Investment in the 7th edition of the APEC Energy Outlook

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Outline

1. Approach to investment in the 7th APEC Energy Outlook
2. Headline results
3. Digging a little deeper
4. A quick look at CCS
5. Limitations
6. How we're proceeding for the next iteration of the APEC Energy Outlook

Before we begin, a quick look at the APEC Energy Outlook scenarios

Business as Usual

Provides a baseline

APEC Targets

- 45% improvement in energy intensity to 2035
- Double renewables by 2030 relative to 2010

2 Degrees Scenario

A 50% chance at limiting global temperature rise to 2 degrees Celsius

More decarbonisation

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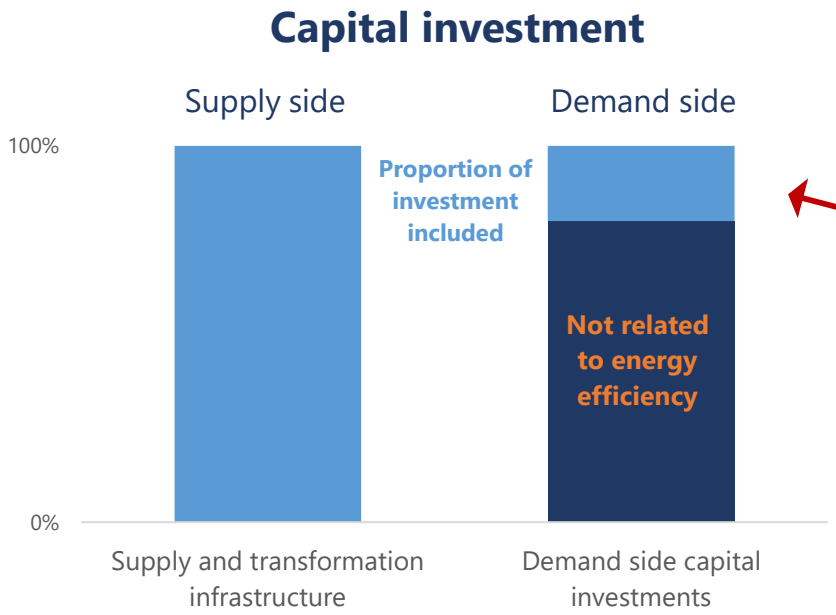
7th Energy Demand and Supply Outlook

Investment component is determined *ex post*



The APEC modelling scenarios allow for **capital investment** and **fuel costs** calculation

1. All supply and transformation spending is captured as capital investments
2. For the demand side, only those capital costs that achieve energy efficiency improvements relative to a 2016 baseline are tallied
3. **Fuel costs** are then calculated to determine the net cost of the energy system under the different scenarios

Net energy system cost = Capital + Fuel

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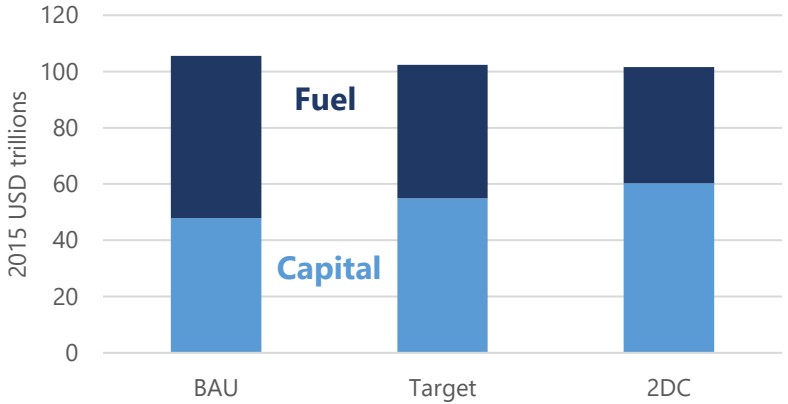
Investment and fuel costs under the three APEC scenarios

APEC energy investments and APEC fuel costs for 2017 to 2050

Scenarios	Energy capital investment	Fuel costs	TOTAL
BAU	47.9 trillion	57.6 trillion	105.5 trillion
APEC Targets Energy intensity and doubling renewables	54.9 trillion	47.5 trillion	102.4 trillion
2 Degrees	60.3 trillion	41.3 trillion	101.6 trillion



Additional capital investment required to deliver:

- **APEC target** goals
- A 50% chance of limiting global temperature rise to **2 degrees**

Is more than offset by **fuel costs** savings

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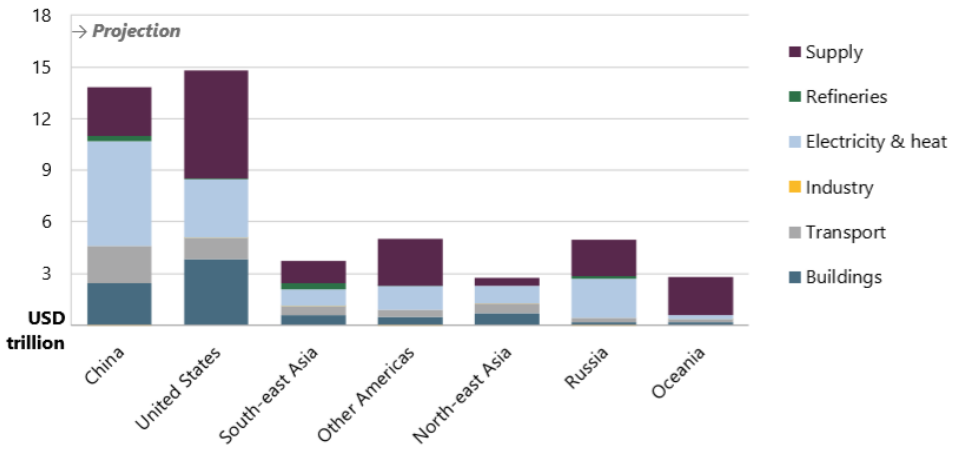
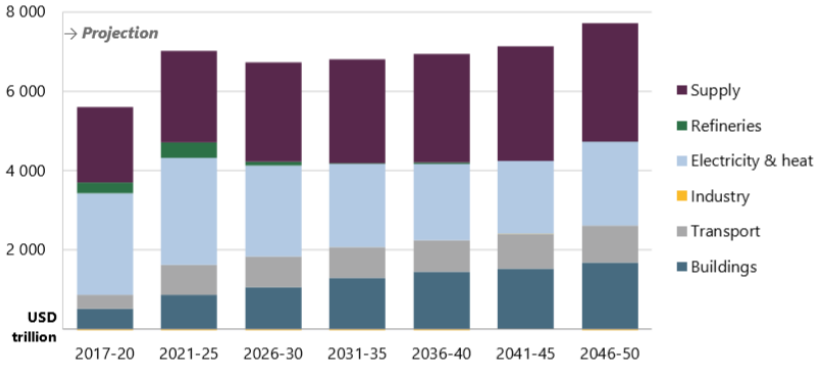
BAU capital investment by region and by 5-year block

By APEC region



By time period



USD 1.4 trillion per annum

APEC energy **capital investment** required in BAU vs 2DC scenarios

USD 1.8 trillion per annum

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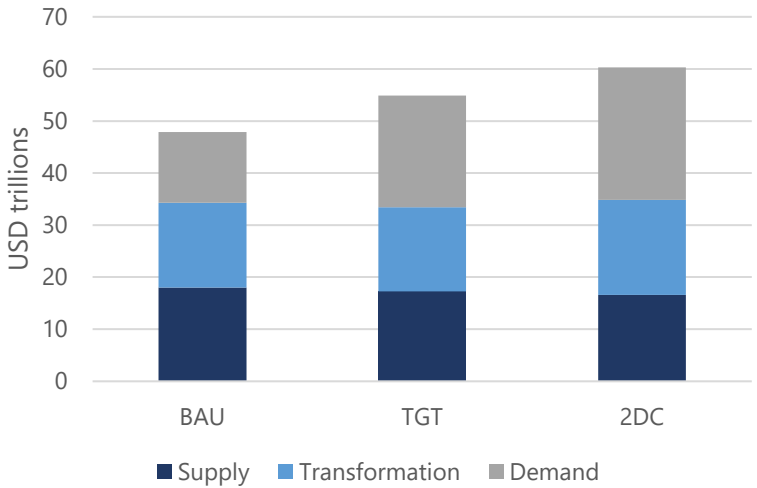
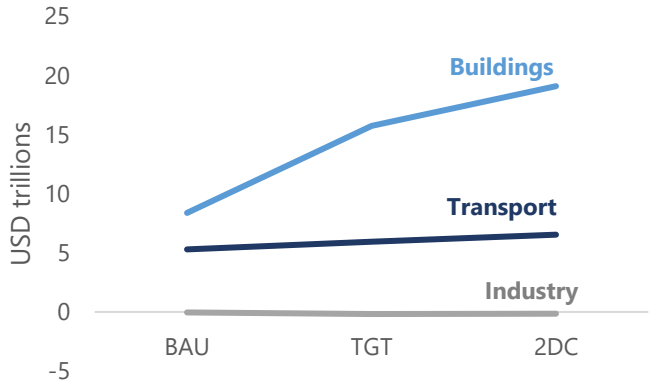
Capital investment across the scenarios

APEC energy capital investment for supply, transformation and demand



...and digging deeper into **demand** side capital investments



In the 2DC scenario

Less Supply (-8%)
More Transformation (+12%)

...And a lot more demand side investment in **buildings** (+128%)

From USD 8.4 trillion → to USD 19.1 trillion

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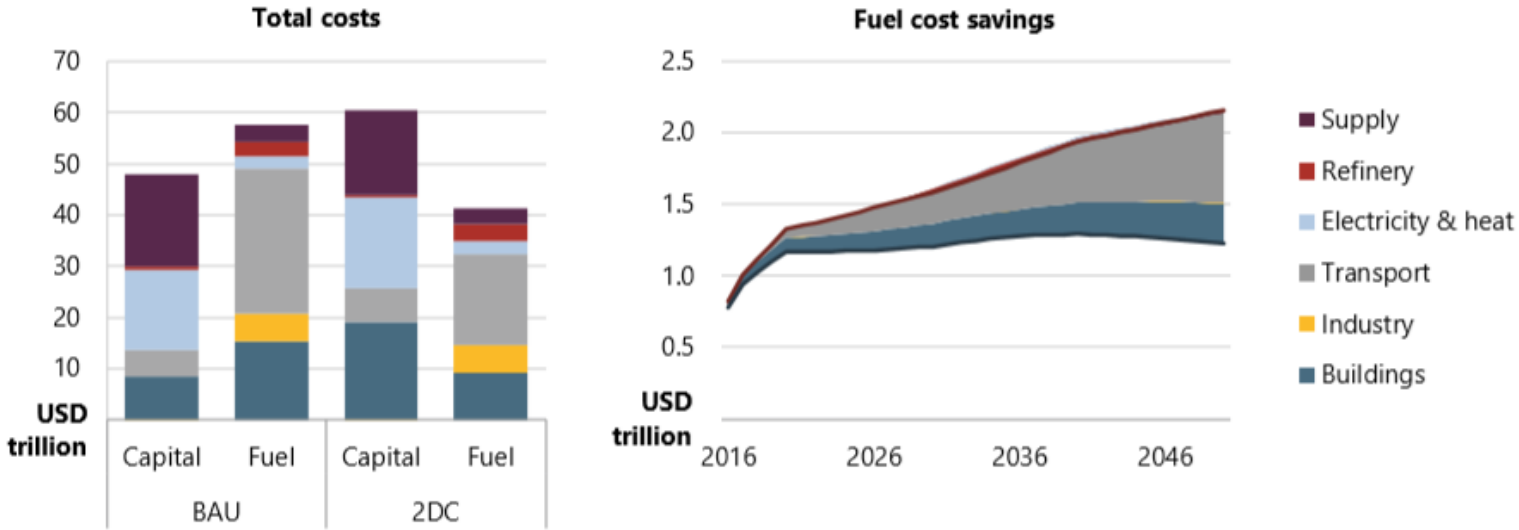
Where do fuel cost savings accrue?

Total costs and fuel costs savings in BAU vs 2DC, 2016 to 2050



Almost all fuel cost savings accrue to the **transport** and **buildings** sectors on the demand side

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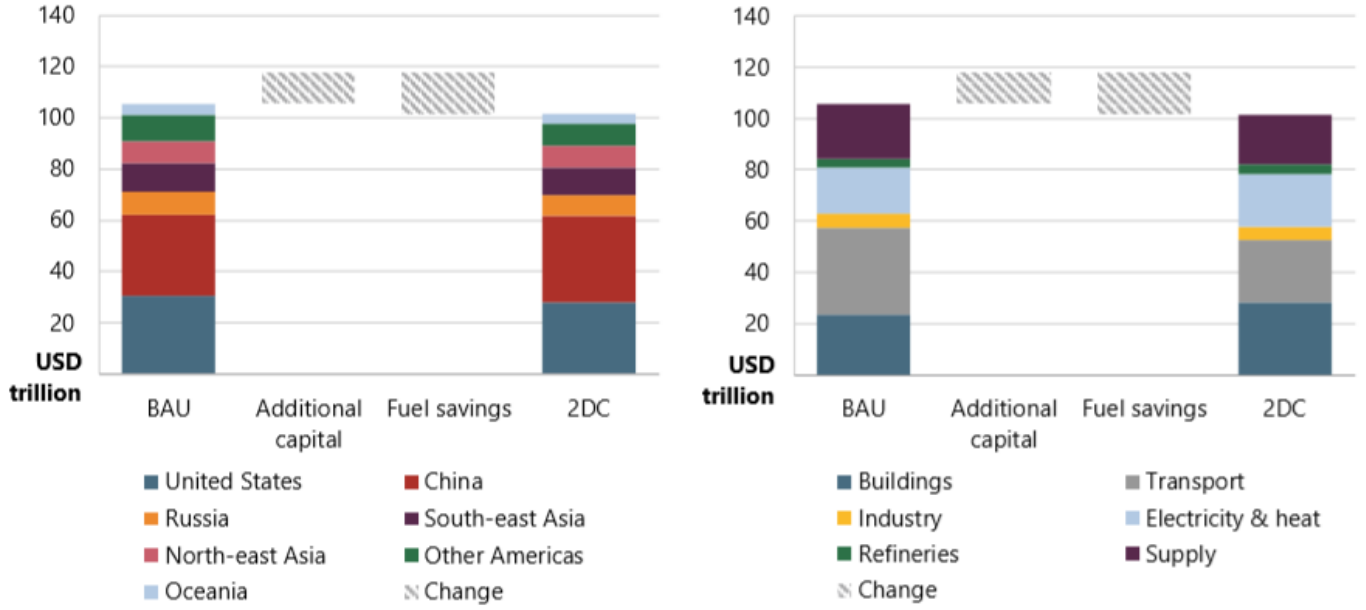
To emphasise the main finding



The extra energy investment required to meet decarbonisation goals can be offset by fuel cost savings

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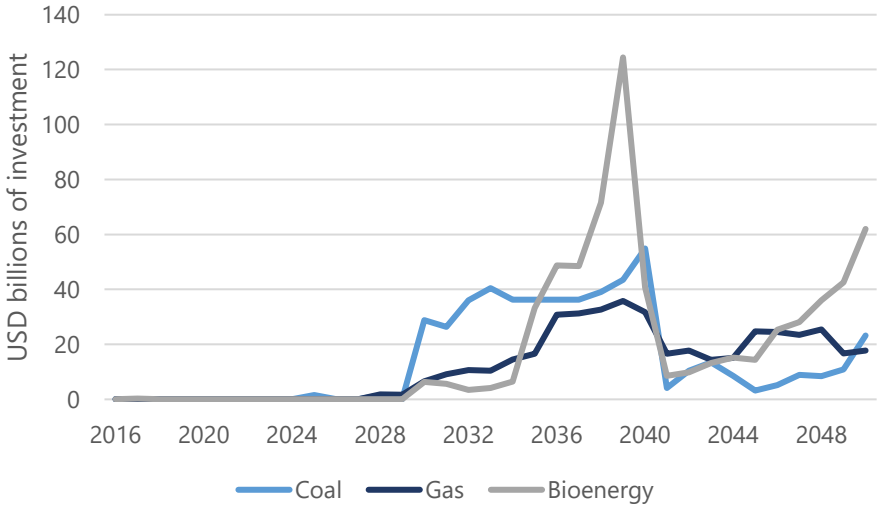
A quick look at carbon capture and storage

2DC modelling results for CCS in APEC electricity generation



There are limited needs for CCS technology in the **BAU** and **APEC target** scenarios

2DC

- **USD 510 billion** Coal
- **USD 430 billion** Gas
- **USD 650 billion** Bioenergy

The lumpy nature of the investment is influenced by existing capacity, cost of new power plants, and the requirement to adhere to an emissions cap.

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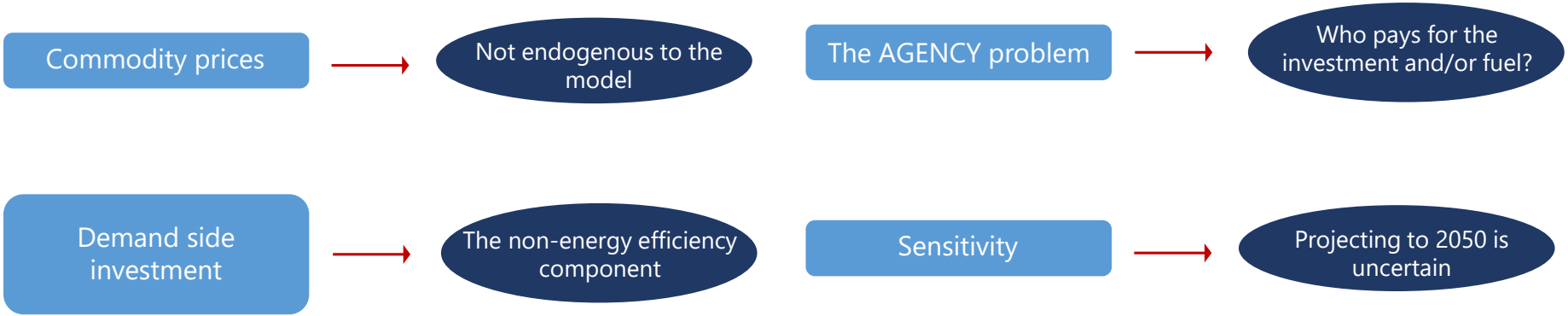
Limitations of the results

Why is APEC not already on the **2DC scenario** trajectory if it is the most cost effective?



Energy system investments and costs are plausible

…BUT, reality of investment decisions not necessarily reflected in the model

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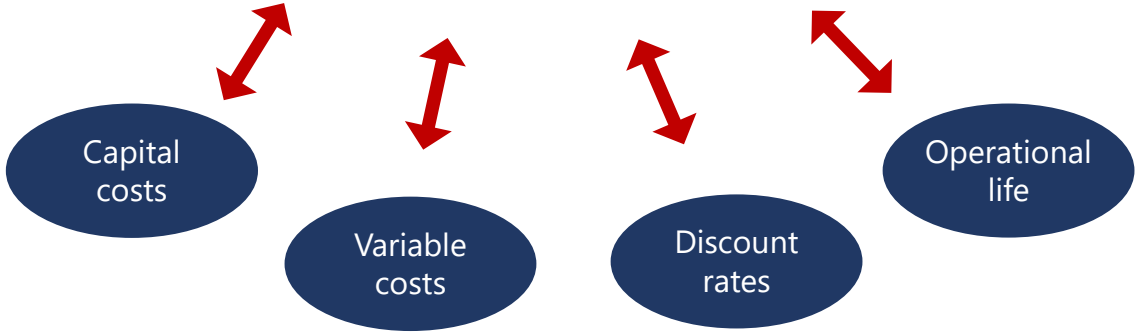
An updated approach for the next iteration of the Outlook

OSeMOSYS

An integrated energy modelling framework allowing for optimisation of energy supply, transformation and demand



Demand side investment assessment is likely to account for entire investment cost

→ Not just energy efficiency component

New modelling framework ensures consistency of modelled inputs

→ Investment is no longer ex post

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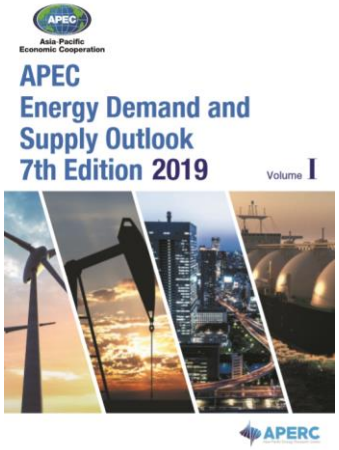
Cheers

You can read more about our investment modelling in the 7th edition of the
APEC Energy Demand and Supply Outlook



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7th Energy Demand and Supply Outlook

A couple of quick demand side capital investment examples

A new fleet of trucks

A new fleet (or replacement fleet) have the same energy efficiency as the 2016 baseline, then:

New air conditioners

If new air conditioners are more energy efficient than the 2016 baseline, then that portion of the cost delivering improved energy efficiency is counted:

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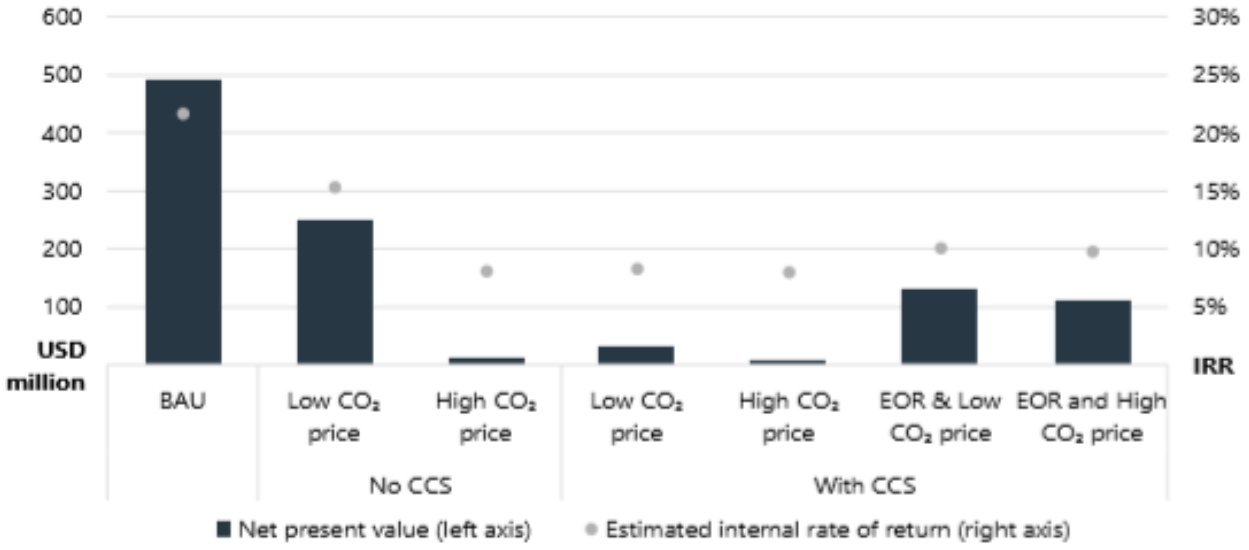
CCS case study in southeast Asia

Net present value and IRR or new coal fired power plants under different scenarios



In a high carbon price scenario, a coal fired power plant is barely viable

→ **No CCS:** Power plant needs to pay for carbon emissions

→ **With CCS**: Power plant has higher capital costs and has higher own use

EOR delivers a valuable revenue stream but still not as profitable as a coal plant in a world where emissions weren't a problem

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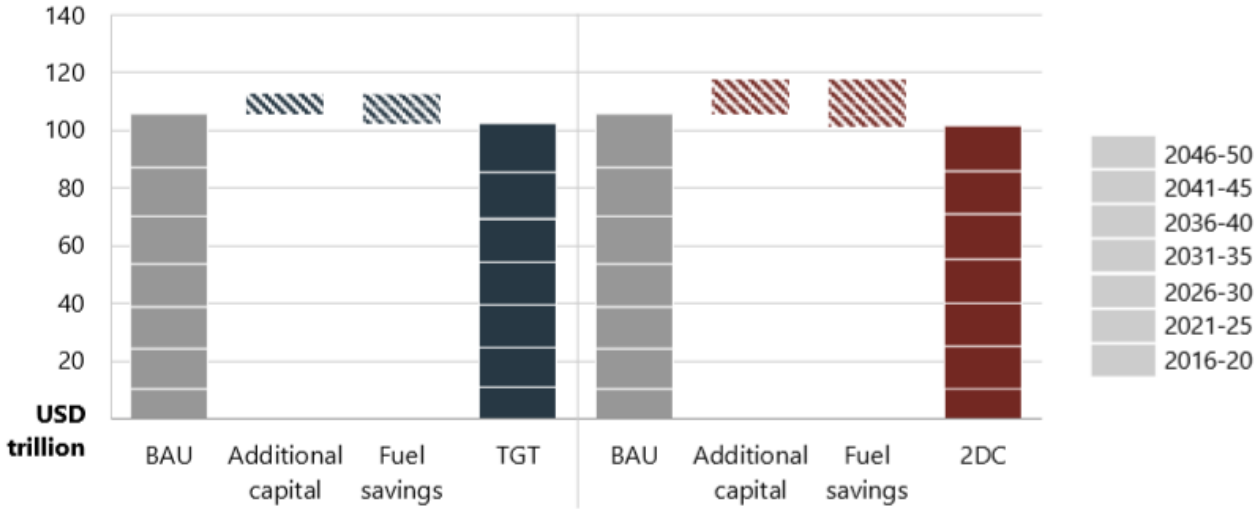
Is the total spend increasingly brought forward with more ambitious decarbonisation?

The timing of required investments and fuel savings in 5-year blocks to 2050

BAU, APEC targets, and 2DC



Additional capital investment in the **APEC targets** and **2DC** are offset by fuel savings that are realised throughout the Outlook period

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