

Modelling the impact on South Africa's Economy of introducing a carbon tax

**Report prepared for National
Treasury Carbon Tax Modelling
Workshop**

10th November 2016

The modelling considers a range of scenarios

We identify one combination as the 'focus' scenario, but all sensitivities are explored

Tax scenarios

- T1: tax rate increasing by 10 percent per annum over the period 2016–21, and thereafter by the assumed inflation rate (5.5 percent); tax-free thresholds are held constant for the duration of the modeling period 2016–35. Ag and waste exempt
- T2: as T1, but the tax-free allowances are gradually removed at a rate of 10 percentage points per annum from 2021. Ag and waste exempt
- T3: as T1, except for the agricultural sector where the exemption is removed at a rate of 10 percentage points per annum from 2026
- T4: T2+T3, ie tax-free allowances are gradually removed at a rate of 10 percentage points per annum, starting in 2021, for all industries except agriculture, for which phasing out begins in 2026

Revenue recycling scenarios (all revenues recycled)

- R1: Recycling of tax revenues is applied through an output-based rebate on all production across all sectors
- R2: tax revenue is recycled through a decrease in the VAT rate on all the goods that make up household spending
- R3: a combination of R1 and R2 (split 50:50)
- R4: subsidy on the production of renewable electricity generators (for modeling purposes, directed towards solar PV)
- R5: The tax revenue is used to decrease the VAT rate on agricultural goods, food, transport services, and beverages and tobacco

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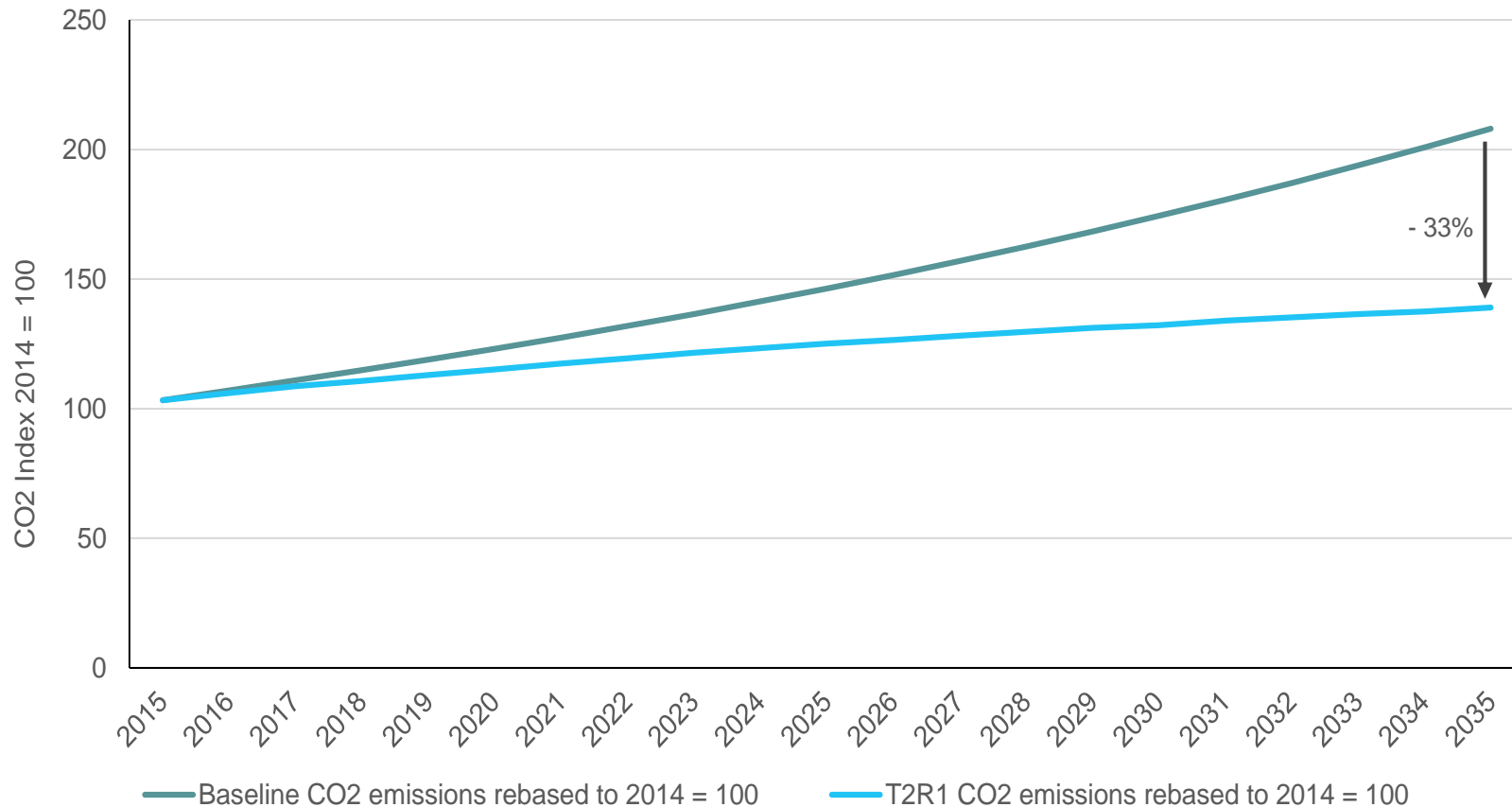
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2. Sensitivity analysis

- tax
 - revenue
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- ### 3. International comparisons

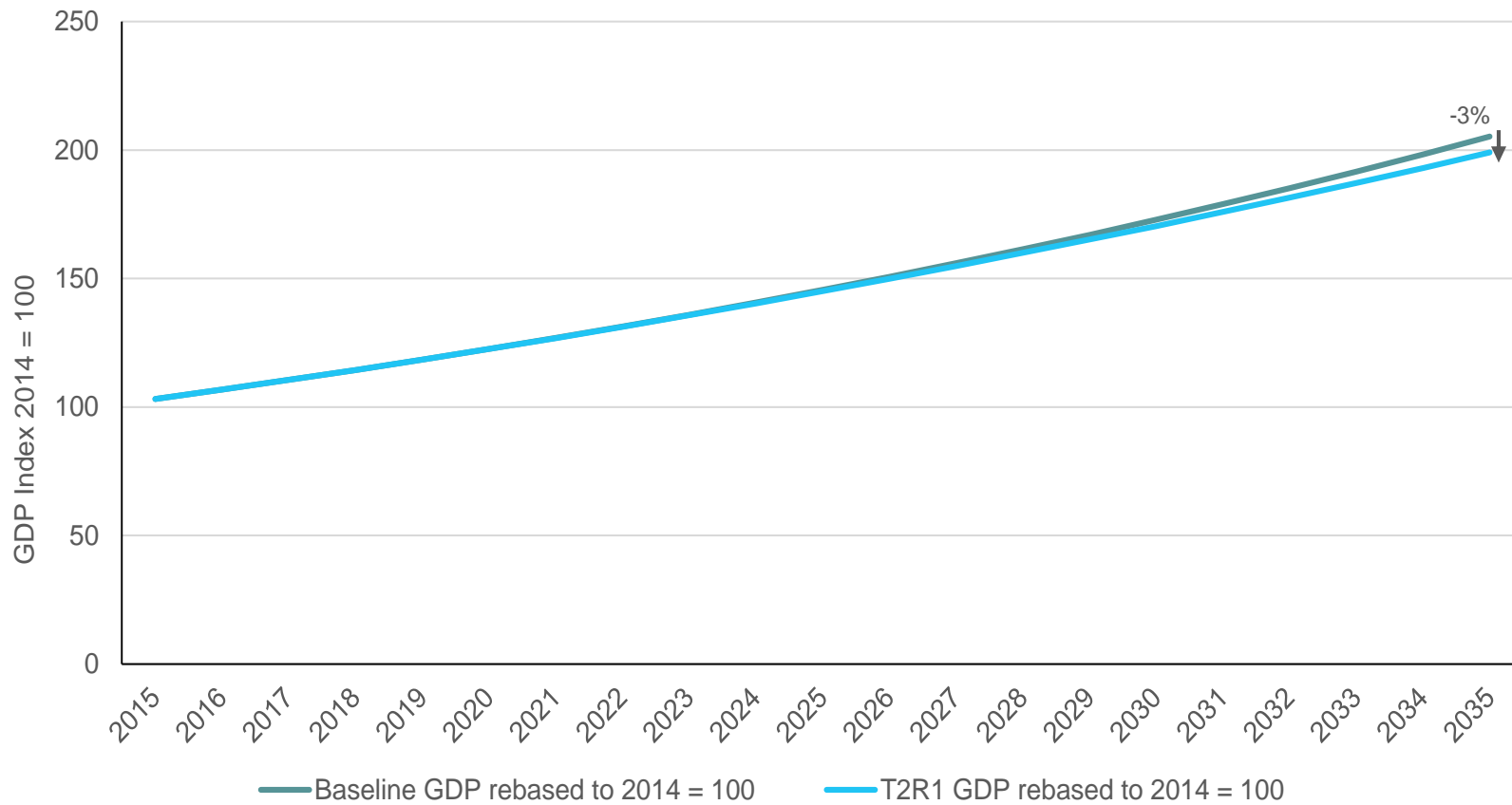
In the focus scenario, emissions in 2035 are expected to be 33 per cent lower than in the baseline

The carbon tax can make an important contribution to meeting South Africa's NDC but would not be sufficient by itself, under these settings

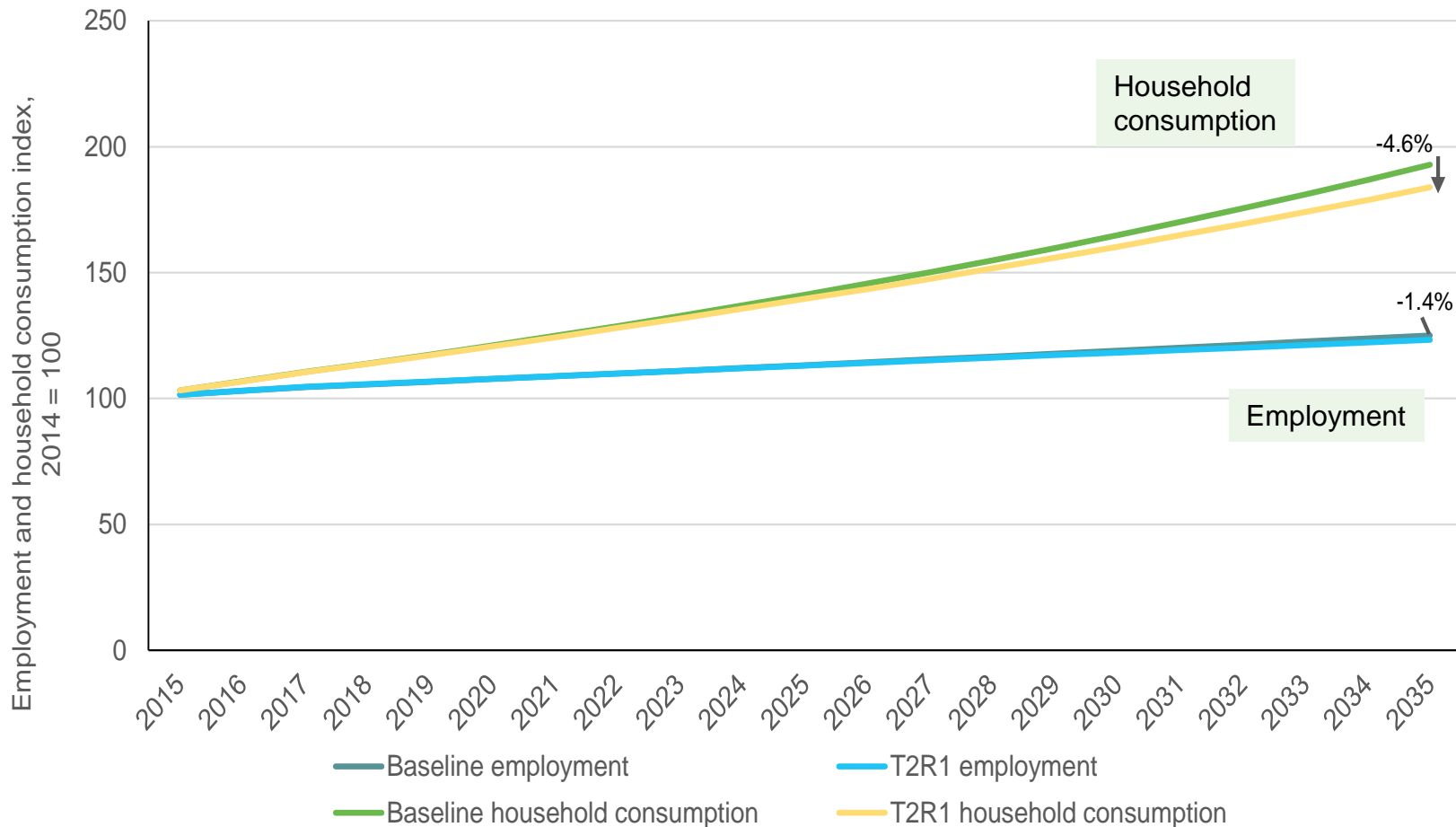


In the context of the expected growth of the economy, the impact of the tax on GDP is small

The average annual growth rate of the economy is expected to be 0.15 percentage points lower, leading to GDP in 2035 being 3 per cent lower than in the baseline



Other macroeconomic aggregates are also only modestly affected



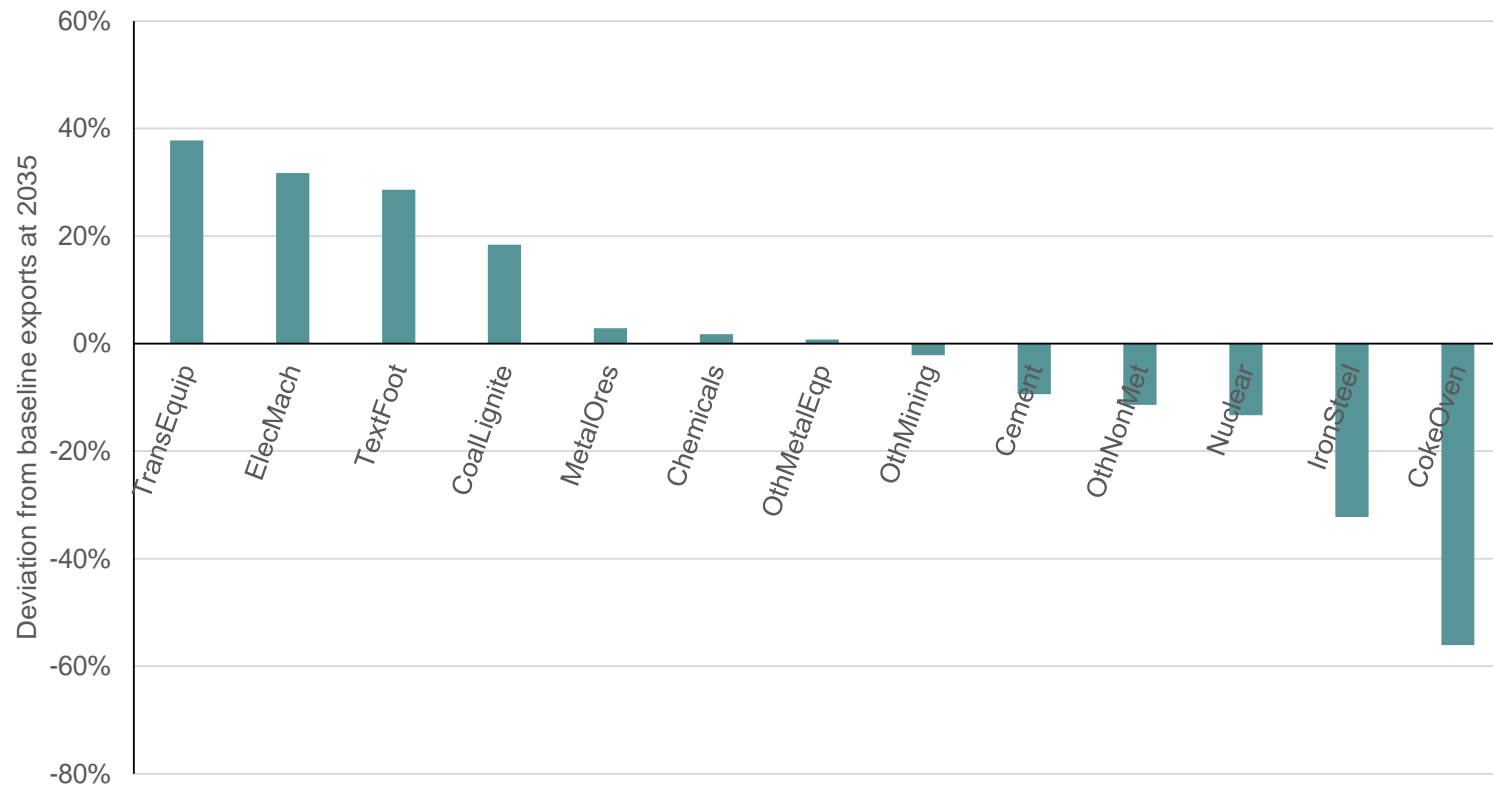
There are some sectoral winners and losers...but many sectors are largely unaffected

The winners and losers reflect the efforts to restructure the South African economy in line with its international commitments



Competitiveness effects are relatively muted with overall exports expected to be 3.5% higher in 2035 than in baseline

There are important differences across sectors

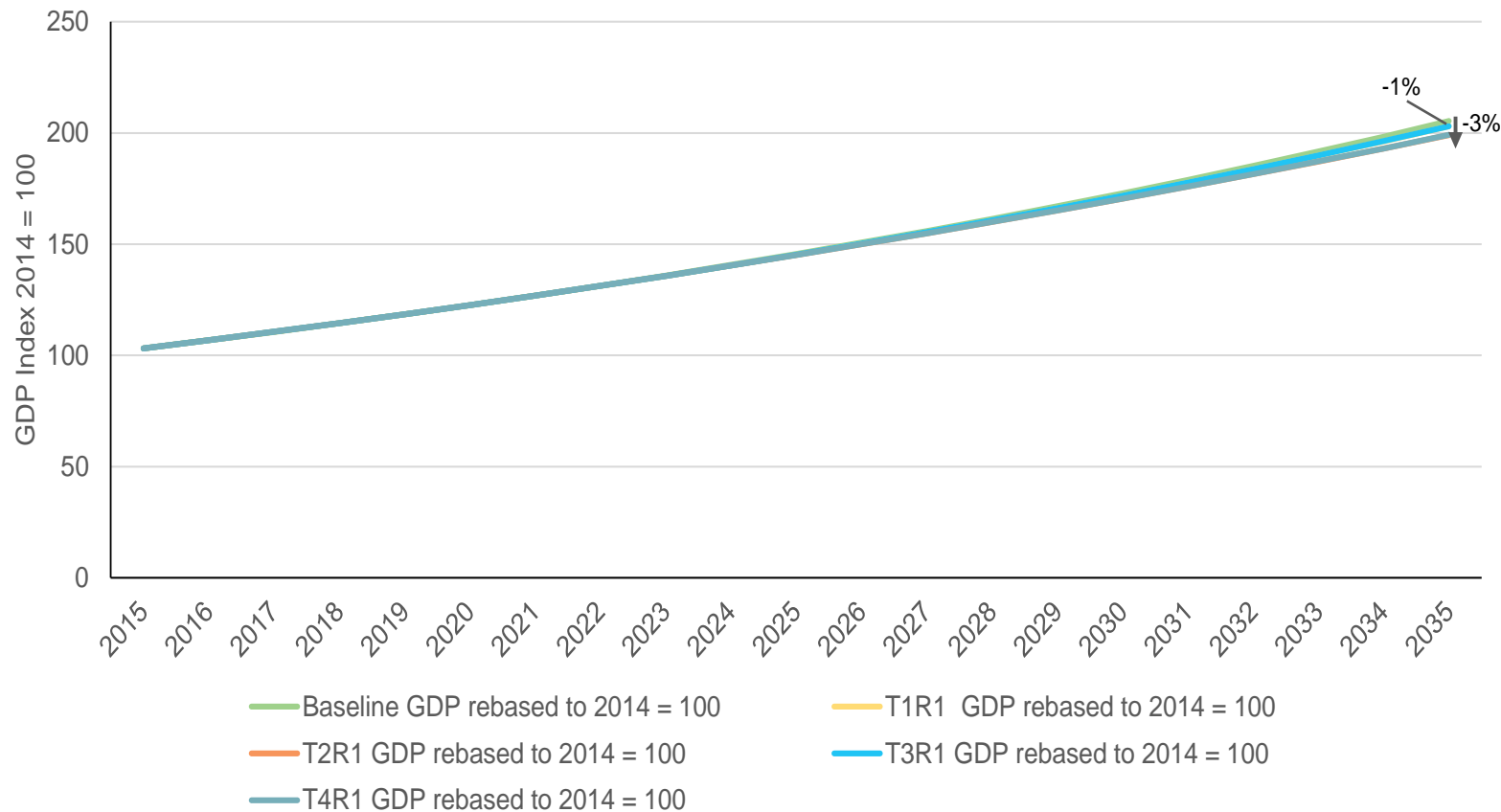


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The different tax scenarios make very little difference to the expected impact on GDP

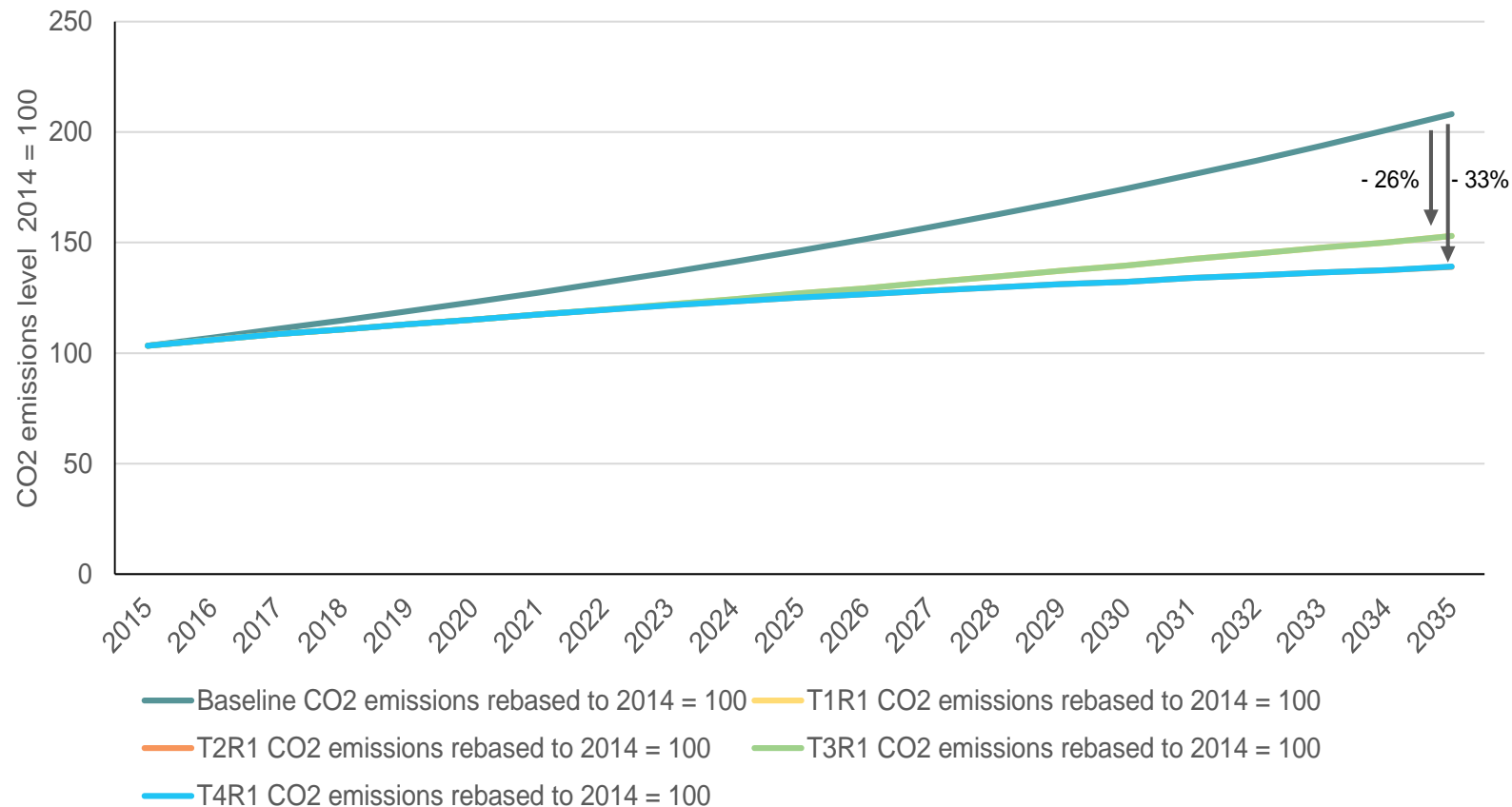
This is because greater tax revenues are offset by greater revenue recycling



Note: T1R1 and T3R1 overlap, as do T2R1 and T4R1.

But different tax schedules do have important impacts on the abatement delivered

If the tax exemptions are not withdrawn, the tax might only deliver emission reductions of 26% relative to the baseline in 2035; leaving more work to be done by other policies

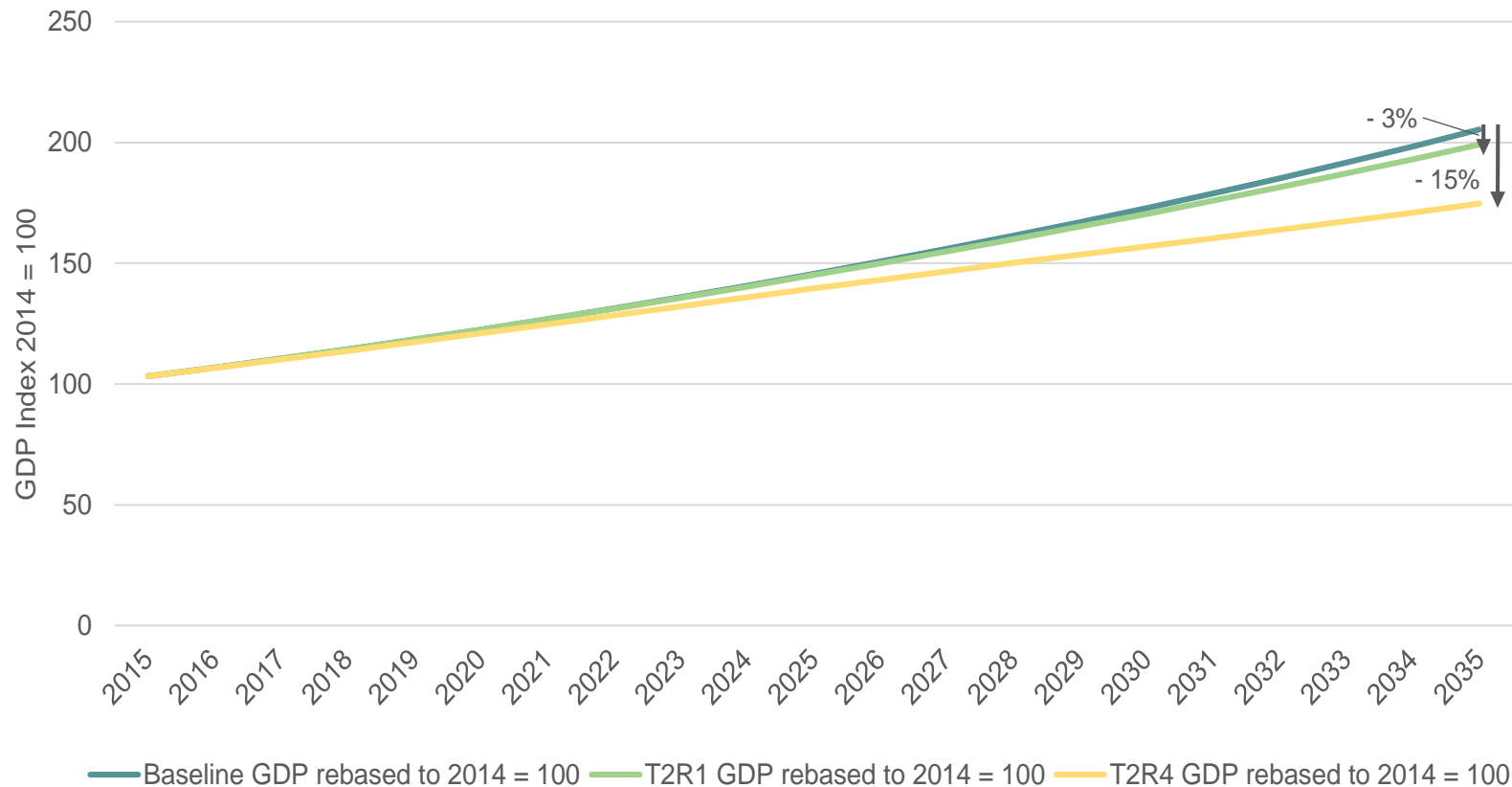


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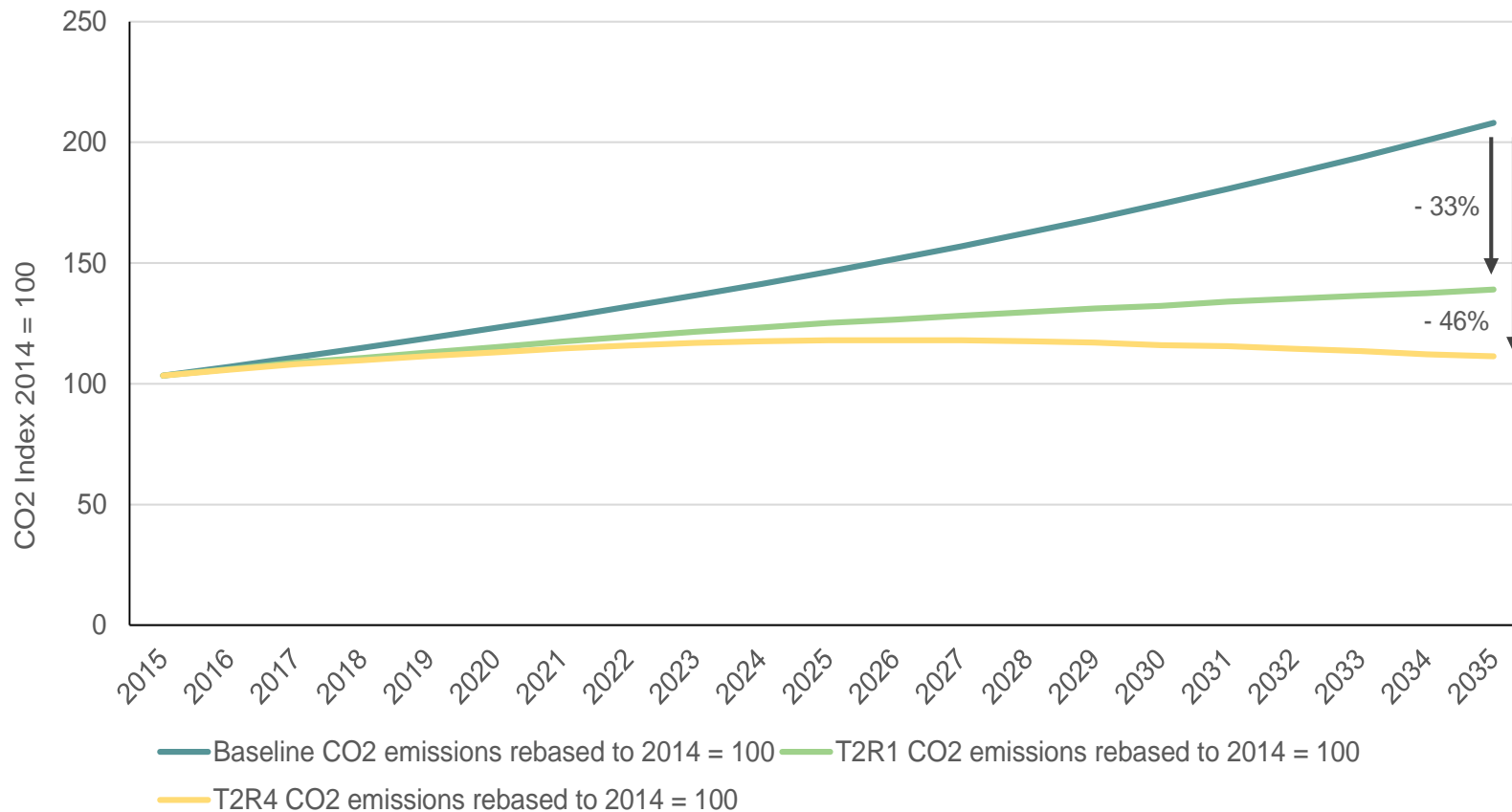
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Broader revenue recycling schemes result in smaller deviations to GDP growth

This is because targeting significant additional resources at a small number of sectors leads to diminishing returns



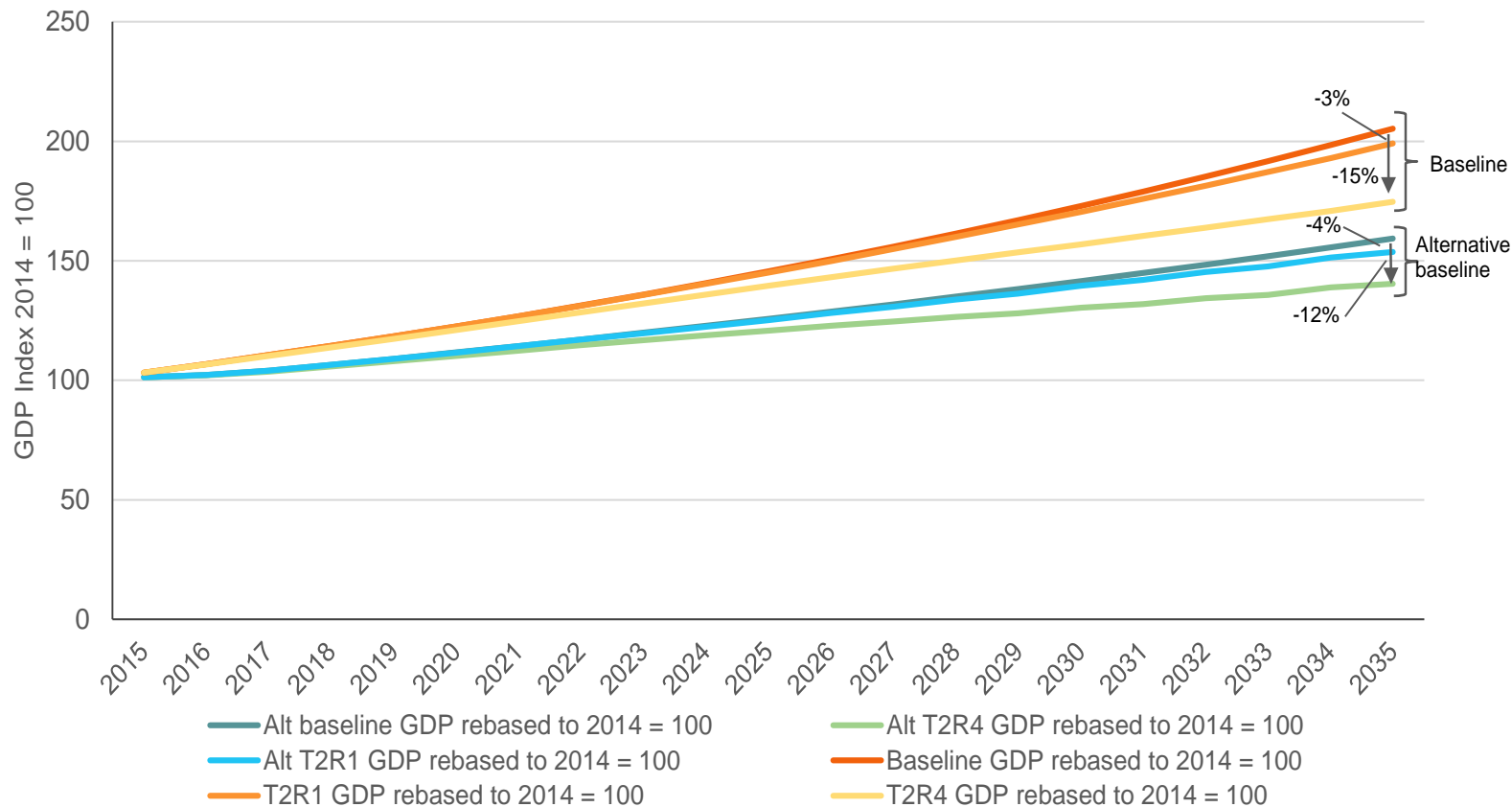
Although, targeting recycling to renewable electricity generators does increase the emission reduction potential of the tax



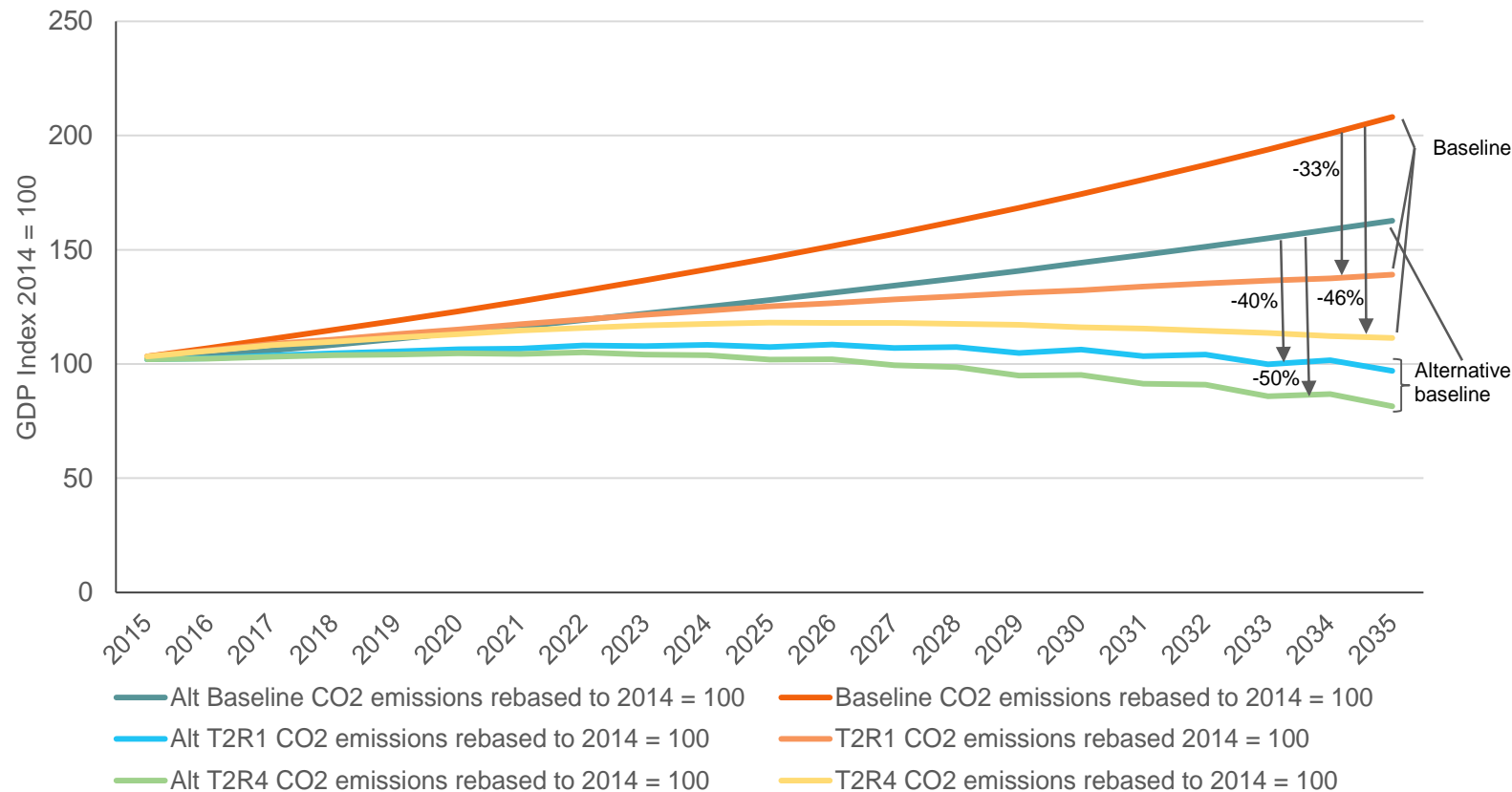
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A more conservative baseline makes very little difference to the expected change in GDP from the carbon tax



A more conservative baseline implies that the carbon tax might give more abatement



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International modelling and experience confirm that carbon taxes and revenue recycling have small macroeconomic impacts

British Columbia

- introduced carbon tax in 2008; current tax rate is CAN\$30/ton
- government must present an annual plan to the legislature demonstrating how all of the carbon tax revenue will be returned to taxpayers through tax reductions
- econometric analysis suggests no difference in the GDP growth rate in British Columbia, compared with other provinces in Canada, as a result of the carbon tax
- for employment, small but statistically significant 2 percent increase in employment over 2007–2013
 - carbon-intensive and trade-sensitive sectors seeing declines in employment but clean service industries benefiting from employment increases

Modelling studies

- a meta-study of European studies show a GDP impact in the range of -0.5 to +0.5 per cent compared with baseline in two-thirds of the studies reviewed
- fewer studies of impact of carbon taxes on emerging market economies; but most suggest broadly similar results (Brazil, Mexico, Indonesia)

Summary

1. The modelling analysis suggests that the carbon tax can make a meaningful contribution to South Africa's emission reduction targets but, under the settings modelled, would need to be complemented by other policies
2. Revenue recycling means that delivers these emission reductions while having a very modest impact on the overall economic performance of the South African economy
3. There are sectoral winners and losers – both in terms of overall output and export performance – but these patterns reflect the objective of the tax in inducing structural change
4. One of the most important determinants of the economic impact of the carbon tax is the way in which the revenues are recycled: broader recycling has a more benign economic impact than narrow recycling
5. The results from the study are consistent with both international experience and other modelling studies of carbon taxation with revenue recycling

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