How Not to Design an Emissions Trading Scheme

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13 November 2009

Outline

- Ten lectures in one slide
- Theory of emissions trading: the ideal-world textbook story (but only if you have a good textbook)
- Fitting NZ numbers to the textbook story
- *Realpolitik* sinks the textbook: the NZ ETS
- Outcomes for CP1
- Outlook beyond CP1: another time….

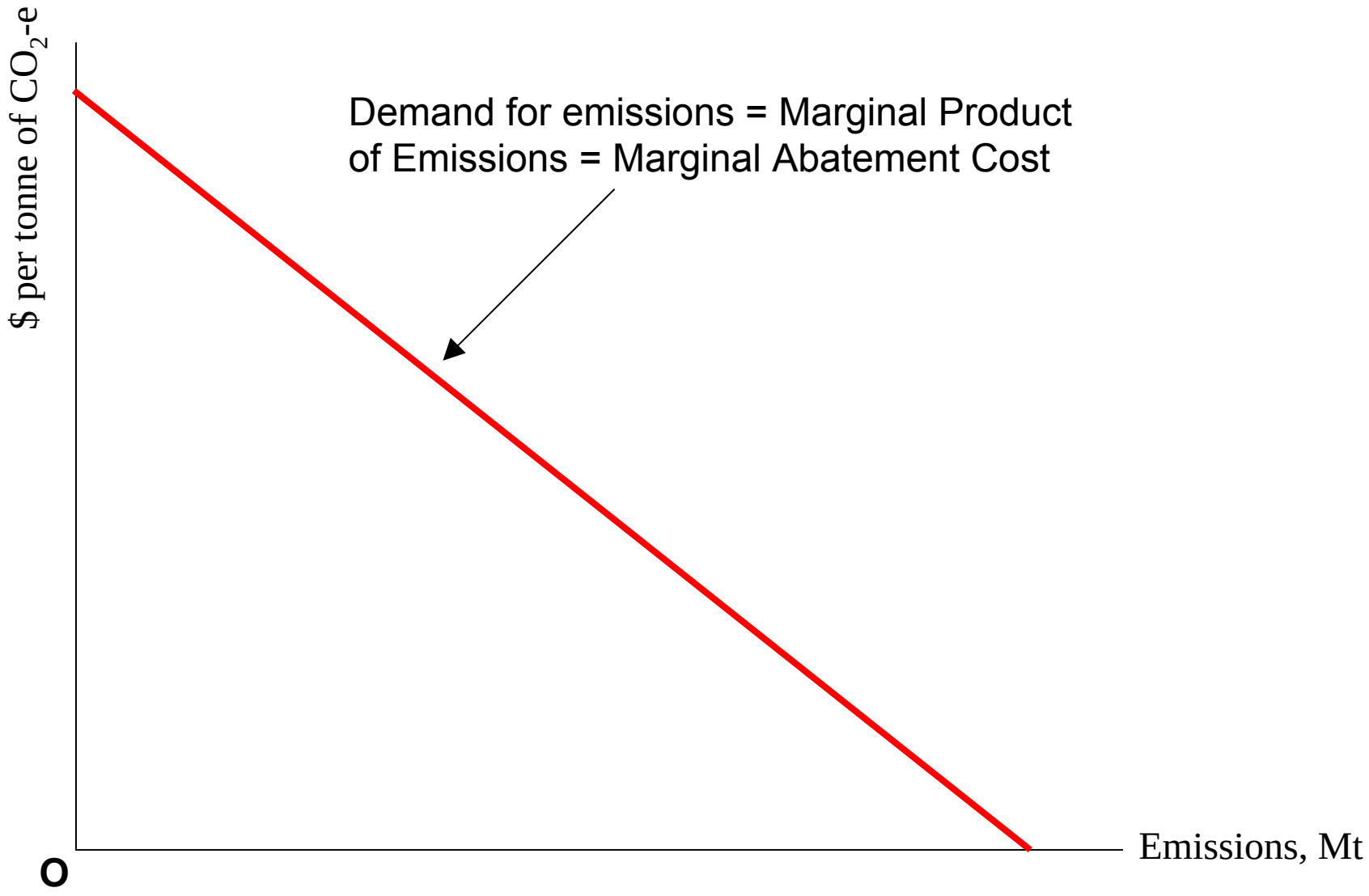
Ten lectures in one slide: how not to design an ETS, and lessons from NZ

- **Start from a false dichotomy between carbon tax and cap-and-trade.**
- **Make the scheme complicated, not simple.**
- **Block the market mechanism from its function as a means of sniffing out, rewarding and promoting technological innovation, emissions reduction and energy efficiency.**
- **Embrace the market mechanism as a means to transfer wealth from poor to rich, from weak to powerful, from unorganised citizens in general to well-organised polluters. Greenwash the process as necessary to save the planet, or at least to "meet international obligations".**
- **Identify your biggest carbon-sinking sector (forestry) and expose it to as much regulatory uncertainty and expropriation risk as possible.**
- **Identify the sector where your headline opportunities for emission reductions lie (pastoral agriculture) and exempt it from all obligations for a decade or so.**
- **Assert repeatedly that the outcome is fair and efficient. Ignore critics who say it is neither.**
- **Move fiscal consequences off balance sheet and out of public view**
- **Hand out subsidies on a basis that leaves the economy vulnerable to imposition of anti-dumping tariffs by trading partners.**
- **Treat future taxpayers in the same way as you treat the environment – as a temporarily defenceless target to be plundered for the benefit of the present generation, or at least today's political insiders.**

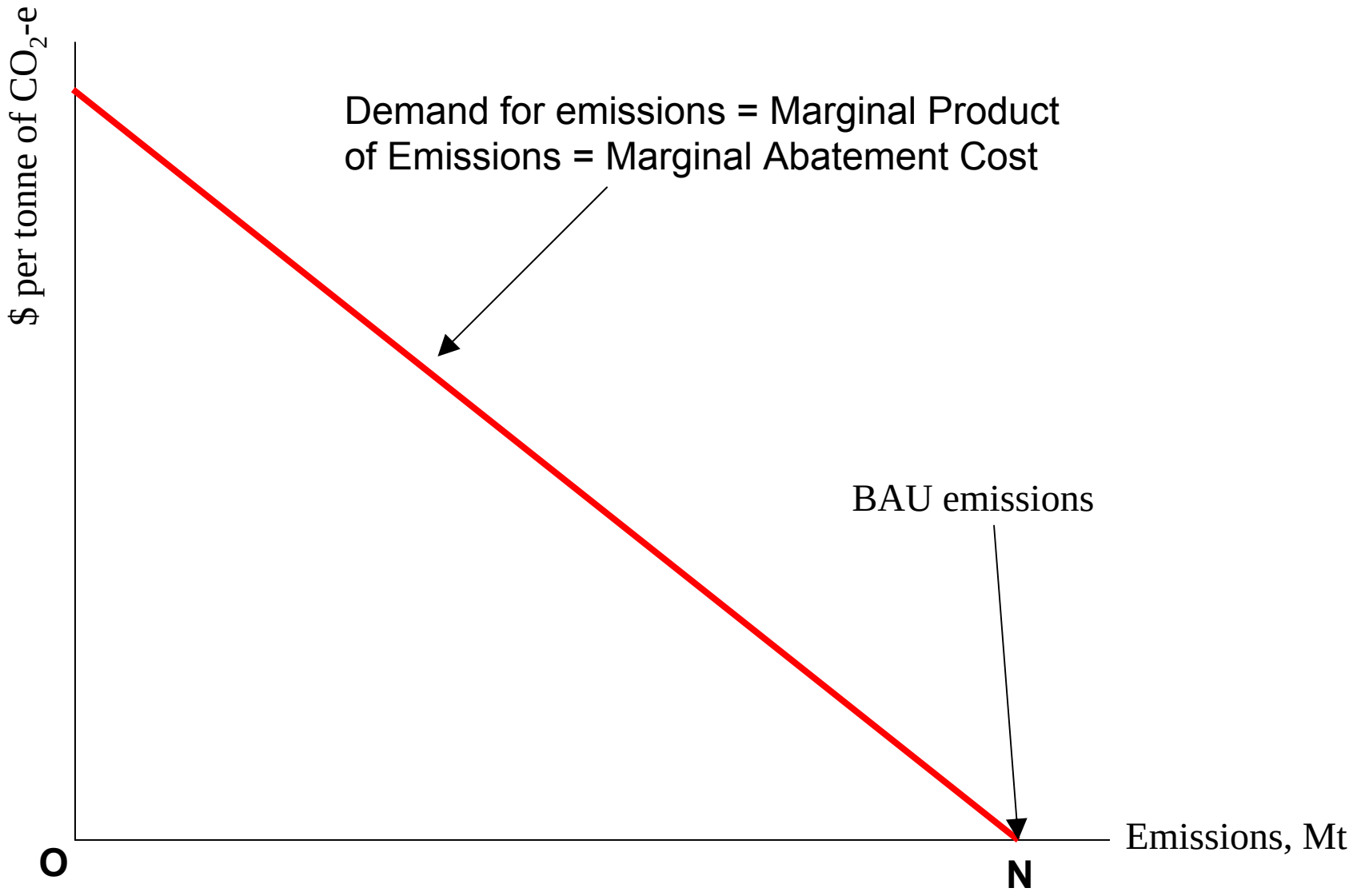
LESSONS FROM NEW ZEALAND: Avoid the above.

Theory of emissions trading: the ideal-world textbook story (but only if you have a good textbook)

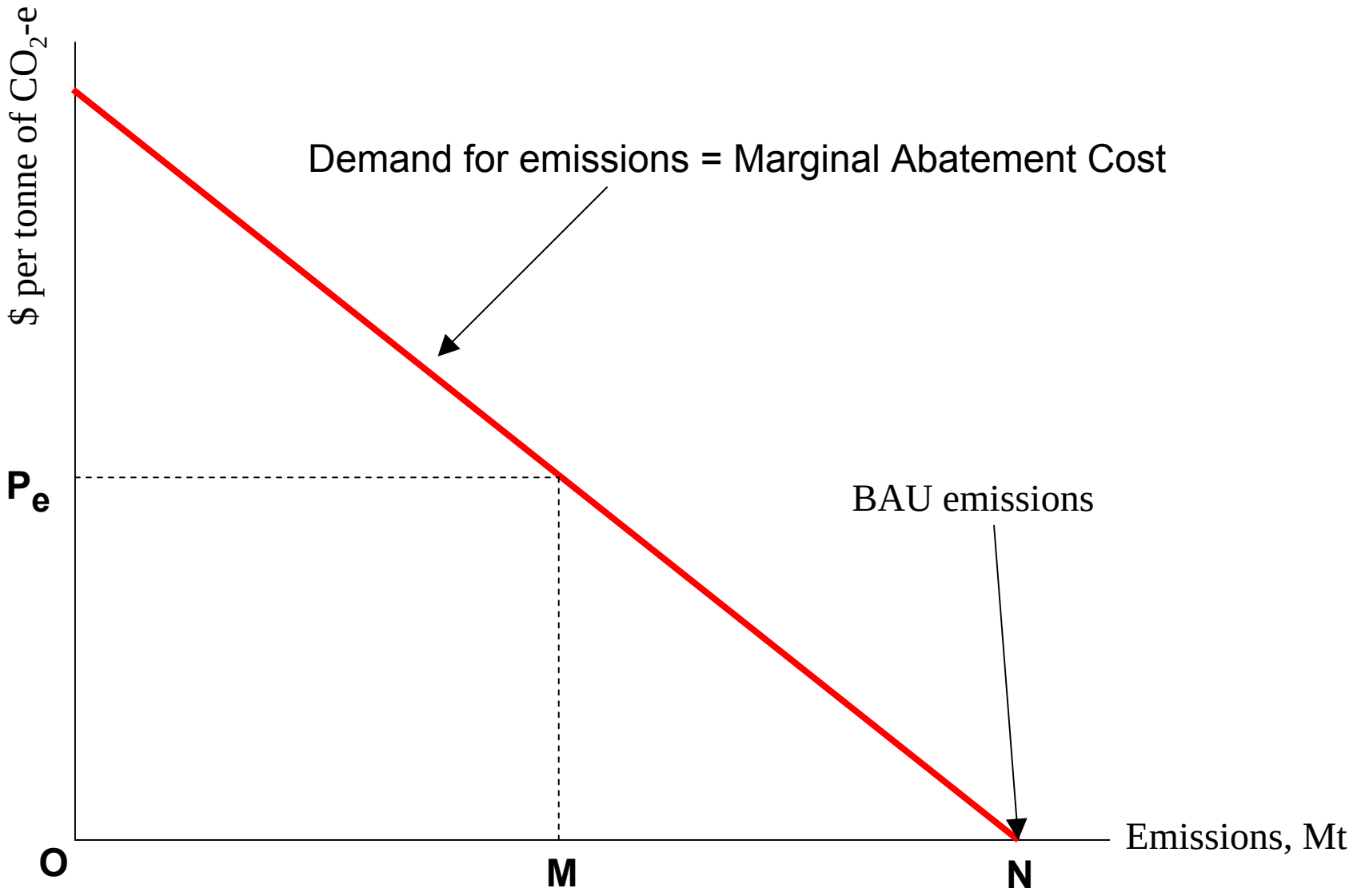
The “carbon market”



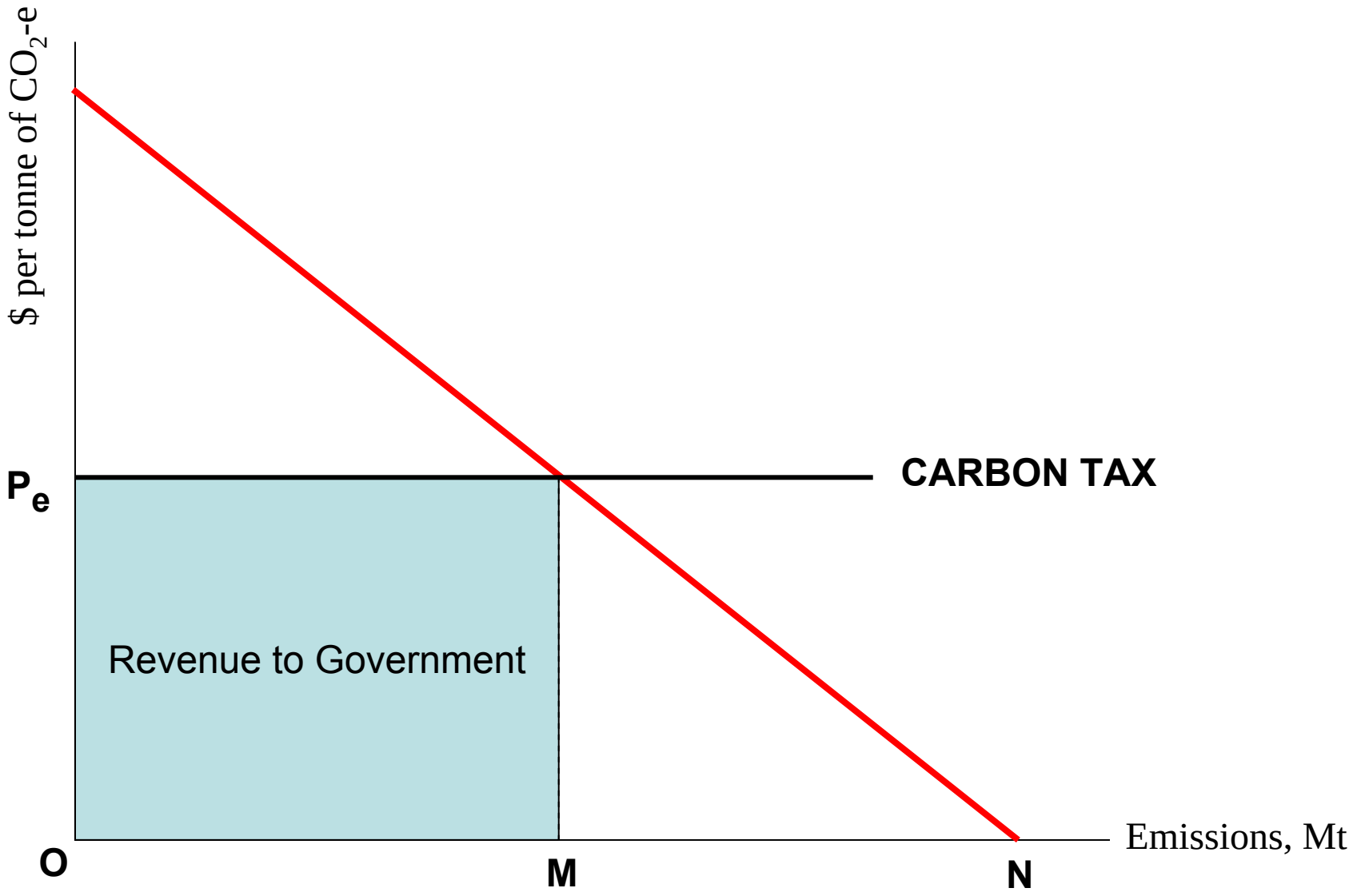
With emissions unpriced, the economy emits ON



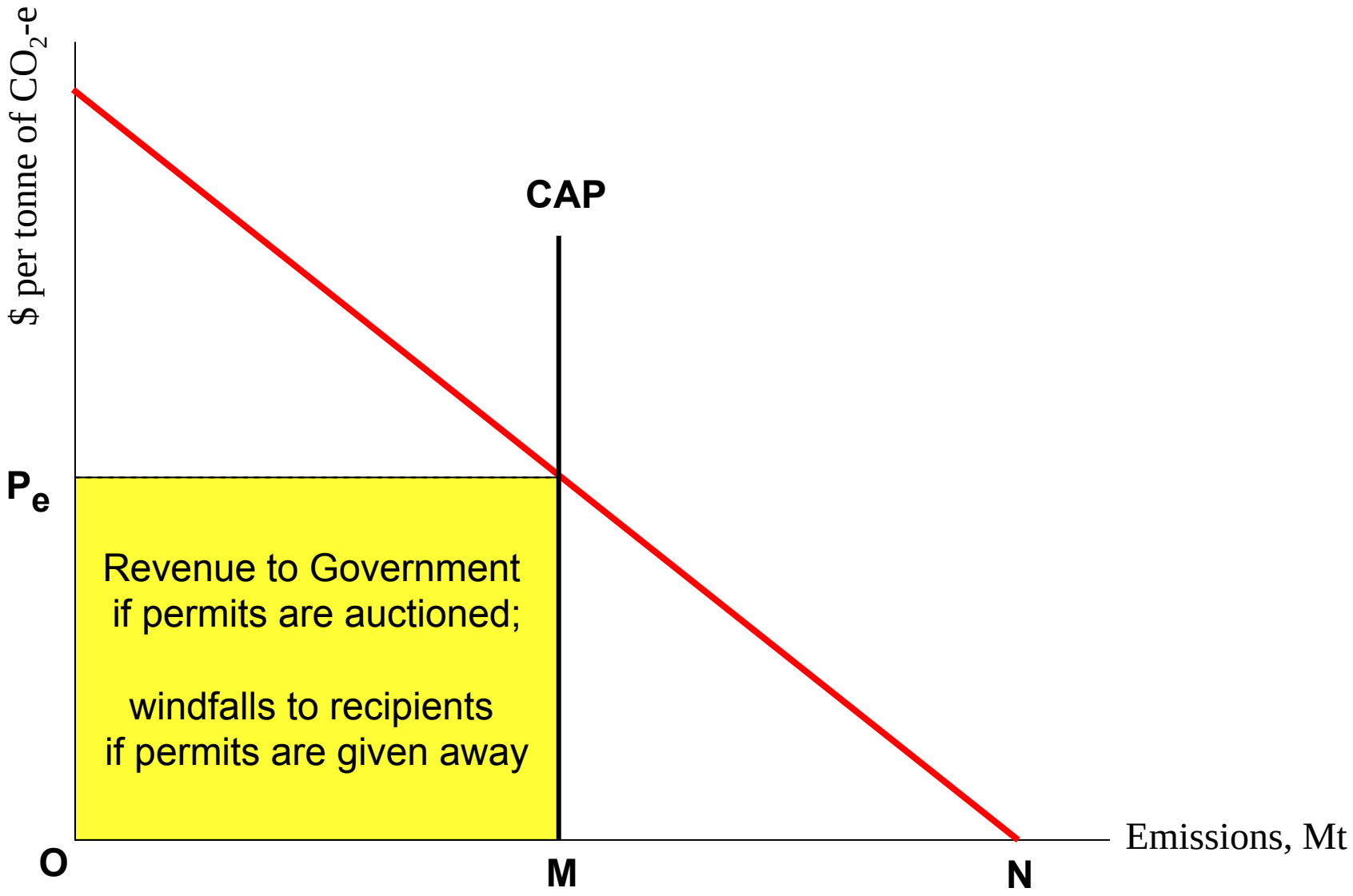
If the price of emissions rises to P_e then the quantity falls to OM and the emissions reduction ("abatement" or "mitigation") is MN



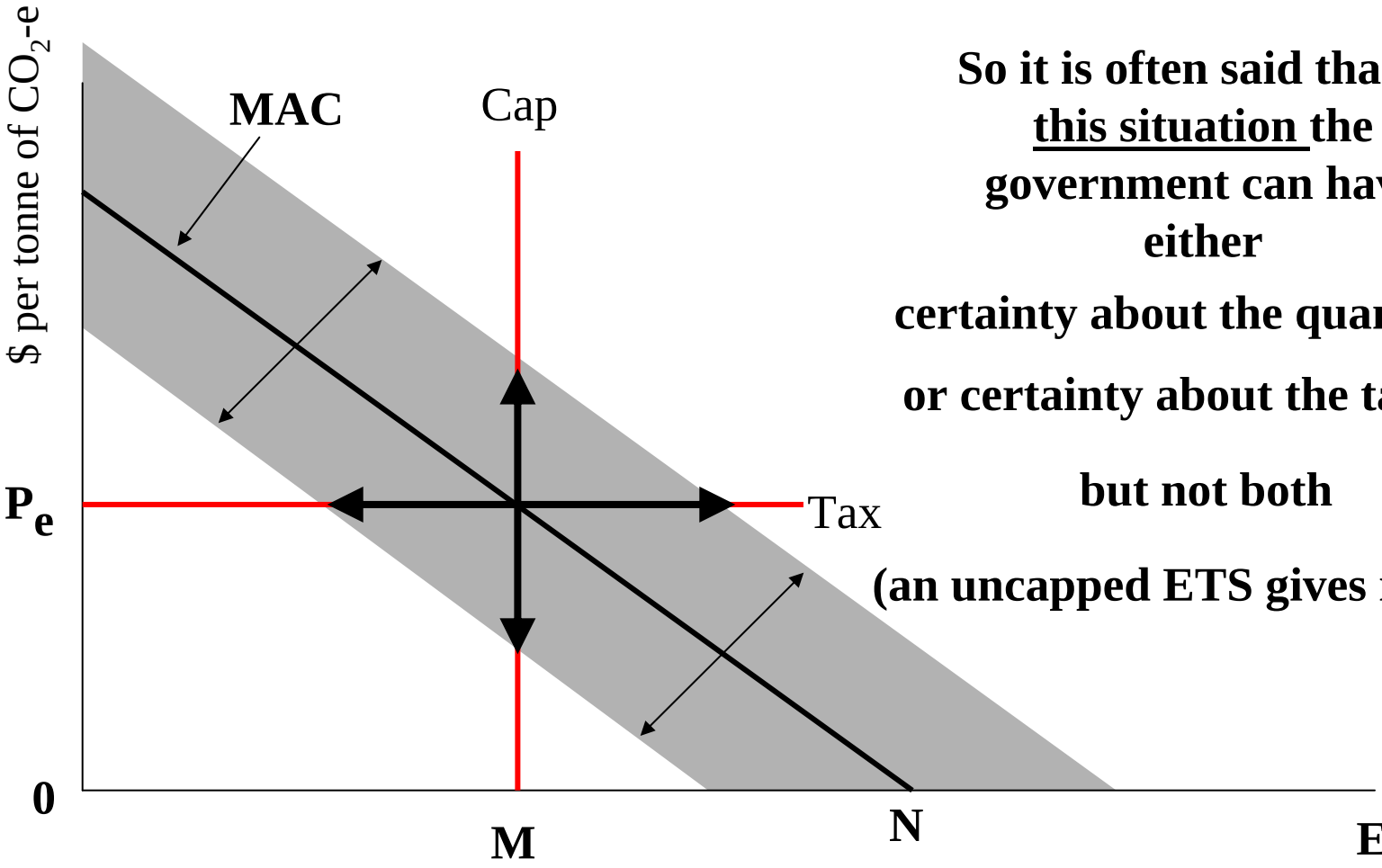
One way of doing it: a carbon tax of P_e would lead to MN of abatement



Or the Government could impose a cap at M, issue permits, allow trading, and the carbon price would be bid up to P_e



In the real world, the MAC is uncertain and shifts about with technology shocks, sectoral restructuring, and so on



So it is often said that <u>in this situation</u> the government can have either

certainty about the quantity M

or certainty about the tax Pe

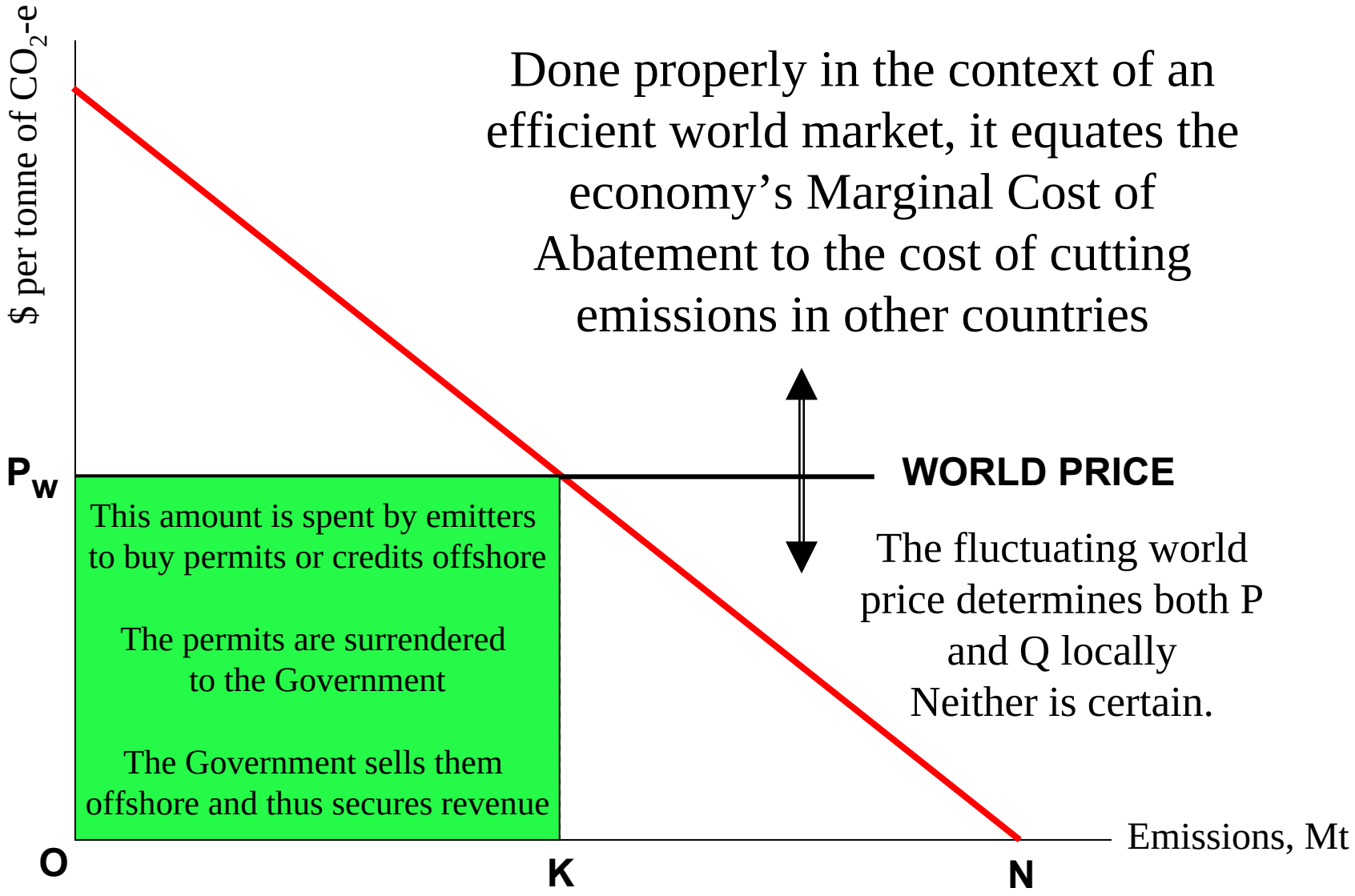
but not both

(an uncapped ETS gives neither)

Open-economy emissions trading, however, is neither of those two closed-economy stories

- The atmosphere is a global commons, not a national asset
- The climate-change problem is a global problem and there exists, in principle, a global carbon price reflecting the real value of atmospheric storage for GHG emission streams (flows into a stock)
- Recognising this, the Kyoto Protocol allowed countries to buy and sell carbon units from each other as a step towards equalising marginal abatement cost across countries, in pursuit of "first-best allocative efficiency"
- So there is a respectable case from mainstream neoclassical economics for uncapped emissions trading, so long as you believe either that the world market is efficient enough to deliver an equilibrium carbon price path that sustains the atmospheric commons

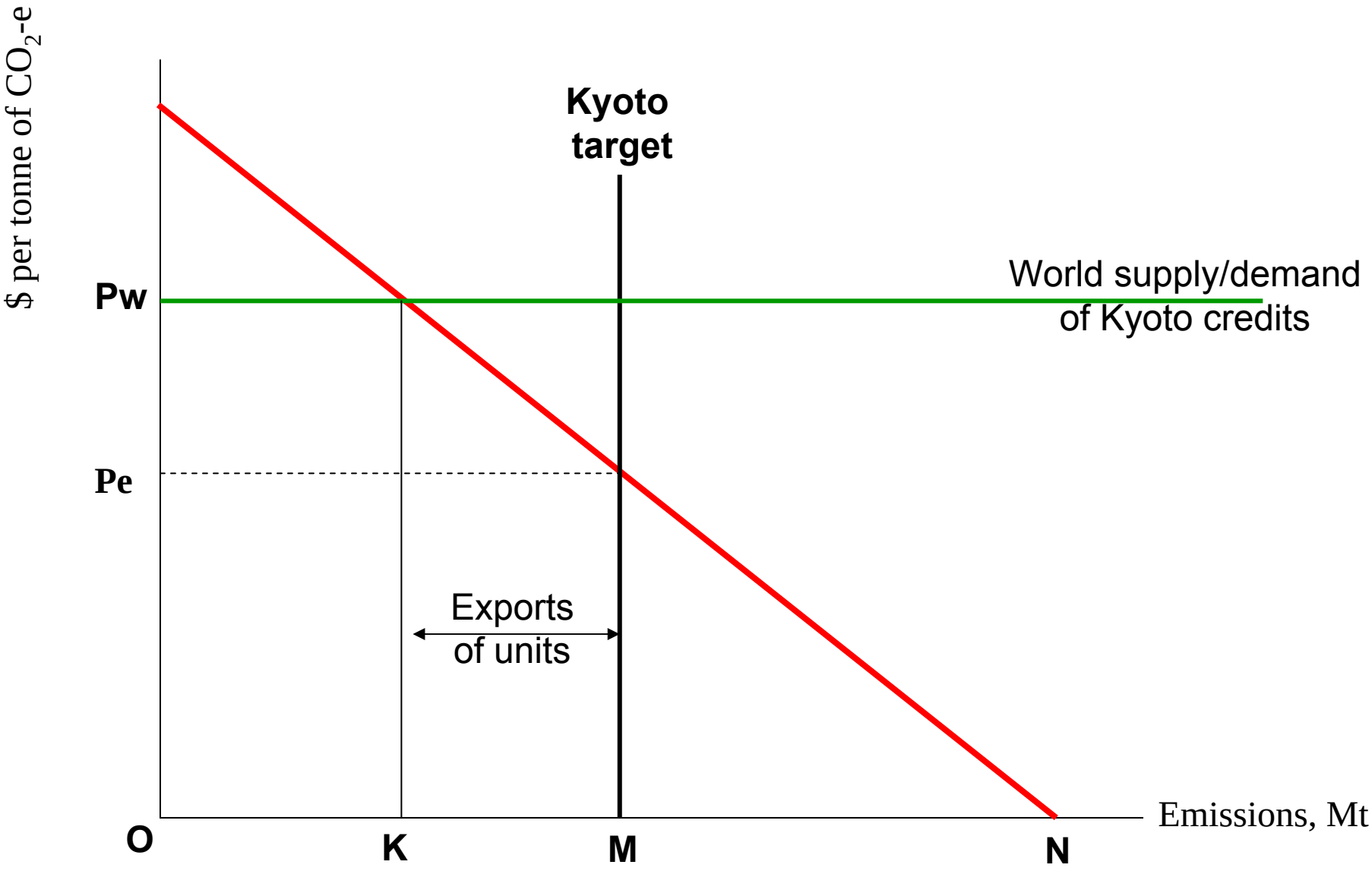
Uncapped emissions trading <u>in Kyoto instruments</u> is "like" a carbon tax – not like a cap-and-trade scheme



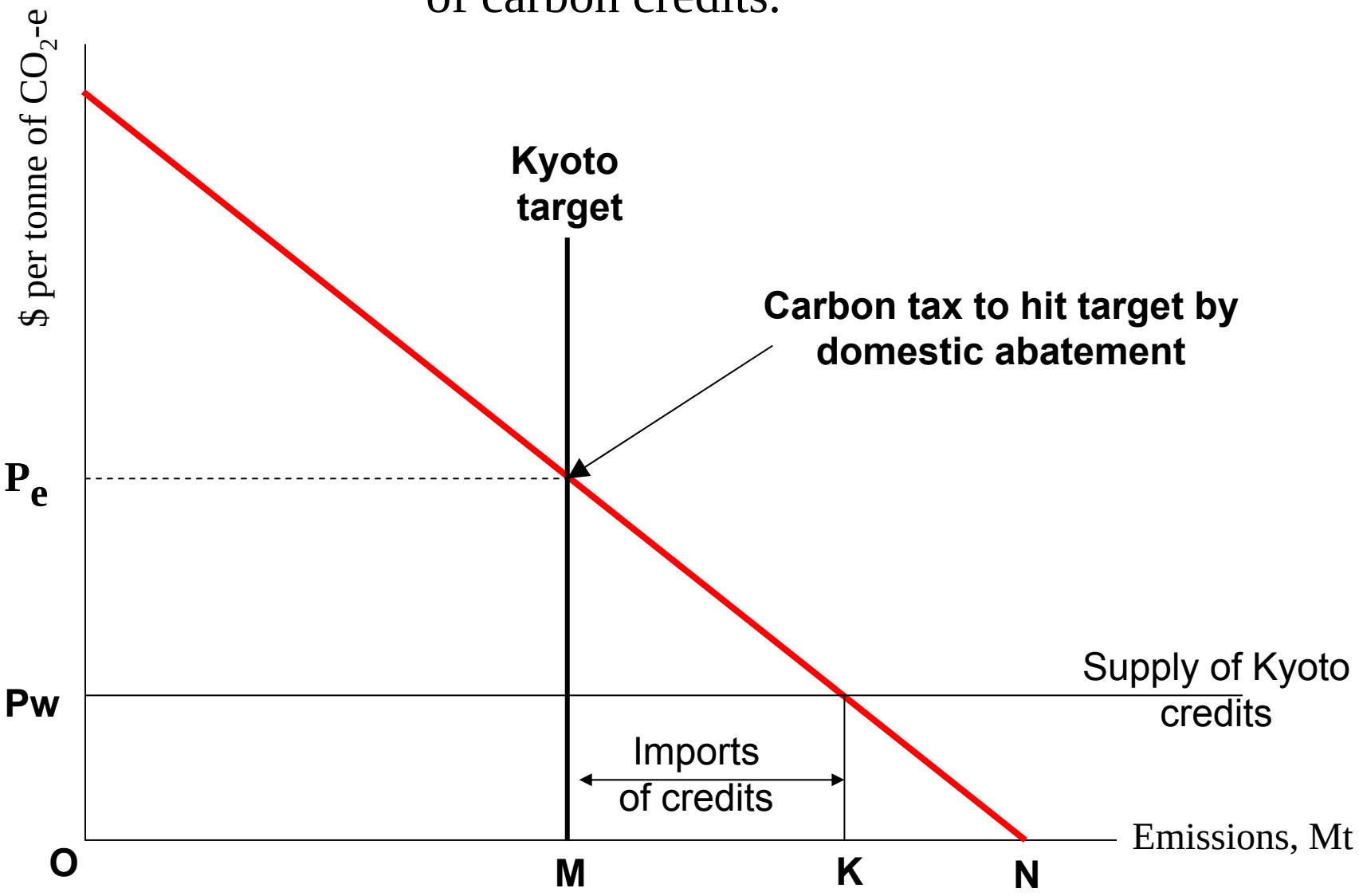
- Choosing between uncapped emissions trading and the closed-economy cap-and-trade/carbon tax options is partly a matter of where the world price is.

- There are two cases: Pw>Pe, and Pw<Pe, where Pe is the carbon-tax or permit price required to achieve the Kyoto or other) target by domestic abatement effort, and Pw is the price at which other countries' abatement credits can be purchased

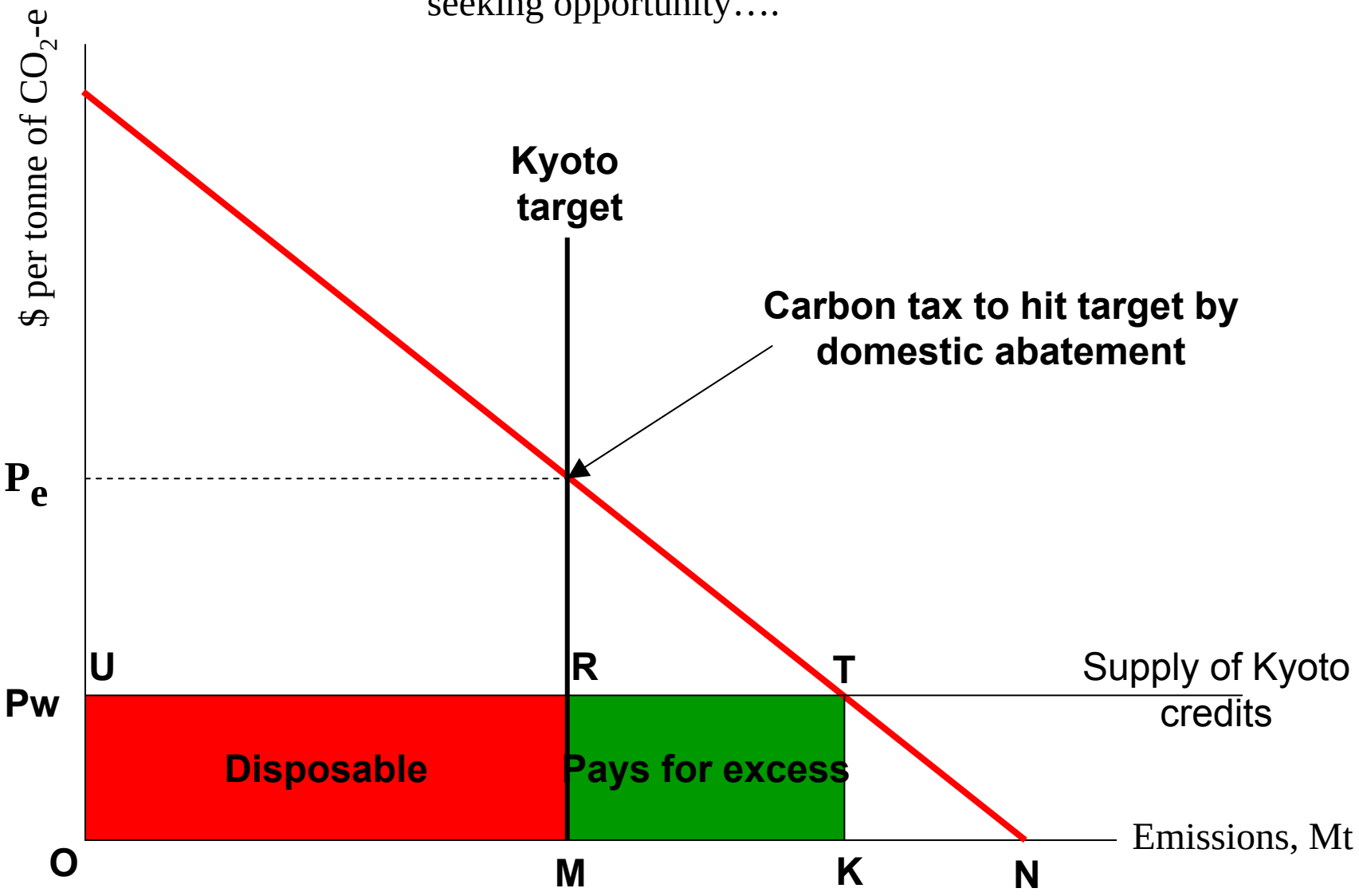
Case 1: Pw > Pe. Cheaper to meet the target by closed-economy policies; but optimal to abate to OK and export KM of carbon credits.



Case 2: Pw < Pe Closed-economy policy is more expensive than buying-in credits from offshore. Country abates to OR and imports MR of carbon credits.



Fiscal/revenue implications of Case 2 under Kyoto rules: the Government receives OKTU of surrendered credits, hands over MKTR to the UNFCCC to cover excess emissions, and has OMRU of disposable revenue (saleable credits) in hand. Lobbyists and politicians smell a rent-seeking opportunity….



Why not simply hand all those disposable units back to emitters to make them happier?

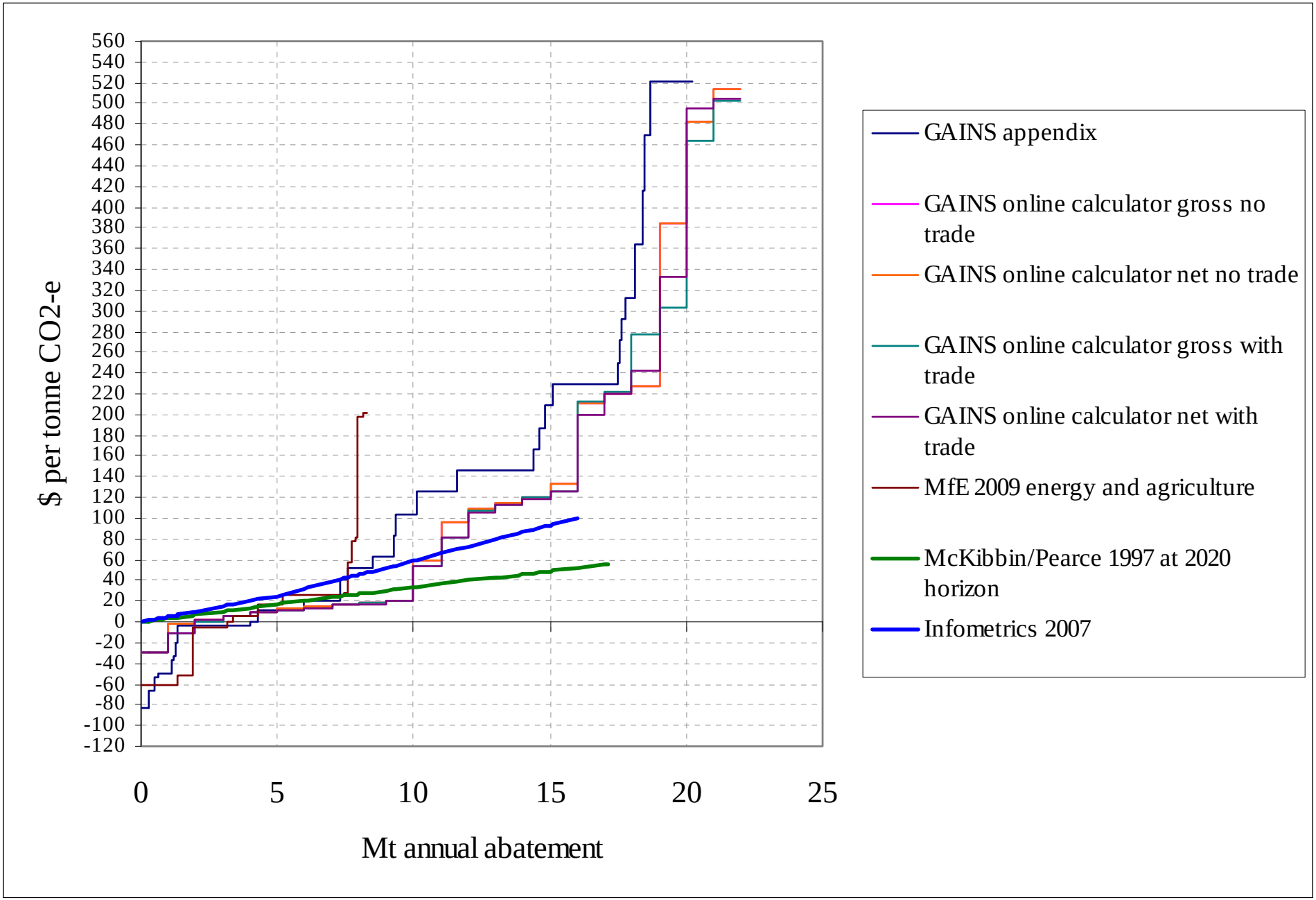
- Because
  - The cost of those units represents the real cost of using emissions as an input and the revenue is legitimate Pigouvian tax revenue [NOT a "taking!]
  - There are better things to do with the money - such as promoting renewables and R&D, and compensating low-income households for the costs of higher-priced electricity etc
  - In the long run the full price incentive for abatement has to bite if the MAC is to be shifted over time. Rebating of emission units blocks the market mechanism from doing its long-run job

Fitting NZ numbers to the textbook story

Put some numbers onto our diagram

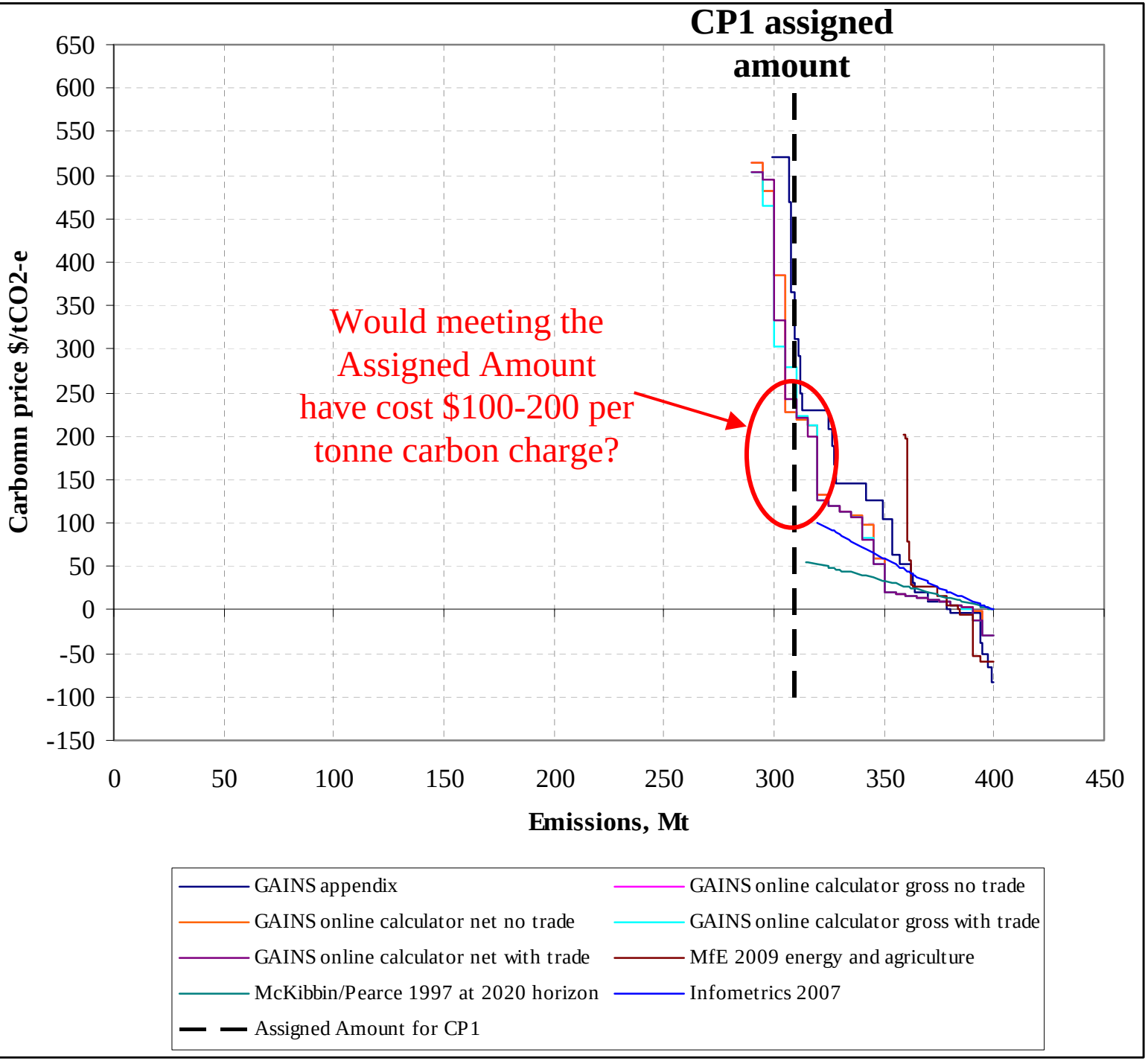
- To do this we need to have some idea of the MAC curve
- There are quite a few estimates but none really solid
- Generally the estimates tend to be conservative because
  - they lack induced technical progress
  - they don't allow for large-scale shifts in the structure of the economy
  - they all embody pessimistic assumptions about agricultural emission reductions, or leave them out altogether (McKibbin & Pearce)
- In particular, integrating "top-down" and "bottom-up" estimates in a framework that includes backstop technologies has not been fully undertaken to date for New Zealand
- The proposition implied by the bottom-up curves that emissions become less price-responsive as the price rises above $100 per tonne seems intuitively wrong - backstops exist, but have not yet made it into the modelling
- Still, for better or worse, here we go….

Estimates of the New Zealand Marginal Abatement Cost Curve (excl forestry)
[Drawn here as a supply of abatement starting from BAU at zero]

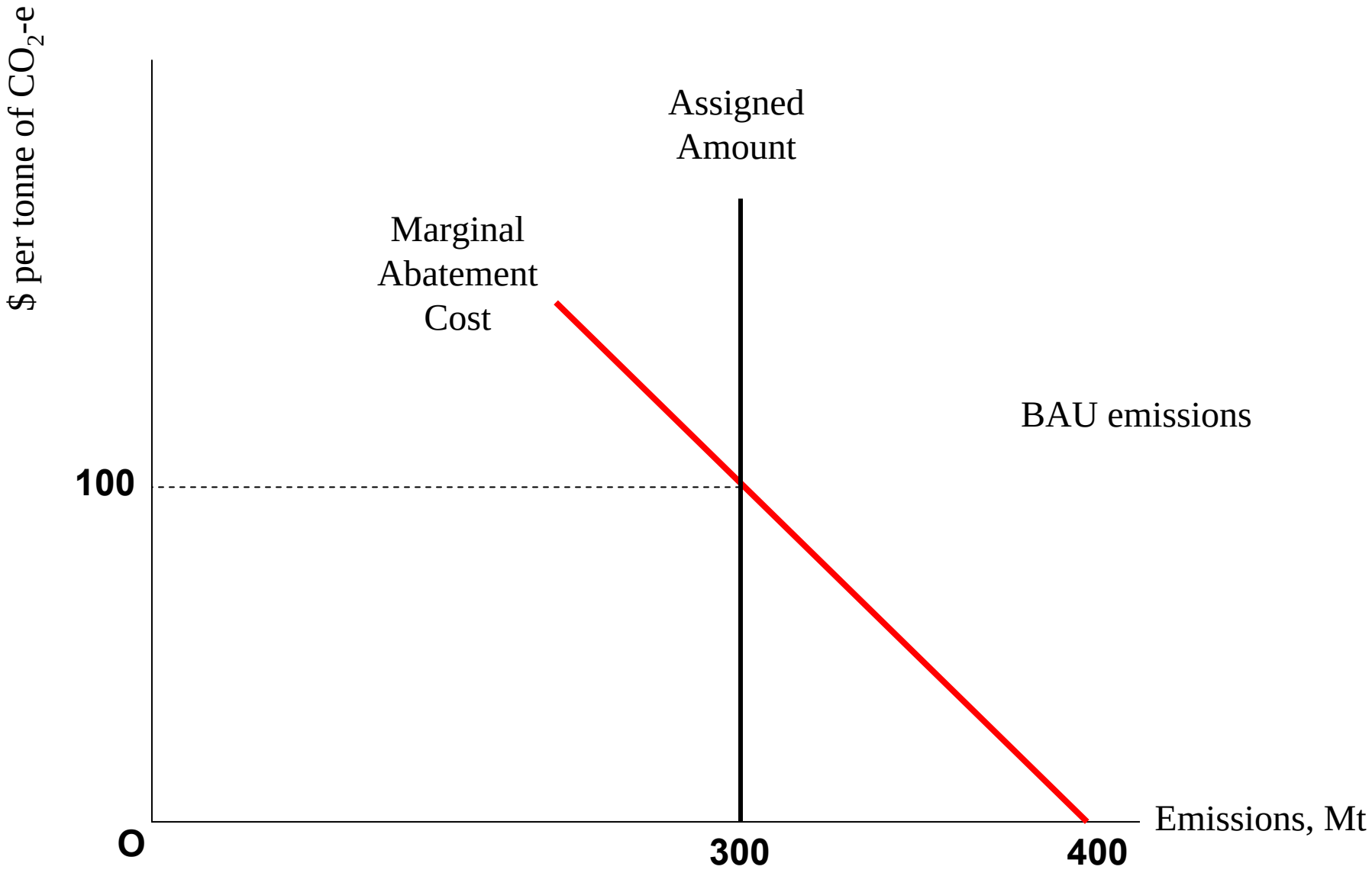


Draw these MAC curves the other way around so that they become the emissions demand curve, convert to 5-year total abatements, and plot them onto our diagram for CP1

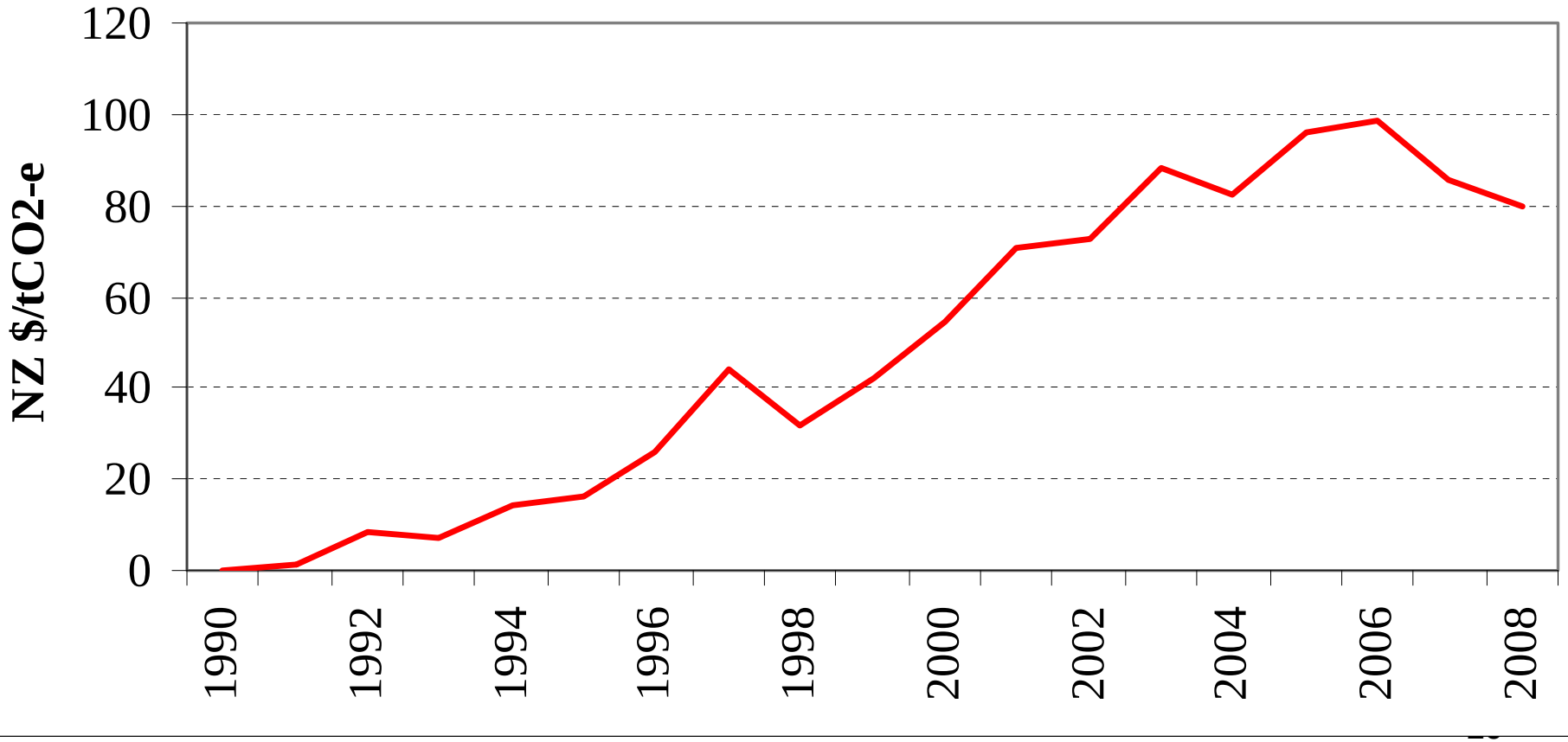
Health warning: I am taking big liberties by imposing long-run 2020-horizon abatement estimates onto the short-run CP1 situation. This is a scoping exercise only


CP1 assigned amount
Would meeting the Assigned Amount have cost $100-200 per tonne carbon charge?
Carbomn price $/tCO2-e
650
600
550
500
450
400
350
300
250
200
150
100
50
0
-50
-100
-150
0
50
100
150
200
250
300
350
400
450
Emissions, Mt
GAINS appendix
GAINS online calculator gross no trade
GAINS online calculator net no trade
GAINS online calculator gross with trade
GAINS online calculator net with trade
MfE 2009 energy and agriculture
McKibbin/Pearce 1997 at 2020 horizon
Infometrics 2007
Assigned Amount for CP1

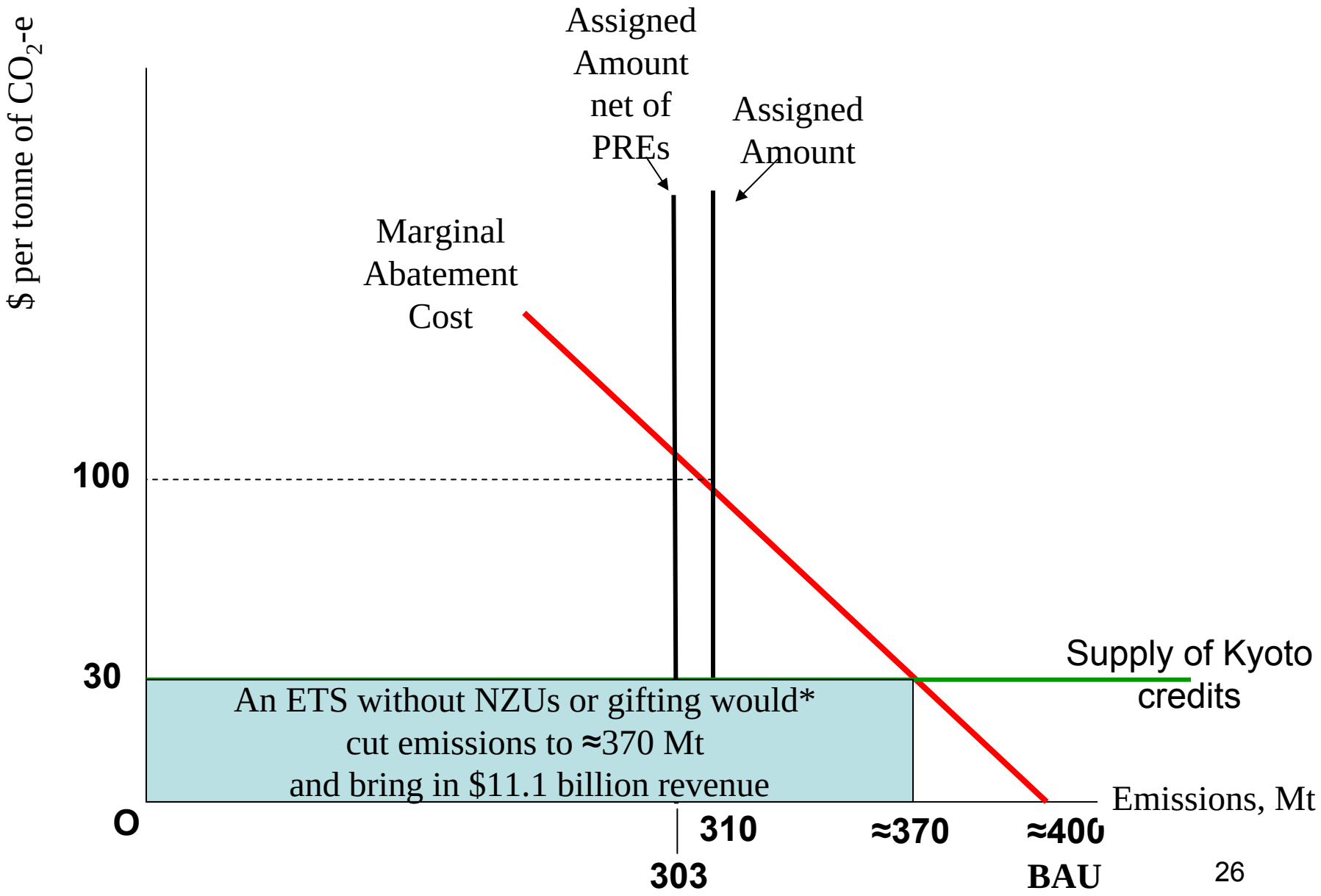
There's a nice clean simplicity about that Infometrics implied MAC so I'll use that for a stylised discussion



Carbon tax path to hold NZ at 1990 gross emissions, assuming Infometrics abatement cost curve



Let's suppose the world carbon price for CP1 is $30/tonne



* assuming long-run response rate and the MAC as drawn

Realpolitik sinks the textbook: the NZ ETS

The NZU: the rent-seeker's delight

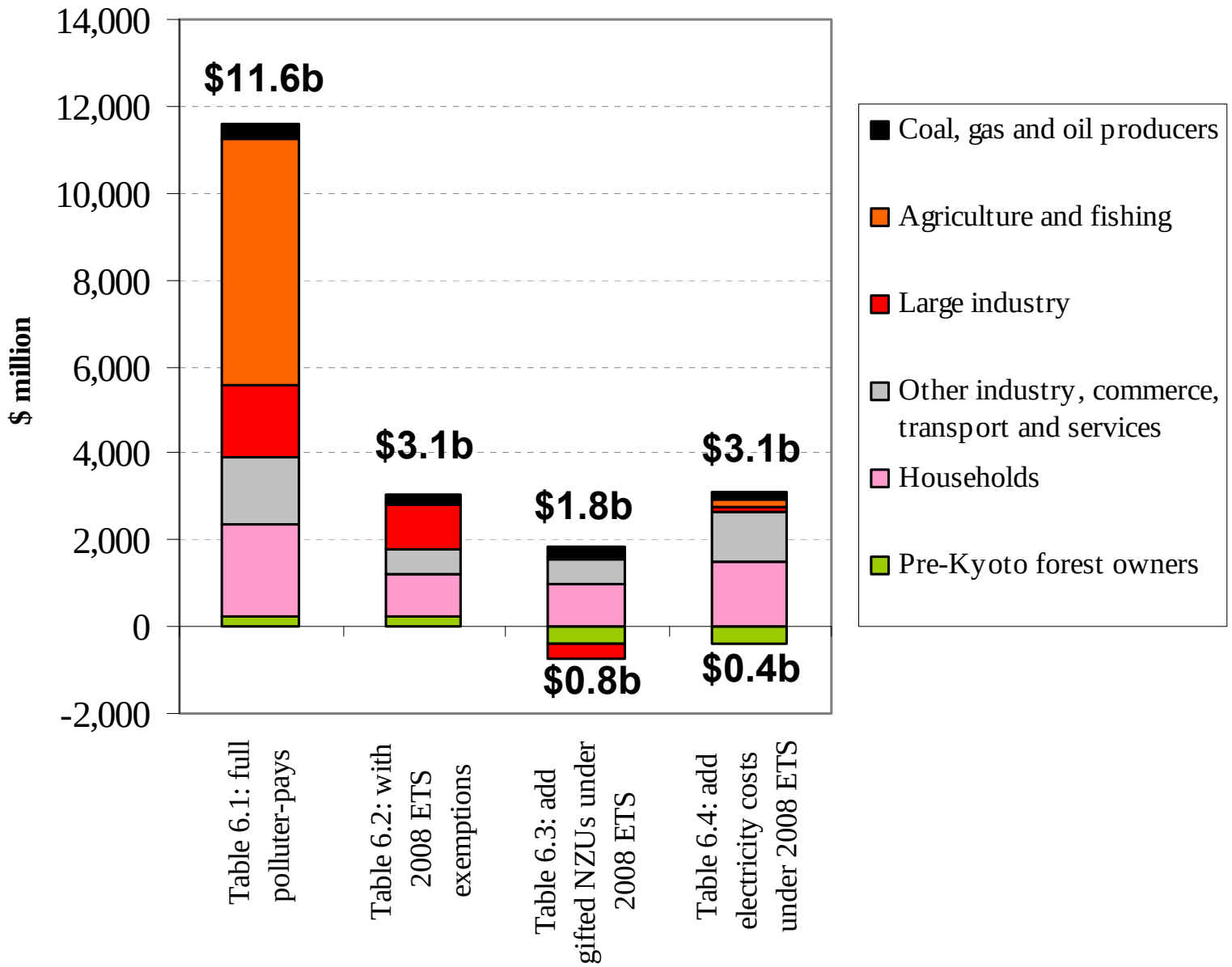
- Instead of requiring emitters to buy and surrender Kyoto units, Government prints its own carbon fiat currency, the NZU, and announces it will accept NZUs as substitutes for Kyoto-derived AAUs, CERs, ERUs, and RMUs.
- There is now an exchange rate issue: Government has to decide whether to fix and defend the value of the local currency. [Monetary policy – is there a carbon-currency Central Bank somewhere?] Inconvertibility looms (check out proposed new s.222G in Nick Smith's Bill)
- Instead of auctioning all the NZUs, which would still provide revenue to fund obligations to the UNFCCC and other activities, Government gives away big tranches of NZUs for free to appease politically-powerful business interests
- This effectively means the ETS's disposable revenue is rebated as corporate welfare - gifted ("allocated") NZUs are wealth transfers.
- Scarce resources that could have been used, e.g., to reduce emissions, are diverted to lobbying for political favours.
- .

Now take the simple scheme and make it complicated

- Instead of applying surrender obligations equally to all, exempt more than half the economy's emitters entirely for the whole of CP1 (2008 scheme) or most of the next decade (2009 scheme)
- Start the scheme off in the middle of CP1 for most of the sectors covered, with only forests in from the beginning
- Make it voluntary for Kyoto forests to join the scheme, then give them confusing and often perverse incentives on whether to do so. Leave ownership of the carbon in their trees an open question but hint that it's social, not private, property – potentially subject to eventual appropriation by government

- The next slide shows what the first two of these do to the total amount payable by emitters or users of emission-intensive products. (The polluter-pays benchmark here is $11.6 billion that a $30 carbon tax would collect on 386 Mt of currently-projected emissions including deforestation)

Amounts payable by various sectors on 386 Mt of CP1 emissions, 2008 ETS

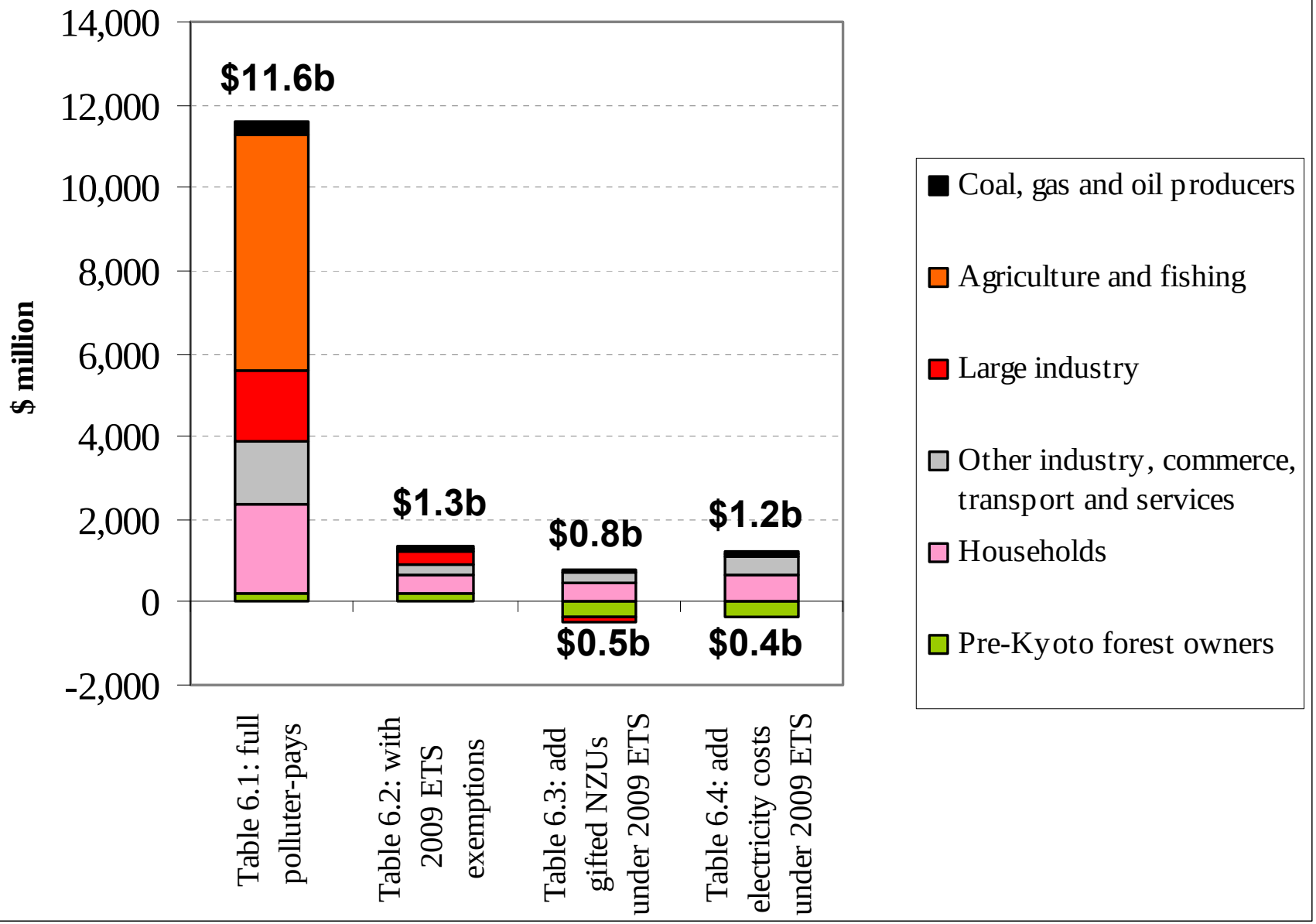


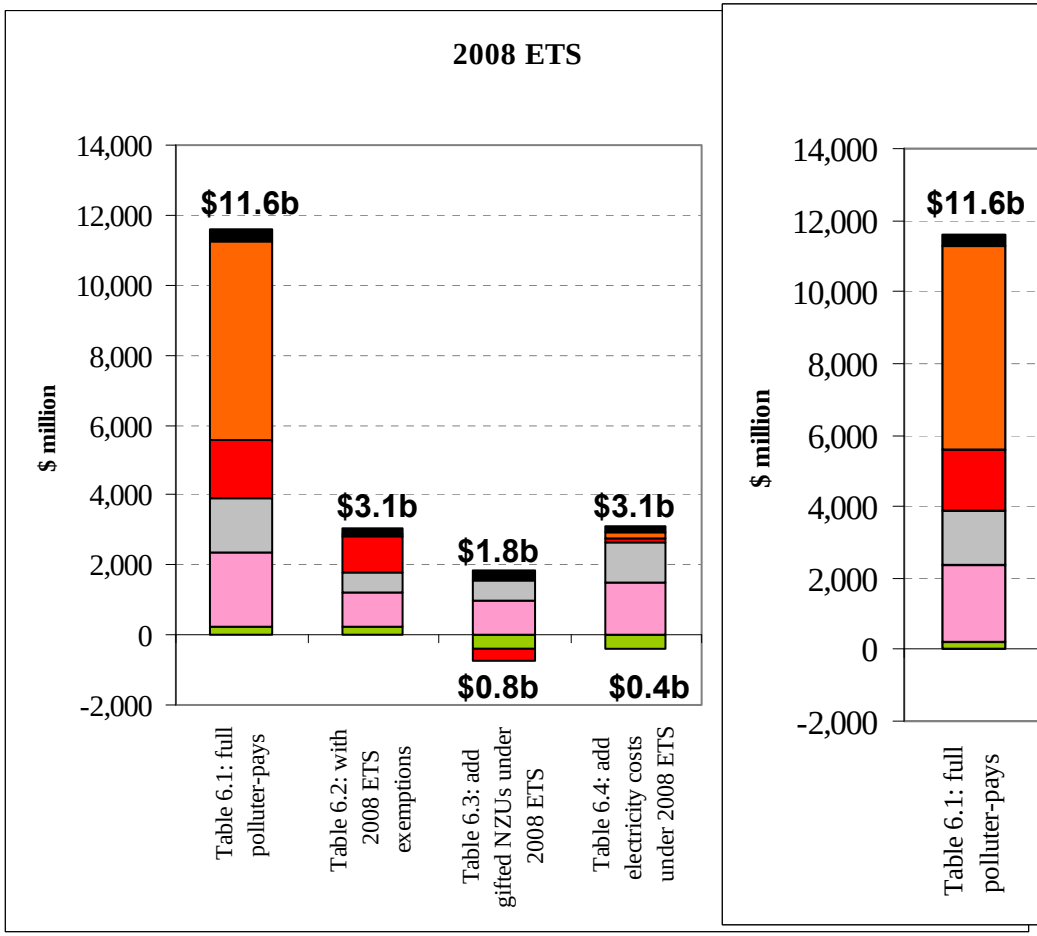
Then increase the complexity but cut the (already negligible) impact on emissions and extend the subsidies' life: the 2009 amendments

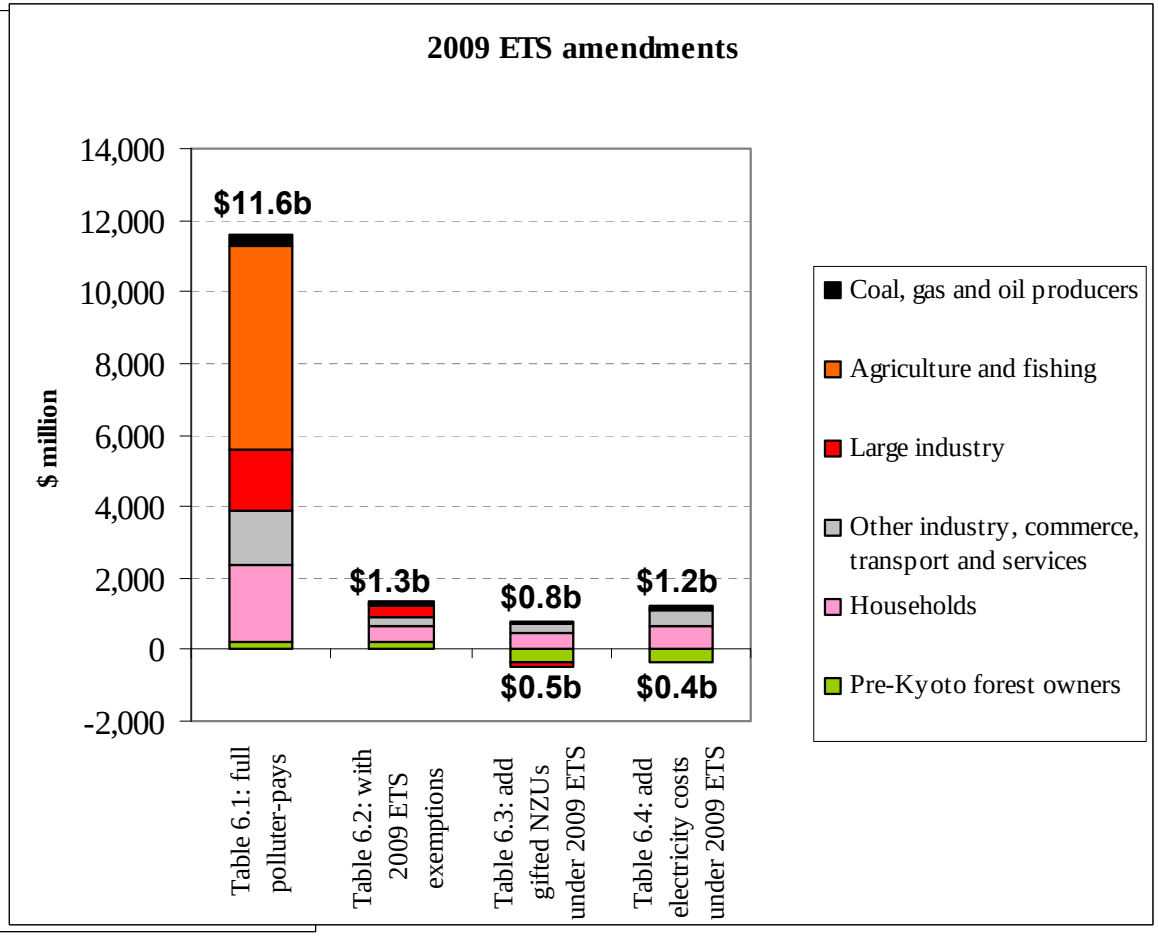
- The amendments now before Parliament knock about two-thirds off the amounts to be paid under the ETS
- They extend the gifting of NZUs to selected sectors out to the year 2088 for industry and 2091 for agriculture, on a scale that declines at 1.3% a year (effectively perpetual production subsidies)
- They allocate NZUs to industry and agriculture on a going-forward intensity basis rather than in lump sum amounts based on historic emissions, which means that emissions are likely to rise rather than fall, whereas New Zealand's assigned amount must be expected to fall

Outcomes for CP1

Amounts payable by various sectors on 386 Mt of CP1 emissions, 2009 proposed amended ETS




2008 ETS
$ million
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
$11.6b
$3.1b
$1.8b
$3.1b
$0.8b
$0.4b
Table 6.1: full polluter-pays
Table 6.2: with 2008 ETS exemptions
Table 6.3: add gifted NZUs under 2008 ETS
Table 6.4: add electricity costs under 2008 ETS


2009 ETS amendments
$ million
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
$11.6b
$1.3b
$0.8b
$1.2b
$0.5b
$0.4b
Table 6.1: full polluter-pays
Table 6.2: with 2009 ETS exemptions
Table 6.3: add gifted NZUs under 2009 ETS
Table 6.4: add electricity costs under 2009 ETS
Coal, gas and oil producers
Agriculture and fishing
Large industry
Other industry, commerce, transport and services
Households
Pre-Kyoto forest owners

Exemptions and rebates: effect on net surrender of emission units

	2008 ETS	2009 ETS
Projected CP1 emissions incl deforestation	**386**	**386**
Exempted from ETS coverage	**284**	**332**
Gross number of units required to be surrendered (mill)	**102**	**54**
NZUs issued as rebates (allocations) (mill)	**31**	**16**
NZUs for power price compensation (allocations) (mill)	**20**	**10**
NZUs for pre-1990 forests compensation (mill)	**16**	**16**
Net number of units required to be surrendered (mill)	**35**	**12**

These can come from offshore or from NZUs earned by Kyoto forest owners and sold off rather than banked

Fiscal impact: how much of those billions of dollars of ETS burdens actually comes to Government?

- With most of the liable CP1 emissions covered by gifted NZUs, Government pulls in only a small amount of direct revenue that can be used to pay for the country's Kyoto obligations
- Under the 2008 scheme, I estimate that 35.4 million of the 102 million emission units surrendered would be of value to the Government to fund offshore Kyoto payments. Under the 2009 scheme that falls to 12.3 million.
- At $30 per tonne, the estimated effective direct revenue is $1.062 billion under the 2008 scheme and $369 million under the 2009 scheme.
- Before amendment, thus, the ETS yield is just 10% of the $11.1 billion from the hypothetical carbon tax for the whole of CP1 (slide 25 above). With the amendments this will fall to 3%.
- Relative to the 76 Mt expected overshoot of gross emissions for CP1, the 2008 ETS would pay for 47%; the 2009 ETS would pay for 16%. 84% then falls on taxpayers.
- My estimated revenue drop of $700 million is bigger than the $415 million shown in the Explanatory note to Dr Smith's Bill, reflecting some different assumptions – mostly my use of a $30 carbon price rather than $25.

Fortunately for taxpayers there is a sort of silver lining in electricity prices

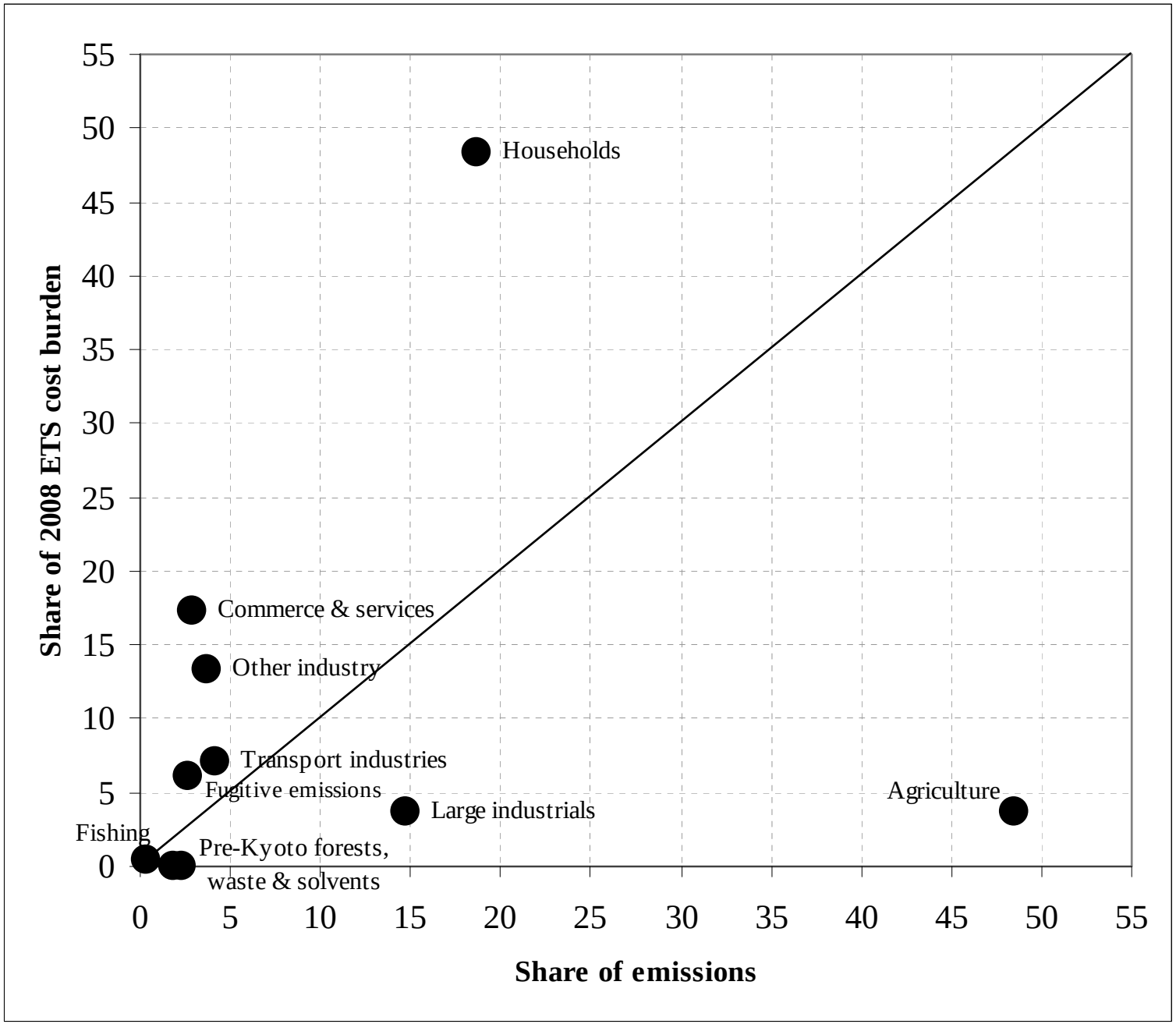
- The Government owns a big share of electricity generation capacity, including much of the renewable capacity.
- As the cost of fossil-fired generation rises, so will the wholesale electricity price
- SOE renewable generators then get windfall profits and these accrue to the owner (Government)
- Under the 2008 ETS total SOE electricity windfall profits during CP1 would be about $1 billion at a $30 carbon price. Under the 2009 ETS they fall to $0.4 billion. (Not all of this comes in as cash dividends to the Crown accounts, of course.)
- Adding electricity profits and ETS revenue, the 2008 ETS yields about $2 billion compared with the Kyoto excess emission cost of $2.3 billion. The 2009 ETS yields less than $0.8 billion, leaving $1.3 billion with taxpayers.

Emission Reductions? Forget them.

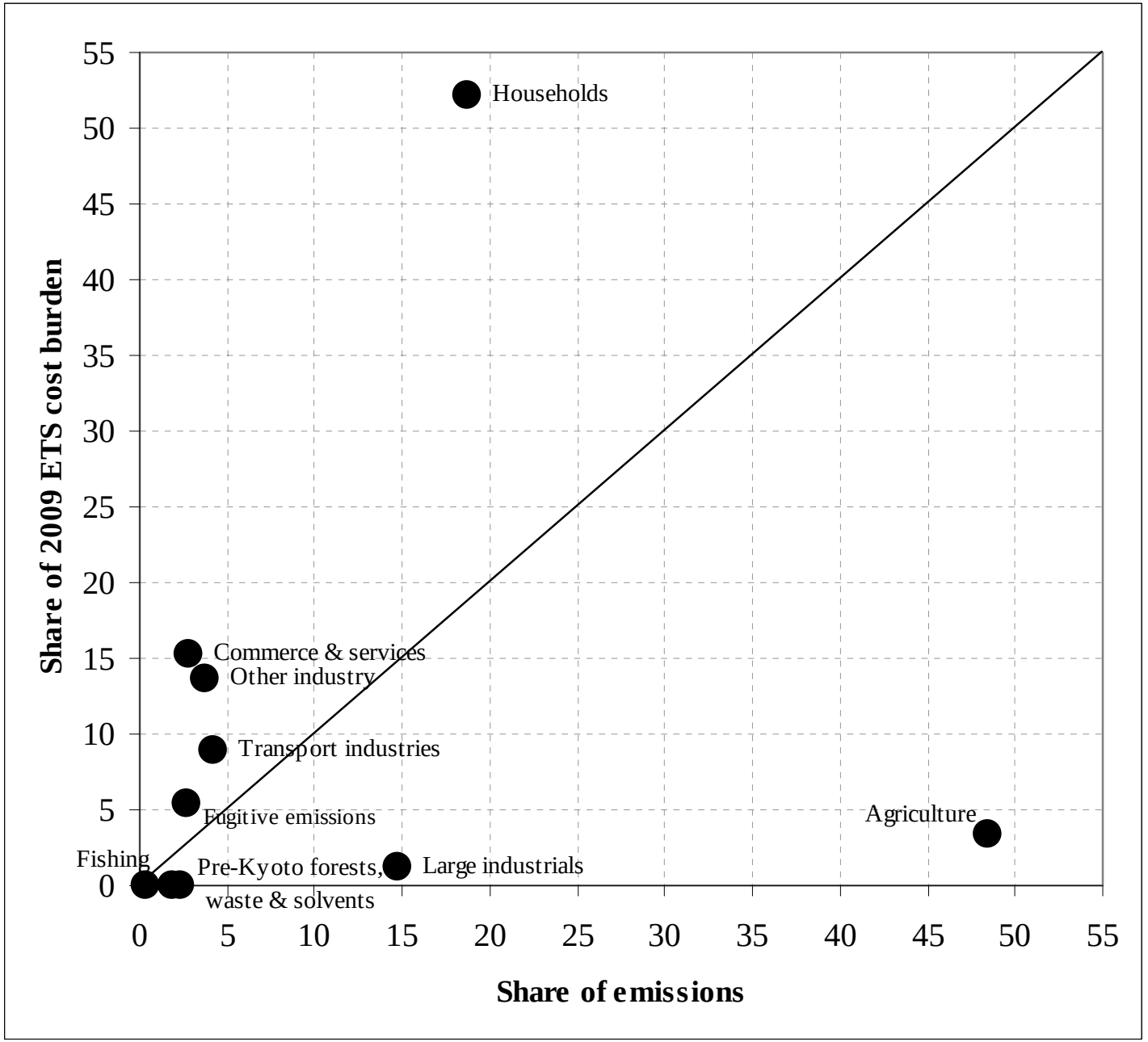
Sector	Projected Emissions for CP1 under BAU without ETS (Mt)	Reduction due to 2008 ETS (Mt)	Reduction due to proposed 2009 ETS (Mt)
Agriculture	184.0	0	0
Transport Fuels	72.1	0.2	0.1
Non-transport Liquid Fuels	14.0	0.2	0.1
Electricity	36.2	3.3	1.5
Stationary Energy from non-liquid fuels	37.2	1.1	0.5
Industrial Processes	21.4	0.6	0.3
Waste, Solvent and Other	9.0	0	0
Fugitive emissions	10.7	0.3	0.13
Total	**384.3**	**5.7**	**2.6**

* BAU emissions have been estimated by marking-up MfE's projected emissions, since these already incorporate the Ministry's estimate of ETS-induced abatement. Hence total emissions in this table are 5.8 Mt greater than the 378.7 of projected emissions in the ministry's most recent net position report.

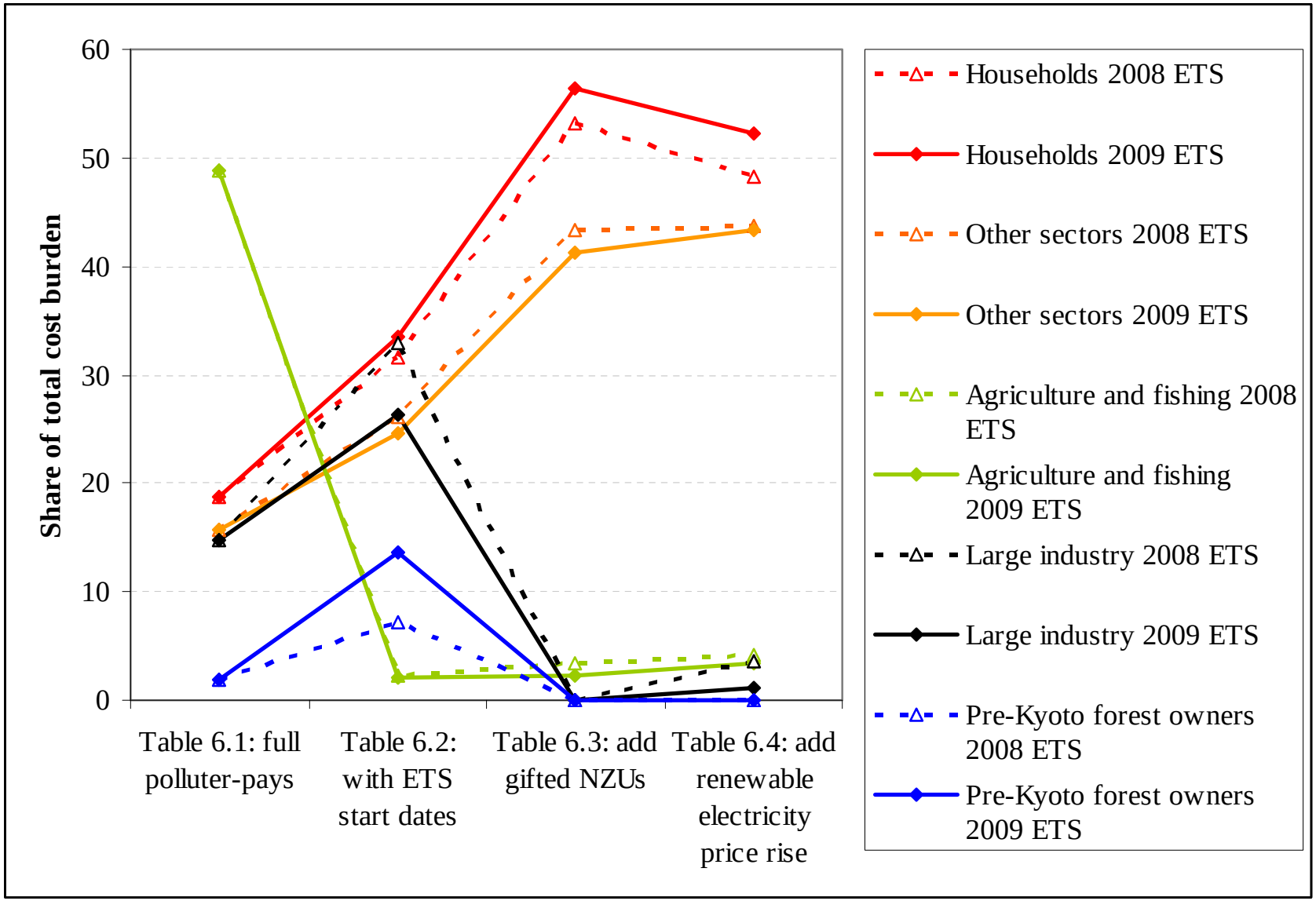
ETS burden compared with emission responsibility by sector, 2008 ETS



ETS burden compared with emission responsibility by sector, 2009 ETS



Effect of exemptions, rebates and electricity pricing on selected sectors



Short-run and long-run views of the subsidies to "trade exposed" (= "too big to refuse") sectors

1. During CP1

	Sector's share of excess (Mt)	Share of Kyoto bill ($ mill)	Net cost proposed 2009 ETS ($ mill)	Excess payment relative to fair share ($ mill)	Payment relative to fair share (%)
Households (including private transport)	14.4	434	452	18	104
Large industry	11.4	343	-145	-488	-42
Other industry	2.9	86	96	10	111
Transport	3.3	98	102	5	105
Commerce and services	2.0	64	65	1	102
Agriculture	37.5	1,123	17	-1,106	2
Fishing	0.5	14	-4	-17	-25
Waste and solvents	1.8	54	0	-54	-
Coal, gas and oil producers	2.1	62	66	4	106
Totals (excluding deforestation)	**75.9**	**2,277**	**649**	**-1,628**	-

2. Value of Subsidies to Large Industry and Agriculture – 2010 to 2092 (undiscounted figures, but no intensity change assumed)

Carbon Price and Sector Subsidy	2008 ETS ($ bill)	2009 ETS Proposed ($ bill)
Assuming emission unit price 2013-2091 is $50		
Large Industry non-electricity allocations	6.5	17.3
Electricity price compensation to industry	4.8	12.7
Agriculture late entry and NZU allocations	26.8	69.0
Total value of subsidies	**38.1**	**99.0**
Assuming emission unit price 2013-2091 is $100		
Large Industry non-electricity allocations	13.0	34.2
Electricity price compensation to industry	9.7	25.0
Agriculture late entry and NZU allocations	53.6	134.2
Total value of subsidies	**76.3**	**193.4**

Time out….