Assessing options for HVDC cost allocation

TPAG Secretariat

29 June 2011

Overview

1. Possible market/regulatory failures or efficiency gains
2. Alternative options
3. Assessment of options (efficiency considerations) relative to SQ
4. Majority and minority conclusions

1. Market/regulatory failures or **efficiency gains**

Current arrangements	Possible inefficiencies
• SI grid-connected gencos • Allocated on peak (kW) generation (HAMI)	• From delaying new SI generation relative to NI • Competition effects between SI gencos • Inefficiencies from HAMI

‘Inefficiency’ from disincentive to invest in SI generation

Appendix D analysis

- Rank base load and renewable investments based on LRMC measure
- 2 scenarios: with and without HVDC charge
- Economic cost calculated from the increase in NPV between 2 scenarios

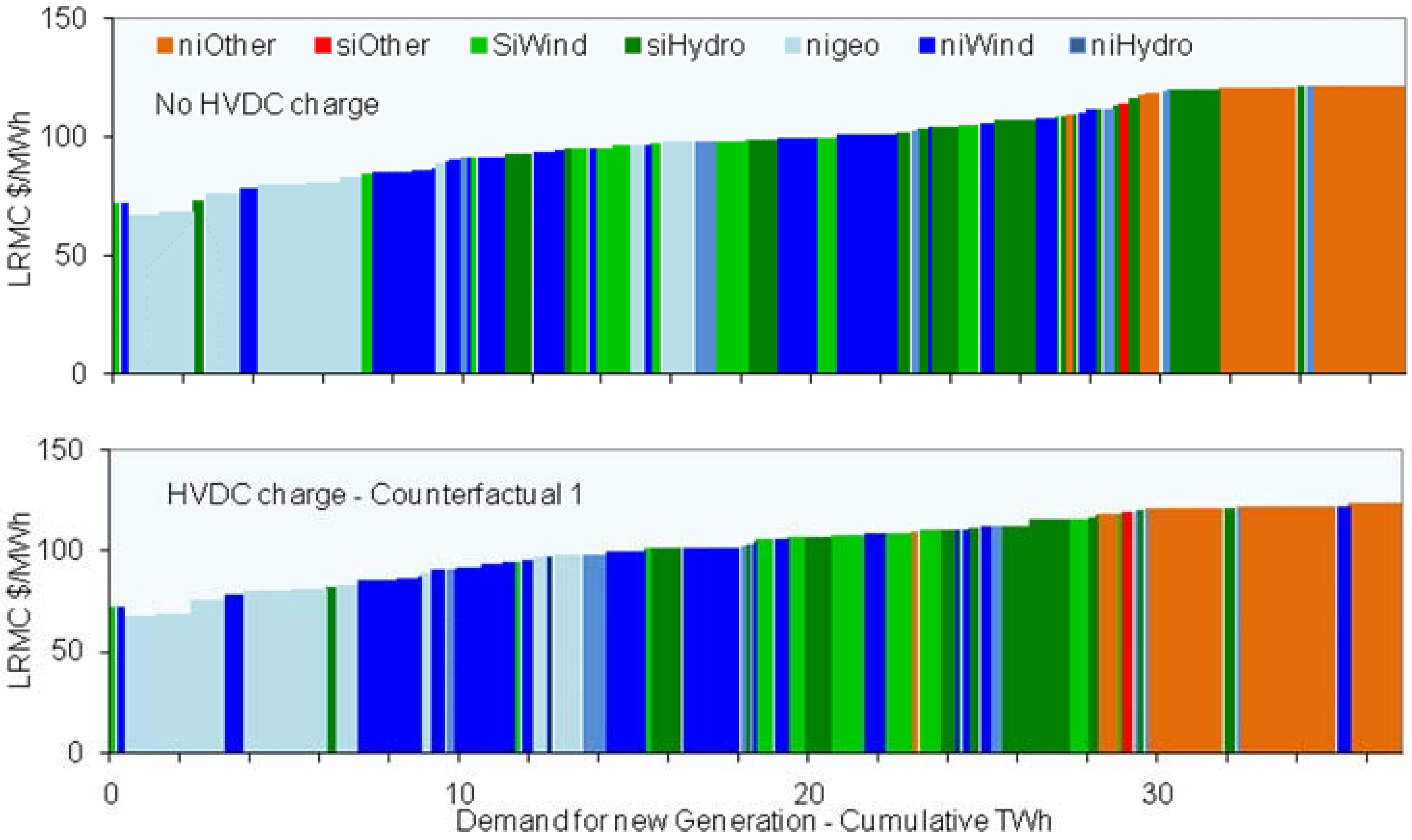
Scenarios, sensitivities and assumptions

To take account of:	
'Different future states of the world'	Standard scenario approach Based on SOO scenarios with some amendments, and SOO project list
Cost variations for projects	Randomly sampling project costs Sensitivity analysis •Exchange rates •Fuel costs
Uncertainty over who gets rentals	Scenarios where SI gens receive and do not receive rentals
Expectations of higher NI investment	Common assumptions: significant cheap NI geothermal, 2x as much NI wind as SI

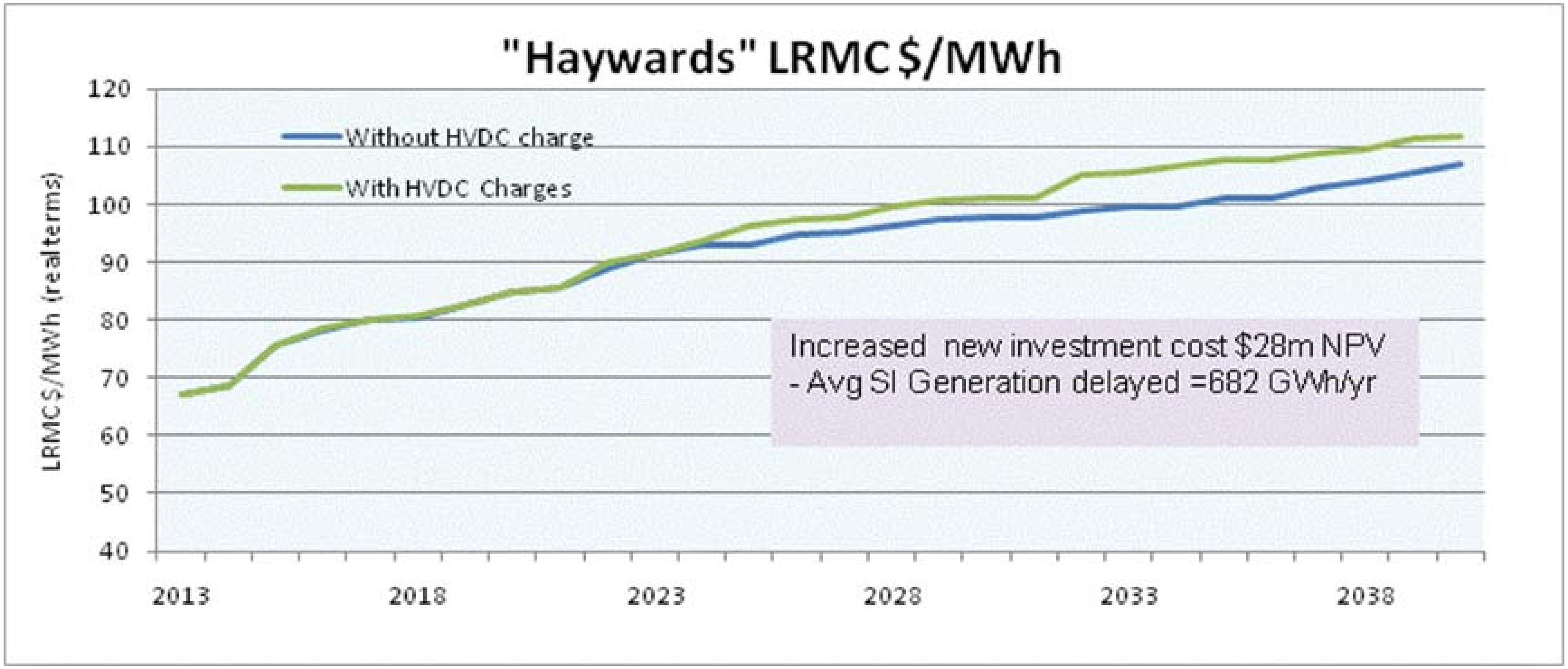
Summary results

– HVDC rentals	– Net HVDC cost	– Economic cost (NPV $m)
• **SI generators continue to get HVDC rentals**	• $35/kW/yr	• $14-51m (average $31m)
• **SI generators don’t get HVDC rentals**	• $40/kW/yr	• $19-64m (average $38m)

Illustrative merit order



Impact on LRMC curve



Competition effects between SI gens

- Total HVDC costs fixed
- New investment in SI grid-connected gen reallocates total costs
  - Different incremental HVDC charges for incumbent generators and new entrants
  - Large incumbent has substantially smaller effective HVDC cost for new investment

BUT depends on what other investments would be displaced

The different counterfactuals

	Description	Meridian's net incremental cost from HVDC charge
Counterfactual 1	Meridian assumes displaces a competitor investment in the SI.	**$35/kW/yr**
Counterfactual 3	Meridian assumes it will displace a NI investment.	**$11/kW/yr** **(100%-70%)*35**
Counterfactual 2	In practice, Meridian will be uncertain about the outcomes and the effective HVDC cost will likely lie between Counterfactual 1 and Counterfactual 3.	**$23/kW/yr**

Peak allocation (HAMI) ‘inefficiencies’

- HAMI allocation may provide incentives to:
  - withhold offers of short-term capacity
  - mothball or retire existing capacity
  - Invest in additional peaking capacity
  - bias new SI gen towards energy rather than peak

HVDC Rentals	Net HVDC cost	Withholding existing peaking capacity	Peaking investment inefficiency (200MW)
		Economic Cost (NPV $m)	
SI generators continue to get HVDC rentals	$35/kW/yr	$0 to $10m	$0 to $37m
SI generators do not get HVDC rentals	$40/kW/yr	$0 to $11m	$0 to $42m

Summarising possible inefficiencies (CAP2)

TPAG members agreed there was sufficient evidence to warrant further analysis of alternatives

2: Alternative options assessed

Options	Detail
Status Quo	
HVDC capacity rights	Introduce market for HVDC capacity rights
MWh	Charge on SI gens, based on MWh
‘Incentive free’	Allocation to existing grid-connected SI Gens that does not influence behaviour
Postage stamp	Costs spread over offtake in the same manner as interconnection
Postage stamp transition	Postage stamp with a transitional ‘incentive free’ arrangement

3: Assessment of options

Efficiency considerations	One line summary (where poss)
1. Beneficiary pays	
2. Locational price signalling	Linked to unintended efficiency impacts
3. Unintended efficiency impacts	
4. Competitive neutrality	Linked to unintended efficiency impacts Postage stamp transition reduces competitive issue arising from FTRs
5. Implementation, operating costs	≈ \$1m to 2m most options ≈ \$20m to \$40m capacity rights
6. Good regulatory practice	

Beneficiary pays

Identifying HVDC beneficiaries and value

- Regulated approach
  - Beneficiaries vary over time and circumstance
  - Benefits depend on direction and magnitude of flow, prices
  - Requires subjective and debateable judgements
- Using capacity-rights

Possible efficiency gains from charging beneficiaries

- Improved investment decision-making
  - Depend on how robust investment decision-making is
  - Depend on incentives and capabilities of beneficiaries
  - Examples suggested *possible* gains of $10m NPV if beneficiaries can be identified, but risk of worse outcomes
- More durable pricing methodology – if beneficiaries are robustly identified.

Beneficiary pays: summary

- TPAG members made different judgements
- SI generators are one beneficiary group
- Varying views on whether SI generators are incentivised to provide better information to investment process.

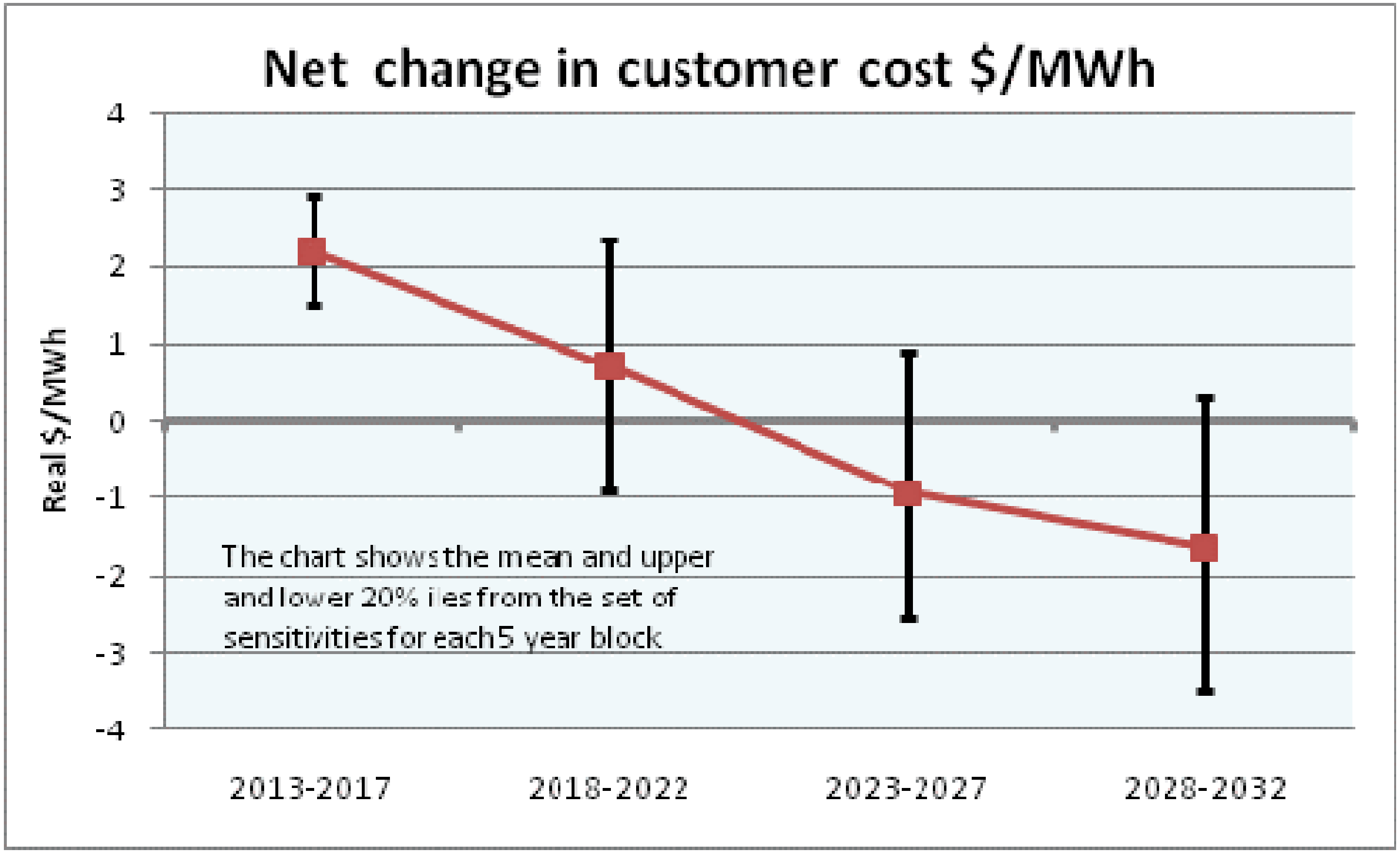
Unintended efficiency impacts

Efficiency impacts	Incentive-free Postage stamp Postage stamp transition	MWh option
Generation investment	Avoid inefficiencies ($14m to $51m)	Reduces inefficiencies ($9m to $33m)
Peaker investment	Avoid inefficiencies ($0m to $37m)	Avoid inefficiencies ($0m to $37m)
Dispatch	Avoid inefficiencies ($0m to $10m)	Avoid inefficiencies ($0m to $10m)
Allocative inefficiency from increased prices	($0m – incentive-free to $2m – full postage stamp)	$0m

Good regulatory practice

	Key distinguishing points
Consistency btw regs	
Durability	
Consistency over time	Postage stamp, transition, capacity rights all sig changes
Consistency over grid	Postage stamp, transition option more consistent
Wealth transfers/ step price changes	Postage stamp creates sig. wealth transfers and step price changes
Market fit	

Price step changes (postage stamp)



HVDC conclusions: minority view (CAP2)

- There is no clear and material efficiency gain that justifies a change from the status quo:
    - Cheaper SI generation may not be brought forward
    - Investment decisions are complex and other factors may predominate

HVDC conclusions: majority view (CAP2)

- There is a clear and material efficiency gain that justifies a change.
  - Gains lie within the range $11m to $96m (before costs)
  - The analysis takes into account a number of conservative assumptions
  - Charging SI generators for the HVDC is not likely to yeild gains through improved investment decision-making

HVDC conclusions: majority (CAP3)

- **Highest efficiency gains:** postage stamp and postage stamp transition
- **Postage stamp** involves significant transfer of value to SI generators from customers (offset by future efficiency gains)
- **Capacity rights** benefits are uncertain, with more substantial costs.

Summary

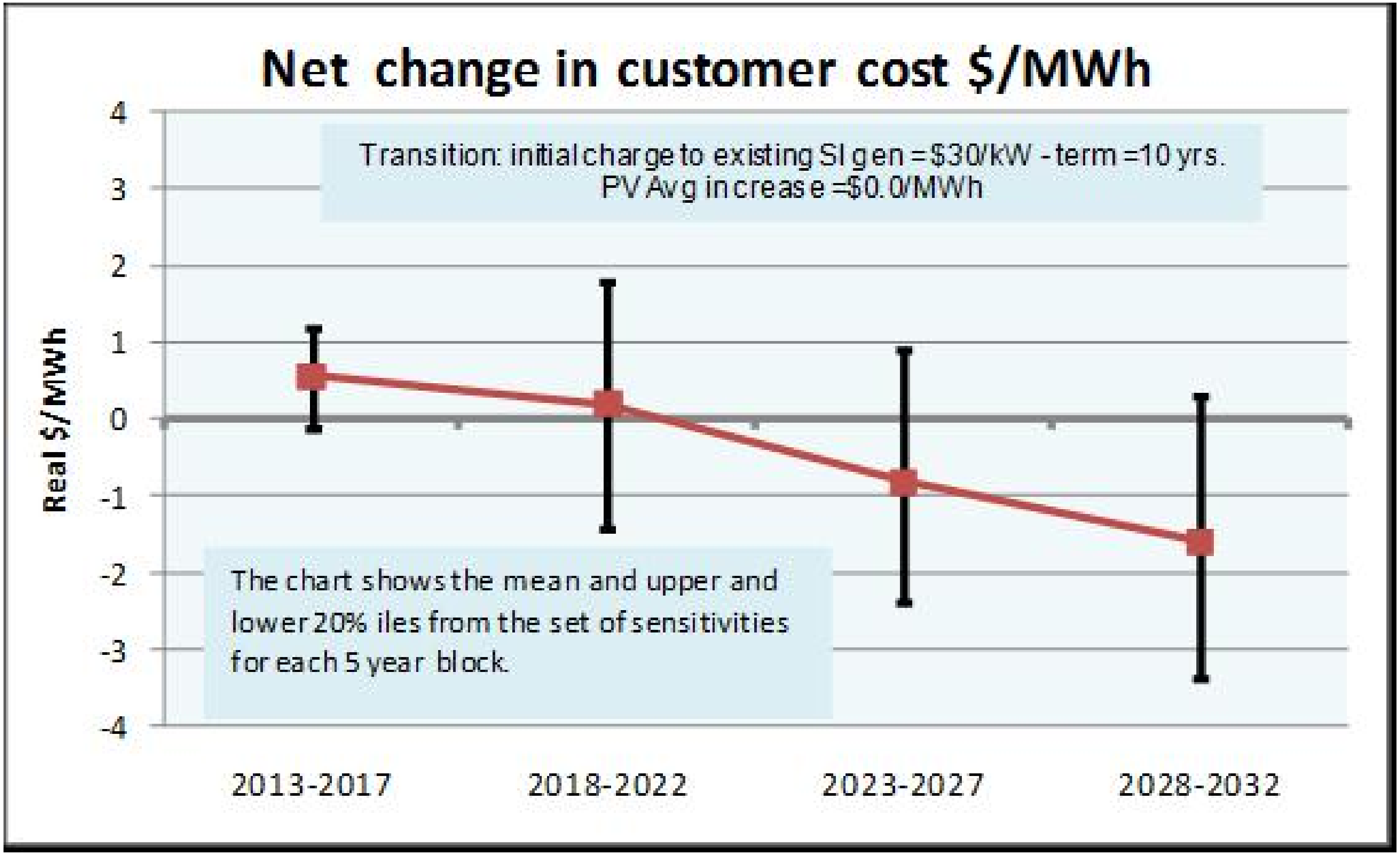
Efficiency consideration	MWh allocation	Postage stamp		Capacity rights options
		Full	Transition	
3 Unintended efficiency impacts				
1. Generation investment	+$10 to $12m	+$14 to+$51m	+$14 to +$51m	?
2. Peaker investment	+ $0 to +$37m	+$0 to +$37m	+$0 to +$37m	?
3. Dispatch efficiency	-$5 to +$9m	+$0 to +$10m	+$0 to +$10m	X
4. Allocative efficiency	Same	-$2 to -$1m	-$1 to -$0.1m	?
5 Implementation & on-going costs	-$1m	-$1m	-$2m	-$20-40m?
Quantified benefit (NPV 30yr)	**+$4** to **+$57m**	**+$11 to+$96m**	**+$11 to +$96m**	**?**
1 Beneficiary pays	same	*?*	*?*	✓
2 Locational Pricing	✓	✓	✓	?
4 Competitive neutrality	same	✓✓	✓✓	✓X
6 Good Regulatory Practice				
1. Consistency btw regulators	same	same	same	*?*
2. Durability	*?*	*?*	*? ✓*	*?*
3. Consistency over time	same	*XX*	*X*	*?*
4. Consistency over grid	same	✓	✓	*X?*
5. Wealth transfers	minor	*small*	*none*	*?*
6. Price step changes	none	*moderate*	*none-low*	*?*
7. Market fit	same	✓	✓	*X*

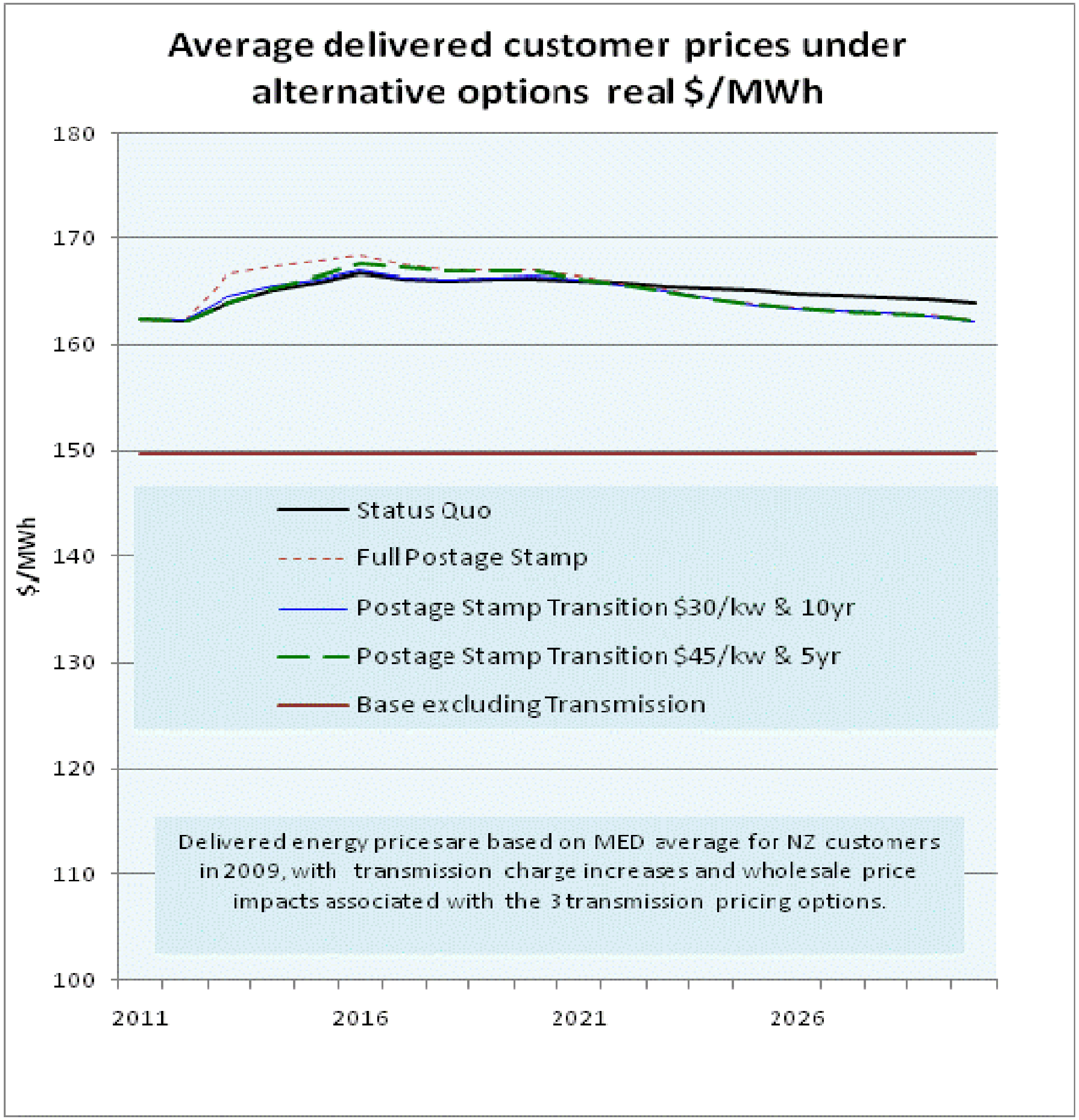
Majority view: postage stamp transition

- Key parameters:
  - Initial charge to existing SI gens
  - Length of transition period
- Majority view:
  - Avoid step changes in prices
  - Base transition costs on existing HVDC assets
  - Transition long enough for efficiency benefits to present, without making ‘incentive-free’ charge unworkable
  - All rentals to offtake

Transition Settings			Present Value Average Price Impact			
Initial charge to existing SI Gens	Transition length	Initial price increase to customers	Transmission Price increase	Value of HVDC rentals	Mean wholesale price reduction	Mean net price increase
$/kW/yr	Years	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh
$0	0	$3.5	$2.8	-$0.4	-$1.5	$0.9
$23	5	$1.8	$2.4	-$0.4	-$1.5	$0.5
$23	10	$1.8	$2.1	-$0.4	-$1.5	$0.2
$23	15	$1.8	$1.9	-$0.4	-$1.5	$0.0
$30	5	$1.2	$2.2	-$0.4	-$1.5	$0.3
$30	10	$1.2	$1.9	-$0.4	-$1.5	$0.0
$30	15	$1.2	$1.6	-$0.4	-$1.5	-$0.3
$45	5	$0.1	$1.9	-$0.4	-$1.5	$0.0
$45	10	$0.1	$1.4	-$0.4	-$1.5	-$0.5
$45	15	$0.1	$1.0	-$0.4	-$1.5	-$0.9

Impact of transition option




Average delivered customer prices under alternative options real $/MWh
$/MWh
180
170
160
150
140
130
120
110
100
2011
2016
2021
2026
Status Quo
Full Postage Stamp
Postage Stamp Transition $30/kw & 10yr
Postage Stamp Transition $45/kw & 5yr
Base excluding Transmission
Delivered energy prices are based on MED average for NZ customers in 2009, with transmission charge increases and wholesale price impacts associated with the 3 transmission pricing options.