2. Identify the power plants that will become stranded



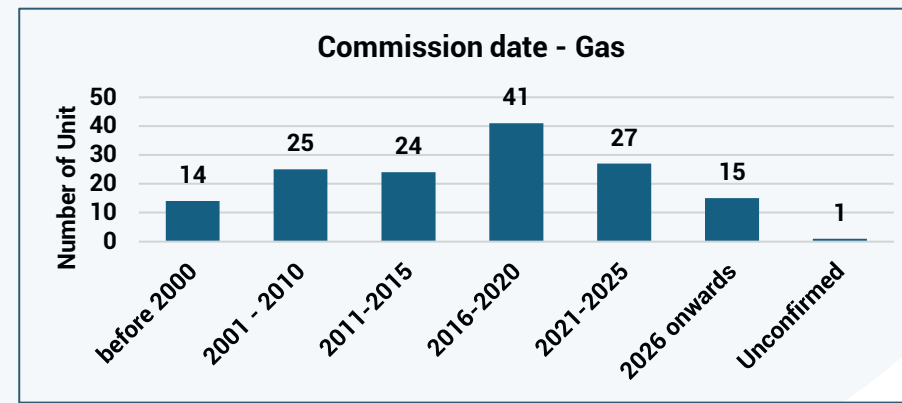
**54%** of coal-fired power plants have capacities within the **300-1,000 MW**.



**48%** of the coal-fired power units have been **operational since before 2000**.

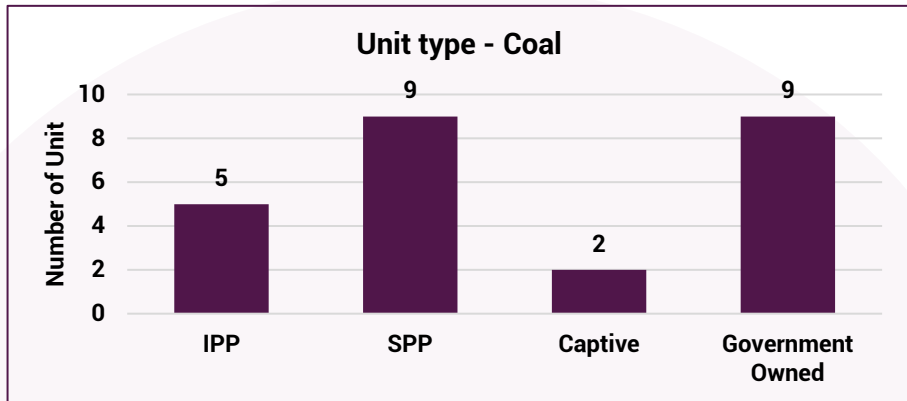


**72%** of gas-fired power plants have capacities within the **100-1,000 MW**.

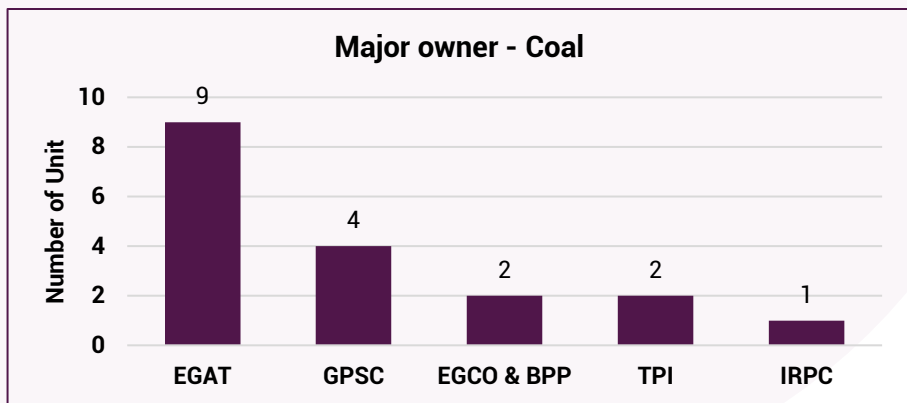


**27%** of gas-fired power units began **operations between 2016-2020**.

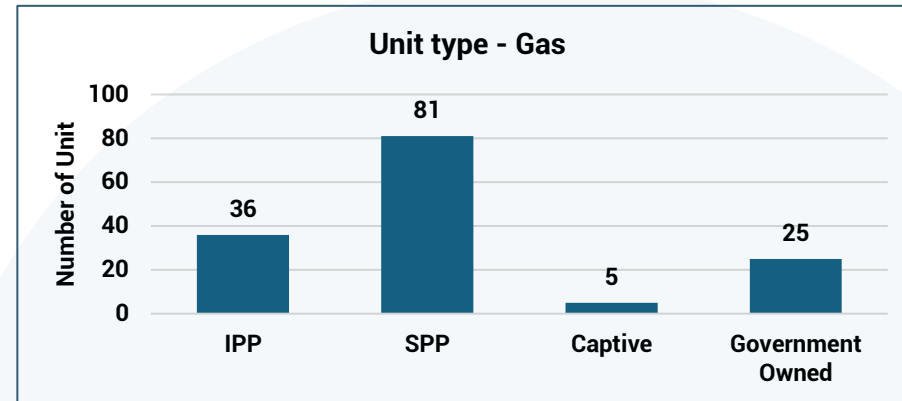
## 2. Identify the power plants that will become stranded



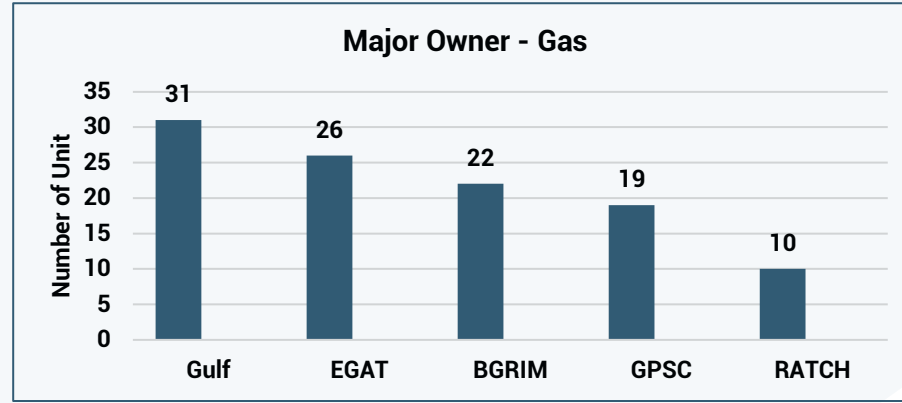
**36%** of units are **SPPs** and owned by **EGAT**.



**1. EGAT 2. GPSC 3. EGCO & BPP 4. TPI 5. IRPC** are the top five major owners.



**55%** of units are **SPPs**.

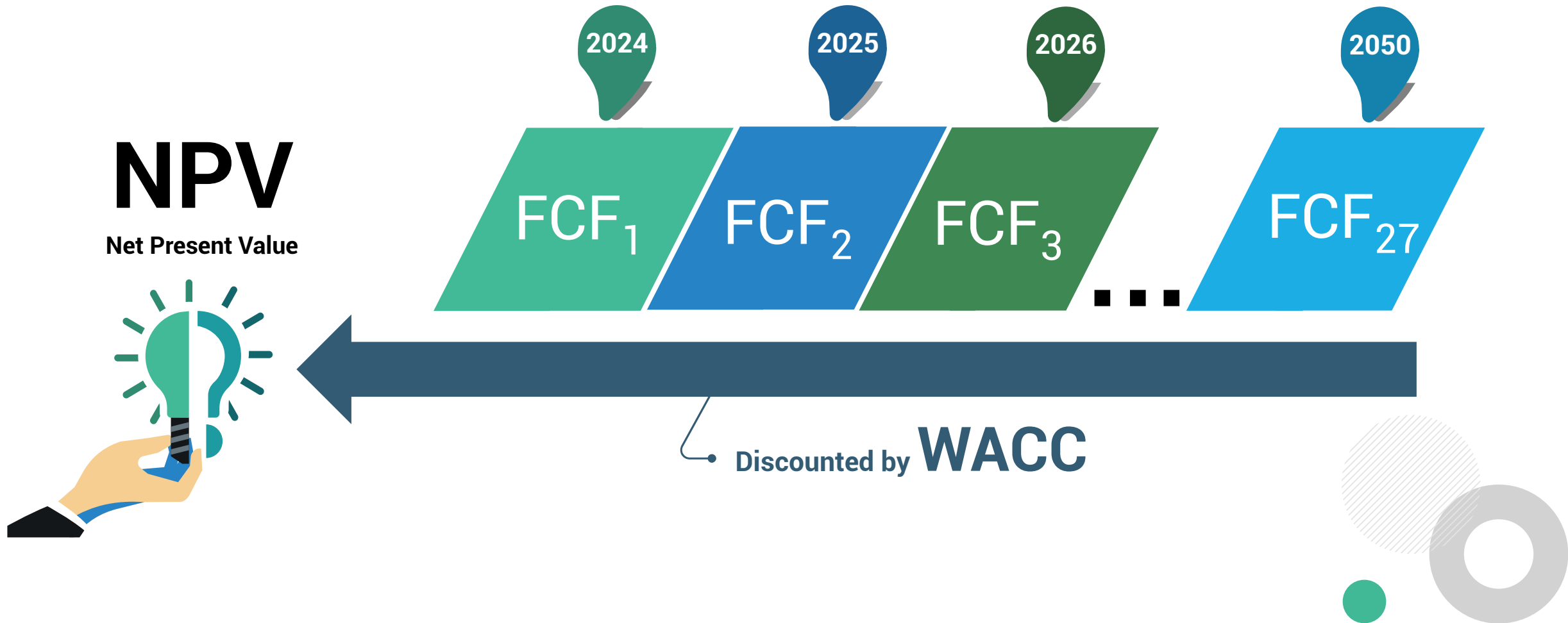


**1. GULF 2. EGAT 3. BGRIM 4. GPSC 5. RATCH** are the top five major owners.



# 3. Estimate the value of these stranded assets using DCF

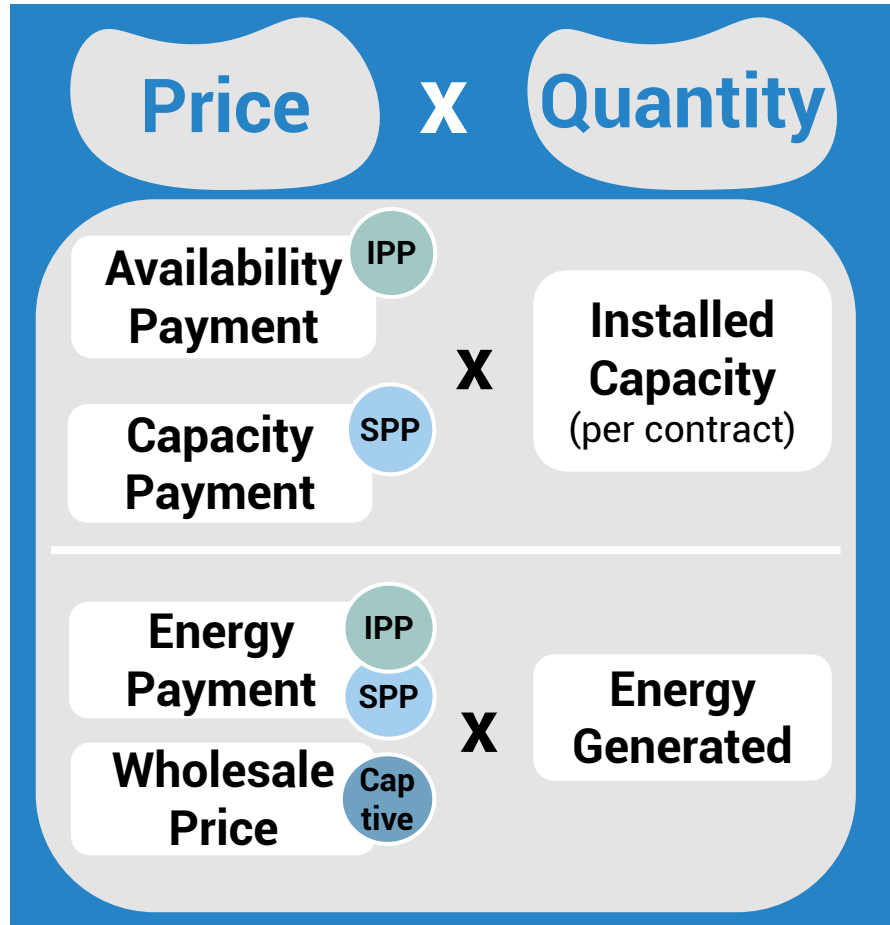
Overview of DCF Analysis



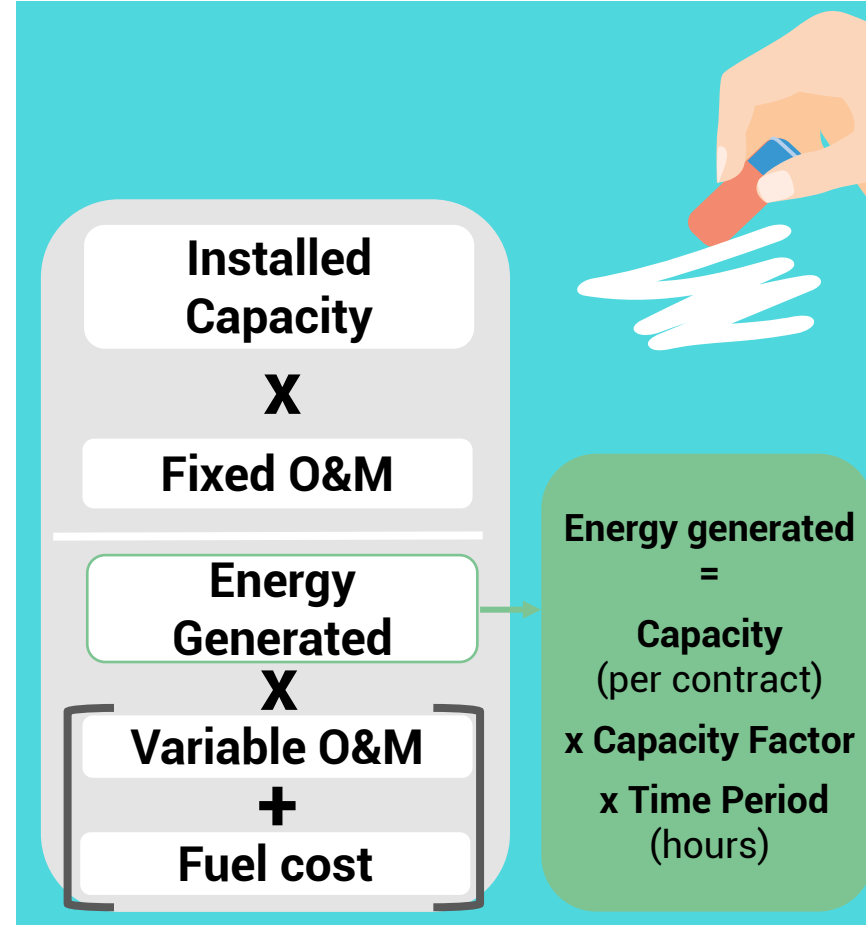
# 3. Estimate the value of these stranded assets using DCF

Revenue Stream and Operating Expenses

## Revenue

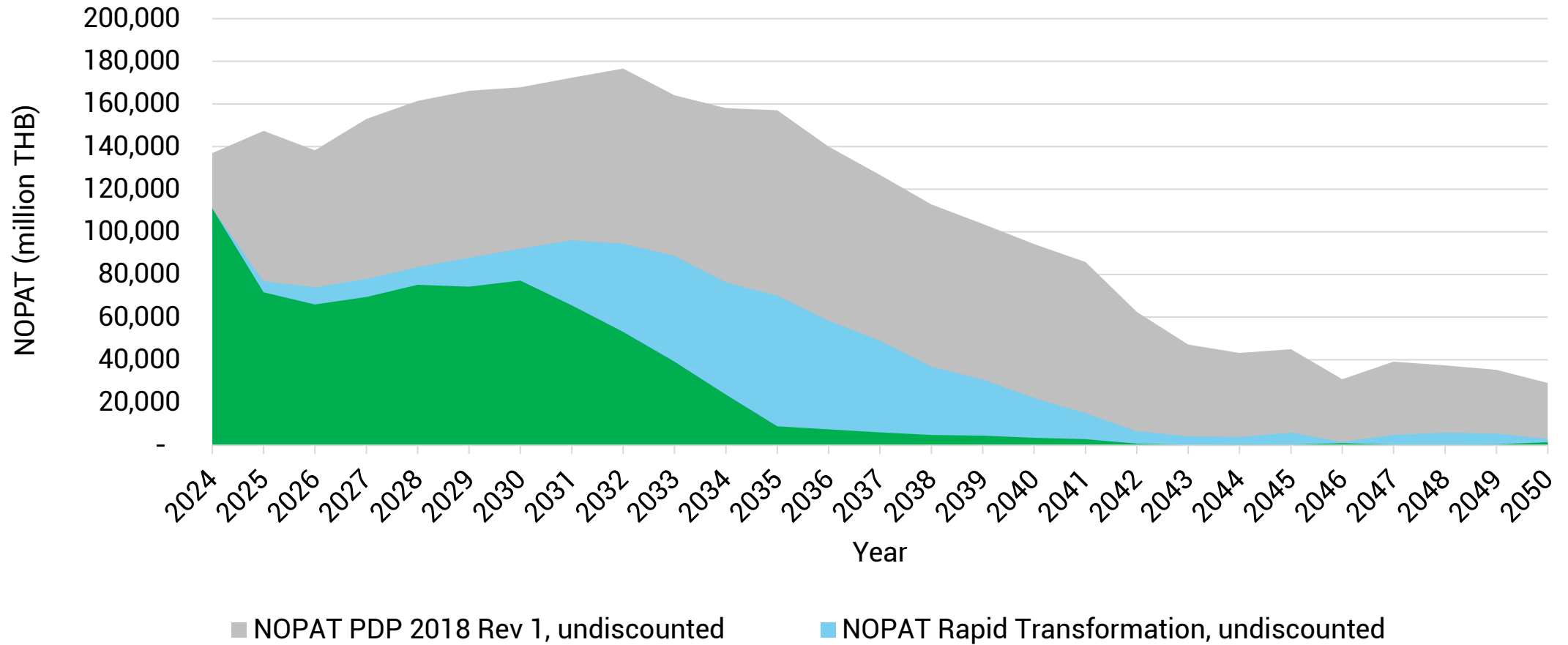


## Cost



# 3. Estimate the value of these stranded assets using DCF

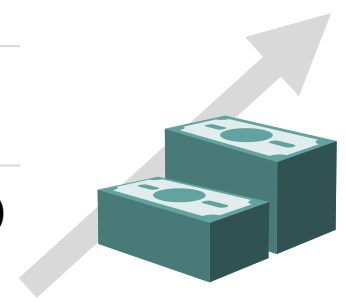
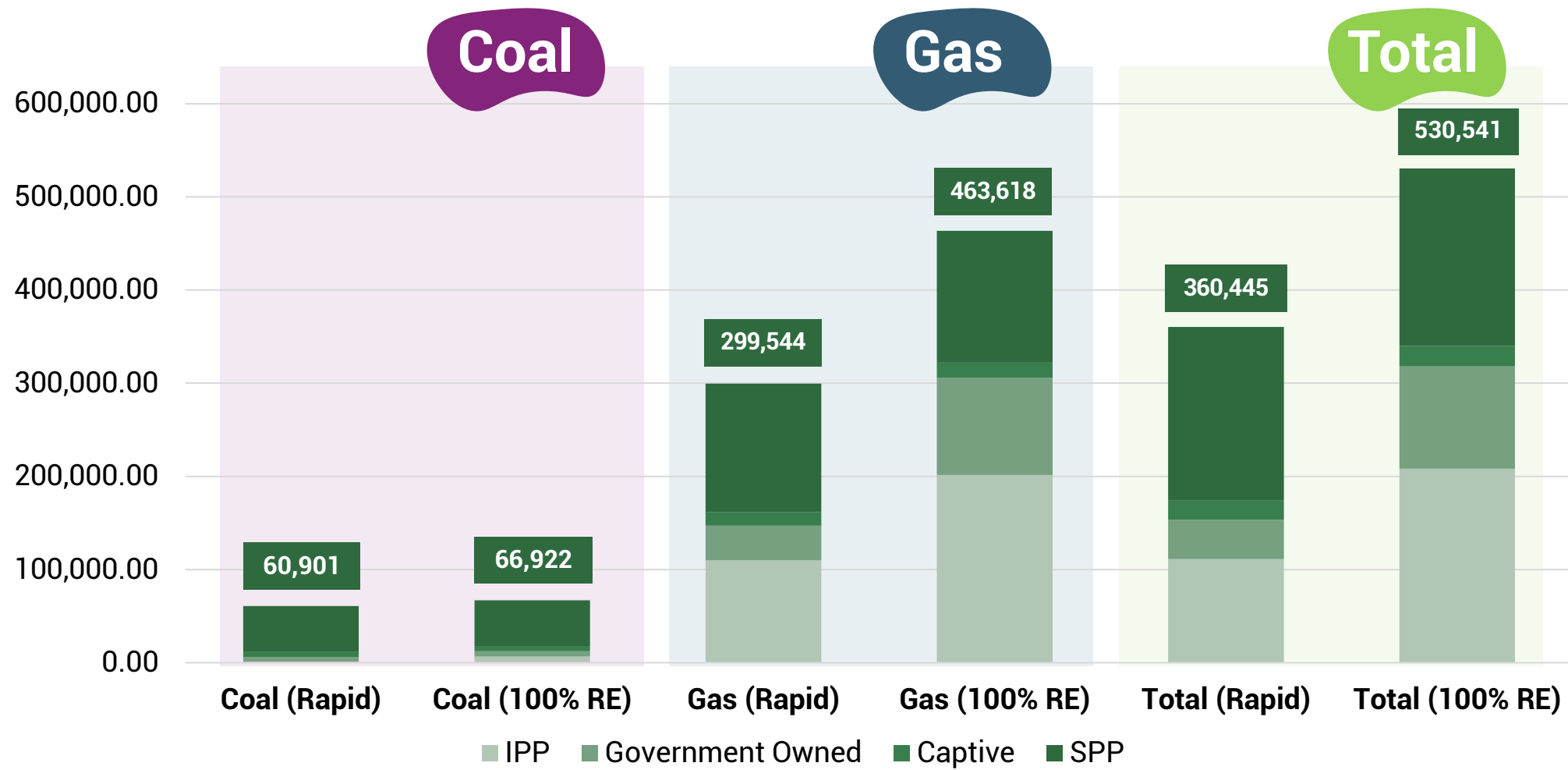
Undiscounted Net Operating Profit After Tax (NOPAT)





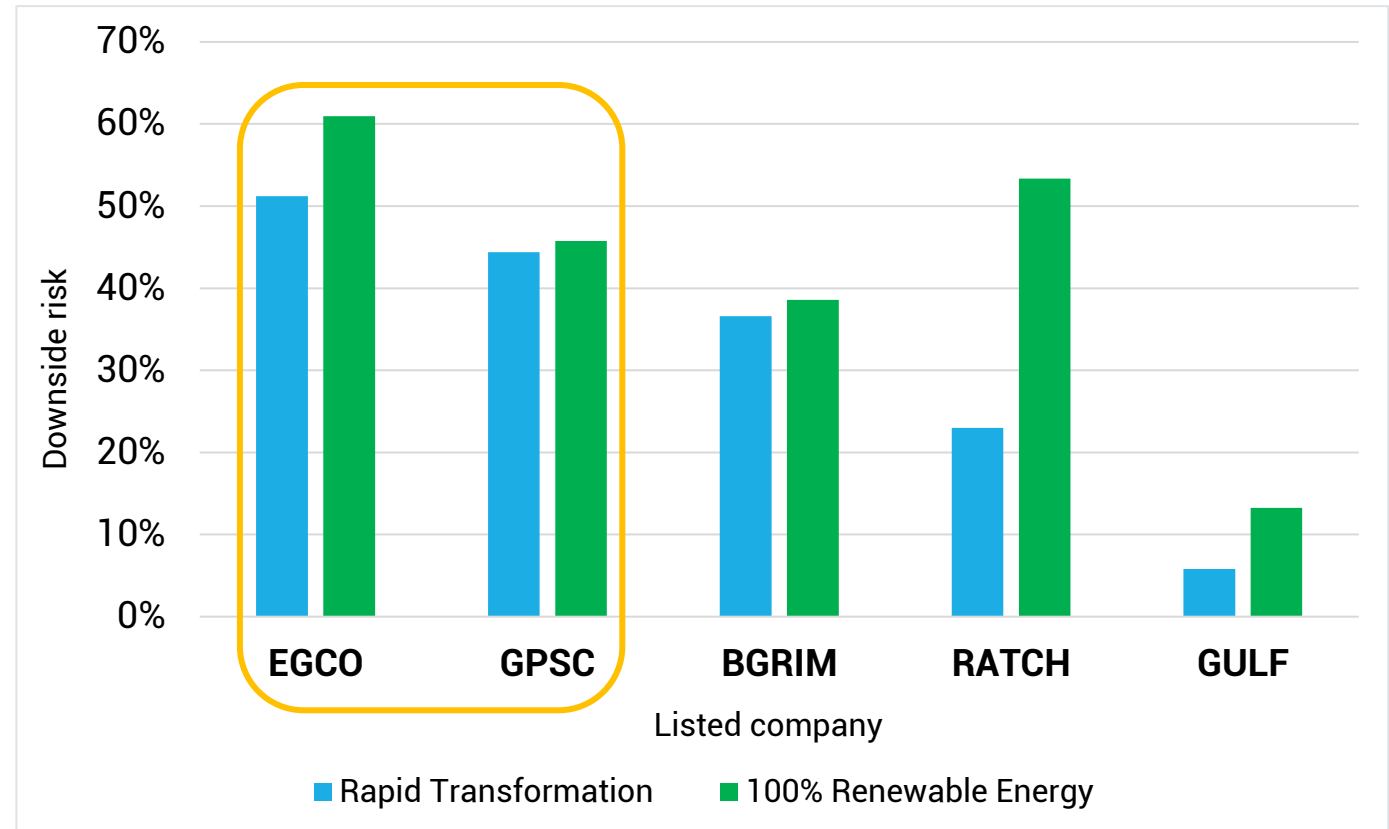
### 3. Estimate the value of these stranded assets using DCF

Net present value (NPV) of stranded coal-fired and gas-fired power plants for Rapid Transformation, and 100% Renewable Energy scenarios (Million THB)



# 4. Based on the determined stranded asset value, we allocate the losses and assess their impact on stock prices

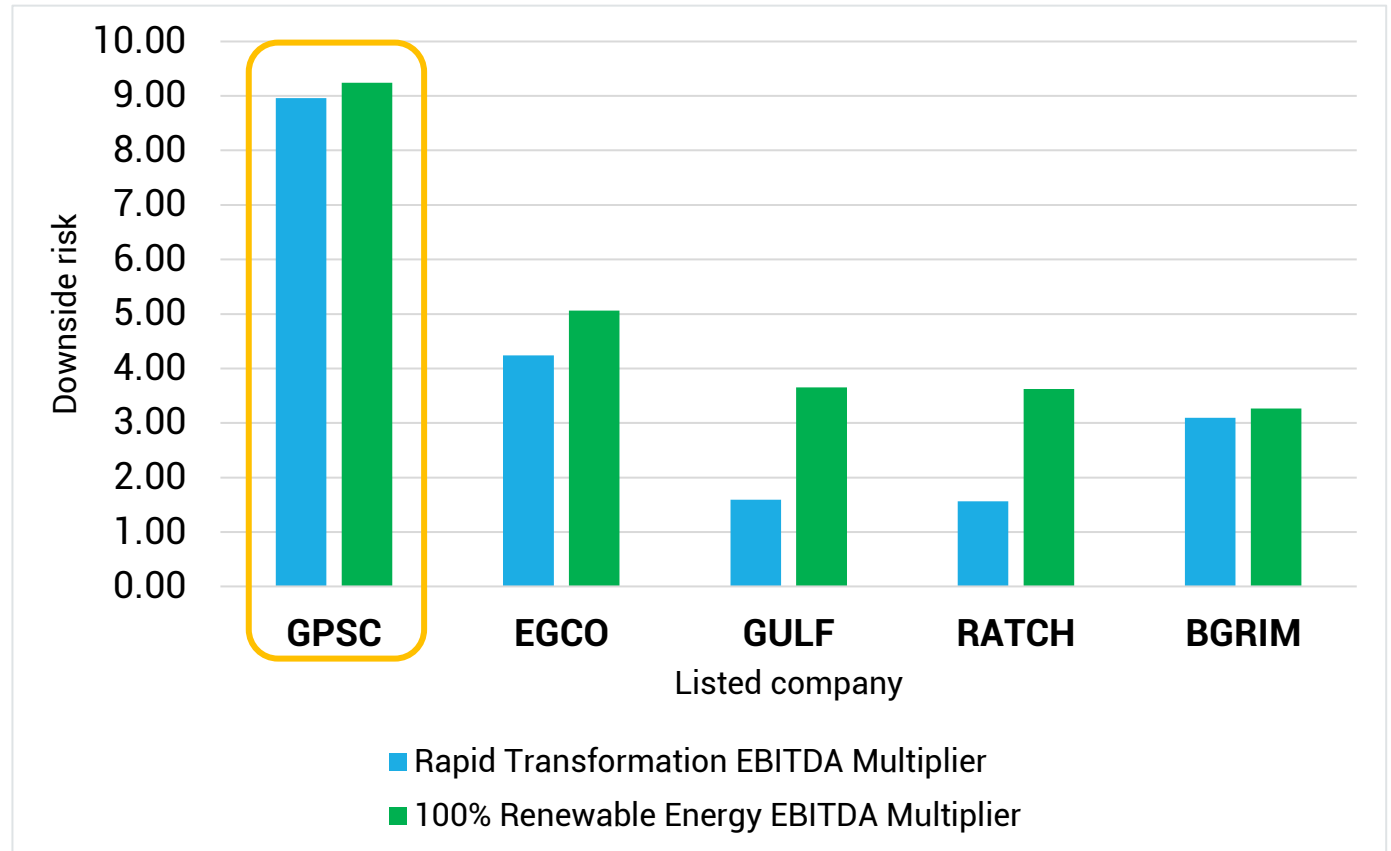
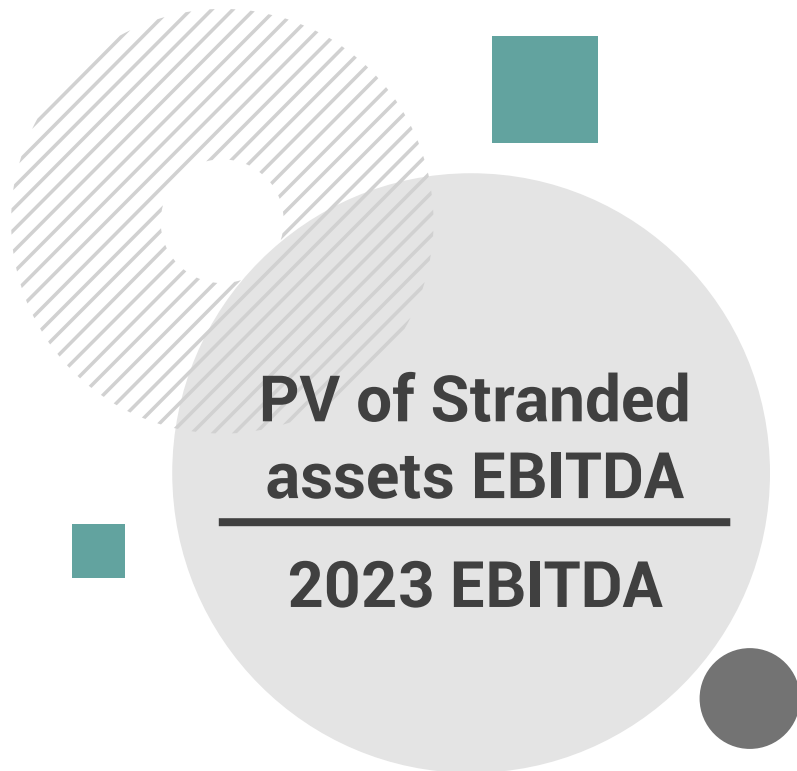
Downside risk for five major energy utilities companies in Thailand



EGCO and GPSC face *higher risks*, with downside risks exceeding 40% in some scenarios.

# 4. Based on the determined stranded asset value, we allocate the losses and assess their impact on stock prices

Downside risk for five major energy utilities companies in Thailand



GPSC is *most significantly impacted* due to its substantial reliance on domestic IPP and SPP contracts

# Policy Implications



# Policy Implications

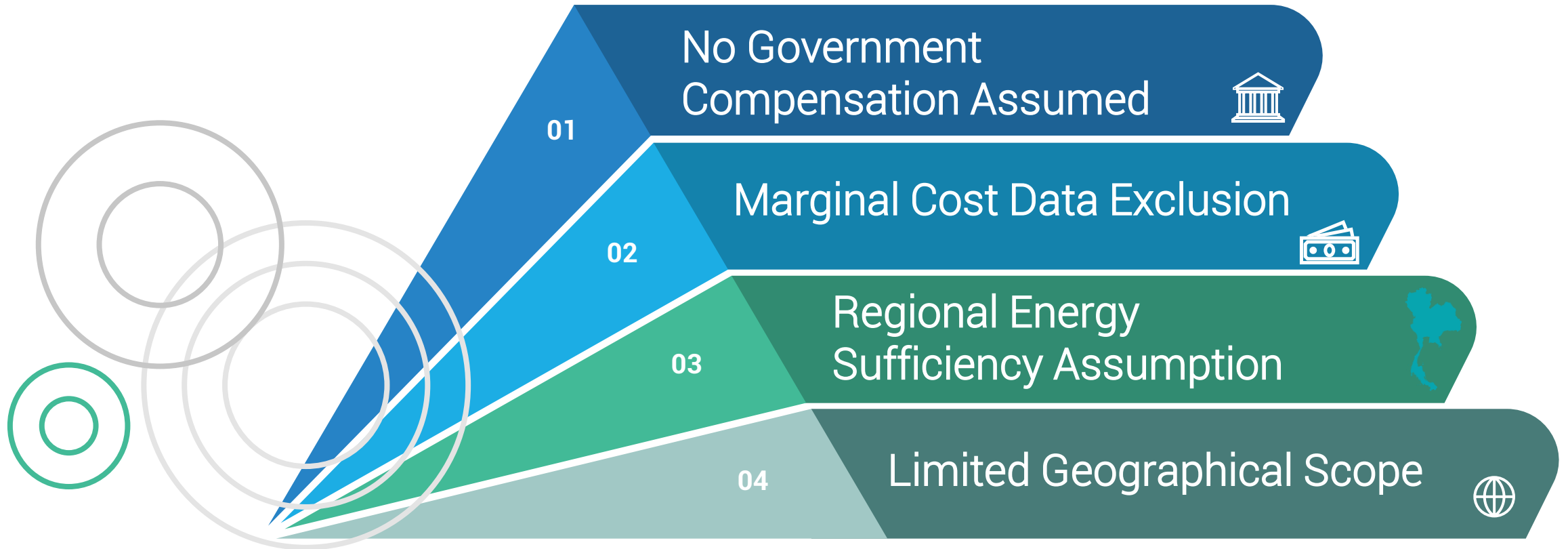
Inform policy makers on  
**designing a just and  
transparent fossil  
phase out plan**  
to all operators and other  
stakeholders



Encourage Thailand to participate in  
**global initiatives** like the Just  
Energy Transition Partnership (JET-P)  
**for financing Thailand's  
energy transition** through  
these initiatives.



# Research Limitations

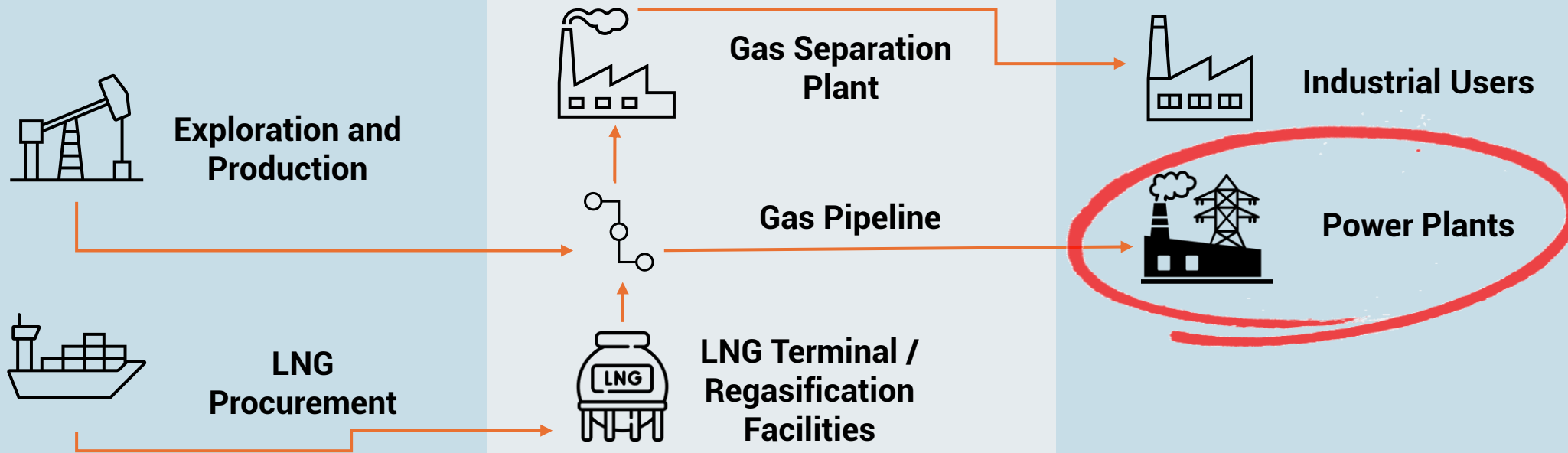


## Upstream

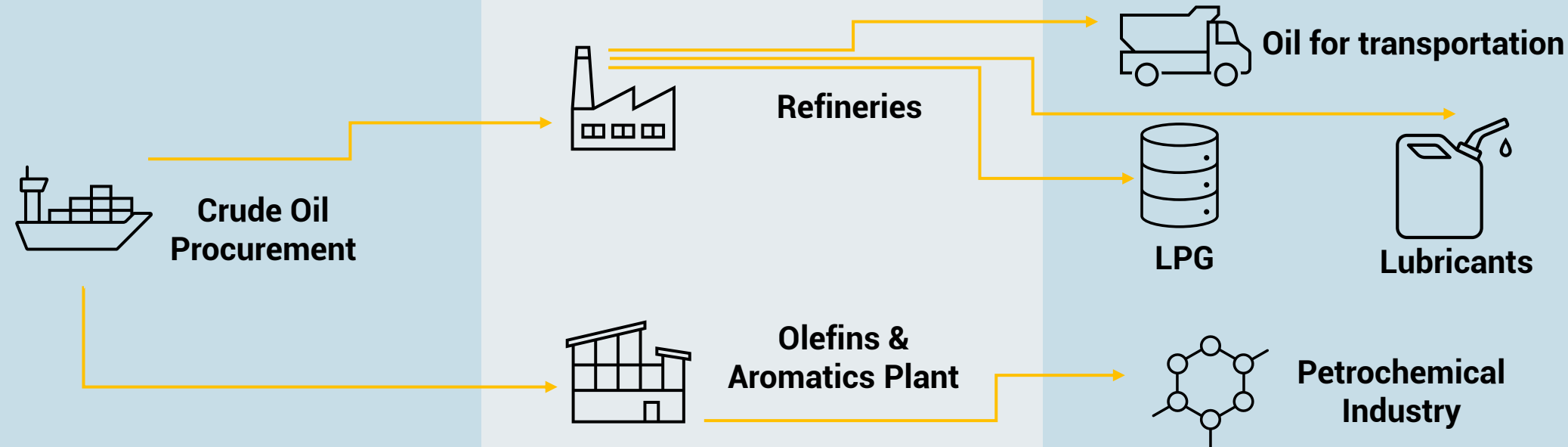
## Midstream

## Downstream

# Gas Supply Chain



# Oil Supply Chain

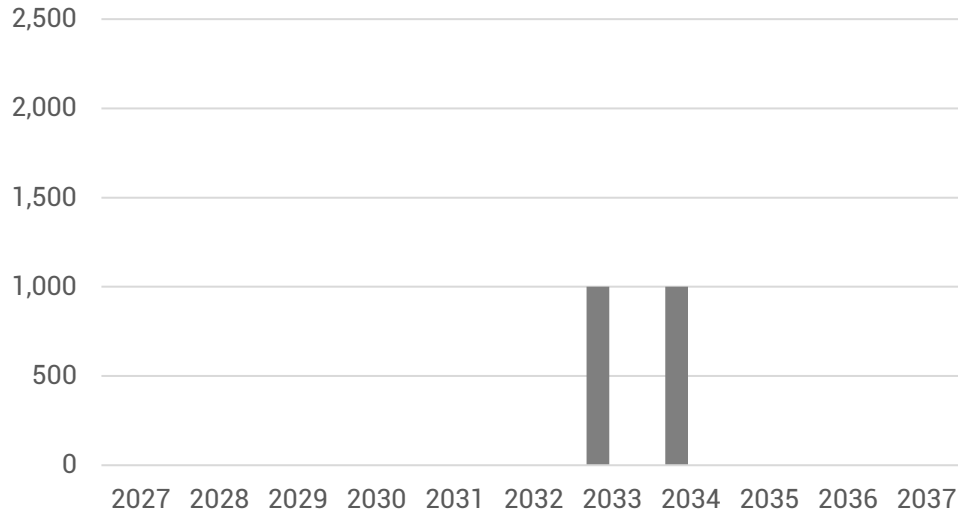


# Some Observations on Draft PDP2024



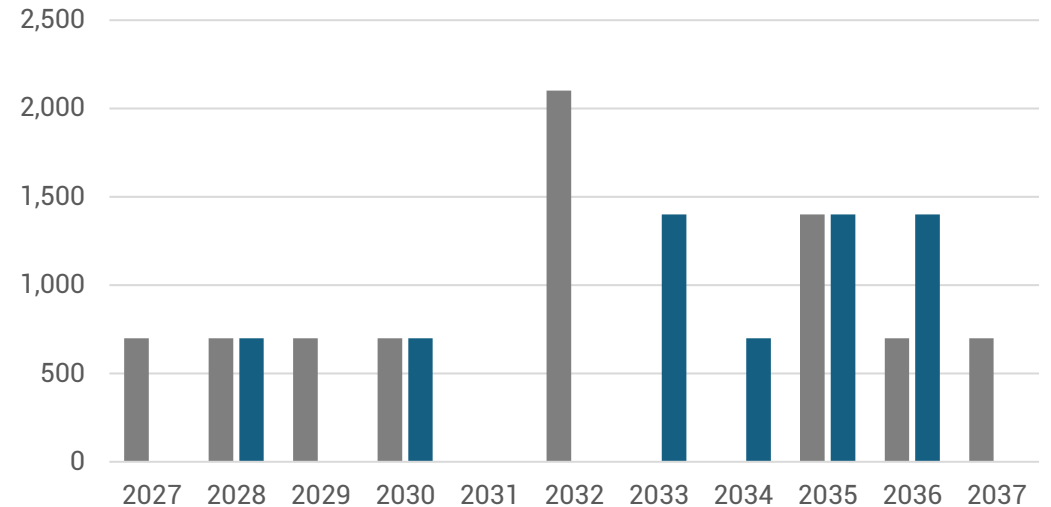
# Power plant to be installed: draft PDP2024 vs. PDP2018 rev 1

## Coal-fired



*\*Note: There are no new power plants in the draft PDP2024.*

## Gas-fired



*\*Note: The installed capacity for some years includes more than one power plant.*

Total power plant to be installed (MW) during 2027 – 2037:

2,000 MW  
PDP2018 rev 1

0 MW  
draft PDP2024

7,700 MW  
PDP2018 rev 1

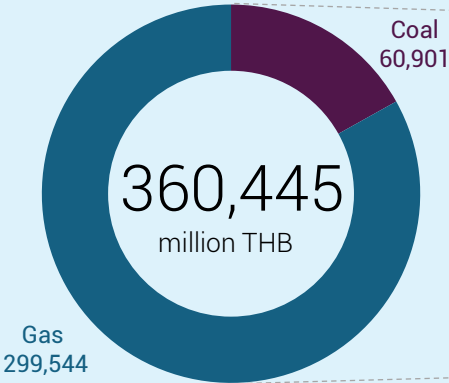
6,300 MW  
draft PDP2024

# Stranded assets value comparison

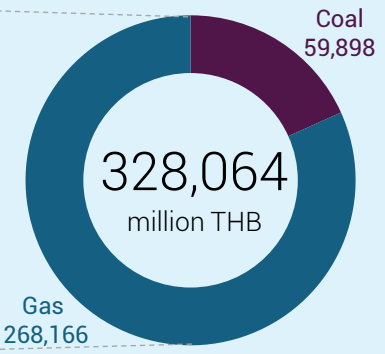
PDP2018 rev 1

Draft PDP2024

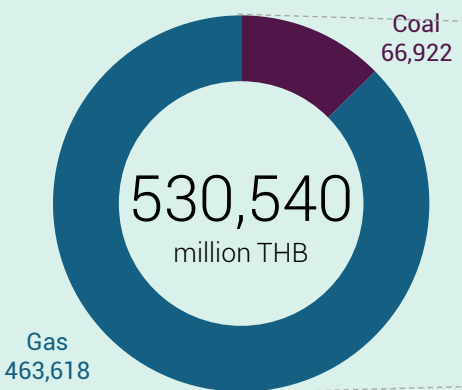
Rapid Transformation



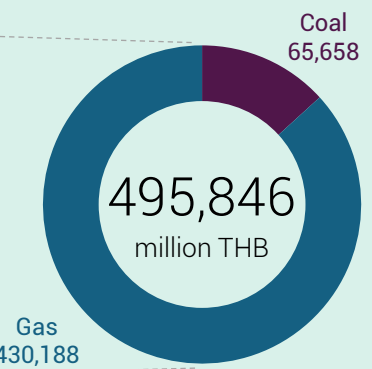
9% ↓



100% Renewable Energy



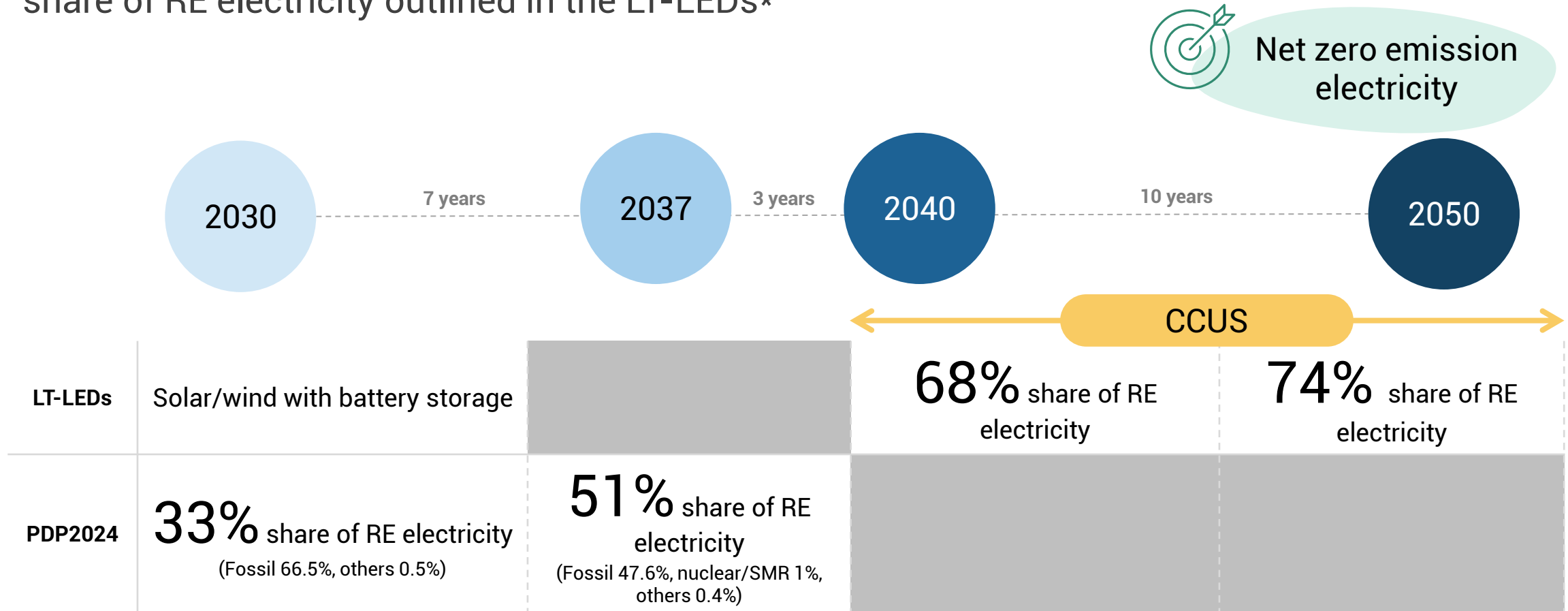
7% ↓





# Target share of RE electricity: LT-LEDs vs. PDP2024

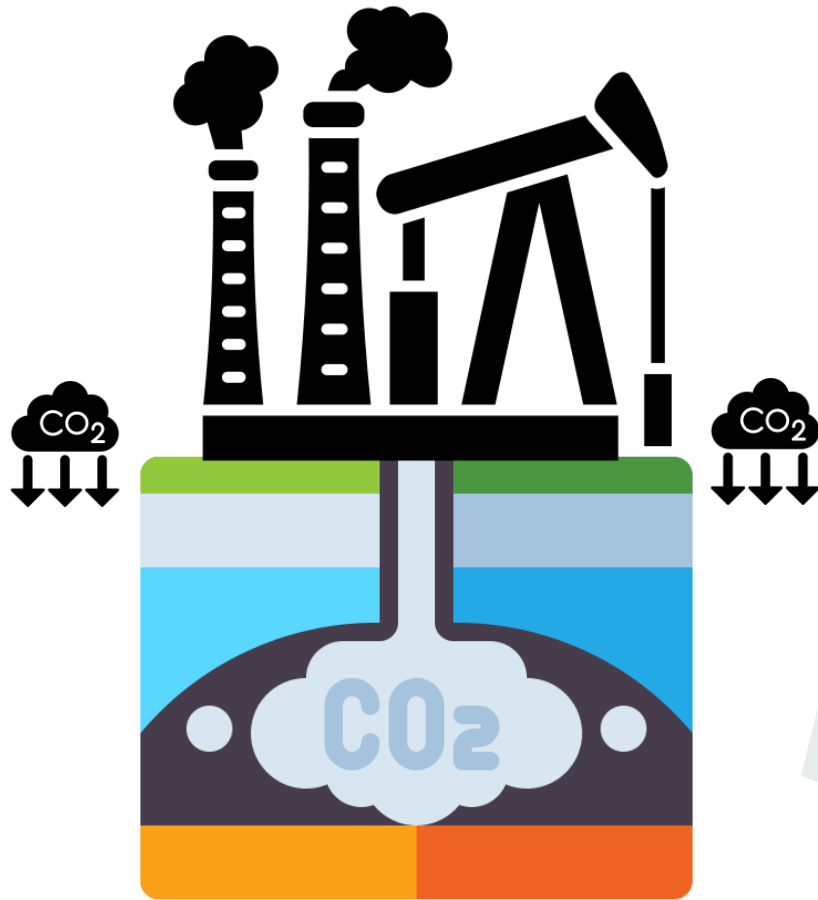
Intensive investment in RE is crucial to meet the target share of RE electricity outlined in the LT-LEDs\*



\*Long-term Low Greenhouse Gas Emission Development Strategy

# Cost of carbon capture: potentially higher than stranded assets

based on current CCS costs from literature review and LT-LEDS during 2041-2050



**CCS cost if draft PDP2024 is implemented...**

**42 – 73 billion THB per year**  
*(average during 2041-2050, using current costs)*

**328-495 billion THB**  
Estimated stranded value of coal & gas in draft PDP2024

**VS**

**420-730 billion THB**  
Estimated total CCS cost between 2041-2050



# Weighted average of LCOE comparison

Between draft PDP2024 and Rapid Transformation (People NEP) scenarios

Draft PDP2024

Rapid Transformation (People NEP)

2.88 THB/kWh vs 2.56 THB/kWh

The weighted average LCOE for two scenarios is calculated based on:

- The energy generation mix in each scenario.
- LCOE for each energy source in Thailand, as reported by WoodMackenzie (2021), USAID-NREL (2019), ERIA (2019), and Bloomberg NEF.

# Thailand's draft PDP2024: Forward-looking

Electricity Price  
Challenges in draft  
PDP2024

01

Targeting 3.87 THB/kWh in draft PDP2024 excludes costs for emission trading schemes and carbon taxes mandated by upcoming Thailand Climate Change Act.

COP30 urge all countries including Thailand to set higher climate goals.

02

**COP30's Demand for Higher Climate Ambitions**

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