Australia's Climate Policy Options: A Study of Policy Options for the Energy Networks Association

Preliminary results

4 March 2016

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Important

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Key Findings

- Carbon reduction targets for 2030 for the stationary energy sector can be met using the different policy approaches modelled.
  - The greater the target reduction the higher the contribution from electricity generation compared to direct combustion in meeting the target
- The lowest economic cost is associated with:
  - Market based mechanisms applied broadly across the energy sector that allow for the lowest cost options to be adopted
  - Technology neutral policies
- The lowest residential electricity bills occur with:
  - Level playing field for technologies to participate in mitigation
  - Where trading around liabilities is allowed
- In the period under study, Australia's domestic gas usage needs to increase in all scenarios from 2020 to 2030 due to the need to deploy low emission technologies

Objective

- Quantify the impacts of alternative policy approaches to achieve the stated national emission reduction target in 2030.
- The analysis focuses on achieving this target in stationary energy activities through 3 alternative means:
  - *Business as usual*: Assumes the continuation of the diverse range of various State and Federal abatement initiatives which prescribe specific technologies (e.g. renewables) or scale (e.g. SRES, FiT) and the extended use of a binding Safeguards Mechanism which limits sectoral emissions without trading. *In addition, in the 45% target scenario a carbon price and 50% RET is assumed.*
  - *Level playing field scenario:* Assumes the current abatement initiatives are made technology neutral (eg. via a low emissions target scheme) and indifferent to scale. In the 26-28% target, it assumes that the Safeguards Mechanism evolves to a baseline & credit mechanism permitting trading among participants. *In addition, in the 45% target scenario a carbon price and 50% LET is assumed.*
  - *Explicit carbon price scenario*: This scenario assumes that an explicit carbon price is established through a mechanism equivalent to a whole of economy carbon tax or emissions trading scheme. All other abatement policies (eg RET, SRES) are removed.

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Objective

- There are two targets in 2030 to be covered under the analysis:
  - a 26 to 28% reduction on 2005 levels and
  - a 45% reduction on 2005 levels.
- The relevant target is met in each of the six scenarios using 3 different policy frameworks

	26-28% Target	45% Target
Business as usual	☑	☑
Level playing field	☑	☑
Explicit carbon price only	☑	☑

- Note: all 45% target scenarios include a carbon price mechanism

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Method

- Integrated modelling approach.
- The models used:
  - *DEAM (part of the SEAM suite of modules covering the direct combustion sector): provided insights on abatement options and costs for the direct combustion sector).*
  - *DOGMMA: provides projections of uptake of small scale generation and electricity displacement systems.*
  - *Strategist: Model of electricity markets: determines dispatch of plant and investment in new plant using least cost programming methods.*
- Study period: 2015 to 2035
  - Study went beyond 2030 as investment choice to 2030 are affected by what happens after 2030 given the long life of energy assets.
  - Policies announced assume a 2020 start.

Method

- Abatement policies modelled:
  - RET/LET: determine uptake of eligible options to meet cumulative target to 2030.
    - Under RET, only renewable energy options allowed.
    - Under LET, all low emission options with an emission intensity below a benchmark of 0.6 t/MWh earnt certificates with the proportion of certificates earnt based on their emission intensity relative to the benchmark.
    - Based on least cost choice of options.
    - Certificate price determined by LRMC of last plant required to meet the target.
  - SRES: projections of uptake of small scale generation and electricity displacement systems (extending eligibility in level playing field scenarios to microgeneration, trigeneration and efficient gas heating).
  - Safeguarding mechanism: Gradually reducing the absolute baselines for facilities operating at emissions above sectoral baselines. For the 26 to 28% target current policy scenarios, this was the main mechanism to meet long term targets.
  - Baseline and credit: Used in the level playing field 28% target scenario. Sectoral baselines were established reducing from 2020 to 2030 to meet the emission target. Generators with emission intensity above the baselines can trade with generators with emission intensities below the baseline to cover their emission liabilities.
  - Carbon pricing: applying a carbon price to fuel combustion emissions. Gradually increased starting price to achieve 2030 target. Used only in 45% target scenarios and in the 28% Explicit carbon pricing scenario.

Method

- Iterative process:
  - First determine level of emissions from technology pull policies
  - Then meet target by adjusting residual policy (absolute baselines, sectoral baselines, carbon prices)

Policy assumptions

	Carbon	RET	ERF & Baseline	SRES	LET	State and territory EE and RE policies
G1	N/A	33,000 GWh renewable generation	Absolute baseline set to achieve the 26-28% target	Extended to 2030	N/A	Extended to 2030
G2	N/A	N/A	Intensity baseline set to achieve the 26-28% target	Expanded to low emission technologies and extended to 2030	Higher RET type target but extended to cover all low emission technologies	Expanded to low emission technologies and extended to 2030
G3	Carbon price path to achieve 26-28% target	N/A	N/A	N/A	N/A	N/A
O1	N/A	Higher GWh target to achieve 50% of electricity demand and scheme extended to 2040	N/A	Extended to 2040	N/A	Extended to 2030
O2	N/A	N/A	N/A	Expanded to low emission technologies and extended to 2040	Higher GWh target extended to all low emission technologies	Expanded to low emission technologies and extended to 2030
O3	Carbon price path to achieve 45% target	N/A	N/A	N/A	N/A	N/A

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Assumptions

	Energy Sector Emissions (Mt CO_2-e pa)		
	Electricity	*Gas (direct combustion)*	*Total*
2005 Emissions (DoE)	197	61	258
26-28% Target	144	45	188
45 % Target	108	34	142
2013 Emissions	187	70	257

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Key results

- If emission targets are higher (i.e. 45%), the electricity sector does proportionally more to meet emission targets
  - Direct combustion sector has already done the fuel switching (to gas) so limited opportunities for further fuel switching from high emission fuels to low emission fuels. Opportunity is switching end use from electricity to gas.
  - For electricity: abatement comes mainly from a switch to gas and renewable energy generation with the proportion determined by policy mix
  - For direct combustion: abatement comes from energy efficiency (including cogeneration in industrial sector), and fuel switching, mainly to gas.

Key results

- Fuel/technology mix results:
  - Overall fuel usage over the period declines because overall energy demand declines and because of higher renewable energy generation in some scenarios.
  - Gas usage needs to increase in all scenarios from 2020 levels by between 35 and 61%.
    - Usage is highest in the technology neutral scenarios
  - Mixed results for coal usage particularly from electricity generation
    - Overall coal reduces in all scenarios by between 36 & 64%.
    - In some scenarios there is a switch from brown coal generation to black coal generation as that produces a lower emission option.
  - Increase in renewable electricity generation in all scenarios (from 45 to 202%)

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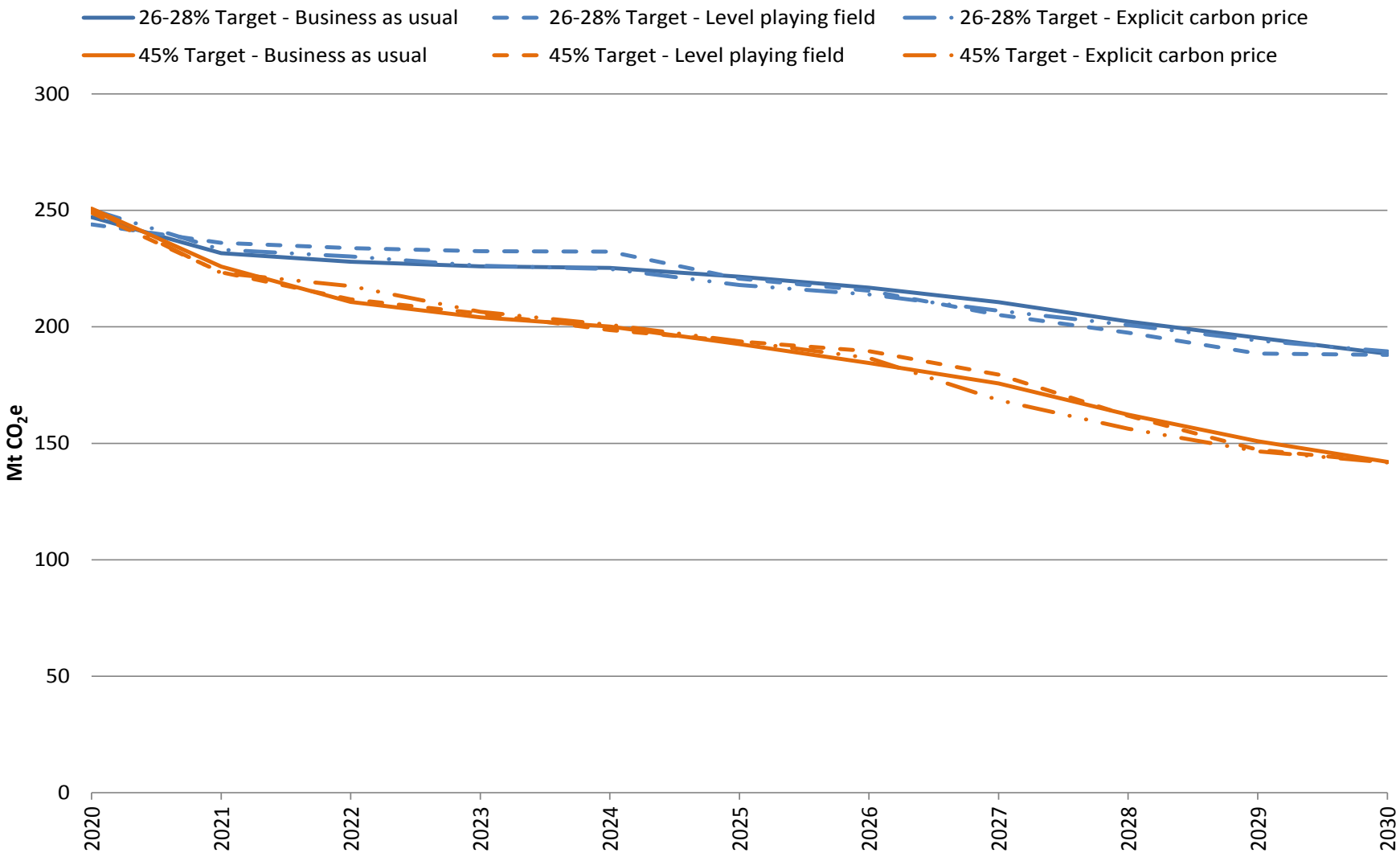
Key results

- Costs:
  - Lowest economic cost for explicit carbon pricing scenarios
    - The cost difference is higher under the higher carbon reduction target scenarios (45%)
    - The level playing field has lower economic cost than business as usual
  - Increase in investment is required in new gas and renewable generation plant under all scenarios
    - Gas plant investment ranges from 6,600 MW to 7,500 MW in the 28% target scenarios, and 8,200 MW to 10,000 MW in the 45% target scenarios
    - Renewable plant investment ranges from 4,800 MW to 8,400 MW in the 28% target scenarios and 13,000 MW to 22,000 MW in the 45% target scenarios

Key results: emissions



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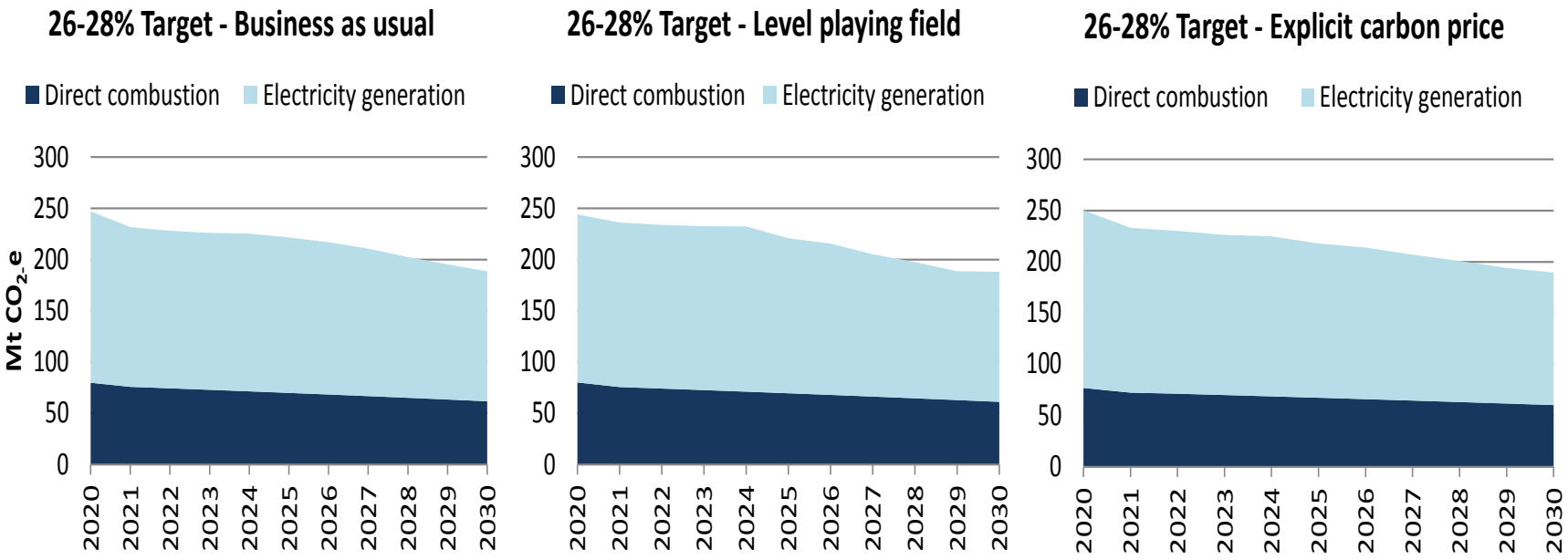
Key results: emissions



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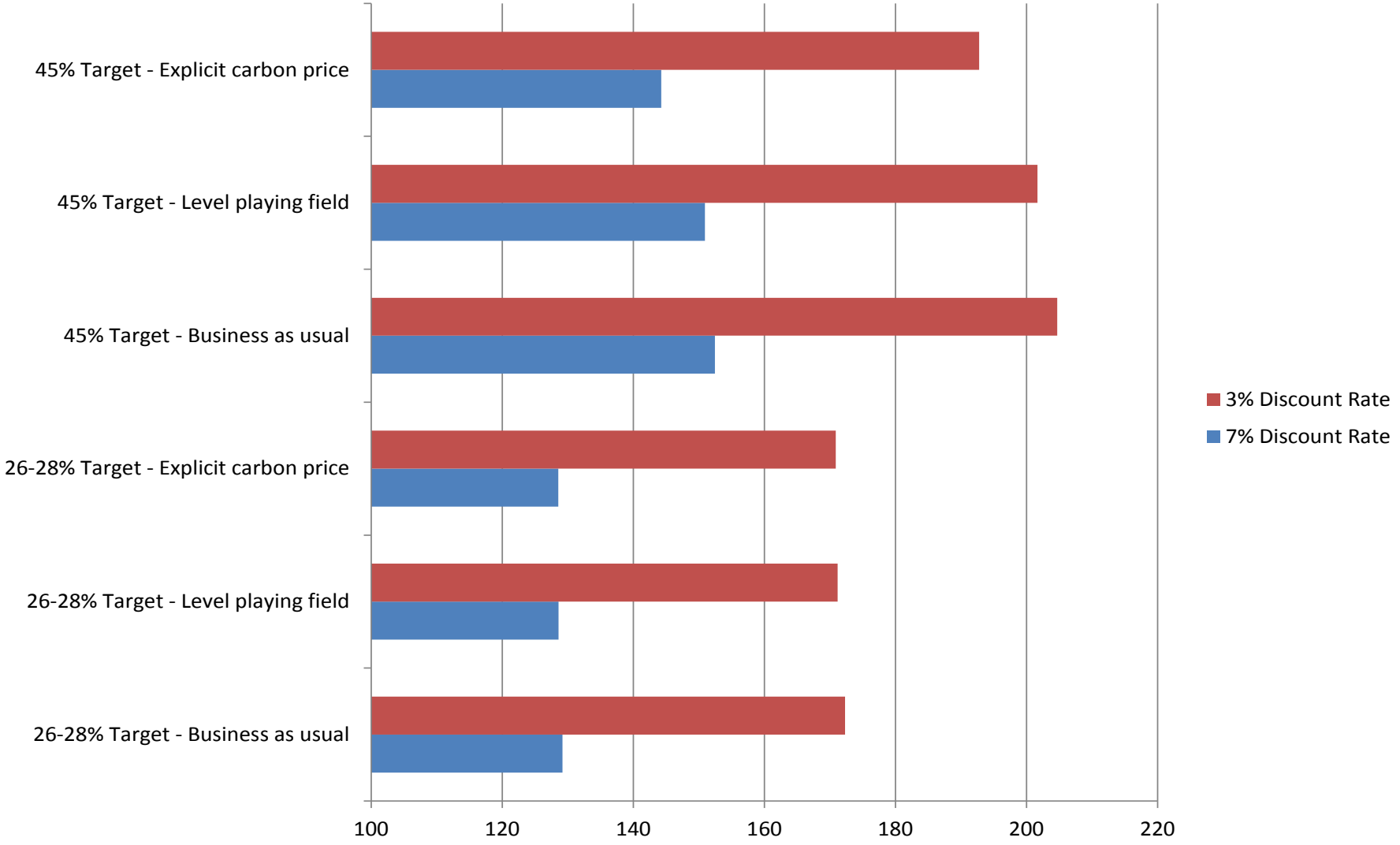
Key results: resource costs - electricity – $ billion



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Key results: resource costs - electricity – $ billion

	Abatement Target			
	26 to 28%		45%	
Policy Settings	***Total Cost***	***Savings***	***Total Cost***	***Savings***
Business as usual	$129.2 bn	-	$152.5 bn	-
Level playing field	$128.6 bn	$600 m	$150.9 bn	$1.5 bn
Explicit carbon price	$128.5 bn	$700 m	$144.3 bn	$8.2 bn

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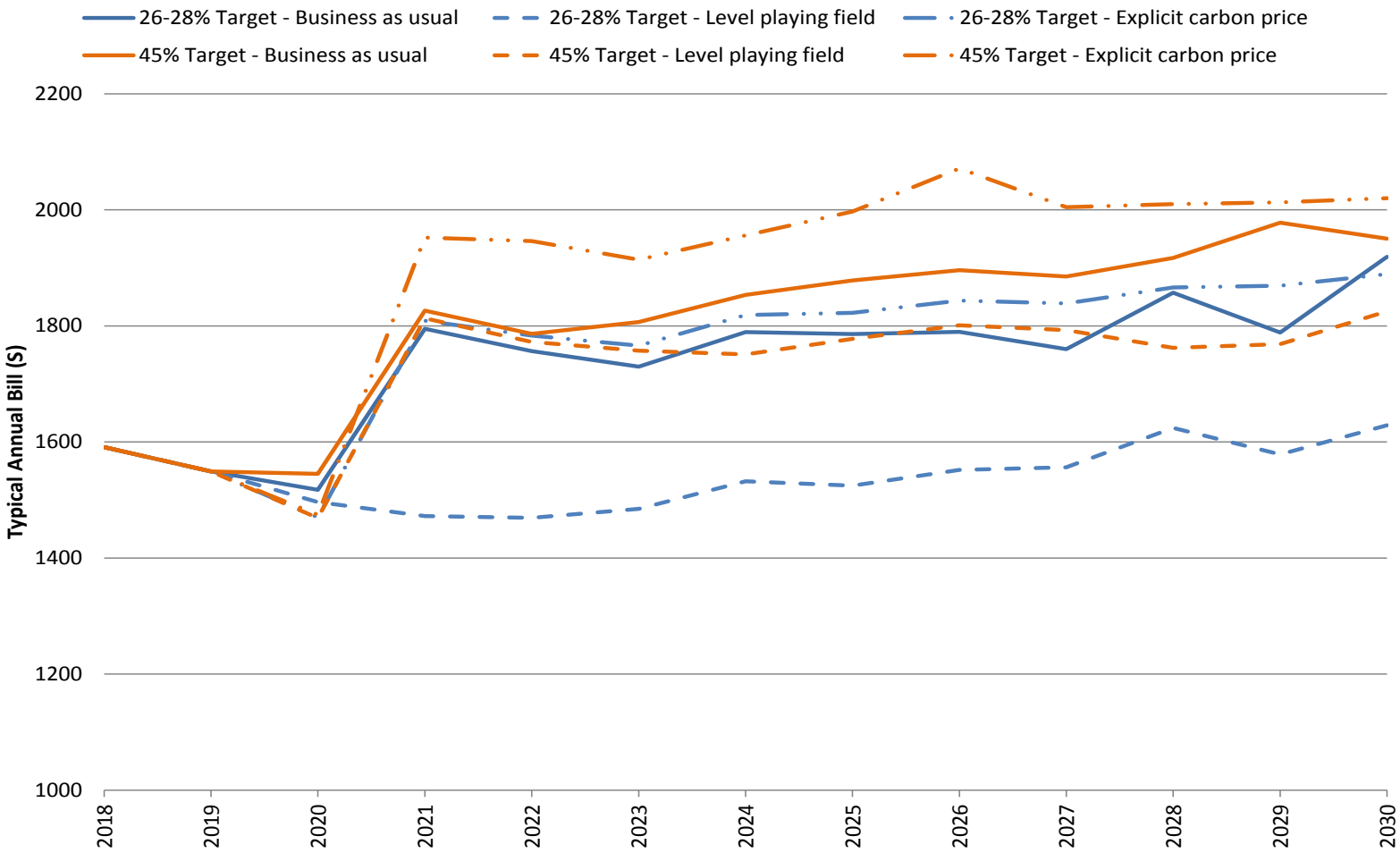
Key results: residential bills - electricity – $/annum



NOTE: In the explicit carbon price scenario, the bill outcomes does not reflect the final household financial outcome. No adjustment has been made for any offsetting household payment/relief which would be possible from scheme revenue.

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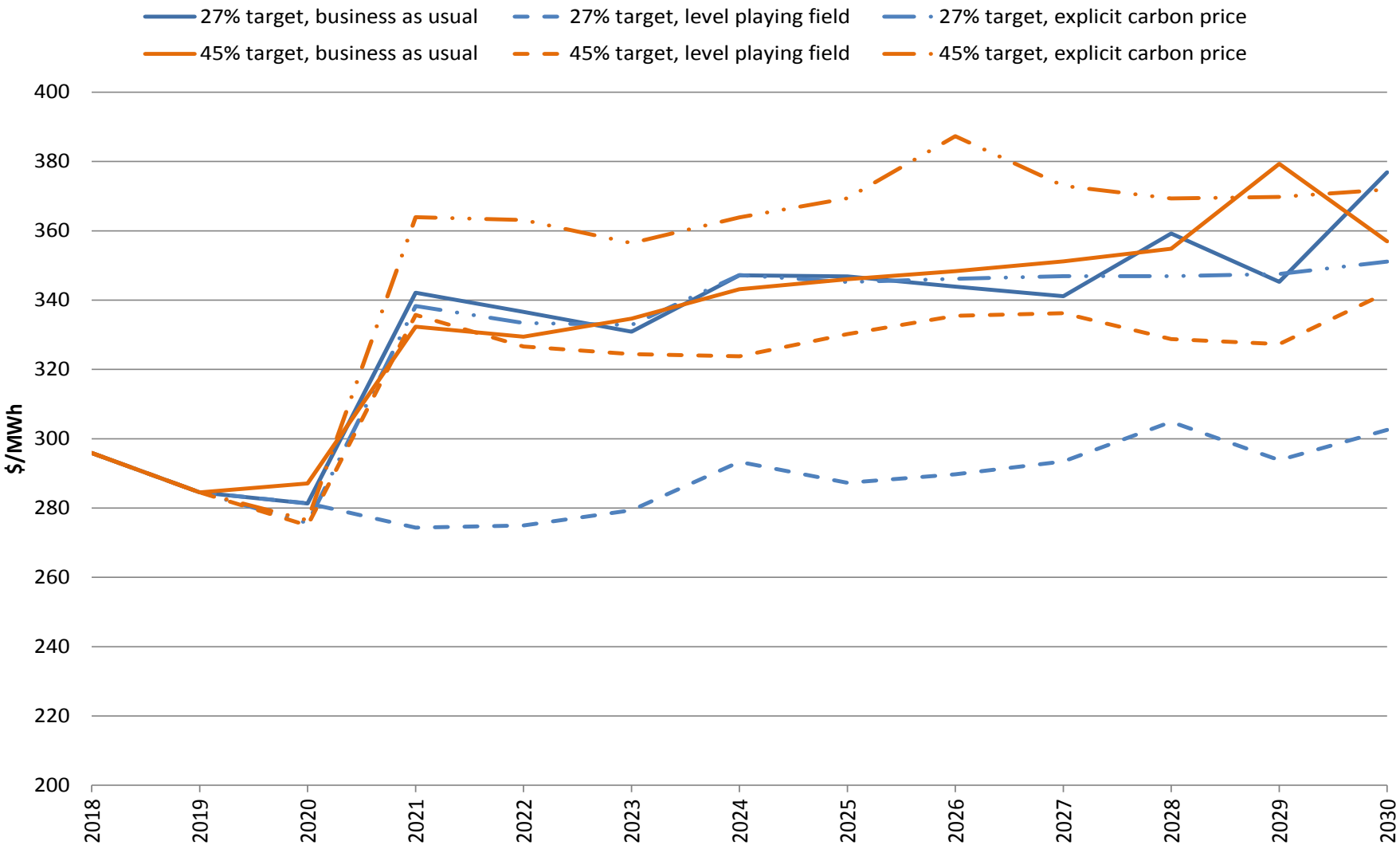
Key results: residential prices - electricity – $/MWh



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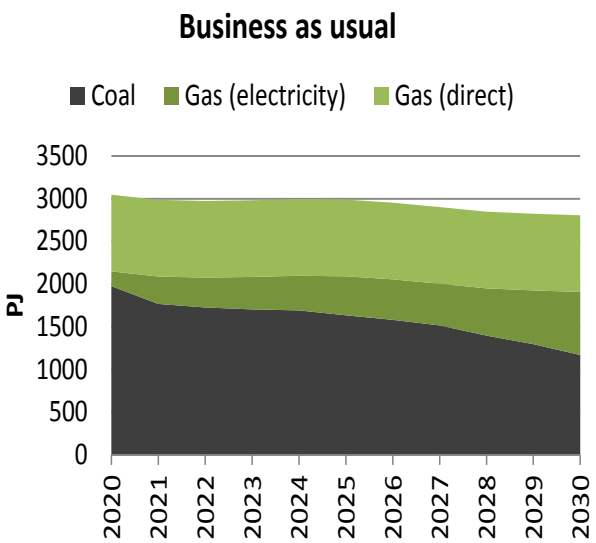
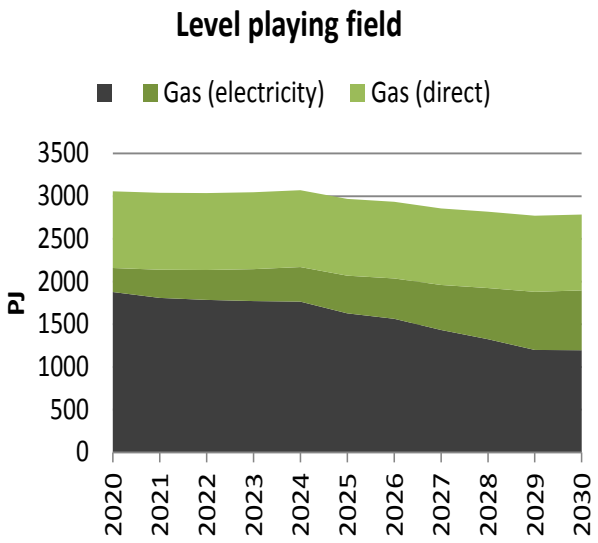
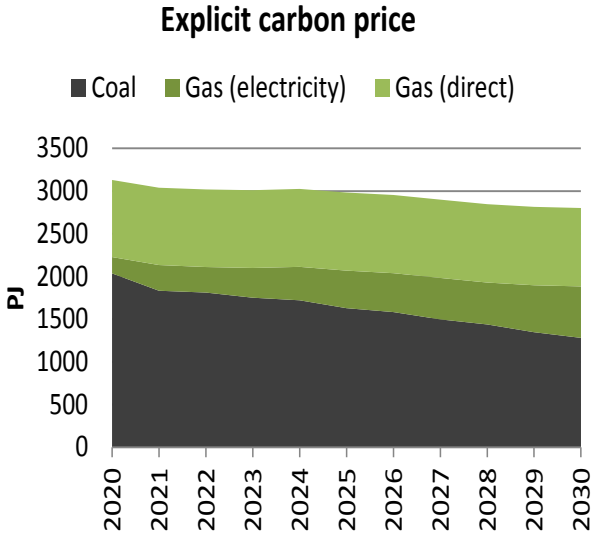
Key results: fuel usage – 26 to 28% target







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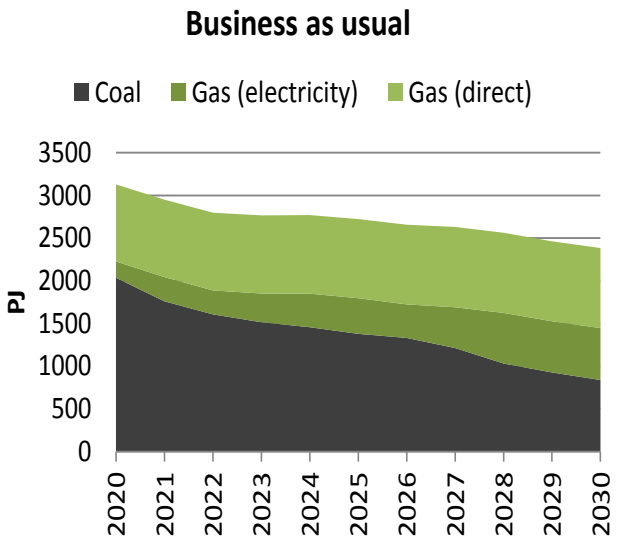
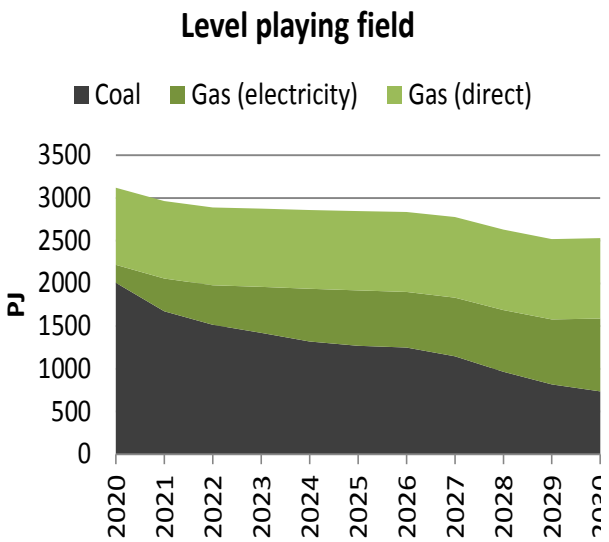
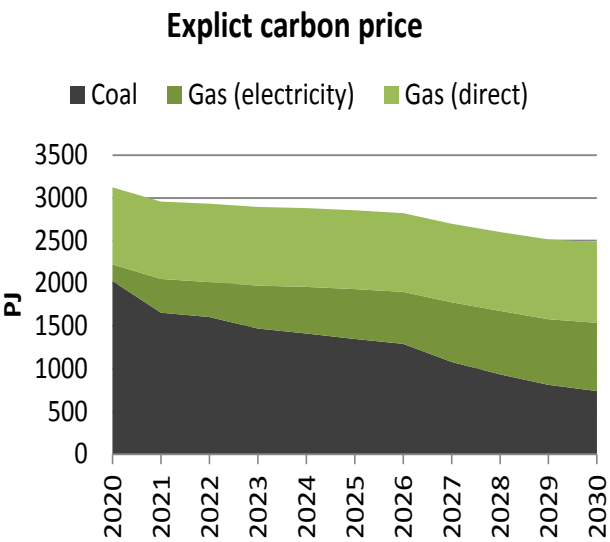
Key results: fuel usage – 45% target







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Limitations

- The energy mix will be affected by post 2030 targets.
- Potential industrial plant closures (and subsequent net reduction in energy demand) not included in modelling
- Abatement options for direct combustion sector limited to energy efficiency and fuel switching

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