# A perspective on New Zealand's climate change policies

Presentation to Engineers for Social Responsibility
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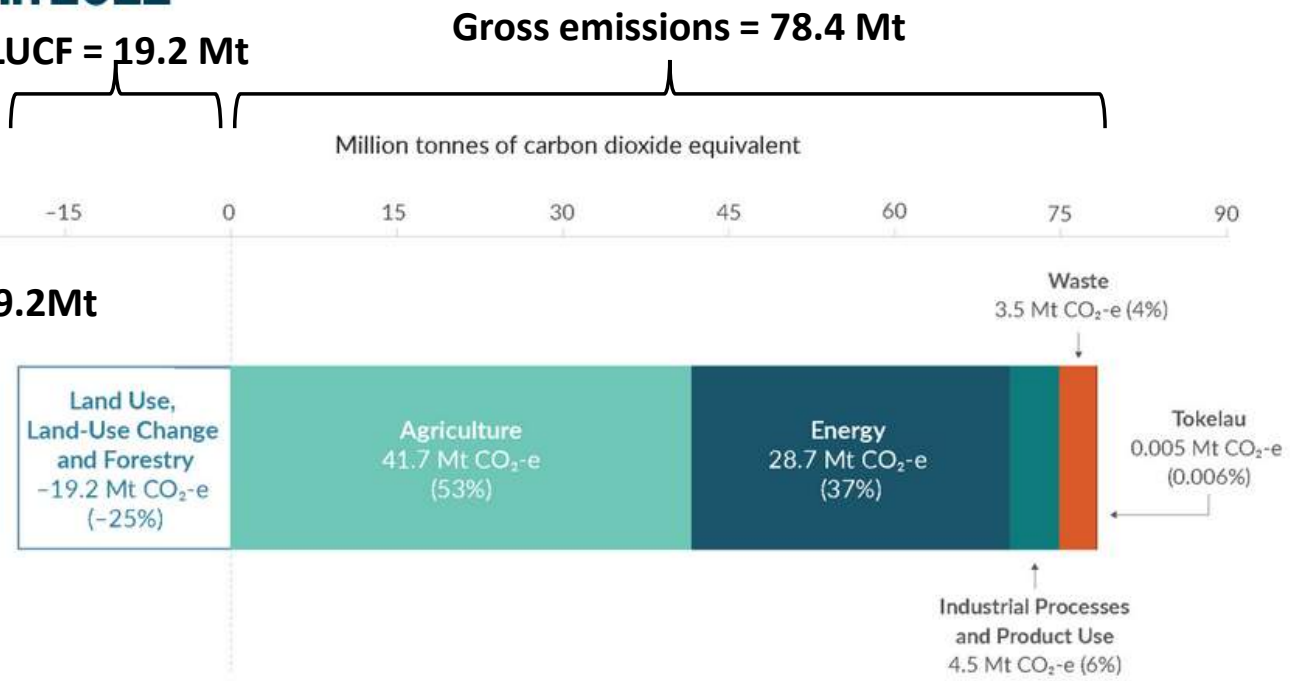
# New Zealand's most recent UNFCCC data (published April 2024)

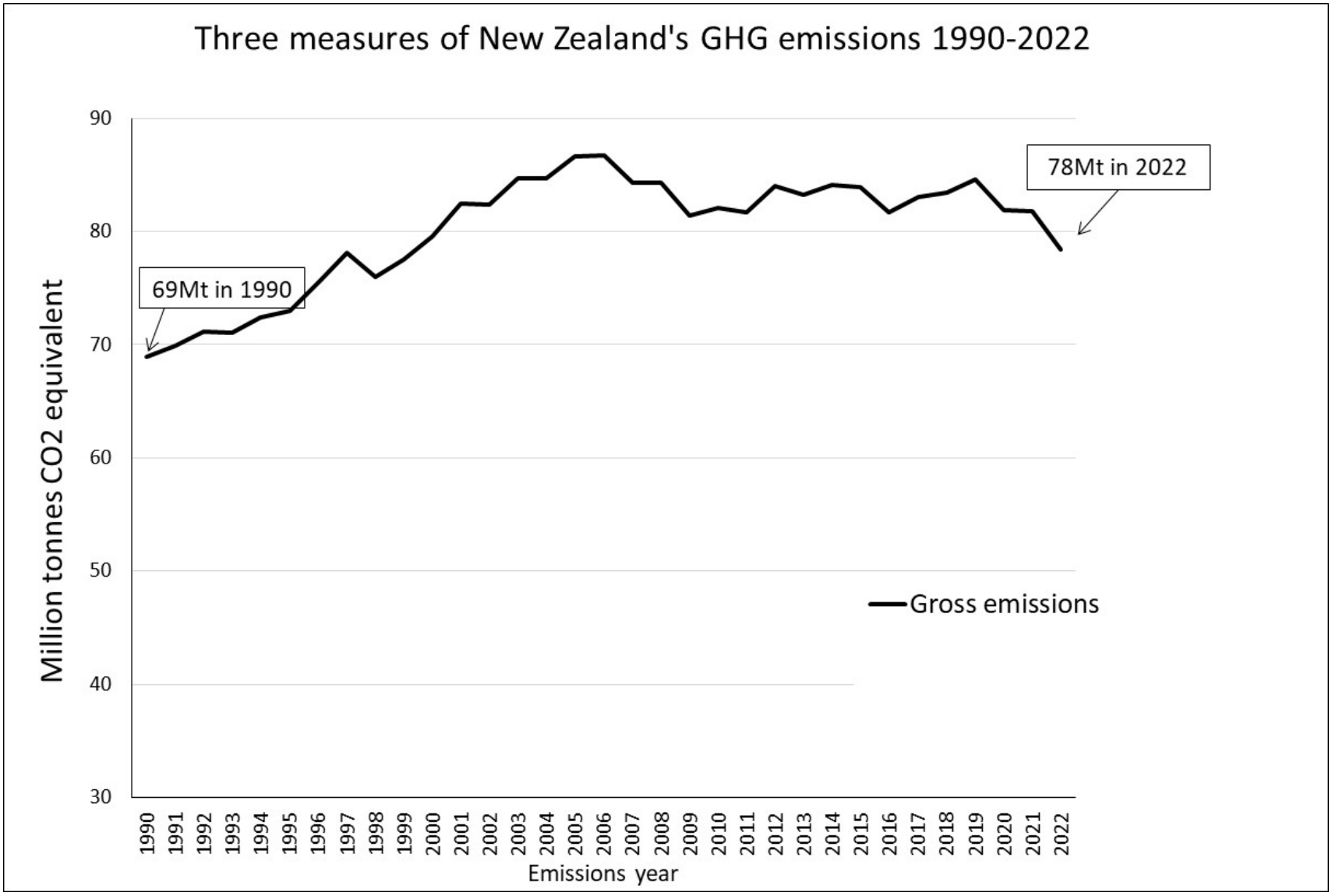
**Figure 1: Breakdown of Aotearoa New Zealand's emissions (in million tonnes of carbon dioxide equivalent [Mt $CO_2$-e]) by sector in 2022**




**Net emissions = 78.4 – 19.2 = 59.2Mt**

Net emissions from the LULUCF sector are negative because the sector removes more greenhouse gases from the atmosphere than it emits.

https://environment.govt.nz/assets/publications/GhG-Inventory/GHG-inventory-2024/2024-Summary-data-for-website.xlsx


Three measures of New Zealand's GHG emissions 1990-2022
Million tonnes CO2 equivalent
90
80
70
60
50
40
30
69Mt in 1990
78Mt in 2022
Gross emissions
1990
1991
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1993
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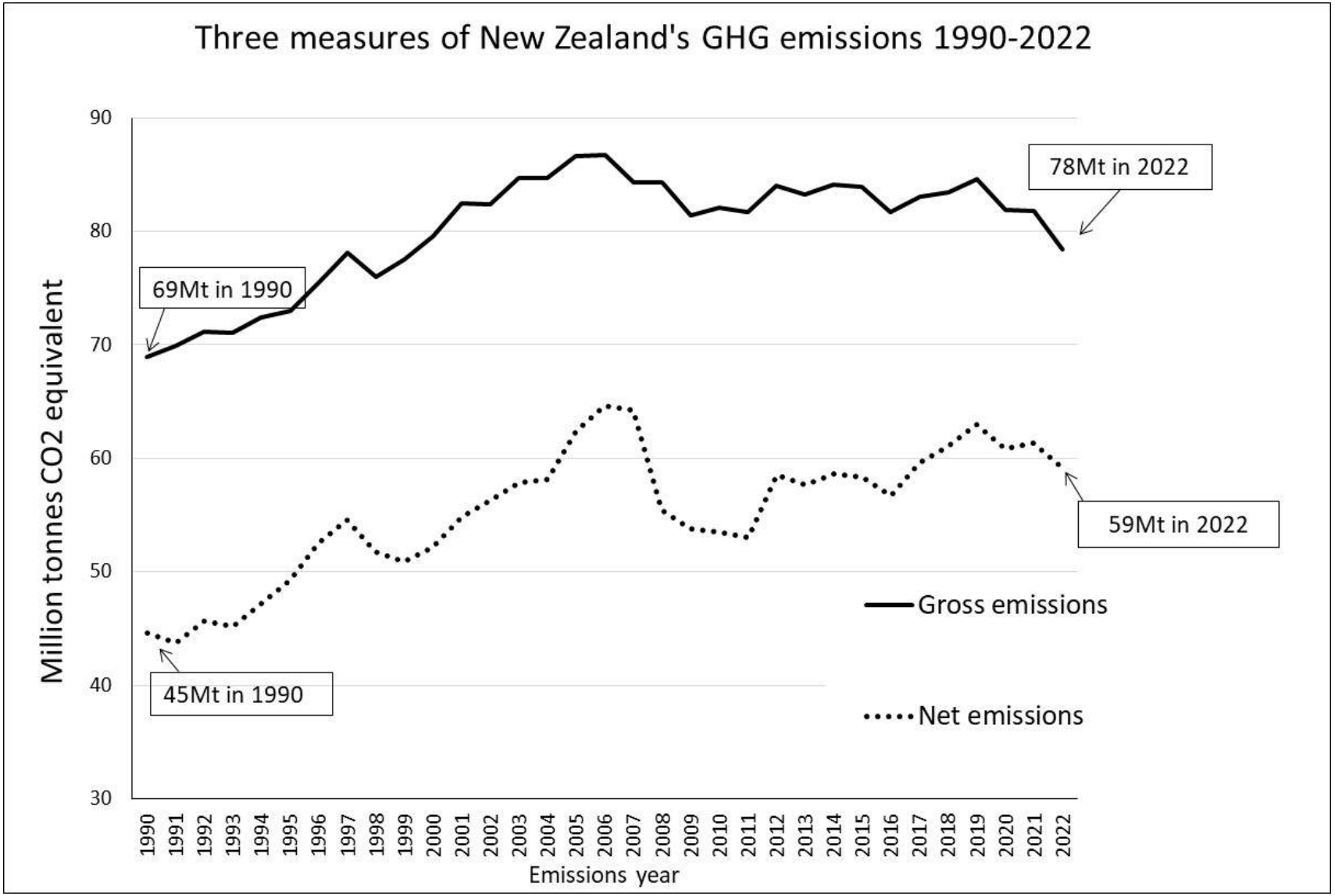
2020
2021
2022
Emissions year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Million tonnes CO2 equivalent
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60
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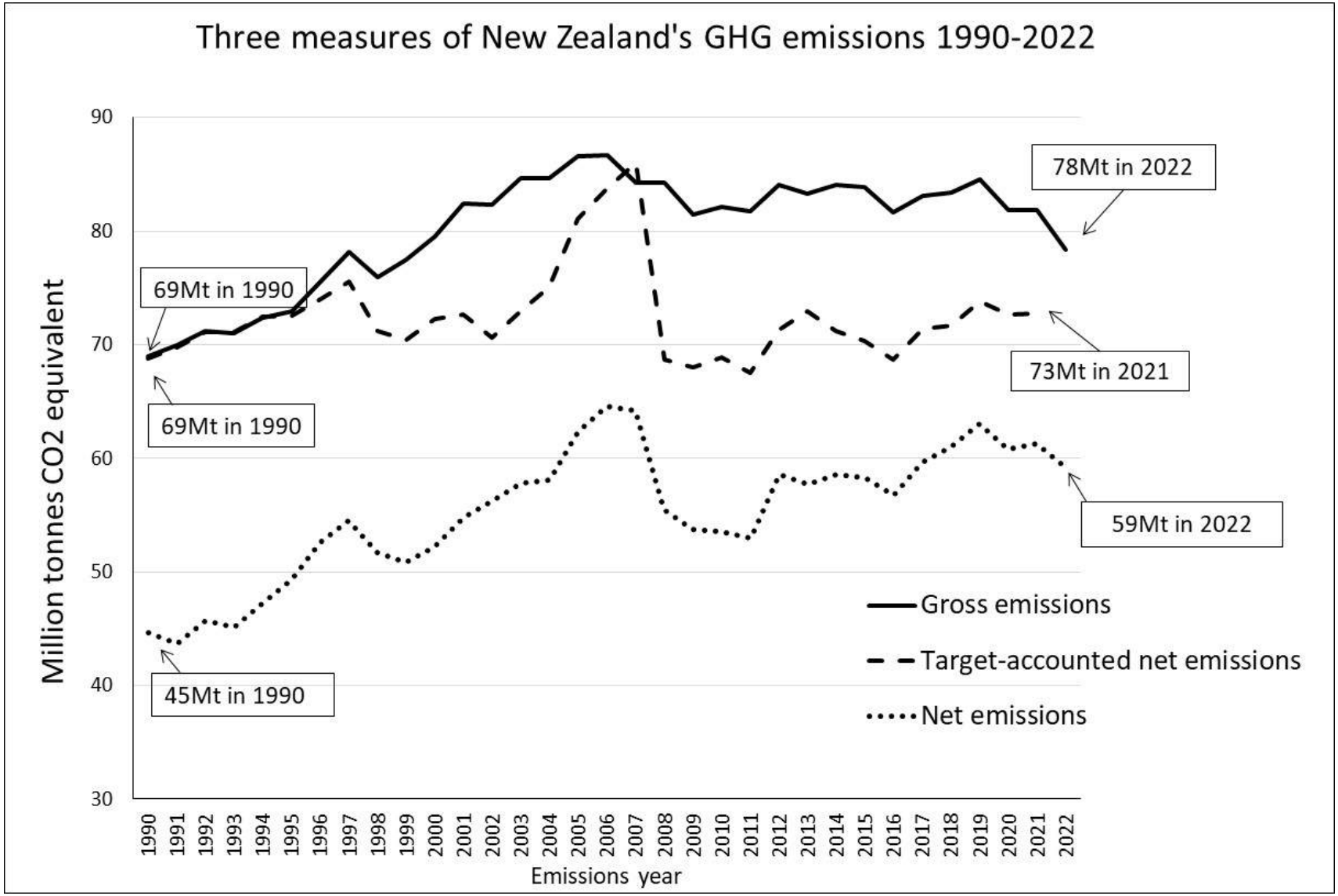
40
30
69Mt in 1990
78Mt in 2022
59Mt in 2022
45Mt in 1990
Gross emissions
Net emissions
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Emissions year


Three measures of New Zealand's GHG emissions 1990-2022
Million tonnes CO2 equivalent
90
80
70
60
50
40
30
78Mt in 2022
69Mt in 1990
73Mt in 2021
69Mt in 1990
59Mt in 2022
45Mt in 1990
Gross emissions
Target-accounted net emissions
Net emissions
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Emissions year

# What are those three different emissions measures?

Gross emissions are defined in s.4(1) of the Climate Change Response Act 2002 (as amended by the Zero Carbon Act in 2020) as "New Zealand's total emissions from the agriculture, energy, industrial processes and product use, and waste sectors (as reported in the New Zealand Greenhouse Gas Inventory)"

Net emissions (the ones that really matter for the atmosphere) **are not mentioned in the Climate Change Response Act 2002** , but are reported to the UNFCCC in the annual GHG Inventory submission. They are gross emissions less all removal of carbon by human activity (currently that's forestry but in future carbon capture and storage may qualify)

Net accounting emissions are defined in s.4(1) of the Climate Change Response Act 2002 as "the total of gross emissions and emissions from land use, land-use change, and forestry (as reported in the New Zealand Greenhouse Gas Inventory), less—

(a) removals, including from land use, land-use change, and forestry (as reported in the New Zealand Greenhouse Gas Inventory); and

(b) offshore mitigation"

## You might think that last measure is the same as the second, but NO

- In the NZ Government's interpretation of the Act, "removals, including from land use, land-use change, and forestry (as reported in the New Zealand Greenhouse Gas Inventory)" do **not** mean the same thing as the removals reported in the GHG Inventory for the purpose of calculating "net emissions". They are a completely separate set of numbers calculated under different rules and reported in a separate section of the inventory tables.

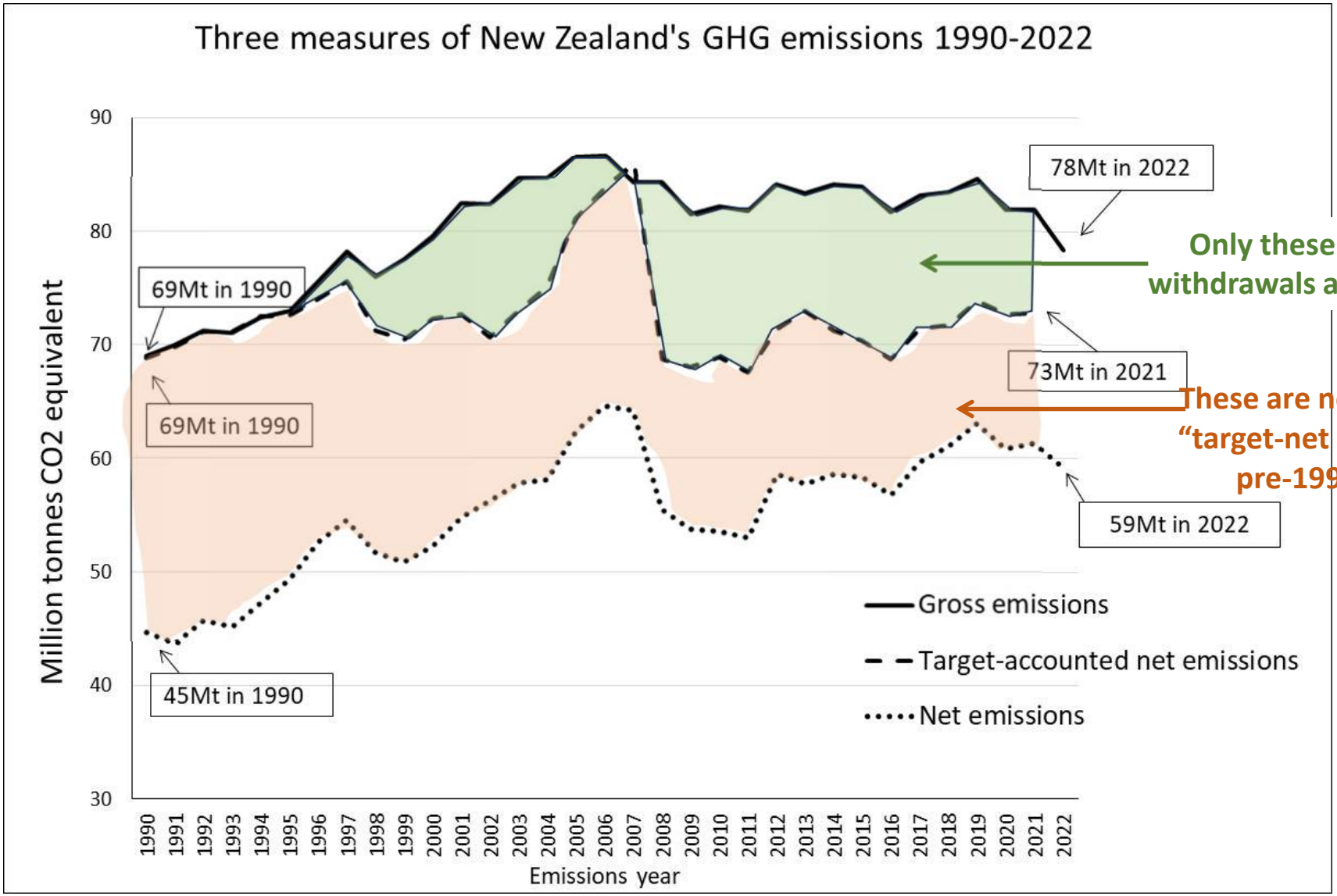
- As Justice Mallon concluded in *LCANZ v Climate Change Commission and Minister for Climate Change* [2022] NZHC 3064 at paragraphs 255 and 272,

  > "the Act does not hard-wire the accounting methodology for tracking progress against the 2050 Target and the Budgets, and it is to be the subject of advice from the Commission to the Minister…..
  >
  > "I consider that Parliament has determined that it is for the Commission to advise and the Minister to decide on the methodology by which progress against our emission budgets are to be measured."

- Which is where "target net accounting emissions" – basically, net accounting emissions without the international offsets – come from

# The cover story

- Kyoto took 1990 as the base year and focused on efforts to reduce emissions after that
- So forests that were already planted and growing before 1990 were not “additional” actions and so were set aside
- The Kyoto accounting rules allowed New Zealand to count its forestry carbon-absorption starting from that 1990 zero base as if these were all additional actions attributable to policy. This meant that “target-accounted-net emissions” could fall as actual net emissions rose
- What this turned out to mean was that forestry could do all the work of meeting Kyoto Protocol promises (New Zealand quickly forgot its early undertakings, and it has been forestry all the way since then)
- The reason is that it’s cheaper to grow trees than to cut emissions, and emissions trading leads to exactly that outcome
- The Kyoto accounting rules allow New Zealand to talk big and act little so long as trees grow, which has proved seductive to politicians and obscure to voters

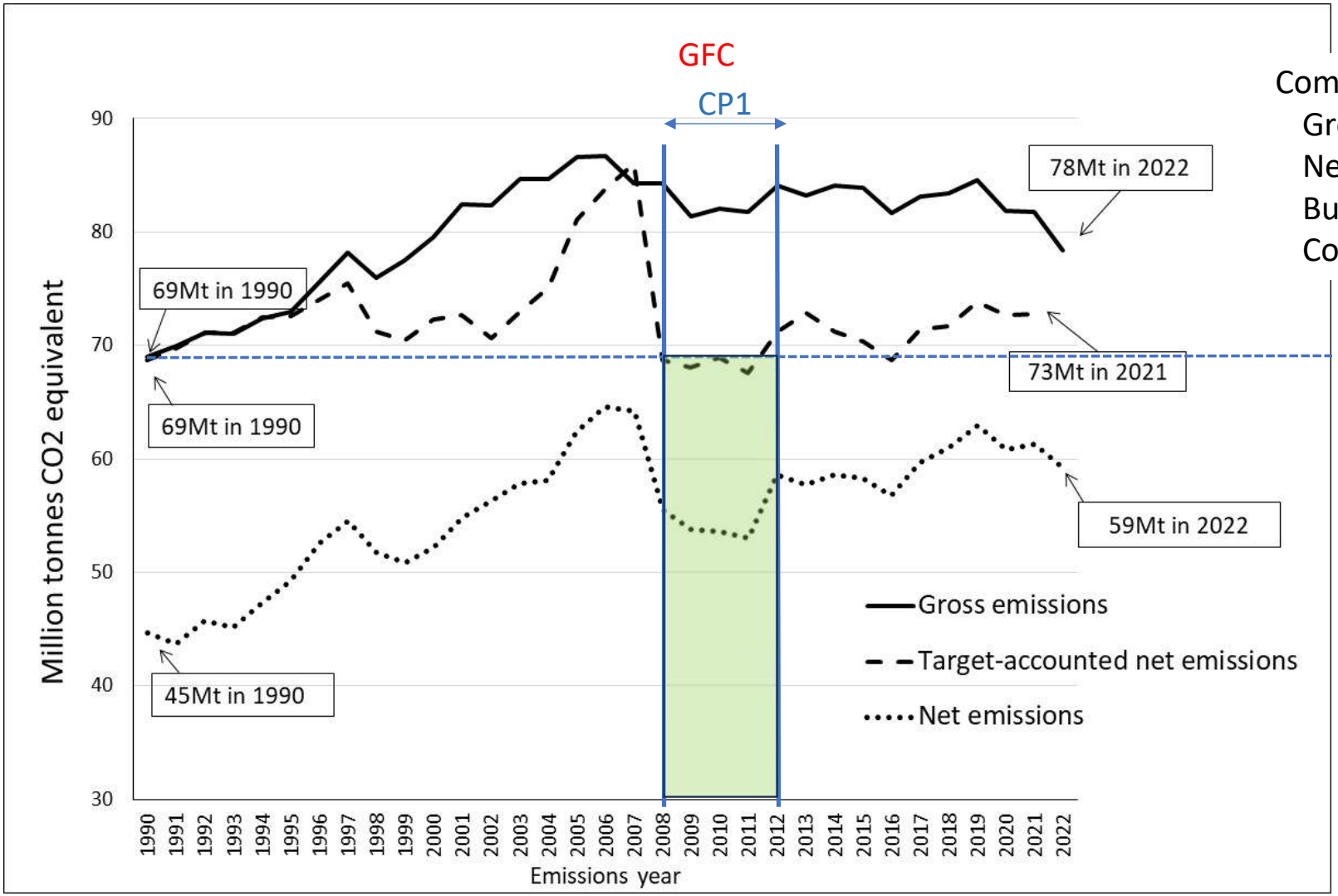



**Only these LULUCF withdrawals are counted**

**These are not counted in "target-net accounting"– pre-1990 forests**

So we can work through New Zealand's successive international commitments under gross-net accounting

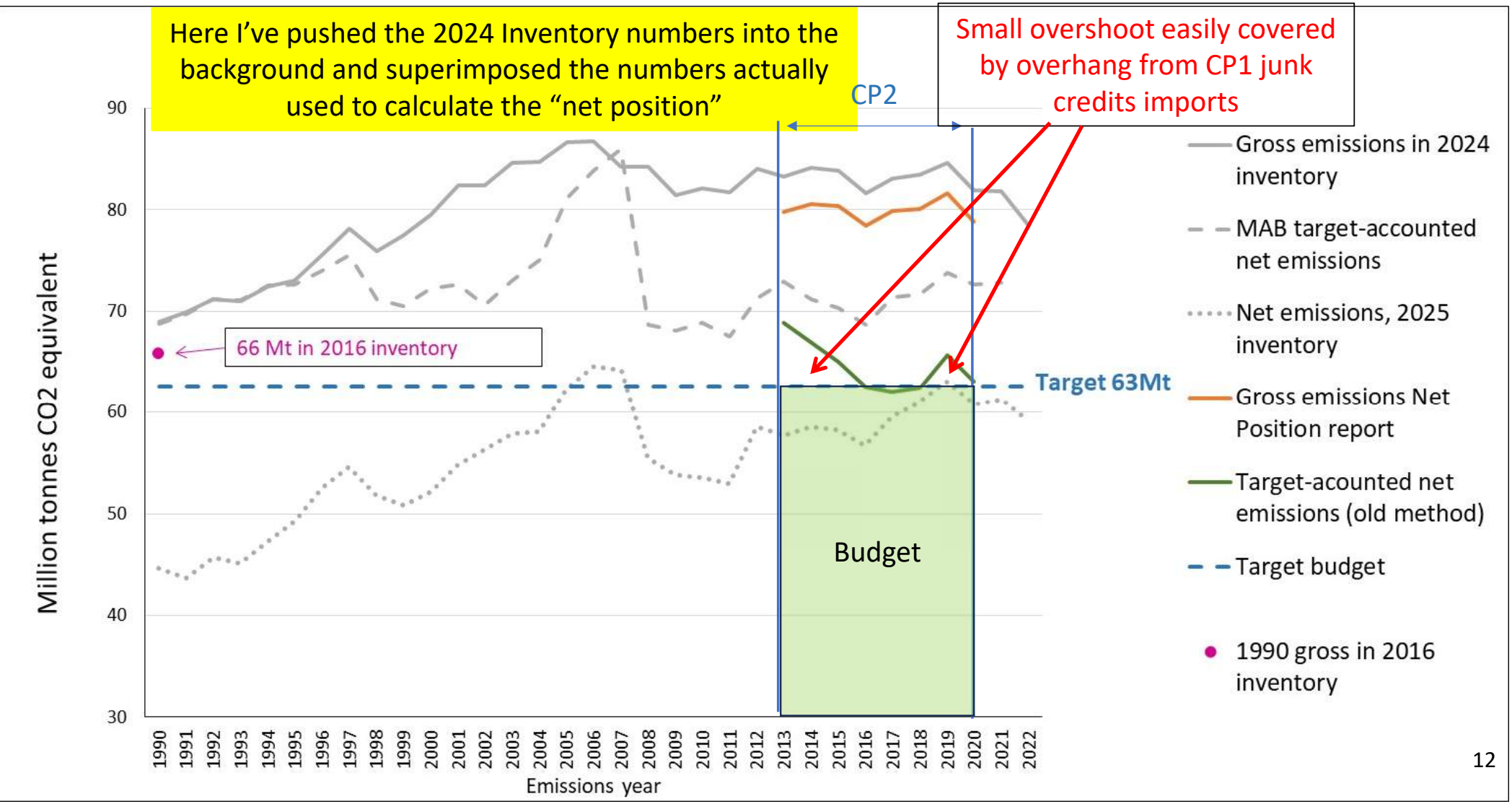
# Kyoto Protocol First Commitment Period 2008-2012 (CP1): **target-accounted net** emissions 2008-2012 were to average no more than 1990 **gross emissions**



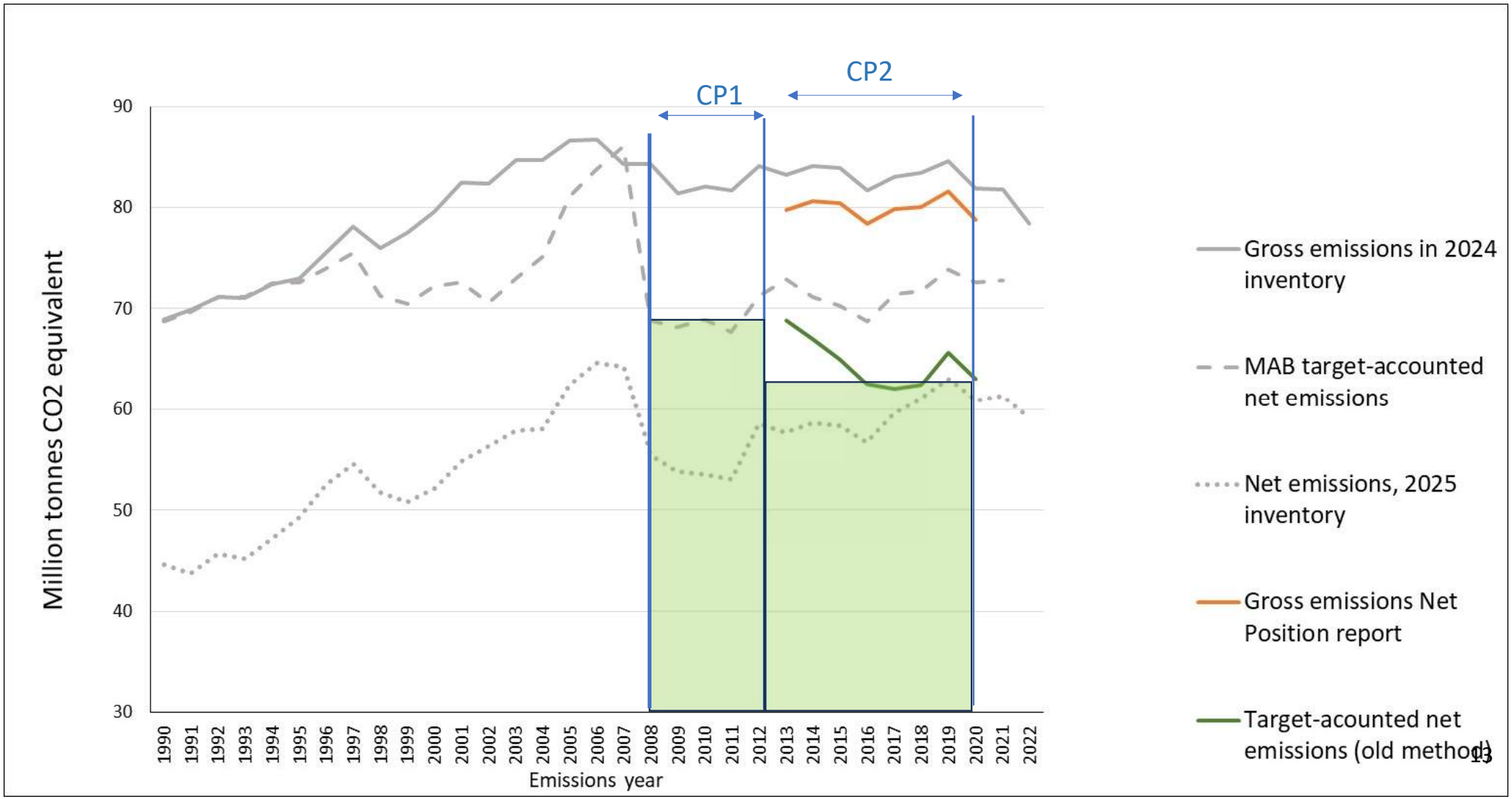

Compared to 1990 gross emissions:
- Gross emissions were up 26%
- Net emissions were up 20%
- But target net emissions were fine
- Commitment fully met

Warning: I did this using the 2024 inventory and MAB target-net numbers – the actual 2014 official "true-up" had different numbers

# Kyoto Second Commitment Period 2013-2020 (CP2): target-net emissions to be 5% below 1990 gross emissions as reported in the 2016 inventory



# Summarising to here

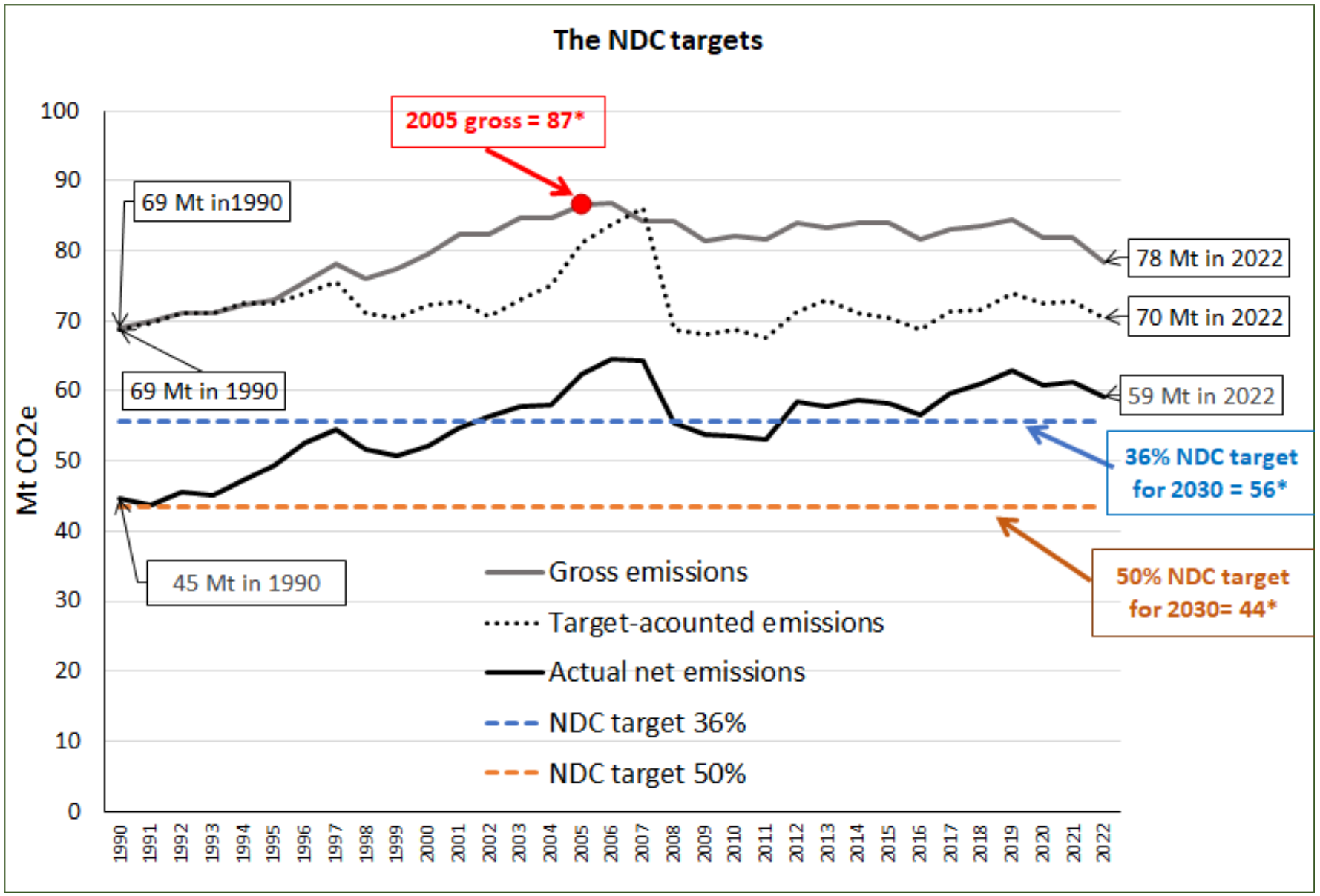


# Those first two commitments were so weak as to be effectively meaningless

- Imposed no need to cut gross emissions at all
- Sounded impressive
- Passed muster under the UNFCCC and Kyoto rulebook
- (Note that while the CP1 commitment was binding, the CP2 one was just unilateral and voluntary so no real consequences for failure - New Zealand just walked away from the Kyoto Protocol for CP2)
- But still maintained domestic political credibility by hyping the numbers
- And got away with it because other countries were also acting without good faith

# Then came Paris

- All countries to make “Nationally Determined Contributions” to meeting a 2-degrees-of-warming target.
- NDCs to be non-binding, which lowered the stakes
- Article 4.3 of the Paris Agreement states that “each Party's successive nationally determined contribution will ... reflect its highest possible ambition...”
- So political credibility required something that sounded dramatic while *realpolitik* required minimal actual commitment
- In 2016 New Zealand’s declared NDC goal was that target-net emission in 2030 should be 36% below 2005 gross emissions
- In 2021 that was raised to a 50% reduction, with a total budget 2021-2030 of 571 Mt



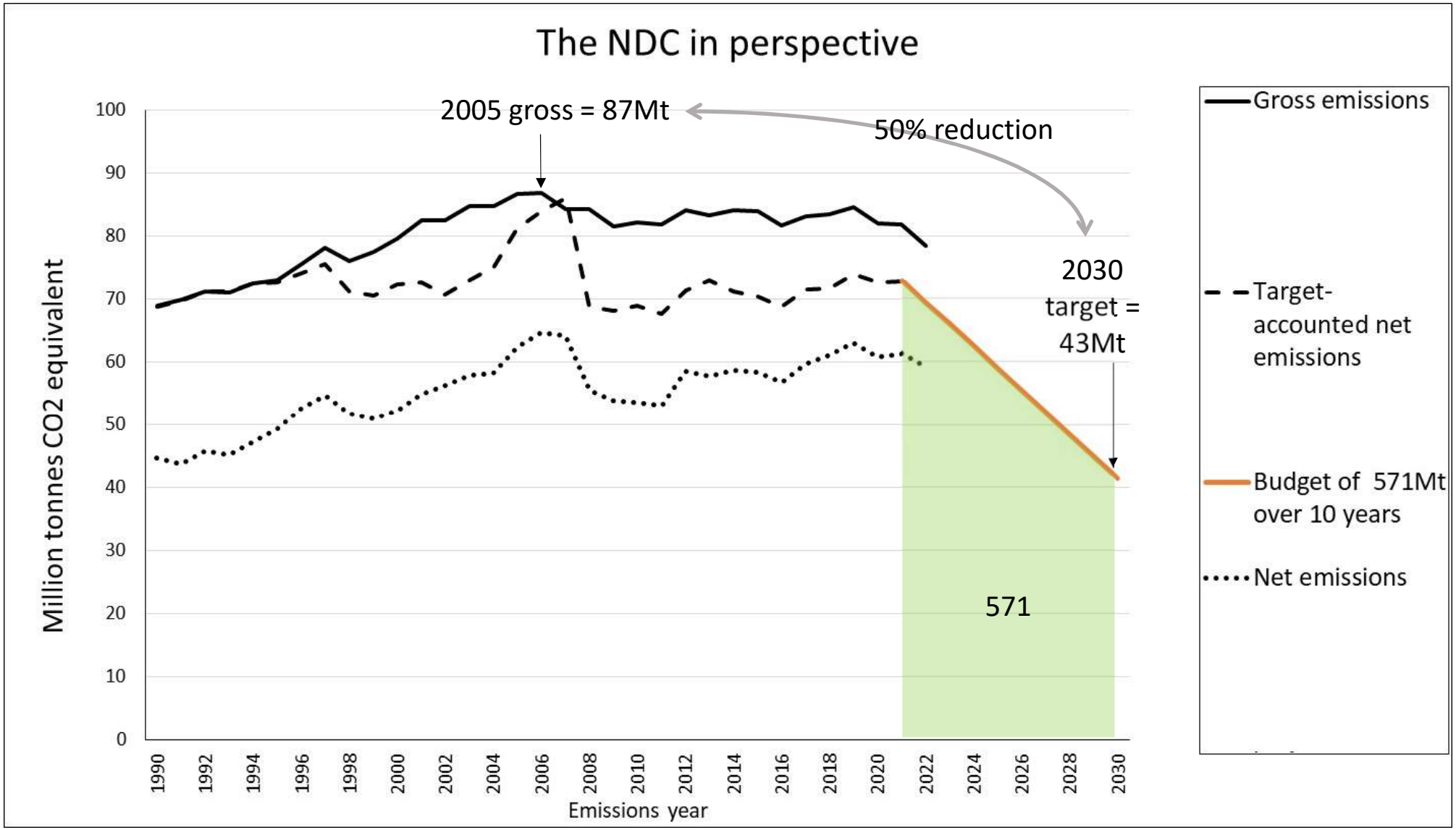

* Using numbers from the 2024 GHG Inventory

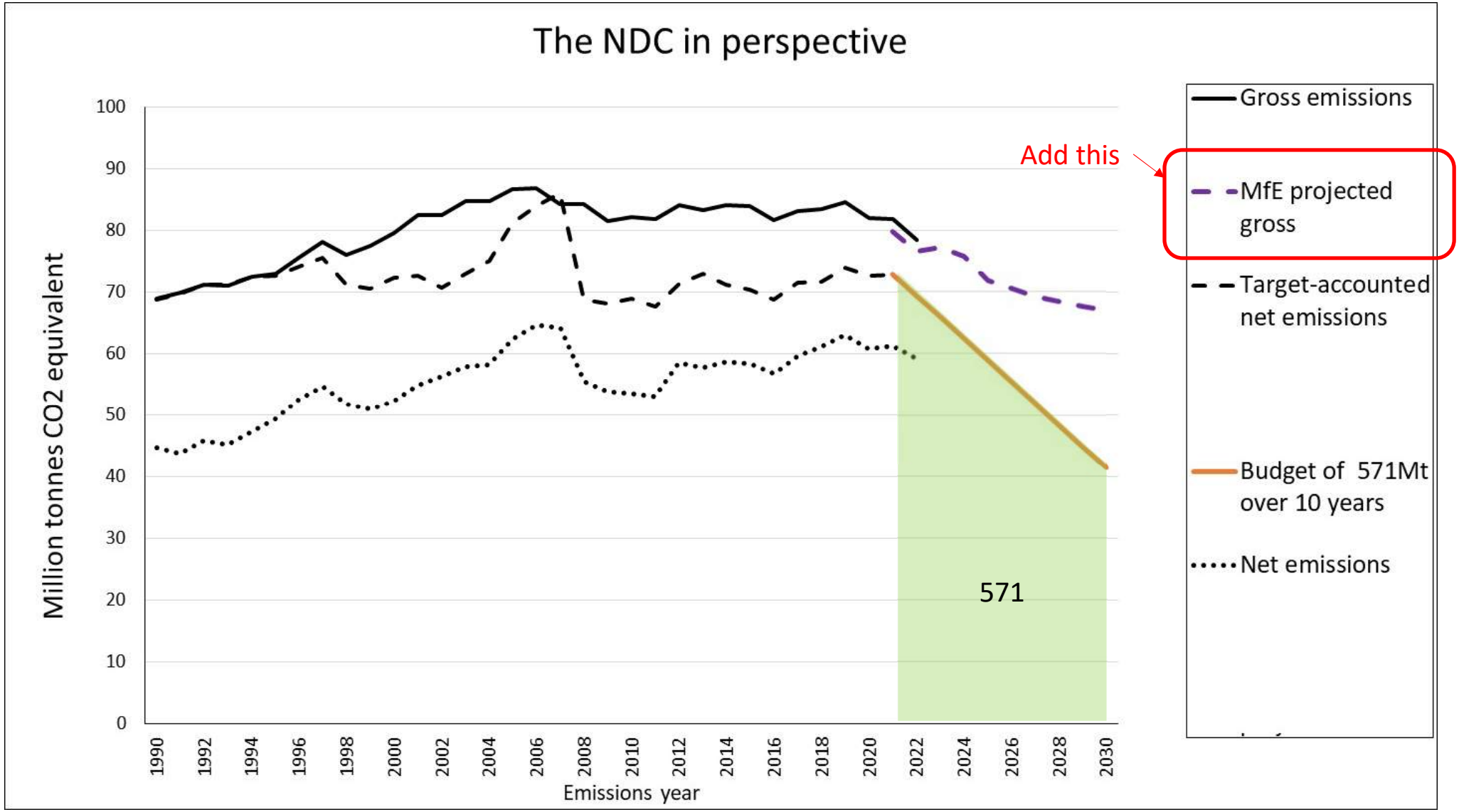
# The target is very obscurely stated

**The Nationally Determined Contribution of New Zealand is:**

- To reduce net greenhouse gas emissions to 50 per cent below gross 2005 levels by 2030. This corresponds to 41 per cent when managed using a multi-year emissions budget starting from New Zealand's 2020 emissions target. Based on New Zealand's most recent greenhouse gas inventory, this budget provisionally equates to 571 Mt CO2e over 2021 – 2030.

New Zealand's NDC was thus specified in terms that were opaque to all but the most specialised insiders, ostensibly based on Kyoto Protocol accounting rules (that the NDC actually violated by using a 2005 rather than 1990 base year)


The NDC in perspective
2005 gross = 87Mt
50% reduction
2030
target =
43Mt
571
Million tonnes CO2 equivalent
Emissions year
Gross emissions
Target-accounted net emissions
Budget of 571Mt over 10 years
Net emissions


The NDC in perspective
Million tonnes CO2 equivalent
100
90
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1998
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2016
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2020
2022
2024
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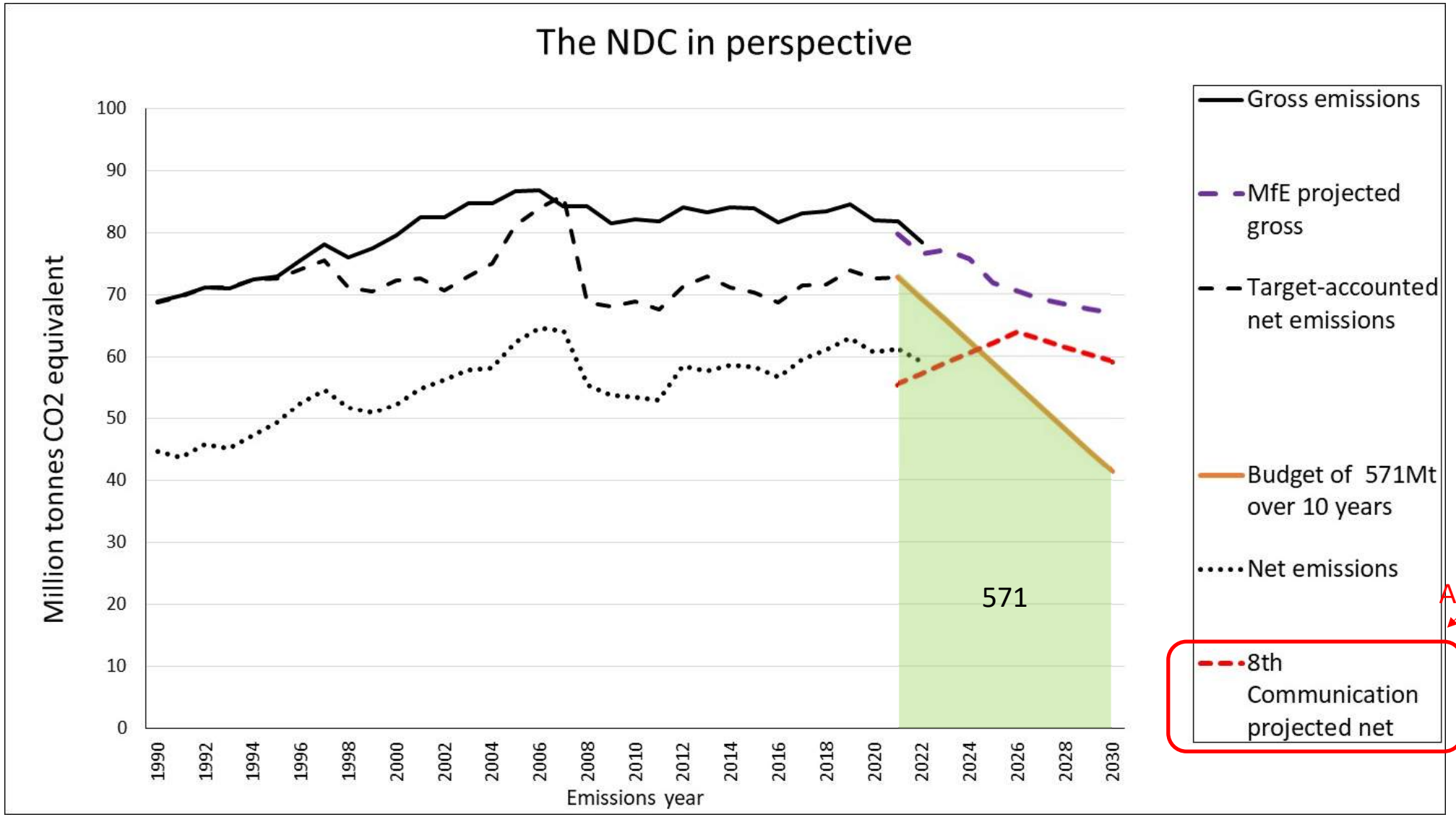
2030
Emissions year
Add this
571
Gross emissions
MfE projected gross
Target-accounted net emissions
Budget of 571Mt over 10 years
Net emissions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2026
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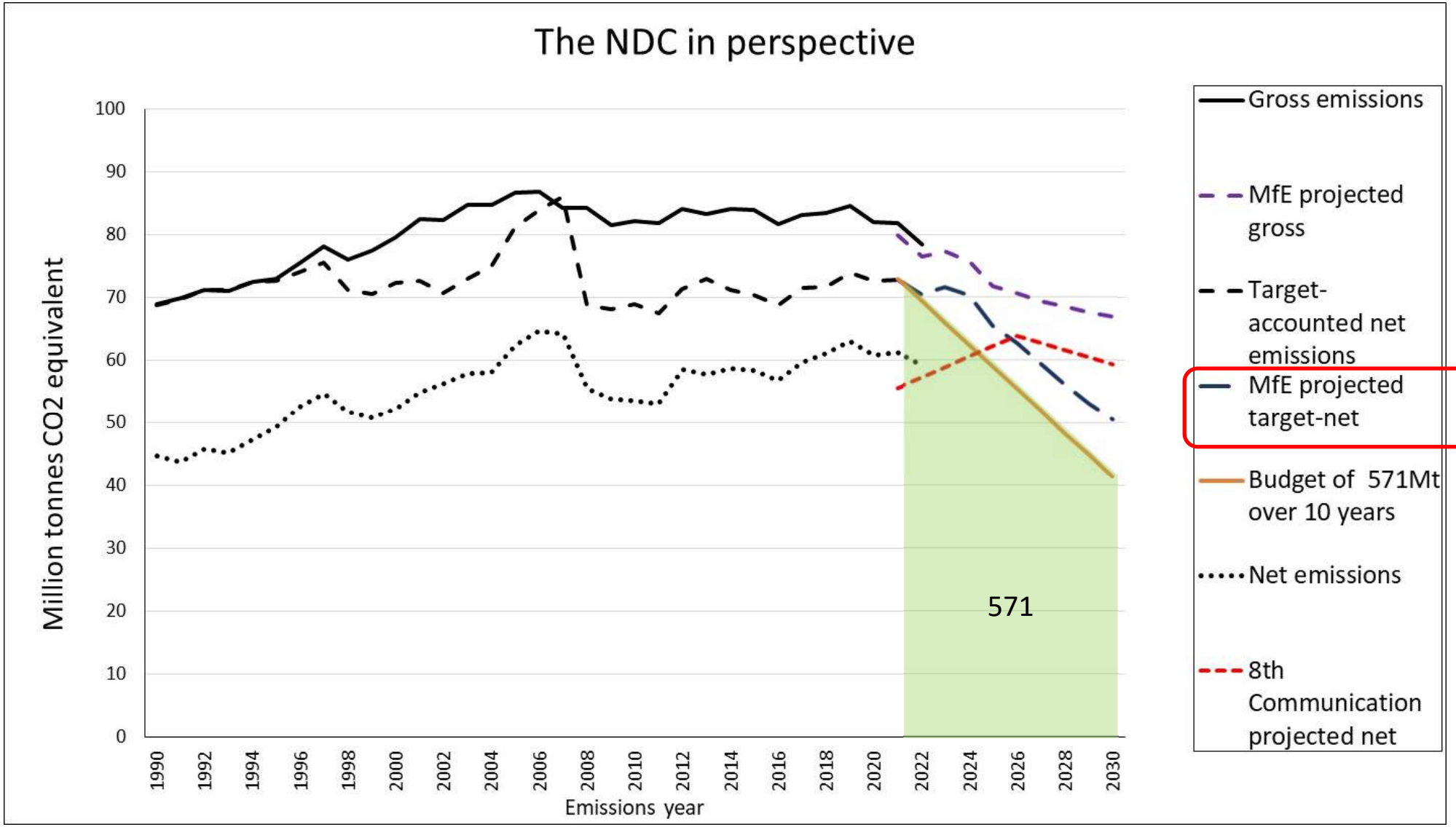
Emissions year
571
Gross emissions
MfE projected gross
Target-accounted net emissions
Budget of 571Mt over 10 years
Net emissions
8th Communication projected net
Add this


The NDC in perspective
Million tonnes CO2 equivalent
100
90
80
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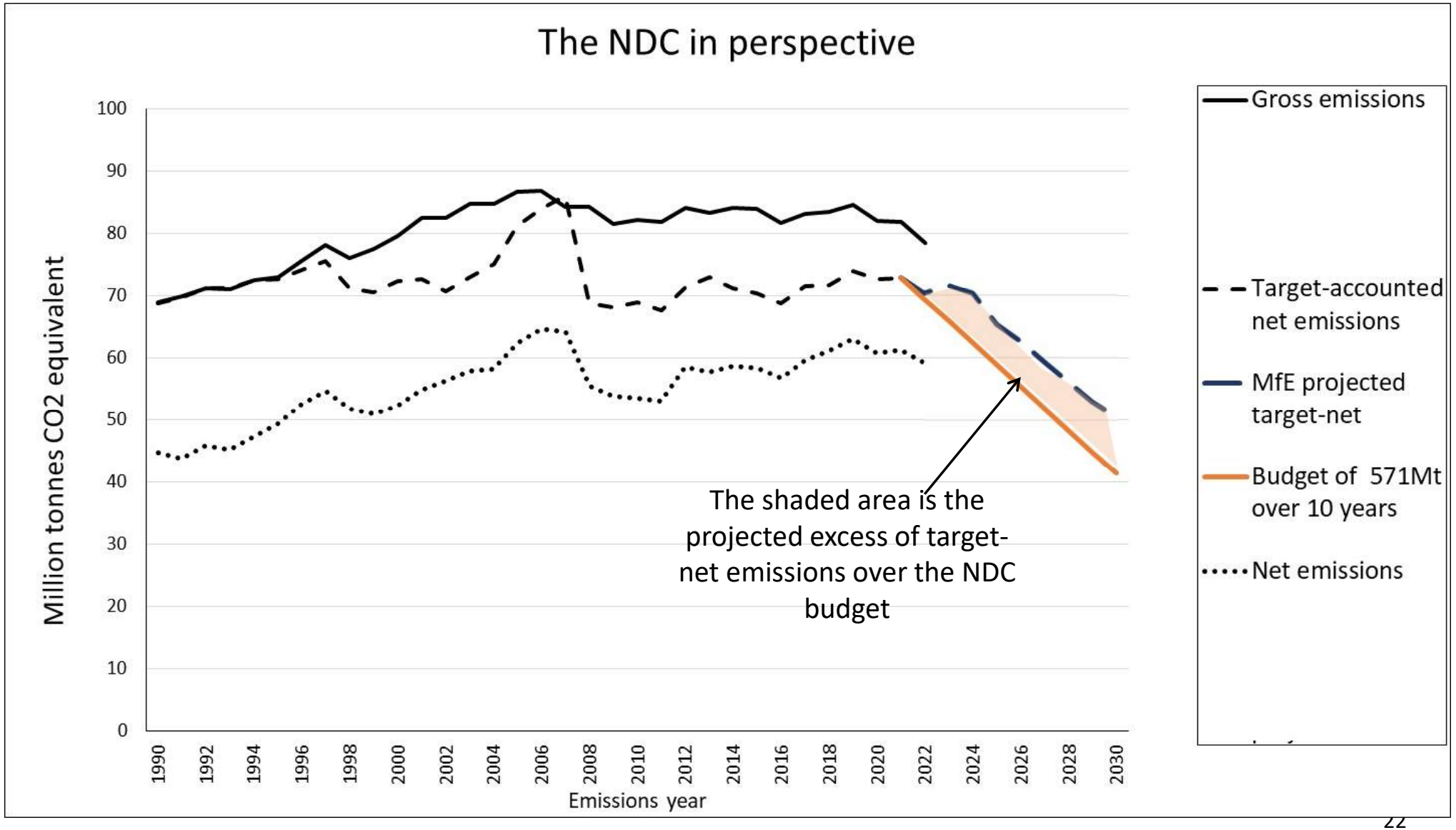
2022
2024
2026
2028
2030
Emissions year
571
Gross emissions
MfE projected gross
Target-accounted net emissions
MfE projected target-net
Budget of 571Mt over 10 years
Net emissions
8th Communication projected net
Add this


The NDC in perspective
Million tonnes CO2 equivalent
100
90
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70
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0
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2018
2020
2022
2024
2026
2028
2030
Emissions year
Gross emissions
Target-accounted net emissions
MfE projected target-net
Budget of 571Mt over 10 years
Net emissions
The shaded area is the projected excess of target-net emissions over the NDC budget

# How big is the problem?

- Most official estimates have been in the range of 100 million tonnes of over-budget emissions to be confronted
- Because the Kyoto rules allow international offsets to be used, the cost depends on the price of units
- The total cost was estimated by Treasury in April 2023 to lie between $3 billion and $24 billion*
- Thus even the accounting trick of gross-net cannot rescue New Zealand from the difficult choice in the later years of the 2020s whether to drastically increase the pace of emissions reduction, find an affordable source of offshore carbon credits, or incur the consequences of reneging on the Paris Agreement.
- That reflects the real prospect that New Zealand may simply renege on its NDC under the Paris Agreement rather than pay the rest of the world any compensation for failure to honour the Nationally Determined Contribution

* https://www.treasury.govt.nz/sites/default/files/2023-04/cefa23.pdf

# Part 3: Why New Zealand can walk away

Because none of these commitments are legally binding so the consequences of breaking them are purely political and reputational

# Start with those Treasury estimates of the cost of buying-in units to meet the NDC

- Because the Nationally Determined Contribution is not a legally binding international obligation, the Treasury did not enter those cost figures as contingent liabilities on the Crown balance sheet
- That contrasts with Kyoto CP1 (the last time a New Zealand Minister faced a legally-binding emissions limit), when contingent fiscal liabilities were regularly recorded
- In its April 2023 document calculating the fiscal costs of offshore purchases, Treasury noted (p.82):

> "NDC ambition New Zealand may change its NDC at any time. The total required volume of offshore mitigation could therefore be different than under the currently stated NDC1 if it were to be further updated."

As the Climate Change Commission pointed out in its 2024 review of the 2050 emissions-reduction target,

The Paris Agreement imposes a binding obligation on countries to ***have*** an NDC in force at all times but does not impose an obligation to meet that NDC. NDCs themselves are non-binding. This means changes in the level of Aotearoa New Zealand's NDC are not a change in international obligations.

https://www.climatecommission.govt.nz/our-work/advice-to-government-topic/review-of-the-2050-emissions-target/2024-review-of-the-2050-emissions-target/discussion-document-2024-review-of-aotearoa-new-zealands-2050-emissions-reduction-target/ accessed 29 April 2024, page 65.

From a recent McGuinness Institute document, regarding 2015 NDC discussions,:

The *2015 Cabinet Paper* acknowledges a legal obligation existed in 2015 in terms of 'transparency processes' under the Paris Agreement (for updating, accounting, and regular reporting and review of NDC implementation and achievement). The *2015 Cabinet Paper* noted certain paragraphs in the agreement used the term 'shall', implying some aspects did contain a legal obligation (see excerpt of the Paris Agreement overleaf). However, advice from officials makes clear that they consider no legal obligation existed at that time for the delivery of prescribed goals and ambitions towards achieving the NDCs. Arguably, there is no legal obligation to exactly achieve the NDC target, but there is a legal obligation to take action towards achieving it.

The *2015 Cabinet Paper* notes:

> The Agreement **obliges** New Zealand to submit and undertake 5-yearly updates of nationally determined (mitigation) contributions (NDCs), and to pursue domestic measures towards achieving them. New Zealand must participate in **the Agreement's transparency (accounting, reporting and review) regime.** [bold added] (Para 5)
>
> Officials advise that the 2030 target should not be reflected in the Crown accounts **at this time.** Whether the target will be included in Crown accounts **depends on the degree to which the target is internationally binding, as well as the domestic enforceability of the target, including any obligation on the Crown to expend resources to meet the target.** Since there is currently no legally enforceable obligation on the Crown to expend resources to meet the target, there is no requirement to reflect this in Crown accounts **currently.** [bold added] (Para 47)[46]

46 See Office of the Minister for Climate Change Issues. (9 November 2015). *Paris Climate Change Agreement - Report back to Cabinet and Approval for Signature* [Cabinet Paper] [CAB-15-MIN-1099]. Retrieved 21 June 2021 from environment.govt.nz/publications/paris-climate-change-agreement-report-back-to-cabinet-and-approval-for-signature

# Doesn't the Zero Carbon Act bind the Minister to meet his domestic budgets?

- No – the only binding obligation is to set up the Climate Change Commission and set domestic emission budgets

Section 5W of the Act provides only that the Minister must "set a series of emissions budgets … in a way that allows those budgets to be met domestically" [emphasis added]. This is an aspiration, not a binding commitment.

**5ZM Effect of failure to meet 2050 target and emissions budgets**

(1) No remedy or relief is available for failure to meet the 2050 target or an emissions budget, and the 2050 target and emissions budgets are not enforceable in a court of law, except as set out in this section.

(2) If the 2050 target or an emissions budget is not met, a court may make a declaration to that effect, together with an award of costs.

(3) If a declaration is made and becomes final after all appeals or rights of appeal expire or are disposed of, the Minister must, as soon as practicable, present to the House of Representatives a document that—

(a) brings the declaration to the attention of the House of Representatives; and

(b) contains advice on the Government's response to the declaration.

Section 5ZM: inserted, on 14 November 2019, by section 8 of the Climate Change Response (Zero Carbon) Amendment Act 2019 (2019 No 61).

# Now turn to the latest Draft Emissions Reduction Plan released last week*

- The Coalition Government has dumped most of the last Government's additional measures and intends to rely primarily on the NZETS and forestry planting
- It plans to achieve sufficient forestry planting to bring the NZU price down to $50 by 2035 and hold it there until 2050
- (In contrast, the Ministry for the Environment's December 2023 emissions projections assumed an NZU price rising to $230 by 2050.)
- Consider first how much the emissions projections are increased by the Draft ERP's weakening of policy
- Then look at the economics of the NZETS and the carbon price

* https://environment.govt.nz/assets/publications/climate-change/New-Zealands-second-emissions-reduction-plan-Discussion-document.pdf and https://environment.govt.nz/assets/publications/climate-change/New-Zealands-second-emissions-reduction-plan-Technical-annex.pdf

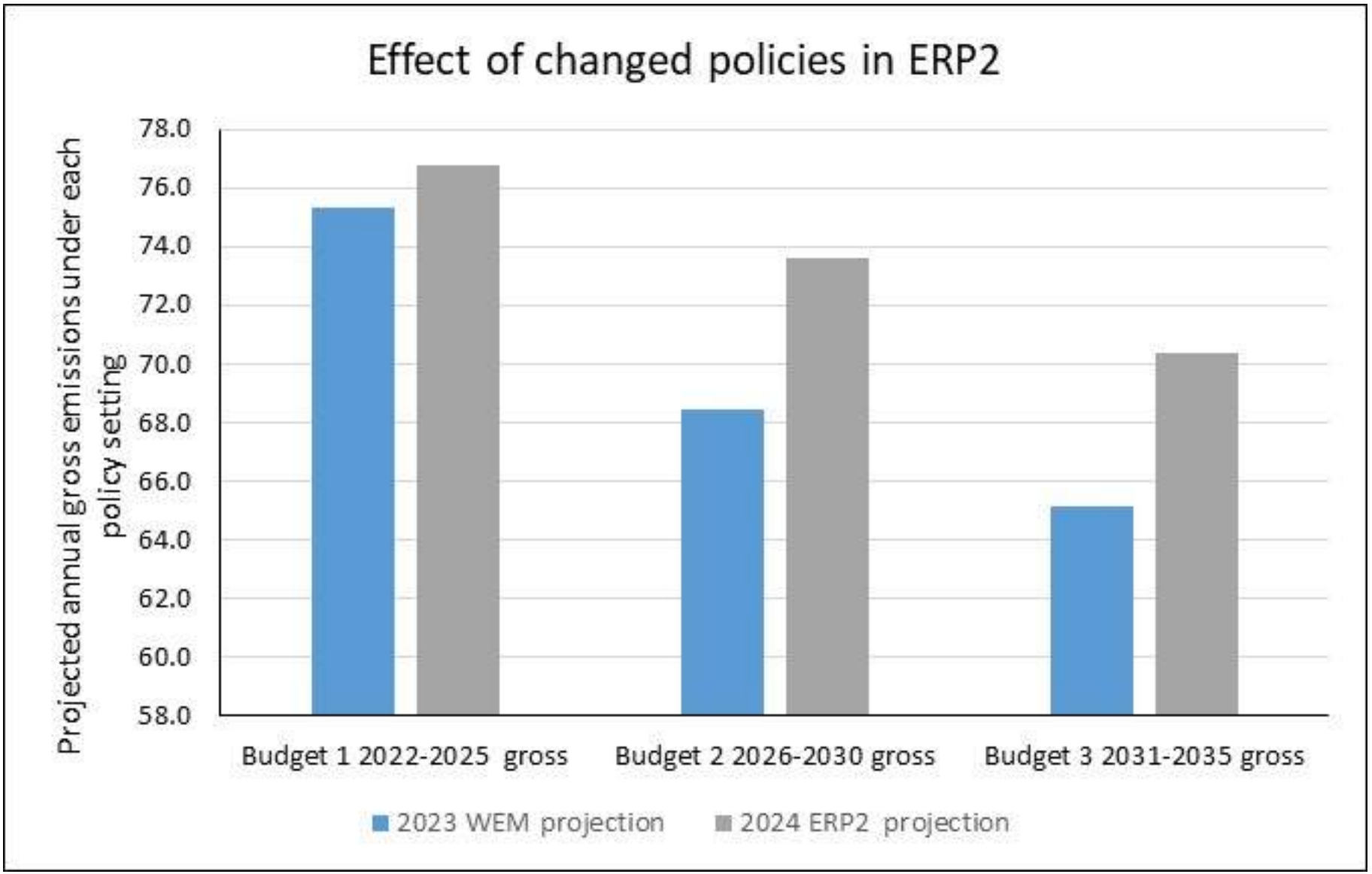
# Here " net" means "target-accounted-net"

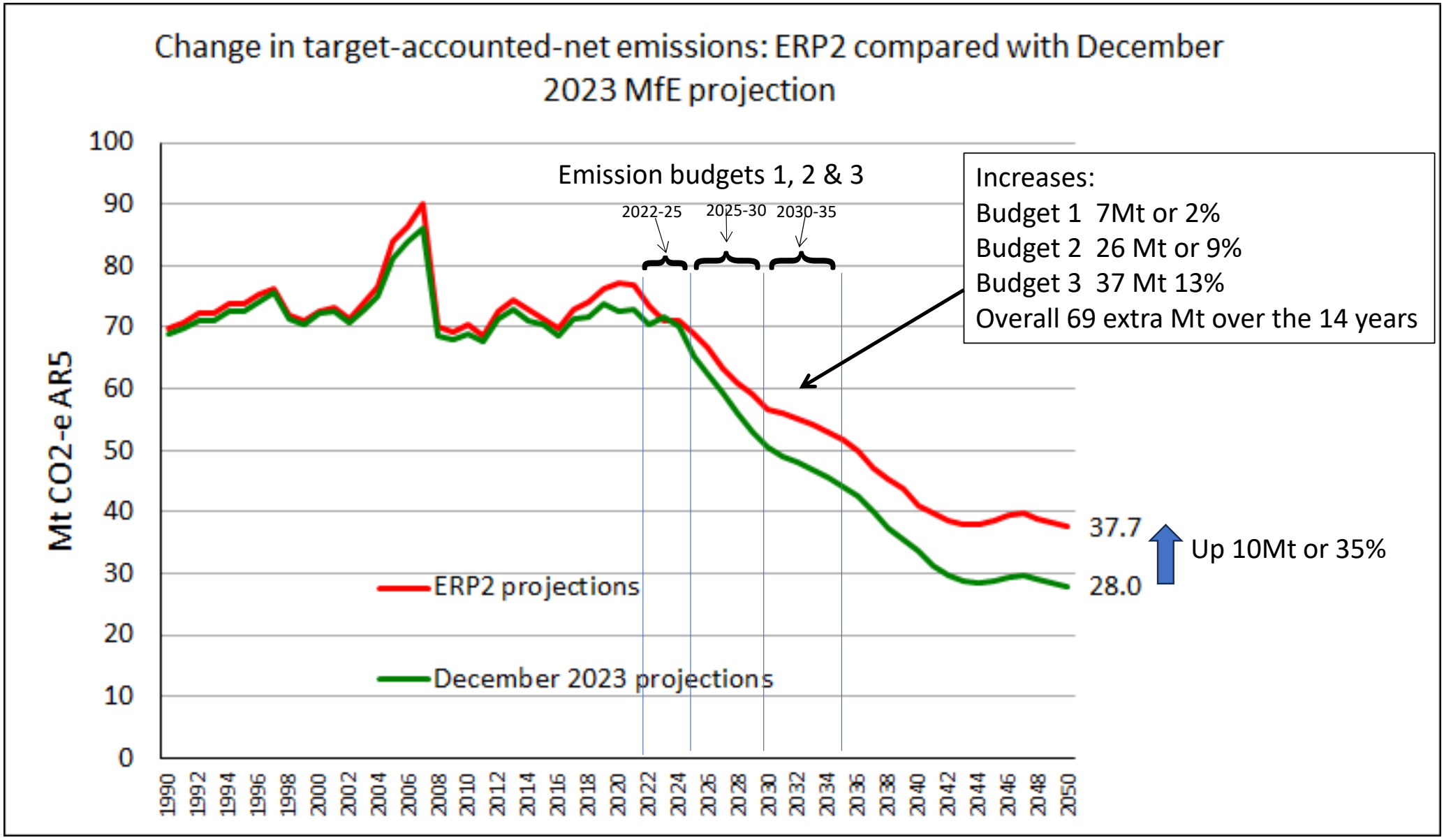
**Table 1: Interim consultation baseline, excluding new policies, compared with 2023 projections per budget period (Mt $CO_2$-e)**

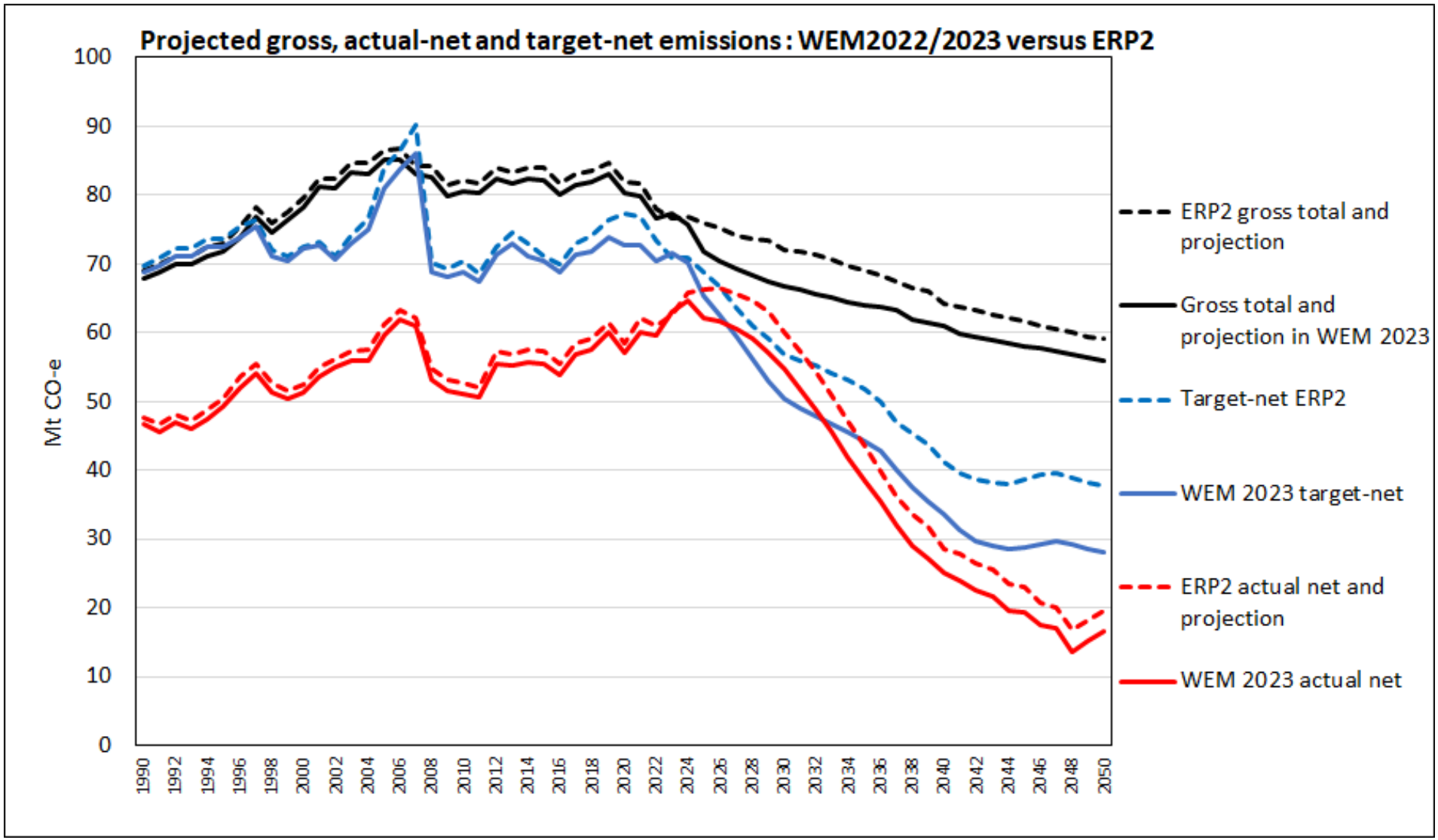
| Budget period | Category | Budget | 2023 WEM projections | ERP2 interim baseline | Change in emissions ERP2 v WEM2023 Mt | Change in emissions ERP2 v WEM2023 % |
|---|---|---|---|---|---|---|
| **First** 2022-2025 | **Net emissions** | **290** | **277** | **284.0 ± 4** | **7** | **2.5%** |
| | Gross emissions | | 301 | 307 | **6** | **2.0%** |
| | Removals | | –24 | –23 | **1** | **4.2%** |
| **Second** 2026-2030 | **Net emissions** | **305** | **281** | **307.1 ± 18** | **26.1** | **9.3%** |
| | Gross emissions | | 342 | 368 | **27** | **7.9%** |
| | Removals | | –61 | –61 | **0** | **0.0%** |
| **Third** 2031-2035 | **Net emissions** | **240** | **233** | **270.1 ± 29** | **37.1** | **15.9%** |
| | Gross emissions | | 326 | 352 | **26** | **8.0%** |
| | Removals | | –92 | –82 | **-10** | **-10.9%** |

Note: WEM = with existing measures.

New Zealand's second emissions reduction plan (2026-30): Technical annex to the discussion document MFE July 2024, https://environment.govt.nz/assets/publications/climate-change/New-Zealands-second-emissions-reduction-plan-Technical-annex.pdf accessed 20 July 2024, p.14 Table 1.


Effect of changed policies in ERP2
Projected annual gross emissions under each policy setting
78.0
76.0
74.0
72.0
70.0
68.0
66.0
64.0
62.0
60.0
58.0
Budget 1 2022-2025 gross
Budget 2 2026-2030 gross
Budget 3 2031-2035 gross
2023 WEM projection
2024 ERP2 projection


Change in target-accounted-net emissions: ERP2 compared with December 2023 MfE projection
Mt CO2-e AR5
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
2048
2050
Emission budgets 1, 2 & 3
2022-25
2025-30
2030-35
Increases:
Budget 1 7Mt or 2%
Budget 2 26 Mt or 9%
Budget 3 37 Mt 13%
Overall 69 extra Mt over the 14 years
ERP2 projections
December 2023 projections
37.7
28.0
Up 10Mt or 35%


Projected gross, actual-net and target-net emissions : WEM2022/2023 versus ERP2
Mt CO-e
100
90
80
70
60
50
40
30
20
10
0
1990
1992
1994
1996
1998
2000
2002
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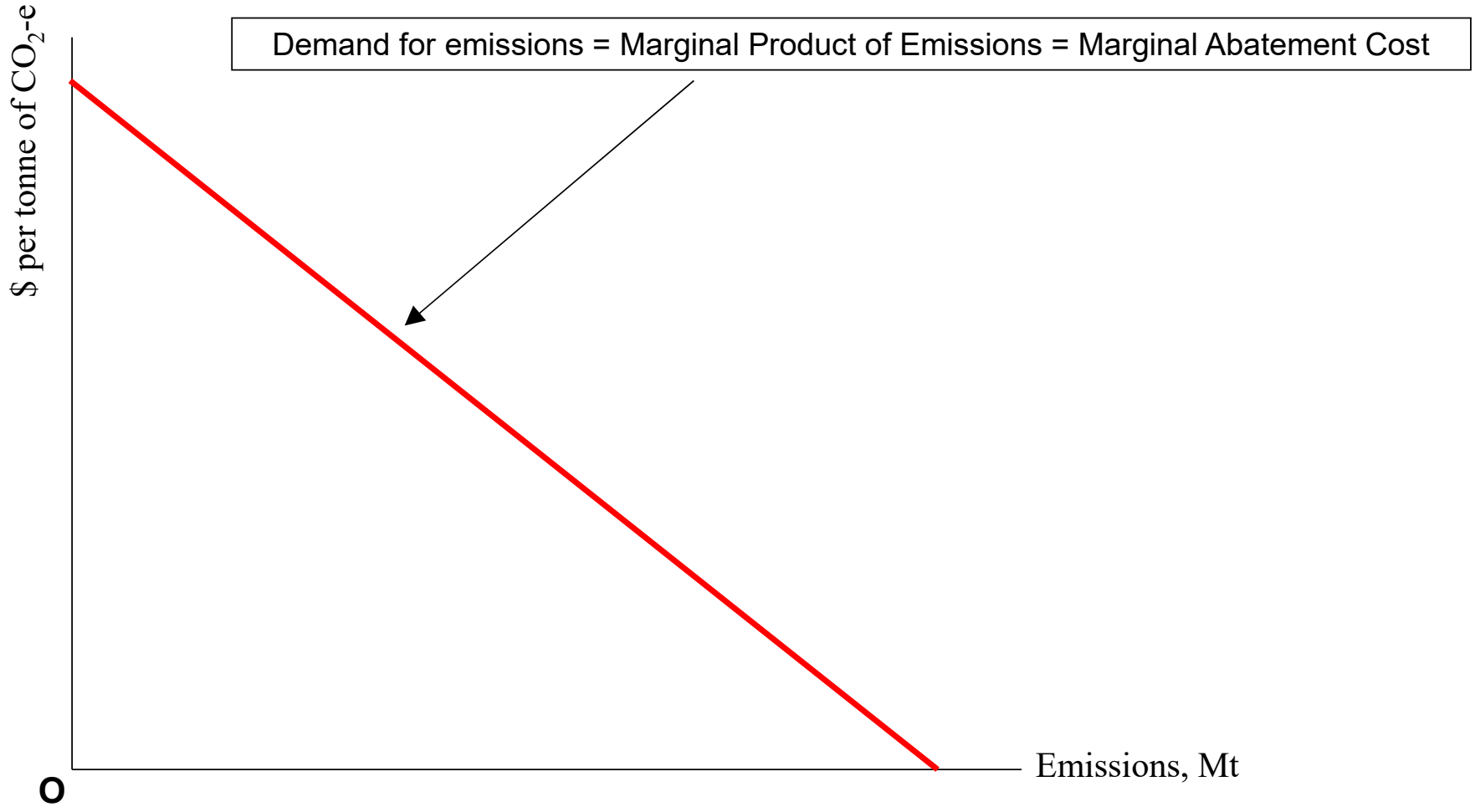
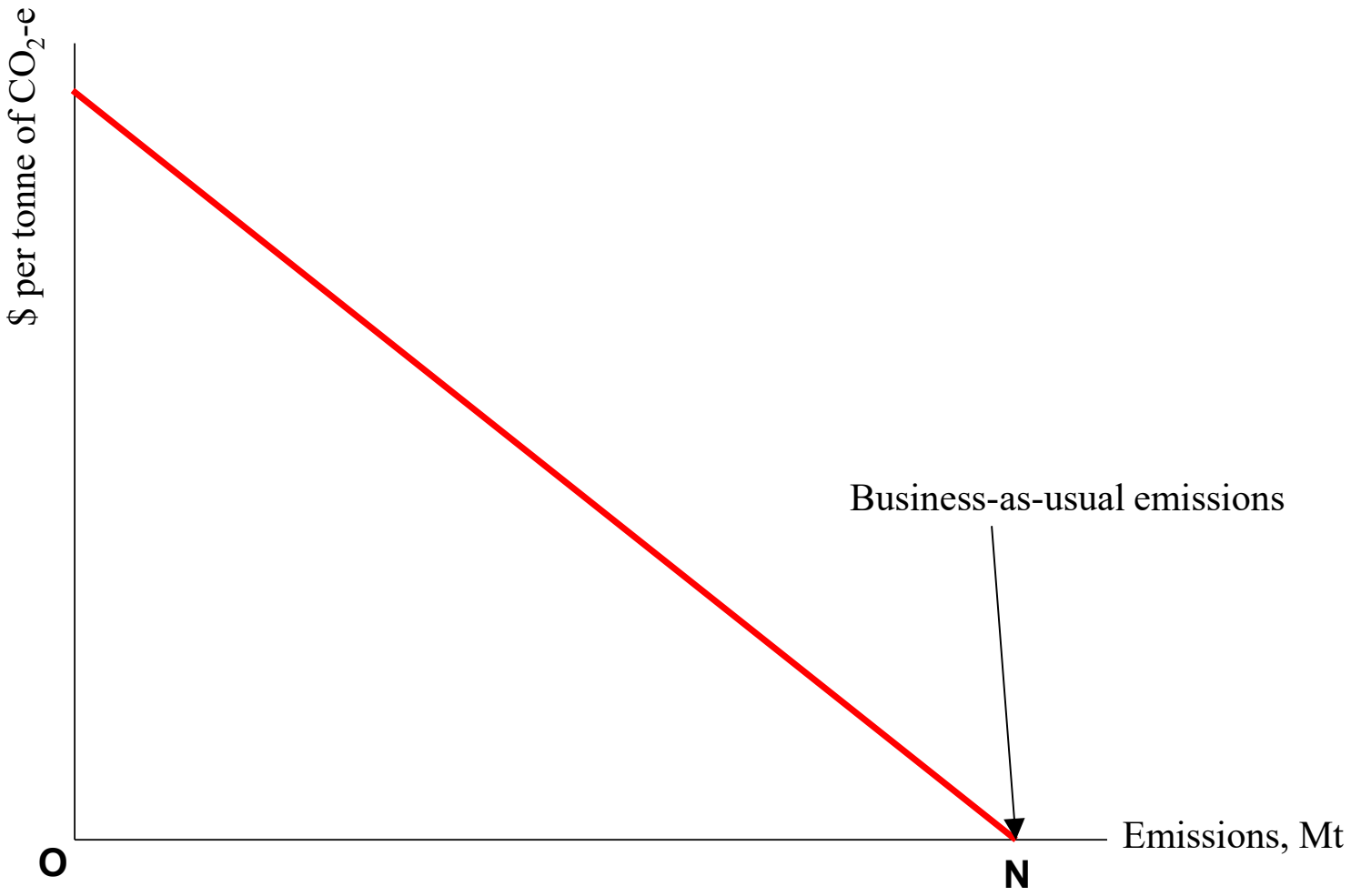
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
2048
2050
ERP2 gross total and projection
Gross total and projection in WEM 2023
Target-net ERP2
WEM 2023 target-net
ERP2 actual net and projection
WEM 2023 actual net

# Economics of the Draft Second ERP

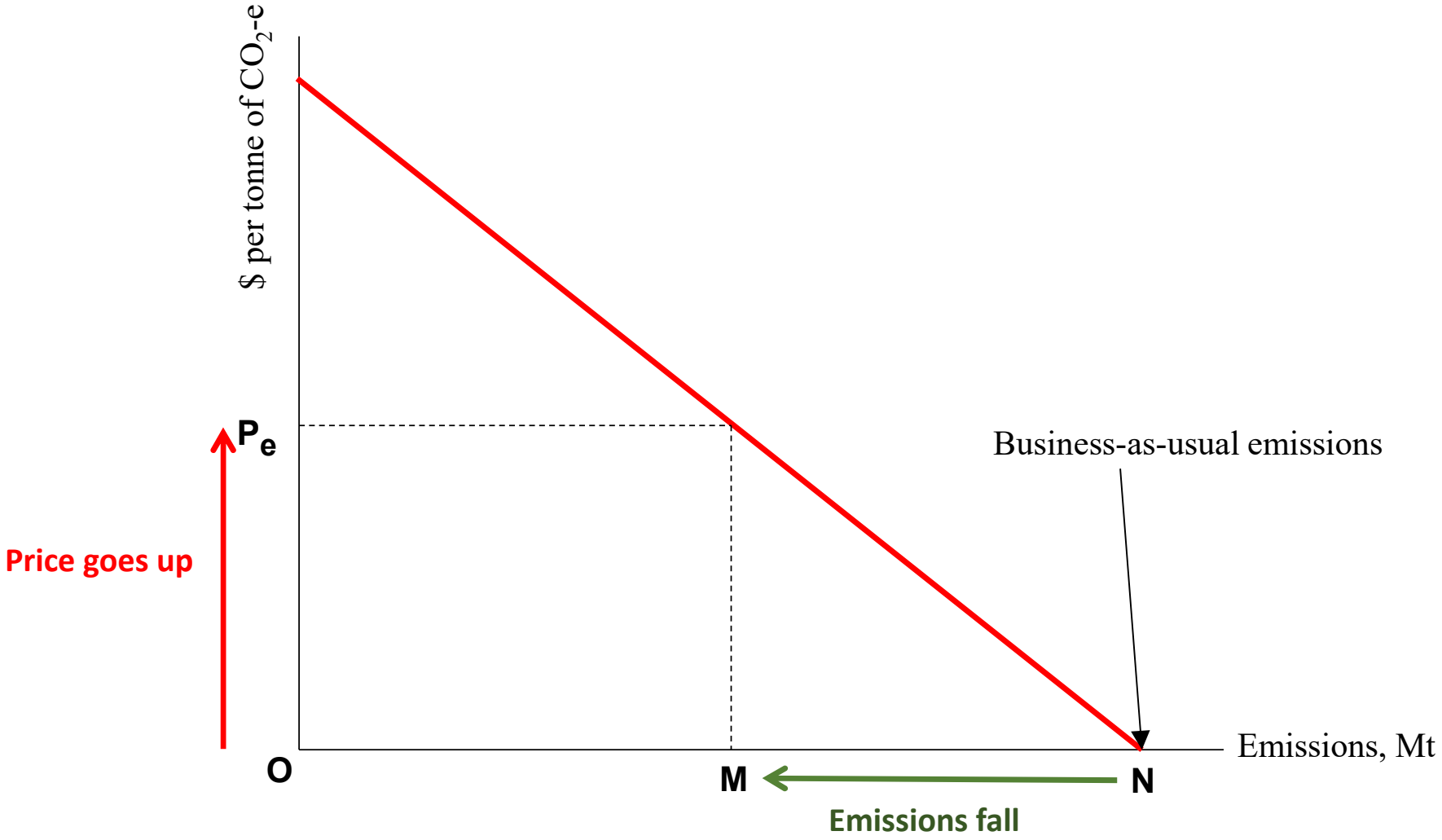
# The “carbon market” has a “demand curve”



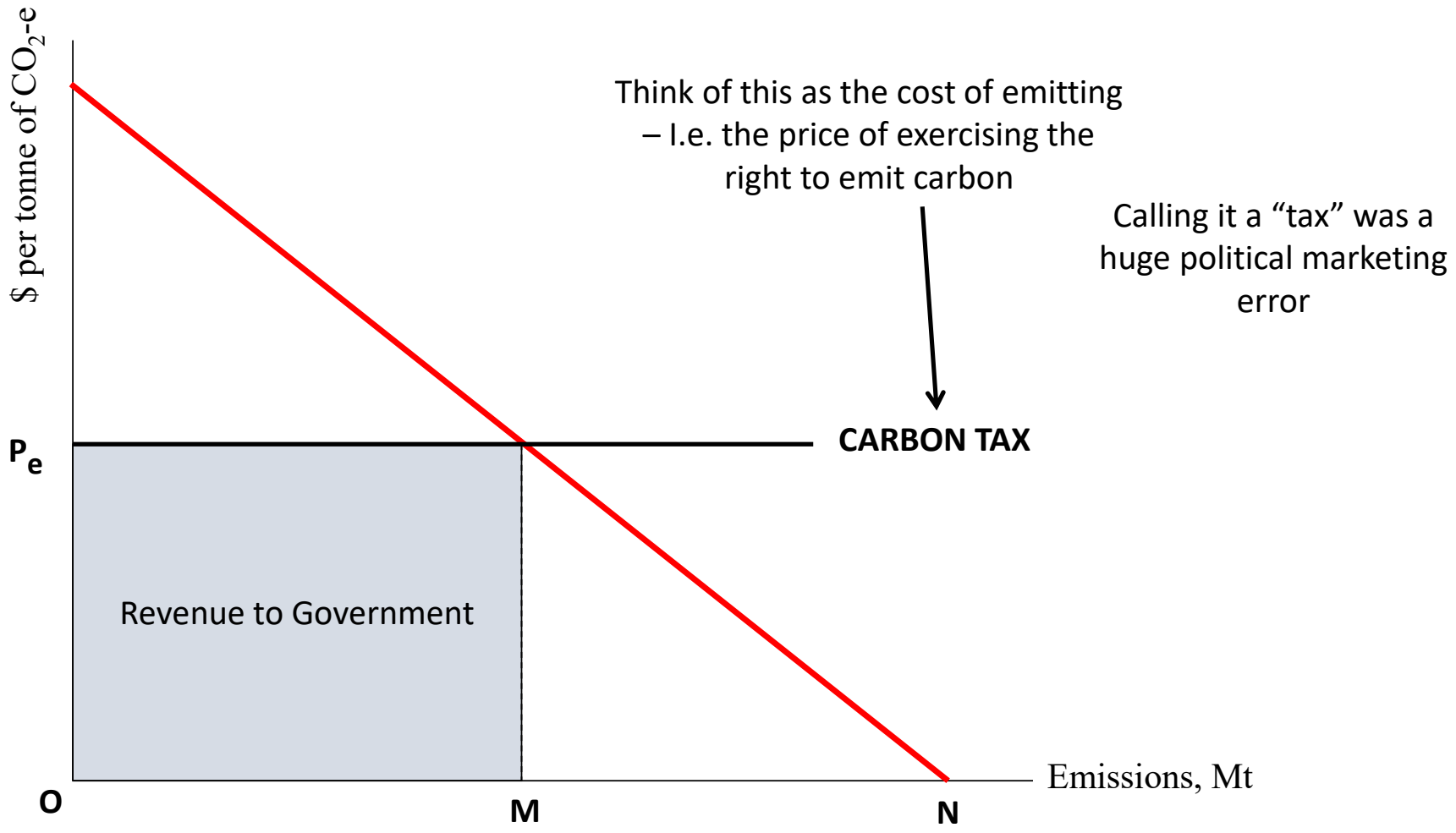
# With emissions unpriced, the economy emits ON



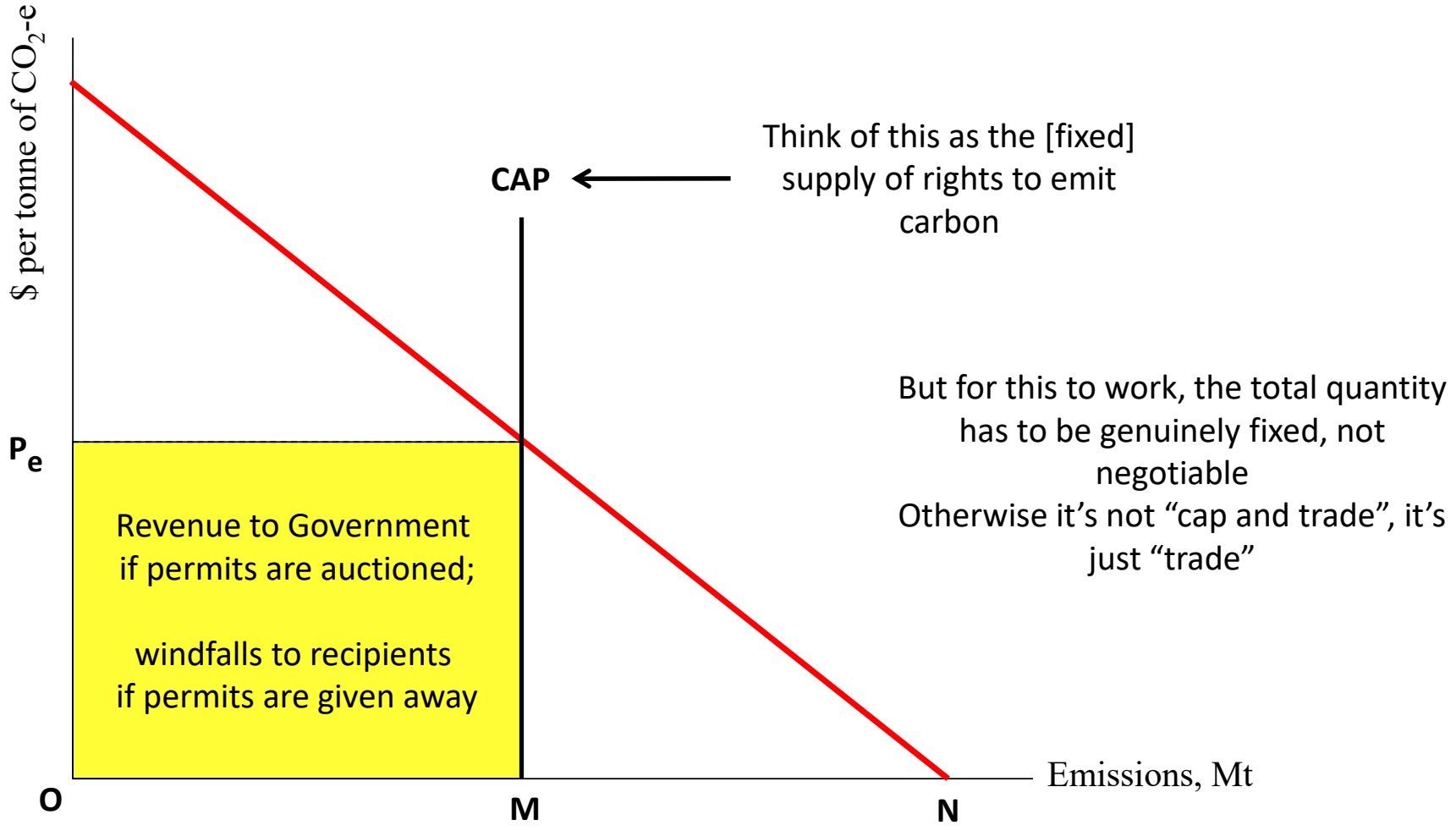
If the price of emissions rises to $P_e$ then the quantity falls to OM and the emissions reduction ("abatement" or "mitigation") is MN



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



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




But for this to work, the total quantity has to be genuinely fixed, not negotiable
Otherwise it's not "cap and trade", it's just "trade"

# What could go wrong?

# A carbon tax was too hard in the face of vested interests

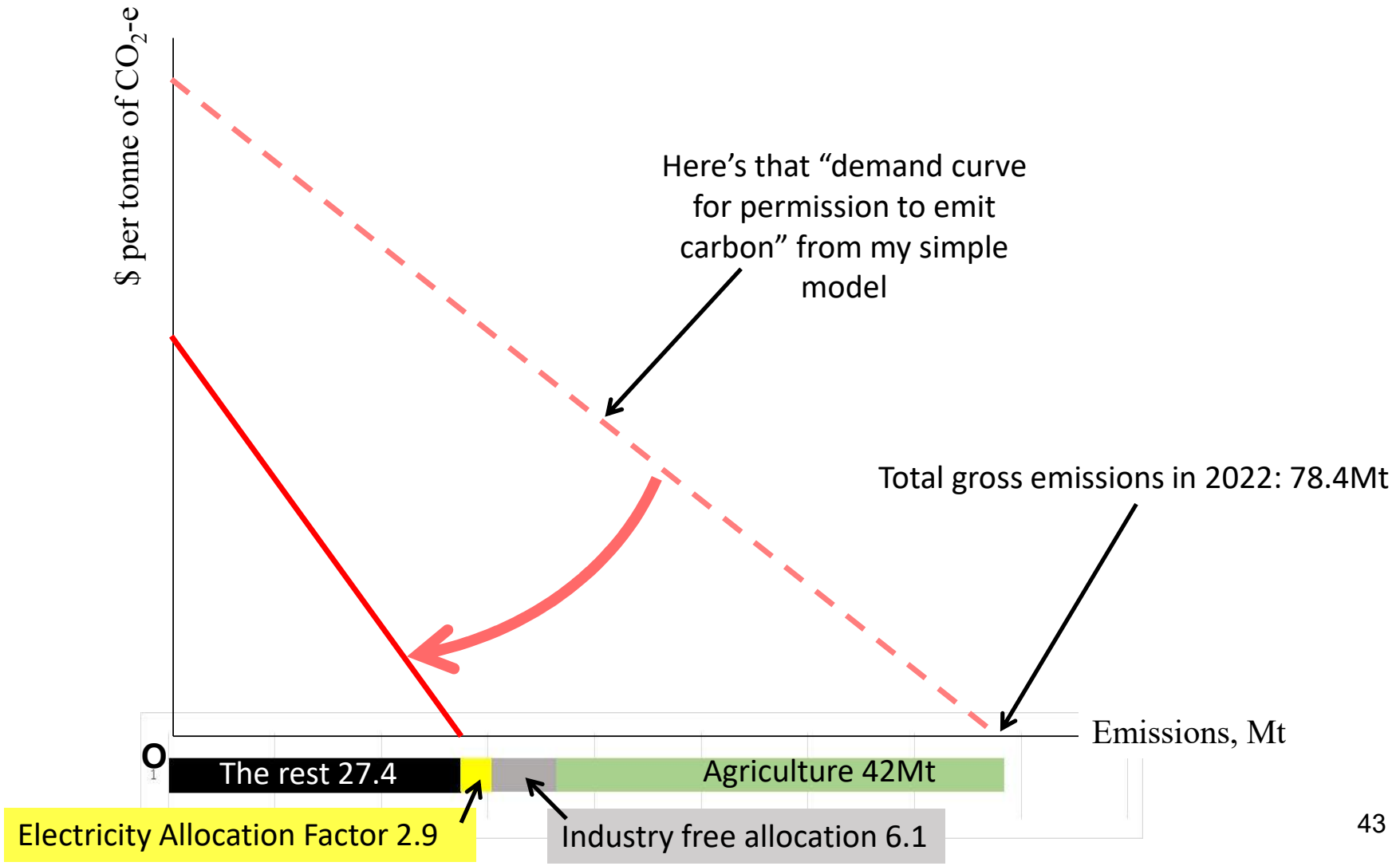
- Simon Upton tried in the early 1990s; ended up with Voluntary Negotiated Greenhouse Agreements

- Helen Clark and Peter Hodgson tried with agriculture in 2003 and got the ‘fart tax’ campaign

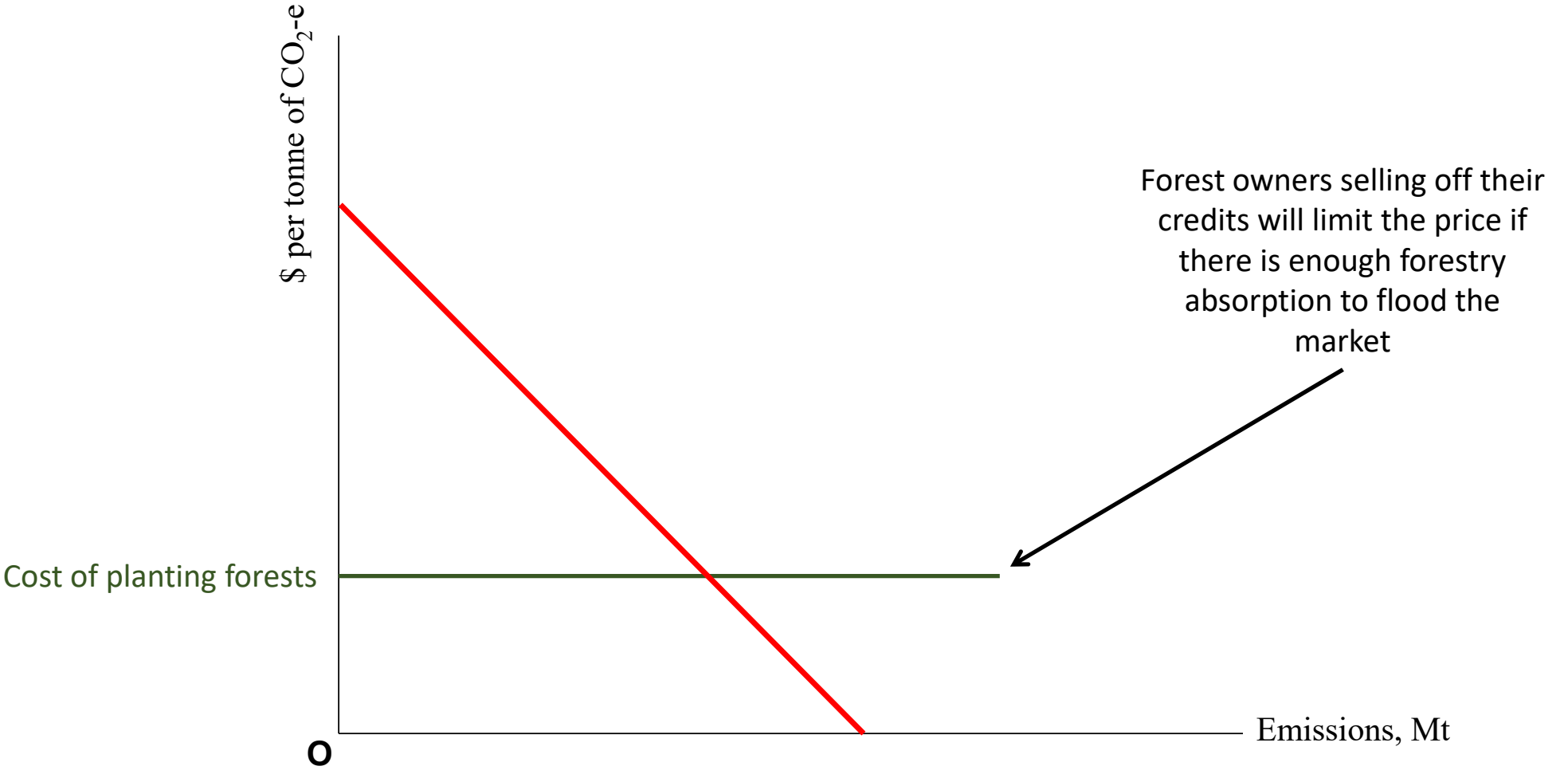
- They tried again in 2005 and were blocked by Winston

- So we ended up with Emissions Trading by default

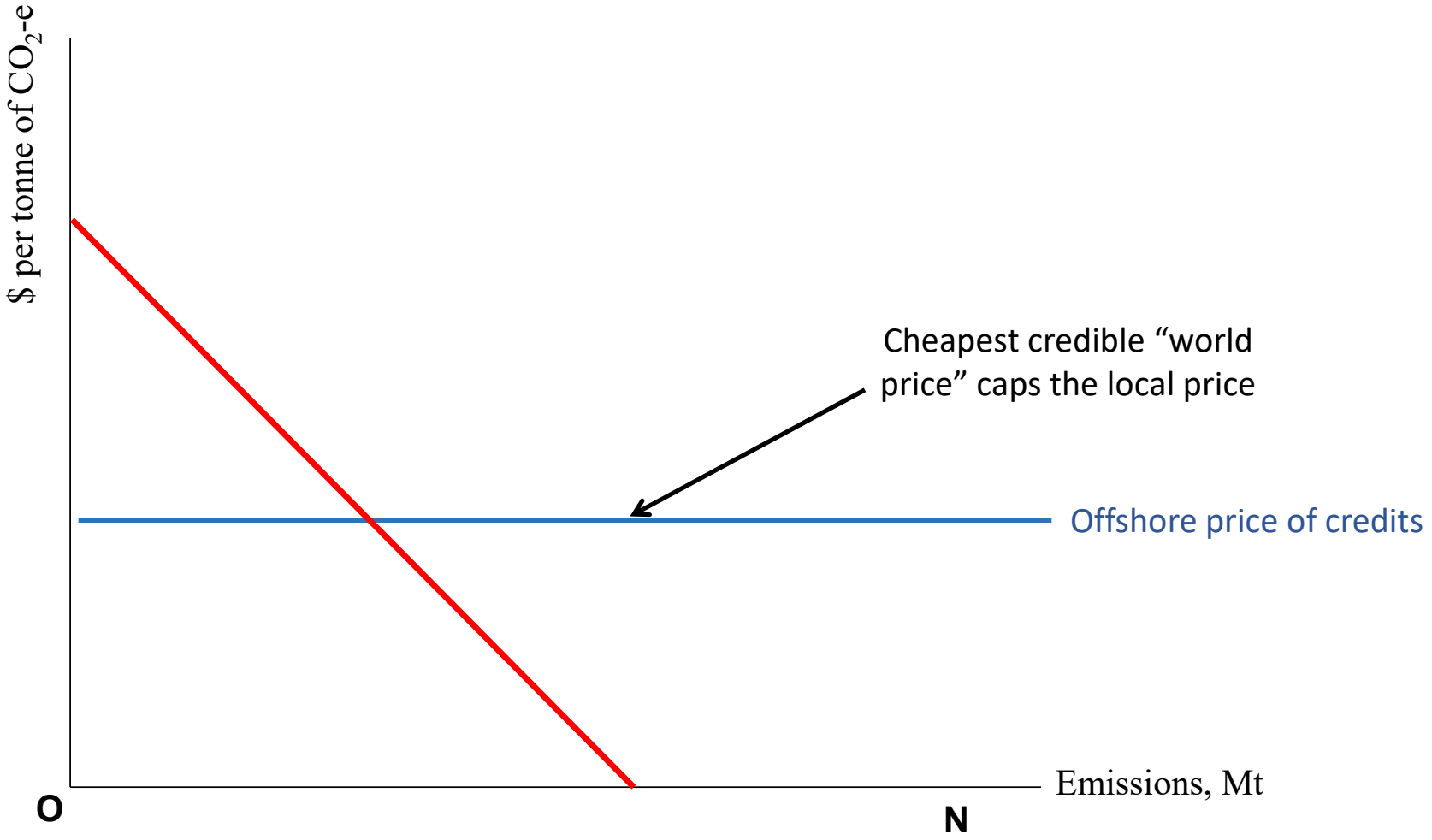
# NZETS provisions 1: give polluters free credits => shrink the market



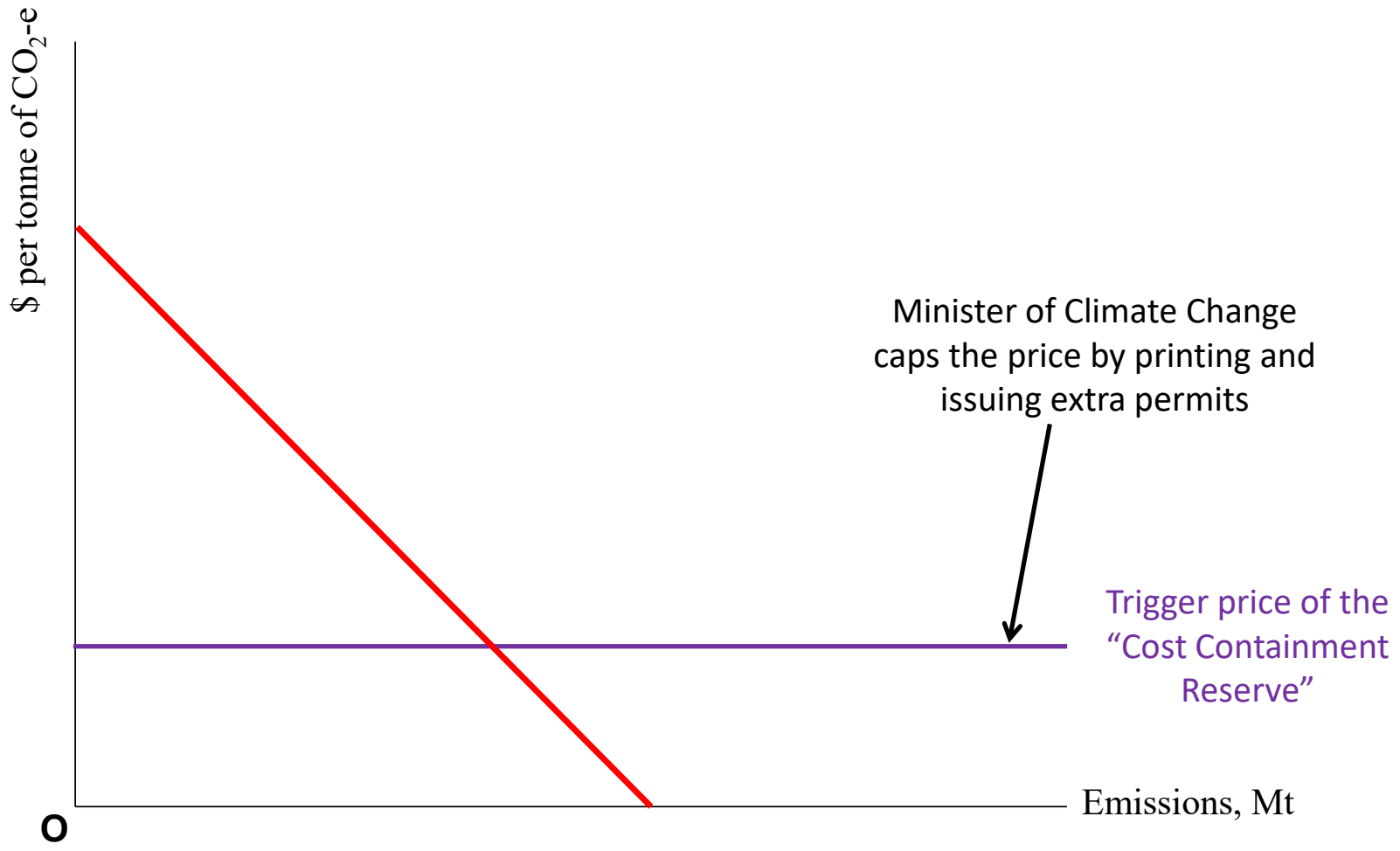
# NZETS provisions 2: allow forestry absorption to be traded one-for-one



# NZETS provision 3: allow polluters to buy credits offshore and use them domestically



# NZETS provisions 4: allow Government to print extra units to hold the price down



# The key ERP2 leakages is forestry

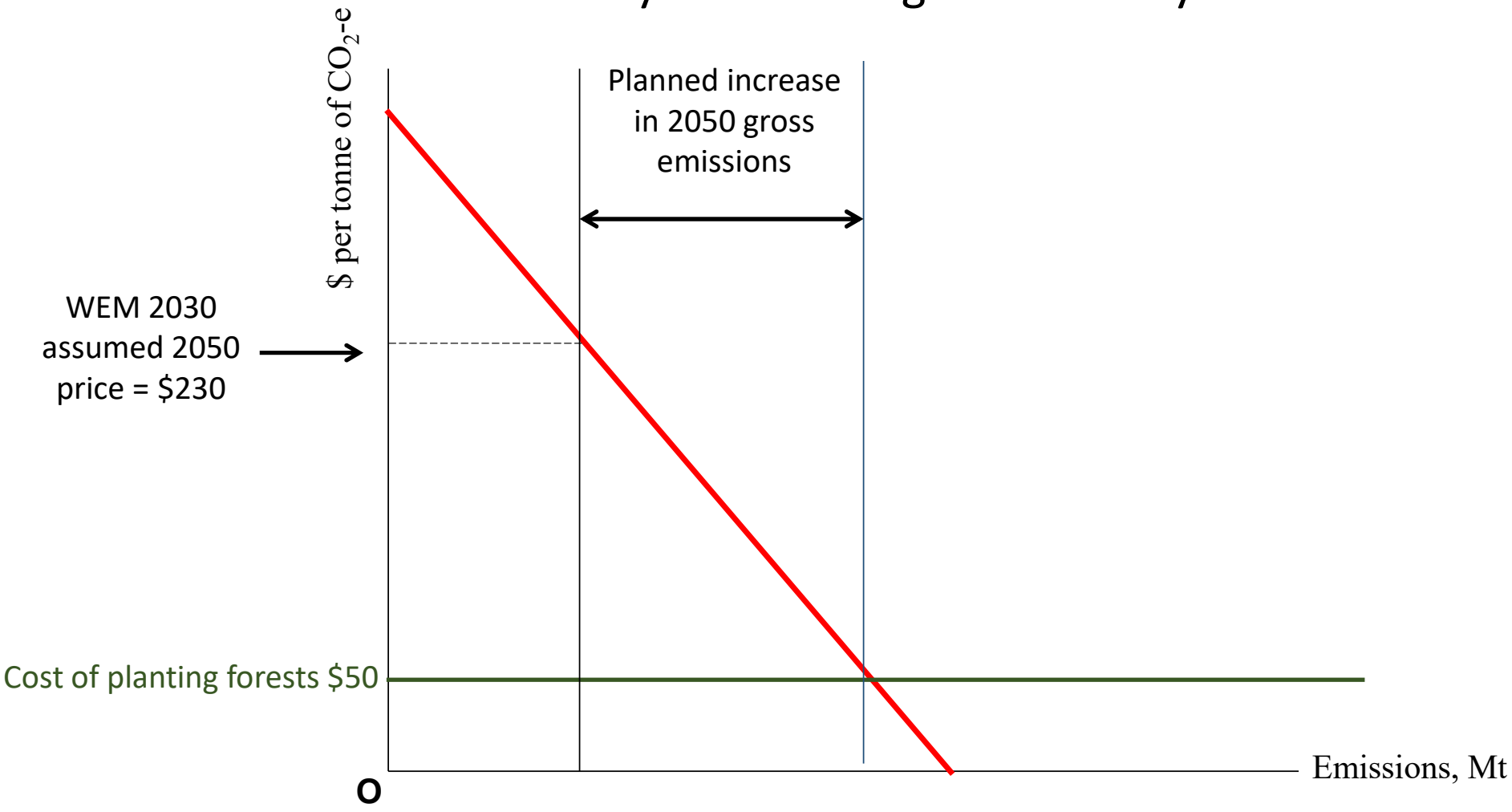
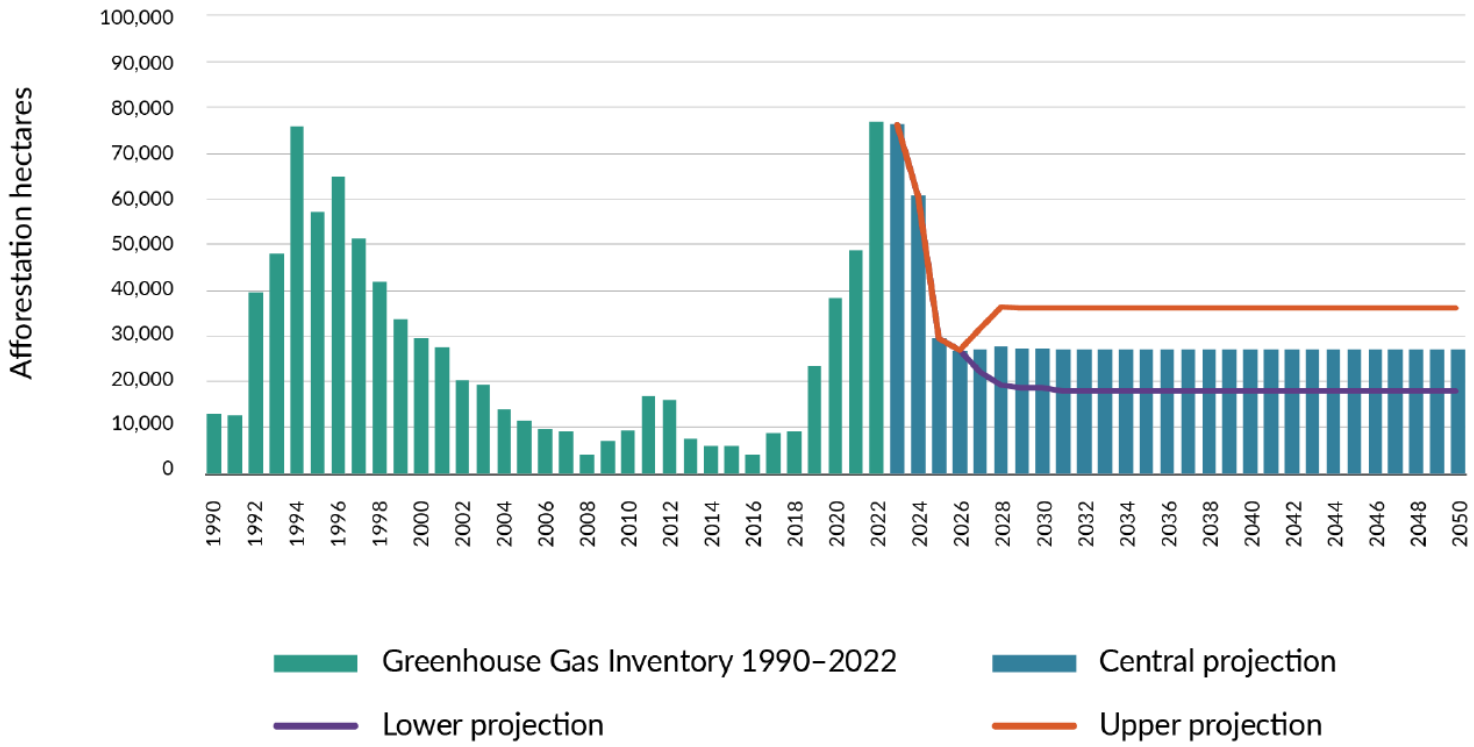


**Figure 8.1: Actual and projected afforestation rates assumed in the 2024 projections (hectares), 1990–2050**

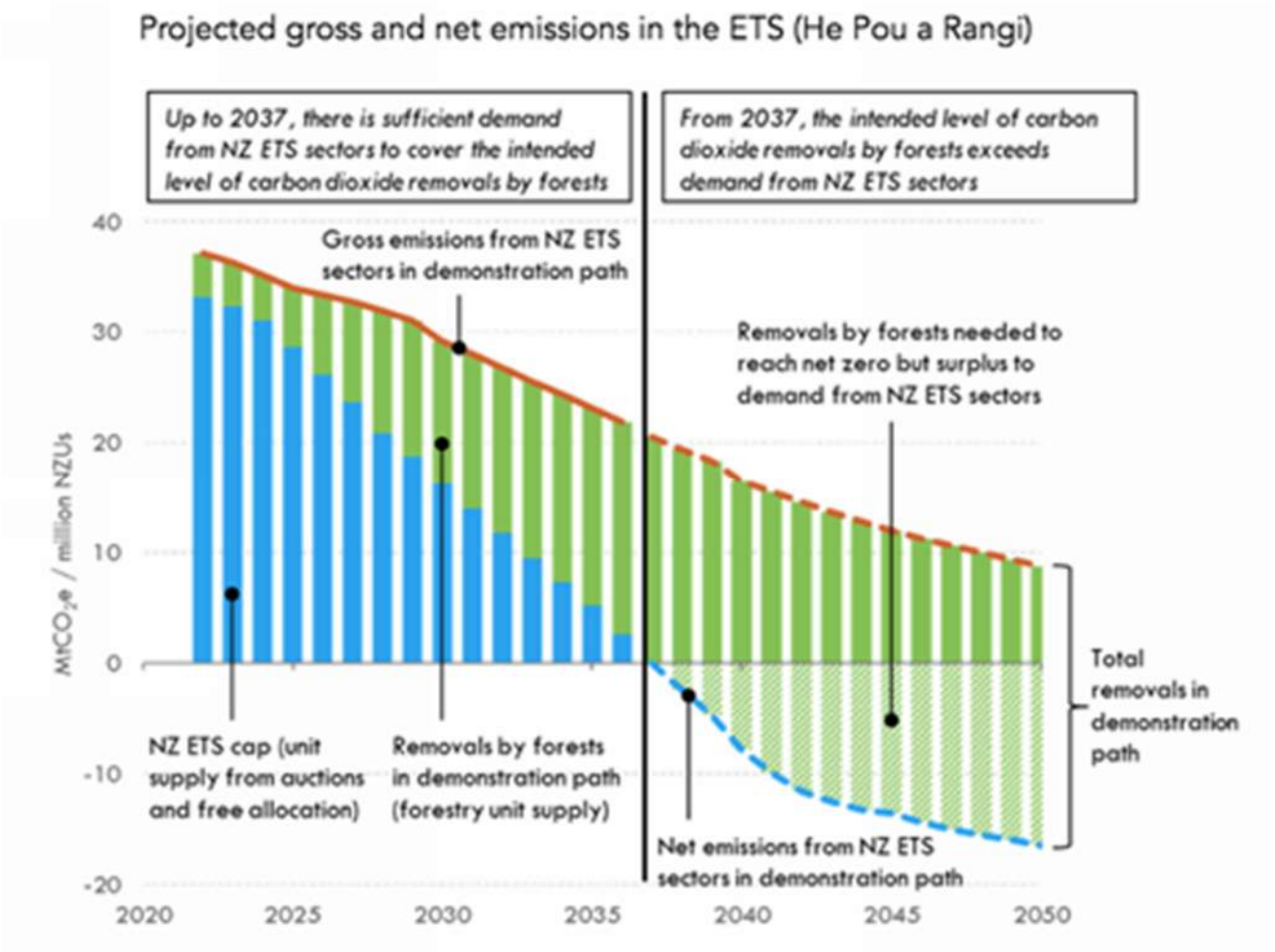



Source: Afforestation projections from 2023–26 and the lower afforestation projection are primarily based on the 2023 ADIS, while the upper projection is primarily based on the 2021 ADIS. To access the ADIS reports, go to Agricultural Greenhouse Gas Inventory reports.

Planting about 28,000 hectares per year over 25 years to 2050 => 700,000 hectares or 2.5% of the total surface area of NZ.

New Zealand's net stocked planted production forest covered an estimated 1.79 million hectares as at 1 April 2023 so this is roughly a 40% increase.

*Discussion document: New Zealand's second emissions reduction plan* MfE July 2024, https://environment.govt.nz/assets/publications/climate-change/New-Zealands-second-emissions-reduction-plan-Discussion-document.pdf accessed 20 July 2024, page 78 Figure 8.1.




Christina Hood "ETS forestry review critical to achieving emissions goals" *Carbon News* 20 June 2024 https://www.carbonnews.co.nz/story.asp?storyID=27993 accessed 15 July 2024

But where are international carbon prices going?

*Table 3.1.1: Social Cost of Carbon ($SC\text{-}CO_2$) by Damage Module, 2020-2080 (in 2020 dollars per metric ton of $CO_2$)*

| | Near-Term Ramsey Discount Rate and Damage Module | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2.5% Near-Term Rate | | | 2.0% Near-Term Rate | | | 1.5% Near-Term Rate | | |
| Emission Year | DSCIM | GIVE | Meta-Analysis | DSCIM | GIVE | Meta-Analysis | DSCIM | GIVE | Meta-Analysis |
| 2020 | 110 | 120 | 120 | 190 | 190 | 200 | 330 | 310 | 370 |
| 2030 | 140 | 150 | 150 | 230 | 220 | 240 | 390 | 350 | 420 |
| 2040 | 170 | 170 | 170 | 280 | 250 | 270 | 440 | 390 | 460 |
| 2050 | 210 | 200 | 200 | 330 | 290 | 310 | 500 | 430 | 520 |
| 2060 | 250 | 220 | 230 | 370 | 310 | 350 | 550 | 470 | 570 |
| 2070 | 280 | 240 | 250 | 410 | 340 | 380 | 600 | 490 | 610 |
| 2080 | 320 | 260 | 280 | 450 | 360 | 410 | 640 | 510 | 650 |

US Environmental Protection Agency ***Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances*** November 2023 p.78, https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf

*Table 3.1.2: Social Cost of Methane (SC-$CH_4$) by Damage Module, 2020-2080 (in 2020 dollars per metric ton of $CH_4$)*

| | Near-Term Ramsey Discount Rate and Damage Module | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2.5% Near-Term Rate | | | 2.0% Near-Term Rate | | | 1.5% Near-Term Rate | | |
| Emission Year | DSCIM | GIVE | Meta-Analysis | DSCIM | GIVE | Meta-Analysis | DSCIM | GIVE | Meta-Analysis |
| 2020 | 470 | 1,600 | 1,700 | 850 | 1,900 | 2,200 | 1,500 | 2,500 | 2,900 |
| 2030 | 1,100 | 2,300 | 2,300 | 1,600 | 2,800 | 2,800 | 2,400 | 3,500 | 3,700 |
| 2040 | 1,900 | 3,300 | 2,900 | 2,500 | 3,800 | 3,500 | 3,300 | 4,700 | 4,500 |
| 2050 | 2,700 | 4,200 | 3,700 | 3,400 | 4,900 | 4,400 | 4,300 | 5,900 | 5,600 |
| 2060 | 3,500 | 5,000 | 4,400 | 4,200 | 5,800 | 5,300 | 5,200 | 7,000 | 6,700 |
| 2070 | 4,200 | 5,700 | 5,100 | 5,100 | 6,600 | 6,200 | 6,100 | 7,900 | 7,800 |
| 2080 | 5,100 | 6,300 | 5,900 | 6,000 | 7,300 | 7,100 | 7,100 | 8,800 | 8,900 |

US Environmental Protection Agency ***Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances*** November 2023 p.78, https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf

*Table 3.1.3: Social Cost of Nitrous Oxide (SC-$N_2O$) by Damage Module, 2020-2080 (in 2020 dollars per metric ton of $N_2O$)*

| | Near-Term Ramsey Discount Rate and Damage Module | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2.5% Near-Term Rate | | | 2.0% Near-Term Rate | | | 1.5% Near-Term Rate | | |
| Emission Year | DSCIM | GIVE | Meta-Analysis | DSCIM | GIVE | Meta-Analysis | DSCIM | GIVE | Meta-Analysis |
| 2020 | 30,000 | 38,000 | 38,000 | 49,000 | 55,000 | 58,000 | 81,000 | 85,000 | 96,000 |
| 2030 | 40,000 | 47,000 | 46,000 | 63,000 | 67,000 | 69,000 | 98,000 | 100,000 | 110,000 |
| 2040 | 52,000 | 57,000 | 55,000 | 77,000 | 78,000 | 81,000 | 120,000 | 110,000 | 130,000 |
| 2050 | 64,000 | 67,000 | 66,000 | 93,000 | 91,000 | 95,000 | 140,000 | 130,000 | 150,000 |
| 2060 | 77,000 | 75,000 | 76,000 | 110,000 | 100,000 | 110,000 | 150,000 | 140,000 | 160,000 |
| 2070 | 89,000 | 82,000 | 84,000 | 120,000 | 110,000 | 120,000 | 170,000 | 150,000 | 180,000 |
| 2080 | 100,000 | 89,000 | 94,000 | 140,000 | 120,000 | 130,000 | 190,000 | 160,000 | 200,000 |

US Environmental Protection Agency ***Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances*** November 2023 p.78, https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf

# New Zealand's Coalition Government is proposing to

- Hold the domestic carbon price at NZD50 by massive afforestation
- Meantime, secure 100 million offshore units to cover its NDC, probably by joint ventures to gain credit for mitigation and absorption in other countries, under an international trading regime
- Meantime prohibiting New Zealand forest owners from entering into any reciprocal joint ventures with other countries even when the price offered could be hundreds of dollars higher
- Thereby setting up a classic example of dumping when New Zealand export producers paying $50 for their emissions face off elsewhere in the world against competitors paying hundreds of dollars for their emissions

Good luck with that

# For reference, here are the numbers and sources (have to magnify the slide to read them!)

## All numbers are Mt CO2-e AR5

| Gross emissions | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 GHG Inventory | 68.96 | 69.92 | 71.16 | 71.02 | 72.40 | 72.99 | 75.53 | 78.16 | 75.97 | 77.51 | 79.53 | 82.44 | 82.36 | 84.66 | 84.69 | 86.62 | 86.73 | 84.26 | 84.27 | 81.41 | 82.10 | 81.72 | 84.07 | 83.25 | 84.11 | 83.89 | 81.66 | 83.07 | 83.43 | 84.59 | 81.88 | 81.81 | 78.40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2023 GHG Inventory | 64.72 | 65.69 | 66.83 | 66.69 | 67.86 | 68.39 | 70.55 | 73.38 | 71.19 | 72.98 | 74.85 | 77.76 | 77.68 | 79.83 | 79.67 | 81.75 | 81.77 | 79.67 | 79.35 | 76.65 | 77.33 | 77.11 | 79.09 | 78.43 | 79.21 | 79.04 | 76.93 | 78.51 | 78.78 | 79.99 | 77.33 | 76.82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ERP2 history and projection | 68.95 | 69.92 | 71.16 | 71.01 | 72.40 | 72.99 | 75.52 | 78.16 | 75.96 | 77.50 | 79.53 | 82.44 | 82.36 | 84.66 | 84.69 | 86.61 | 86.72 | 84.26 | 84.26 | 81.41 | 82.09 | 81.72 | 84.06 | 83.24 | 84.10 | 83.89 | 81.65 | 83.07 | 83.43 | 84.58 | 81.88 | 81.80 | 78.02 | 76.63 | 76.87 | 75.83 | 75.21 | 74.07 | 73.68 | 73.41 | 72.04 | 71.76 | 71.28 | 70.56 | 69.81 | 69.06 | 68.23 | 67.35 | 66.61 | 65.95 | 64.30 | 63.72 | 63.20 | 62.64 | 62.14 | 61.60 | 61.01 | 60.51 | 60.00 | 59.45 | 59.06 |
| WEM December 2023 history and projection | 67.90 | 68.89 | 70.03 | 69.92 | 71.17 | 71.70 | 73.92 | 76.83 | 74.58 | 76.38 | 78.31 | 81.21 | 81.08 | 83.21 | 83.04 | 85.16 | 85.23 | 83.02 | 82.52 | 79.84 | 80.54 | 80.31 | 82.30 | 81.64 | 82.43 | 82.19 | 80.01 | 81.57 | 81.83 | 83.03 | 80.34 | 79.81 | 76.54 | 77.21 | 75.73 | 71.72 | 70.44 | 69.16 | 68.35 | 67.49 | 66.80 | 66.28 | 65.66 | 65.18 | 64.52 | 63.99 | 63.70 | 63.25 | 62.01 | 61.53 | 60.93 | 59.79 | 59.26 | 58.80 | 58.35 | 57.97 | 57.73 | 57.35 | 56.90 | 56.46 | 55.98 |
| 8th communication 2022 history and forecast | 65.20 | | | | | 69.01 | | | | | 75.52 | | | | | 82.67 | | | | 78.43 | | | | | | 80.45 | | | | | 78.78 | | | | | | 73.29 | | | | | 70.04 | | | | | | | | | 66.68 | | | | | | | | | | | | | | | |

| Actual LULUCF | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 GHG Inventory | -24.32 | -26.21 | -25.46 | -25.86 | -25.16 | -23.73 | -22.96 | -23.61 | -24.21 | -26.67 | -27.35 | -27.62 | -26.06 | -26.81 | -26.59 | -24.25 | -22.14 | -20.05 | -28.79 | -27.63 | -28.57 | -28.73 | -25.50 | -25.55 | -25.51 | -25.59 | -24.94 | -23.46 | -22.43 | -21.59 | -21.06 | -20.51 | -19.24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2023 GHG Inventory | -20.17 | -22.16 | -22.01 | -22.94 | -22.91 | -21.83 | -21.56 | -22.31 | -23.01 | -25.83 | -26.79 | -27.36 | -25.96 | -27.09 | -27.03 | -25.30 | -23.25 | -21.62 | -29.37 | -28.23 | -29.23 | -29.49 | -26.55 | -26.21 | -26.42 | -26.40 | -26.09 | -24.48 | -24.09 | -23.92 | -23.24 | -21.08 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WEM December 2023 history and projection | -21.26 | -23.31 | -23.07 | -23.87 | -23.66 | -22.48 | -22.02 | -22.66 | -23.29 | -26.05 | -26.97 | -27.52 | -26.11 | -27.39 | -27.23 | -25.46 | -23.39 | -23.10 | -29.45 | -28.29 | -29.35 | -29.66 | -26.75 | -26.32 | -26.68 | -26.63 | -26.26 | -24.72 | -24.32 | -23.05 | -23.33 | -19.69 | -16.94 | -14.07 | -10.97 | -9.55 | -8.73 | -8.59 | -9.12 | -10.39 | -12.03 | -14.47 | -16.92 | -19.70 | -22.63 | -25.50 | -28.38 | -31.22 | -33.08 | -34.28 | -35.74 | -35.80 | -36.64 | -37.13 | -38.72 | -38.67 | -40.27 | -40.42 | -43.22 | -41.30 | -39.51 |
| 8th communication 2022 history and forecast | -21.23 | | | | | -22.45 | | | | | -26.93 | | | | | -25.42 | | | | | -29.33 | | | | | -26.61 | | | | | -23.31 | | | | | | -9.53 | | | | | -12.01 | | | | | | -25.48 | | | | | | | | | | | | | | | | | |

| Actual net emissions | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2024 GHG Inventory | 44.63 | 43.70 | 45.70 | 45.16 | 47.24 | 49.26 | 52.57 | 54.55 | 51.76 | 50.84 | 52.18 | 54.82 | 56.30 | 57.85 | 58.10 | 62.36 | 64.58 | 64.22 | 55.48 | 53.78 | 53.52 | 52.99 | 58.57 | 57.70 | 58.60 | 58.31 | 56.71 | 59.62 | 61.01 | 62.99 | 60.82 | 61.30 | 59.16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2023 GHG Inventory | 44.55 | 43.53 | 44.82 | 43.76 | 44.95 | 46.57 | 48.99 | 51.07 | 48.18 | 47.15 | 48.06 | 50.40 | 51.73 | 52.74 | 52.64 | 56.45 | 58.52 | 58.06 | 49.98 | 48.42 | 48.10 | 47.61 | 52.54 | 52.22 | 52.79 | 52.64 | 50.84 | 54.03 | 54.69 | 56.07 | 54.09 | 55.75 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WEM December 2023 history and projection | 46.65 | 45.58 | 46.95 | 46.05 | 47.50 | 49.23 | 51.90 | 54.17 | 51.29 | 50.32 | 51.34 | 53.70 | 54.98 | 55.91 | 55.81 | 59.70 | 61.83 | 60.92 | 53.07 | 51.54 | 51.18 | 50.65 | 55.55 | 55.31 | 55.75 | 55.56 | 53.76 | 56.85 | 57.51 | 59.98 | 57.01 | 60.12 | 59.60 | 63.14 | 64.76 | 62.17 | 61.70 | 60.57 | 59.23 | 57.10 | 54.77 | 51.81 | 48.73 | 45.48 | 41.89 | 38.49 | 35.33 | 32.02 | 28.93 | 27.24 | 25.19 | 23.99 | 22.62 | 21.66 | 19.63 | 19.31 | 17.47 | 16.93 | 13.68 | 15.16 | 16.48 |
| 8th communication 2022 history and forecast | 43.97 | | | | | 46.57 | | | | | 48.58 | | | | | 57.24 | | | | | 49.10 | | | | | 53.84 | | | | | 55.47 | | | | | | 63.76 | | | | | 58.03 | | | | | | 41.20 | | | | | | | | | | | | | | | | | |

| Target accounted LULUCF | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WEM December 2023 history and projection | 0.85 | 0.86 | 1.12 | 1.19 | 1.33 | 0.88 | 0.06 | -1.32 | -3.37 | -5.90 | -6.05 | -8.56 | -10.49 | -10.23 | -7.96 | -4.04 | -1.41 | 2.99 | -13.81 | -11.78 | -11.67 | -12.78 | -11.04 | -8.72 | -11.23 | -11.88 | -11.31 | -10.16 | -10.12 | -9.20 | -7.71 | -7.03 | -6.23 | -5.66 | -5.50 | -6.41 | -7.87 | -9.86 | -12.27 | -14.55 | -16.35 | -17.28 | -17.73 | -18.47 | -18.99 | -19.78 | -21.02 | -23.29 | -24.59 | -25.98 | -27.29 | -28.58 | -29.50 | -29.88 | -29.93 | -29.25 | -28.46 | -27.68 | -27.77 | -27.88 | -28.02 |
| ERP2 target-accounted-net | 0.86 | 0.87 | 1.15 | 1.21 | 1.34 | 0.71 | -0.15 | -1.76 | -3.91 | -6.38 | -7.04 | -9.16 | -11.14 | -10.54 | -8.07 | -2.54 | -0.21 | 5.94 | -14.15 | -12.15 | -11.72 | -13.15 | -11.48 | -8.79 | -11.19 | -12.68 | -11.78 | -10.06 | -9.22 | -8.18 | -4.57 | -4.84 | -4.59 | -5.70 | -5.97 | -7.08 | -8.56 | -10.54 | -12.62 | -14.29 | -15.25 | -15.75 | -16.05 | -16.43 | -16.76 | -17.35 | -18.36 | -20.34 | -21.29 | -22.29 | -23.20 | -24.06 | -24.56 | -24.53 | -24.12 | -22.88 | -21.62 | -20.86 | -21.01 | -21.21 | -21.39 |

| Target-accounted-net emissions | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
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| WEM December 2023 history and projection | 68.75 | 69.75 | 71.15 | 71.11 | 72.49 | 72.59 | 73.98 | 75.51 | 71.21 | 70.48 | 72.26 | 72.65 | 70.59 | 72.98 | 75.08 | 81.12 | 83.82 | 86.01 | 68.71 | 68.06 | 68.87 | 67.53 | 71.26 | 72.91 | 71.19 | 70.30 | 68.71 | 71.42 | 71.70 | 73.83 | 72.64 | 72.78 | 70.31 | 71.55 | 70.23 | 65.31 | 62.57 | 59.30 | 56.08 | 52.93 | 50.45 | 49.00 | 47.93 | 46.71 | 45.53 | 44.21 | 42.69 | 39.96 | 37.42 | 35.55 | 33.64 | 31.21 | 29.76 | 28.91 | 28.42 | 28.72 | 29.27 | 29.67 | 29.12 | 28.58 | 27.96 |
| ERP2 target-accounted-net | 69.82 | 70.78 | 72.31 | 72.23 | 73.73 | 73.69 | 75.38 | 76.40 | 72.05 | 71.12 | 72.48 | 73.27 | 71.22 | 74.12 | 76.62 | 84.07 | 86.49 | 90.20 | 70.11 | 69.26 | 70.38 | 68.56 | 72.58 | 74.46 | 72.91 | 71.21 | 69.87 | 73.01 | 74.21 | 76.40 | 77.31 | 76.97 | 73.43 | 70.92 | 70.90 | 68.76 | 66.65 | 63.53 | 61.06 | 59.12 | 56.79 | 56.01 | 55.23 | 54.13 | 53.05 | 51.71 | 49.87 | 47.01 | 45.33 | 43.66 | 41.11 | 39.67 | 38.64 | 38.11 | 38.02 | 38.71 | 39.39 | 39.65 | 38.99 | 38.25 | 37.67 |

Sources:

2024 GHG Inventory https://environment.govt.nz/assets/publications/GhG-Inventory/GHG-inventory-2024/2024-Summary-data-for-website.xlsx

2023 GHG Inventory https://environment.govt.nz/assets/publications/climate-change/Summary-emissions-data-Excel-xlsx.xlsx

ERP2 Figure 6 of Technical annex: chart is at page21 of, https://environment.govt.nz/assets/publications/climate-change/New-Zealands-secondemissions-reduction-plan-Technical-annex.pdf ; data supplied on request by the modelling team.

December 2023 WEM history and projections https://environment.govt.nz/assets/what-government-is-doing/climate-change/2050-historical-and-projected-sectoral-emissions-data-November_2023-for-publishing-v01.xlsx

8th communication Te Whakawhitiwhiti Kōrero Tuawaru ā-Motu o Aotearoa New Zealand's Eighth National Communication Under the United Nations Framework Convention on Climate Change and the Kyoto Protocol December 2022 pp438-439 Table C.2.1 "Information on updated greenhouse gas emissions (with measures) (CTF Table 6a)" https://unfccc.int/documents/624714 .