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ETS

Raising the Profile: Comparing New Zealand's Emission Trends Against Other Countries

This booklet places New Zealand into an international setting. It compares New Zealand's emission profile in various ways against a range of others. It does this in order to help explore the drivers of action and their comparability and the issues this might give rise to when considering domestic policy settings in an international context.

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Foreword

The New Zealand Emissions Trading Scheme (the 'NZETS') has provided businesses and consumers with some clarity about its immediate effects and the nature of the transition it seeks to deliver. For some businesses, new market opportunities have emerged. However, for others, concerns remain about the long-term impact of climate change policies on their incentives to invest and grow and the opportunities foregone.

Events have not panned out as policy makers had expected even as little as a year ago when the new moderated scheme was passed into law. It is no longer clear that the assumptions made about the transitory nature of impacts on what are otherwise competitive, trade-exposed businesses, and the speed of action by our trade-competitors to price carbon, hold true.

Therefore, we welcome the recently announced review of the NZETS. A stock-take of New Zealand's emission trading policy settings now and into the future is both appropriate and timely. The review, required under the Climate Change Response Act 2002, offers an opportunity to re-engage businesses and consumers in a meaningful conversation about what New Zealand is seeking to achieve with the emissions trading scheme, and why.

We have high expectations of the review and its ability to contribute to the establishment of a stable, long term pathway for businesses and consumers. Only time will tell whether it achieves this.

But it will be no easy task. Climate change is widely recognised as one of the most fraught public policy issues a Government can tackle. This was certainly true of the development of the NZETS. Its passage into law only occurred after much vigorous, but often hasty and ill informed debate.

We hope to help fill the information deficit with this booklet about emissions profiles in a range of other countries. Their drivers for action and the policy responses to them need to inform the work of the Review Panel.

This information highlights the complexity of the issues facing the Review Panel. More than anything it shows there is no 'cookie cutter' approach to the development of policy responses to the issues of emissions sources and emission reductions.

We have deliberately not sought to interpret the information set out in this booklet. Rather, by presenting the facts, our aim is to raise important questions that need to be debated in the context of the review.

Let's get the debate going about what's the best direction for New Zealand and its primary response to climate change - the NZETS.

BusinessNZ wishes the Review Panel well in its endeavours and looks forward to engaging with it through the formal submissions we'll be making on behalf of all New Zealand businesses.

Phil O'Reilly
Chief Executive

Setting the Scene

While other countries' political systems have stood in the way of them implementing a price on carbon, the fact that New Zealand is the only country in the Asia-Pacific region to have achieved this at country level has strengthened our international reputation and raised our environmental kudos.

Given New Zealand's high dependence on international trade, this additional boost to our reputation is important. However, the NZETS needs to be economically viable as well as brand-enhancing. Our dependence on trade means any domestic action to reduce emissions must be balanced with action by our trade competitors in order for us to maintain our international competitiveness.

As with most things, New Zealand finds itself a small player in the development of a global climate change response.

Asymmetric climate change policy action poses material economic risks that cannot be ignored. New Zealand cannot afford to implement climate change policy in a global vacuum.

New Zealand's policy response and international negotiating position on climate change issues must, therefore, take into account the policy responses and negotiating positions adopted by other countries, particularly our major trading partners.

But the fluid nature of the global climate change policy development makes settling on a particular policy approach for the design of the NZETS problematic. And any number of recent events show that the international context is even less certain than previously thought.

Therefore it is informative to stand back from the constantly shifting detail of policy developments in other countries (where they exist) and instead, take a factual look at a key driver of policy responses – emission profiles.

These profiles tend to provide a link between economic fundamentals and climate change policy settings by providing a focus for low-cost emissions reductions and shaping the degree of willingness to agree to ambitious emissions reduction targets. They also lie at the heart of any assessment of comparability of action, let alone effort.

In other words, the emission profiles signal the relative ease with which a country can change its emissions trajectory without reducing economic growth.

Providing information about these profiles is hoped to shed some light on the focus of policy responses around the world, and in turn, the future range of possible policy responses in New Zealand.

It is hoped that the emission profiles set out in the following section will provide a factual backdrop to the work of the Review Panel, and enable it and others to tease out in a more sophisticated way what changes may be appropriate for the NZETS.

Only in understanding the drivers of action, can one fully understand the action taken and effort made, and whether New Zealand, in implementing its NZETS has matched or exceeded that action or been found to be doing a disproportionate share of the 'heavy-lifting'.

John Carnegie
Manager Energy, Environment & Infrastructure

Emissions Trends in Other Countries

The purpose of this section is to provide some factual background that will help scope the issues which the review must address.

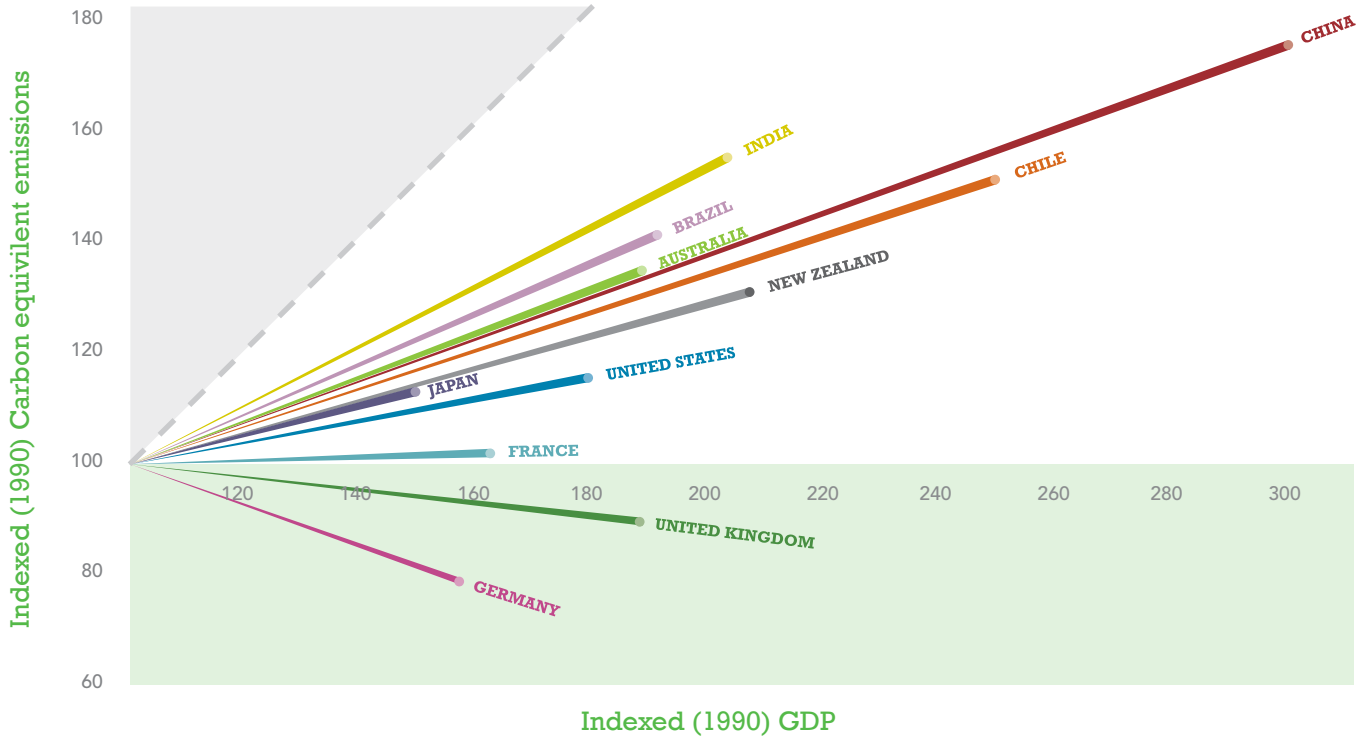
It reviews emissions trends across ten countries that fall into the following three categories:

- **Countries that are important for shaping a future international framework:** United States,China, and India
- **Countries that are expected to implement comparable policies to New Zealand:** Australia, United Kingdom, France, Germany, and Japan
- **Countries that are significant competitors for New Zealand in international markets:** Brazil and Chile.

These three categories also include New Zealand's largest trading partners—Australia, China, the United States, Japan, and the European Union.

Figure 1.1 **Trends in Emissions and Economic Growth**

Source: World Resources Institute (emissions), World Bank (GDP)



Emissions Trends, Economic Growth and Population

In this section, we begin by presenting data on emissions trends in other countries compared to economic growth and increases in population. This factual information highlights that since 1990, all countries have decreased their emissions per dollar of gross domestic product (GDP) generated (emissions intensity), but most now have higher emissions per capita.

Figure 1.1 (above) plots changes in emissions and GDP from 1990 to 2005, using 1990 as the base year (1990 = 100). The dotted-line on the graph represents a 1 for 1 increase in emissions and GDP. The area to the left of the dotted line (shaded grey) indicates that the emissions intensity of economic output has increased since 1990, while the area to the right of the dotted-line, reflects a decrease in emissions intensity.

The following trends in emissions intensity are of interest:

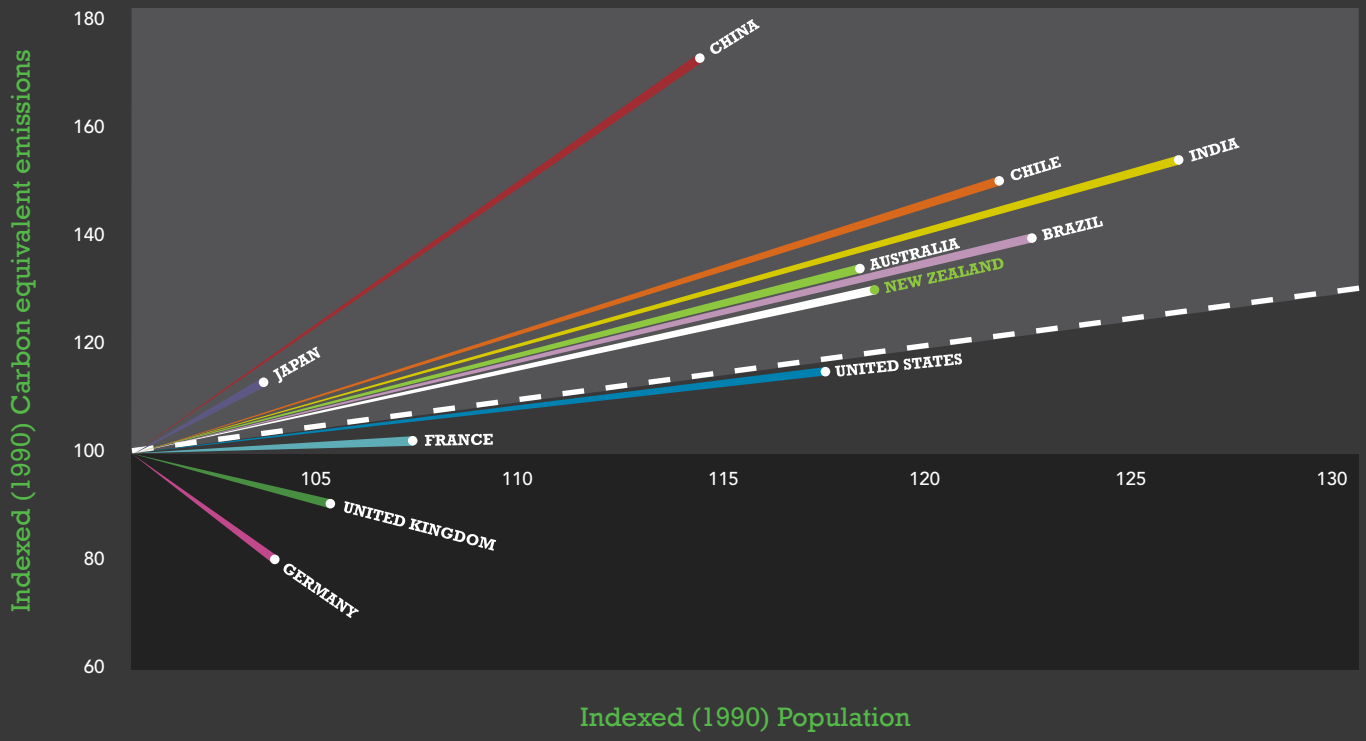
a. all countries have decreased their emissions intensity of GDP since 1990

b. most countries that have achieved levels of economic growth comparable to New Zealand have a similar path of emissions growth - some with slightly higher emissions intensity (Brazil, Australia, India, China and Chile), some with slightly lower (Japan and United States)

c. only the United Kingdom and Germany have managed to achieve economic growth since 1990 while simultaneously decreasing emissions. Germany is a special case, since both the economic growth and emission statistics reflect the re-unification and the associated closure of uneconomic, inefficient and carbon intensive activities in East Germany in the early 1990s.

Figure 1.2 **Trends in Emissions and Population**

Source: World Resources Institute (emissions), World Bank (population)



Trends in emissions growth compared to population growth from 1990 to 2005 are shown in Figure 1.2 (above). Again, 1990 is used as the base year (1990 = 100) and the dotted-line on the graph represents a 1 for 1 increase in emissions and population. The area to the left of the dotted line (shaded grey) indicates that emissions per capita have increased since 1990, while the area to the right of the dotted line, reflects a decrease in emissions per capita.

The following trends in emissions per capita are of interest:

a. most countries with rapidly growing populations have increased emissions per capita, with the exception of the United States

b. most developed countries with low birth rates, with the exception of Japan, (Germany, United Kingdom, and France) have decreasing emissions per capita

c. Germany, the United Kingdom and Japan have the lowest increases in population, with less than five percent growth over the 15 year period considered

d. China has increased emissions per capita by significantly more than other countries—emissions have grown to 155 percent of 1990 levels, while population has only grown to 115 percent of 1990 levels. India's population has grown to 125 percent of 1990 levels, while emissions have grown to 140 percent of 1990 levels.

Emissions Trends by Sector

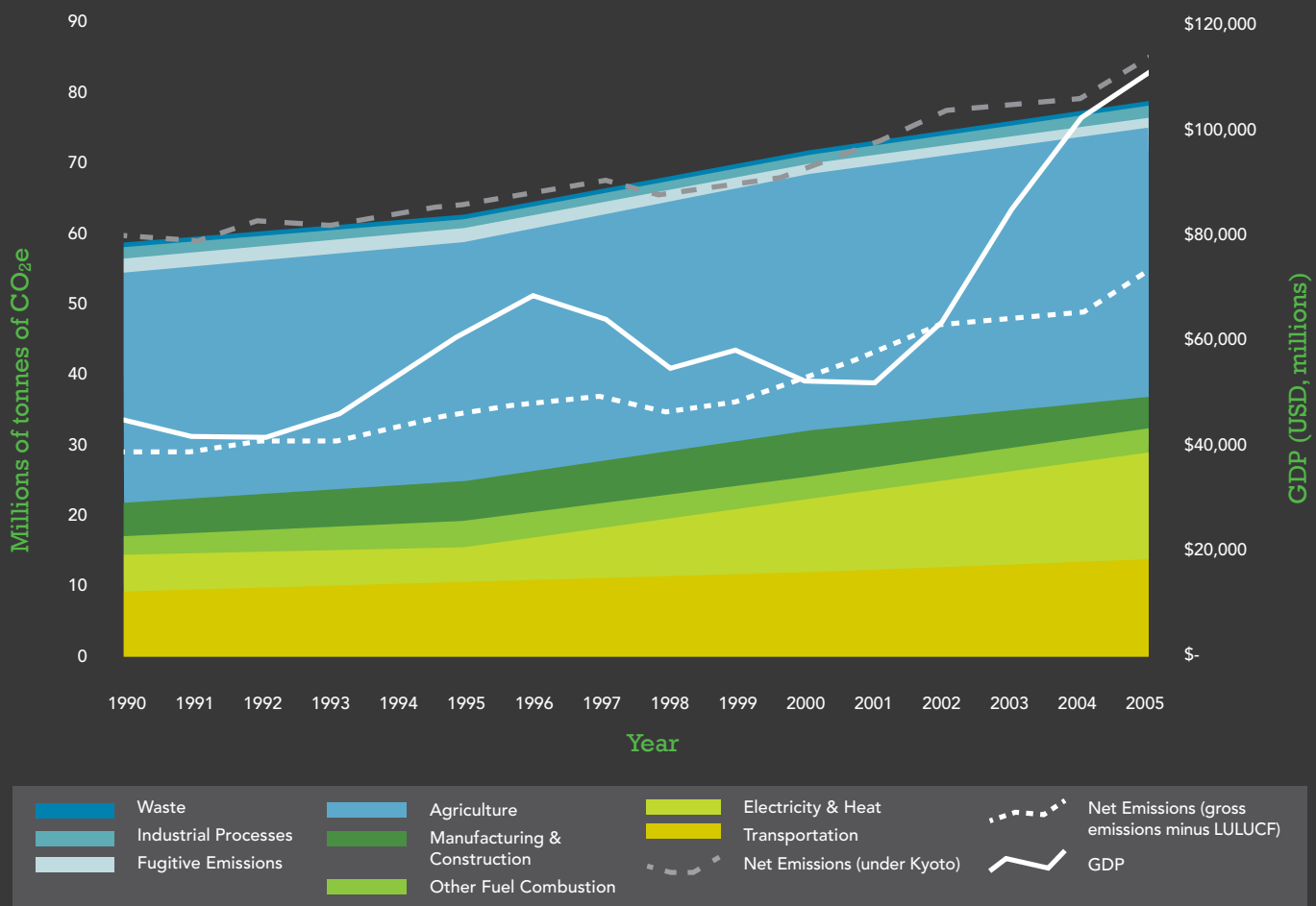
Economy-wide indicators such as GDP and population enable overall trends to be observed, but do not explain the reasons for different emissions trends. To understand the drivers for emissions reductions or growth, we need to examine emissions by sector for each country.

An overview of emissions by sector for New Zealand is shown in Figure 1.3 (below), and similar graphs for the other countries considered in this booklet are included in Appendix A. These graphs show that the contributors to emissions trends (increases and declines) vary across countries. The coloured areas on the graphs show the emissions generated in different sectors, and the lines running across the graphs show the impacts that land use, land-use change and forestry (LULUCF) has on gross emissions. The impacts of LULUCF are shown both under Kyoto Protocol rules (which account for changes in LULUCF since 1990) and actual net emissions (gross emissions minus LULUCF). In some countries, a single sector is clearly responsible for nationwide growth in emissions—for example, the electricity sector in Australia accounts for 66 percent of emissions growth. Emissions growth in other countries is more broad-based. For example in Chile, emissions have grown by more than 25 percent in each of the electricity, manufacturing, and transport sectors.

New Zealand has seen modest growth in agriculture and transport emissions, and quite significant growth in electricity sector emissions. Net reductions in emissions from land use, land-use change and forestry (LULUCF) since 1990 is also significant. Emissions from industrial processes have remained approximately constant, whilst those from manufacturing and construction have actually reduced since 1990.

Figure 1.3 **Sector Emissions in New Zealand**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)



The emissions profiles needs to be understood in the context of:

a. the availability and use of different primary energy resources. Emissions reductions in Germany and the United Kingdom have come from the electricity sector, where increased demand for electricity has been met from less carbon-intensive fuels than previous coal-fired generation. In contrast, electricity sector emissions in New Zealand have grown as increased demand has been met by thermal generation, especially gas (even though New Zealand has a much higher overall proportion of renewable generation than many other countries)

b. the structure of the economy and source of emissions. Countries that have a larger share of their emissions in agriculture (particularly New Zealand and Brazil), have improved the emissions intensity of their agricultural output but have continued to grow their total emissions in this sector. France is the only country in our sample that has increased agricultural output (by value) while decreasing the total level of emissions as more coal-fired power stations were closed.

These two factors are discussed in more detail below.

The availability and use of different primary energy resources

Electricity and heat is the largest single source of emissions for most of the countries considered in this report. Where an electricity sector has predominantly coal-fired generation, electricity emissions invariably account for between 35-45 percent of national emissions. This is true whether the economy is highly developed (United States, United Kingdom, Germany, Japan, and Australia), or is developing (China and India).

Figure 1.4 (overleaf) shows changes in the emissions intensity of electricity production. We use 1990 as the base year (1990 = 100), and the dotted-line on the graph represents a 1 for 1 increase in emissions and electricity generation. The area to the left of the dotted line (shaded light grey) indicates that emissions per unit of electricity have increased since 1990, while the area to the right of the dotted line reflects a decrease in the emissions intensity of electricity generation. The number to the right of the country name indicates the proportion of a country's total emissions that come from the electricity sector (for example, 19 percent of New Zealand's emissions come from electricity).

To a significant extent, changes in electricity sector emissions since 1990 have been driven by energy resource availability rather than any policies regarding emissions:

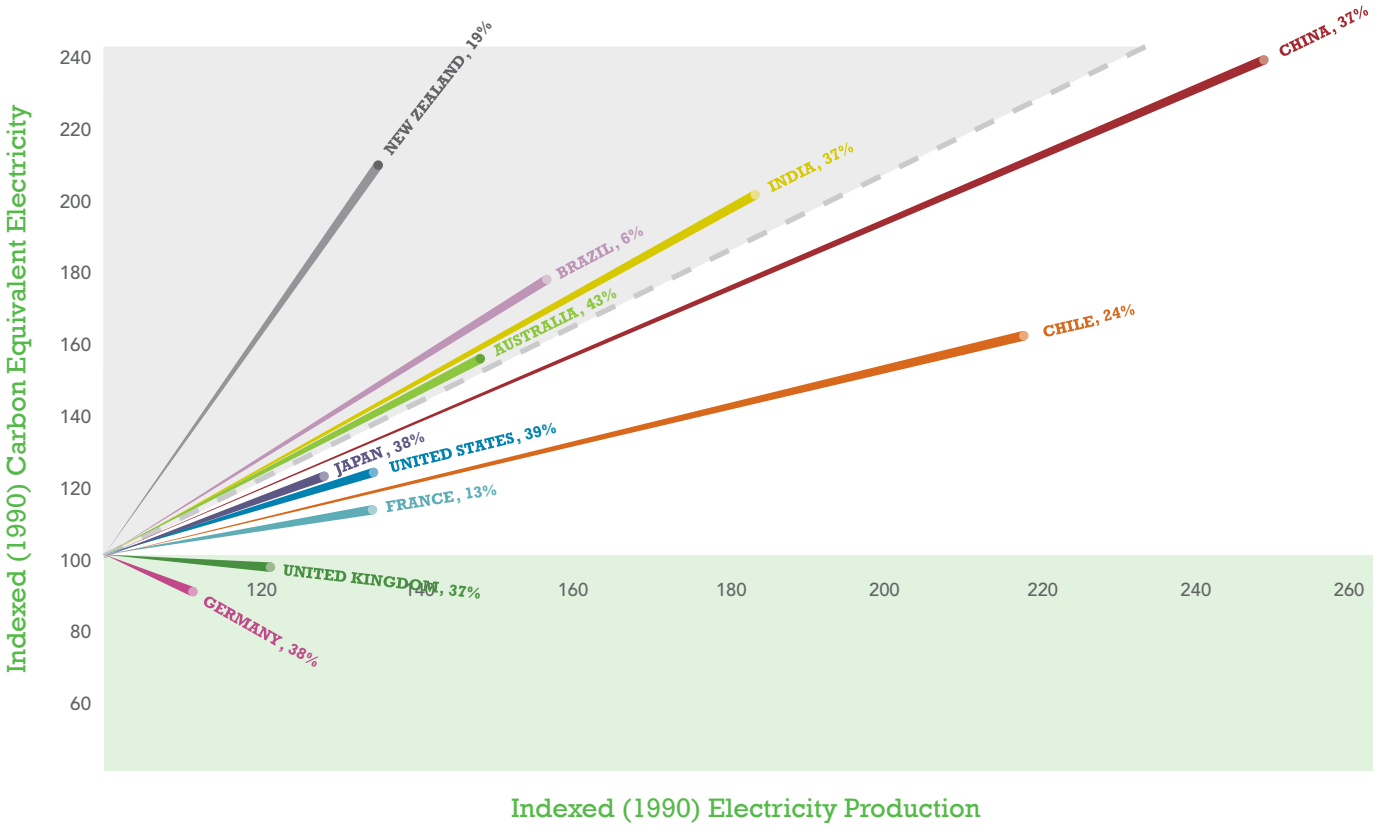
a. a relatively small proportion of New Zealand's emissions come from the electricity sector, but the emissions intensity of electricity generation has increased the most since 1990. This increase is due to the fact that New Zealand's hydro resources had been largely developed prior to 1990, and electricity sector growth since that time has been met by thermal sources (first through gas-fired plants, then more recently by using coal at the Huntly Power Station). New Zealand's increase in emissions occurred despite various policies, including a temporary ban on the building of new thermal generation

b. emissions in the United Kingdom electricity sector have remained constant, while production has grown to 120 percent of 1990 levels. This is mainly due to generators switching fuel from coal to gas throughout the 1990s, as the electricity sector was opened to competition and North Sea gas was available for a relatively low cost. In 1990 around one percent of all gas consumed in the United Kingdom was used in electricity generation, and by 2004 this figure had grown to more than 30 percent

c. New Zealand, Brazil, and Chile all have a lower proportion of their emissions coming from electricity than other countries due to the use of hydro power, while France relies on nuclear power for most of its electricity generation. The emissions intensity of electricity generation in France has also decreased since 1990, due to the commissioning of more than 6,000 MW of new nuclear capacity in recent years.

Figure 1.4 **Electricity Sector Emissions and Production**

Source: World Resources Institute (emissions), World Bank (electricity production)



The structure of the economy and source of emissions

The source of a country's emissions clearly matters for whether it can in fact reduce its emissions. We noted above that some countries with a relatively large proportion of their emissions in the electricity sector have been able to reduce these emissions by switching from coal to gas, or by investing in renewable generation sources. Reducing emissions is more costly in other sectors—such as transport and agriculture.

In the context of climate change policy what matters is progress against an agreed baseline - in this case 1990. Figure 1.4 (above) clearly shows that while New Zealand has built more carbon intensive electricity generation since 1990, the rest of the world has built less carbon intensive generation than we have. While it's true that overall we still have lower carbon intensive generation than other countries shown, what matters is what has happened since 1990.

Transport

Figure 1.5 (right) provides an indicator of the change in emissions intensity of transport, using the same graphing conventions described above Figure 1.4.

The proportion of emissions from transport varies considerably across countries, with more developed economies generating a greater share of emissions from transport. The overall trend in transport emissions growth is relatively consistent across countries, with no country able to substantially reduce the emissions intensity of their transport fuel use. Furthermore, none of the countries surveyed for this report have reduced the share of transport sector emissions in their economy.

Figure 1.5 **Transport Sector Emissions and Transport Activity**

Source: World Resources Institute (emissions), World Bank WDI (transport fuel consumption)
Note: Transport fuel consumption includes petrol and diesel (but excludes other transport fuels such as aviation fuel)

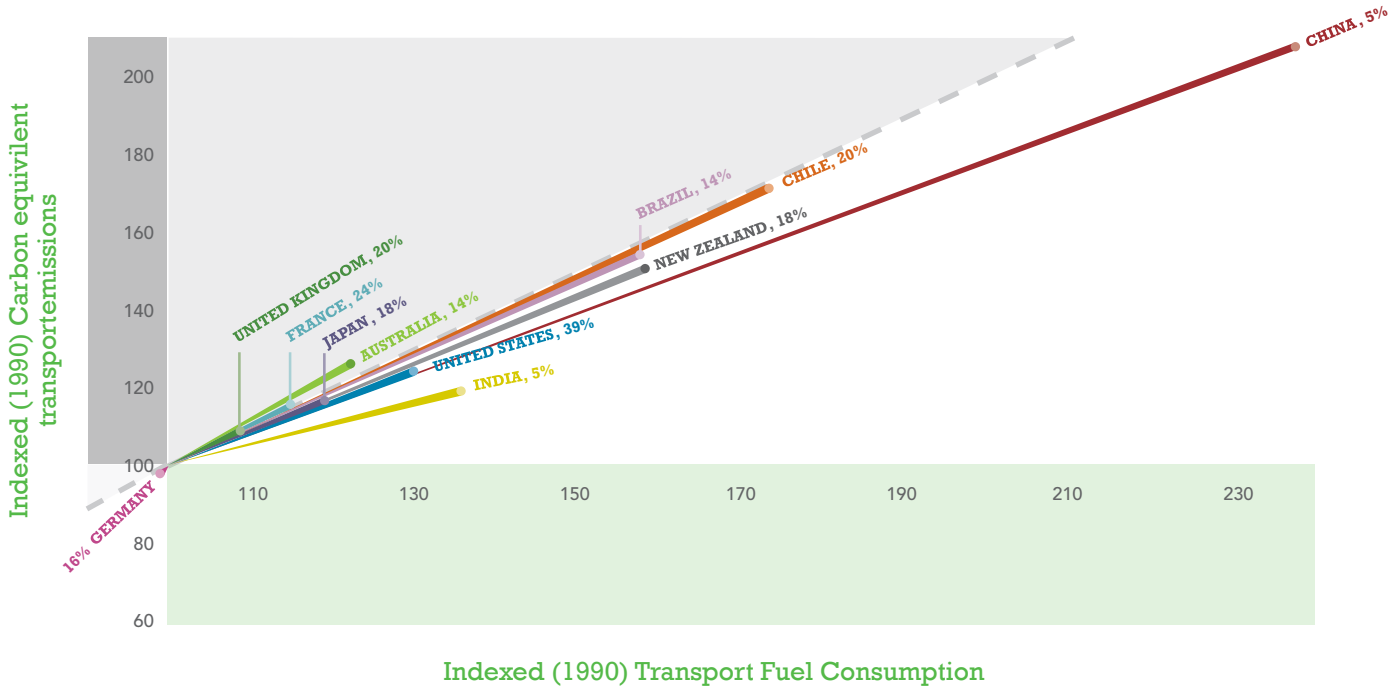
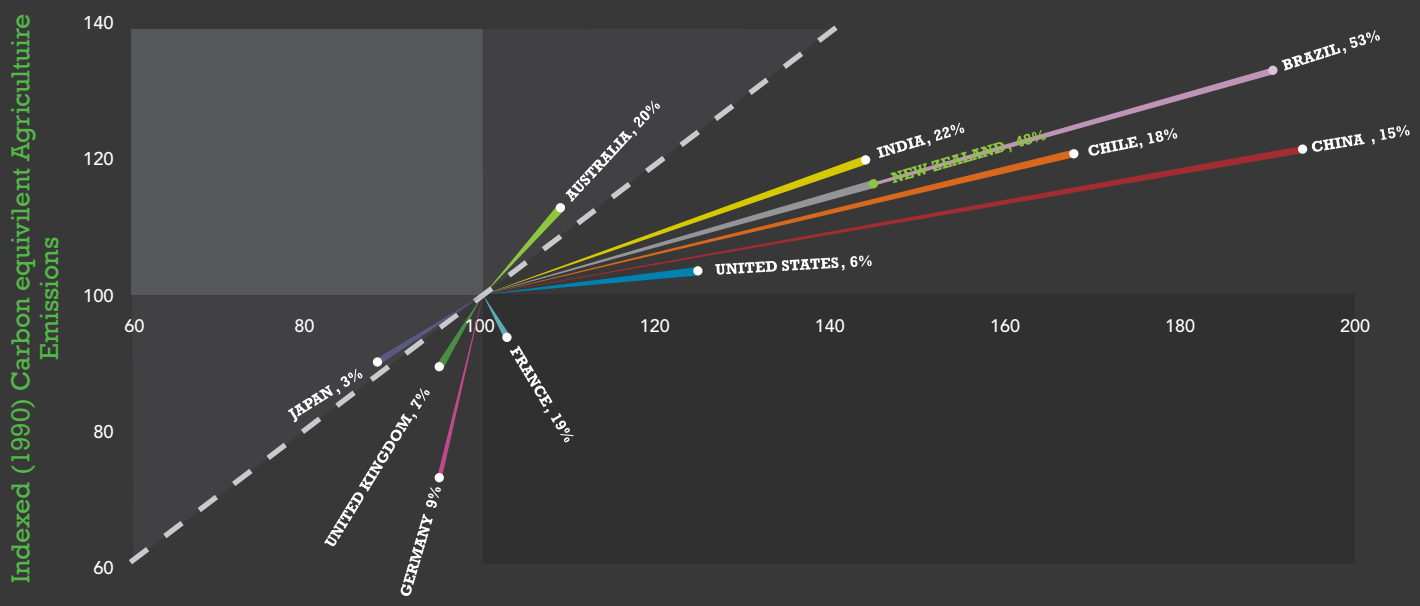


Figure 1.6 **Agriculture Sector Emissions and Production**

Source: World Resources Institute (emissions), Food and Agriculture Organization (agricultural production)



The absence of marked reductions in transport sector emissions can be explained by the limited opportunities to use policy to drive shifts in the transport sector that would reduce emissions. Possible ways to reduce emissions from transport include:

a. **modal shifts**—away from individual vehicles and towards a greater use of public transport and cycling and walking

b. **vehicle choices**—away from larger vehicles and towards more fuel-efficient (usually smaller) cars

c. **road construction**—to relieve traffic congestion.

Governments may also try to reduce transport demand by increasing fuel taxes, although this is generally considered politically unwise and may require substantial increases to overcome low price responsiveness in demand for transport.

A major difficulty for policies to reduce transport emissions is that pricing emissions generally has only a limited impact on consumer choices over transport modes or vehicle choices. Other factors—such as the effectiveness of the public transport system in a particular location and the diffusion of new vehicle technologies are likely to be more important. In New Zealand for example, the vehicle fleet covers a wide range of vehicle and emission technologies and is considered to be quite old, on average[1]. Climate change policy would struggle to change this fleet composition, and could therefore be relatively costly.

Agriculture

The scope for combining growth with reductions in emissions in agriculture is more uncertain than in the rest of the economy. Significant emissions are the result of biological processes which cannot, at present, be altered. More promising are changes in the use of fertilizers and other farm management processes, which are a significant source of emissions. Ensuring that land is put to its best available use, for example forestry versus farming, will also be important.

Figure 1.6 (above) shows changes in the emissions intensity of agricultural production, using the same graphing conventions described above Figure 1.4 (previous).

[1] MED (2007). Resource Document, Section 3 "The New Zealand Fuel Market and Vehicle Fleet". Available online at http://www.med.govt.nz/templates/MultipageDocumentPage____10297.aspx#P764_40602

Because some countries have experienced a decline in the size of their agricultural sector since 1990 (Japan, Germany and the United Kingdom), the x-axis in Figure 1.6 (previous) includes both an increase and decrease in output. The number to the right of the country name indicates the proportion of a country's total emissions that come from the agriculture sector (for example, 48 percent of New Zealand's emissions come from agriculture).

The emissions profile of the agriculture sector has followed a similar trend relative to output in most countries:

a. New Zealand, Brazil, Chile, China, India, and the United States have all grown their agricultural output to more than 120 percent of 1990 levels. Over the same period, emissions from the sector have grown, but at a slower rate than output (decreasing the emissions intensity of the sector)

b. Germany and the United Kingdom have reduced agricultural output, and emissions in both countries have fallen by a higher proportion, again decreasing the emissions intensity of the agriculture sector. This may be due to the partial removal of agricultural subsidies in Europe, and the resulting closure of inefficient farms

c. only France has decoupled output from emissions in this sector, managing a small increase in agricultural output while decreasing sector emissions. The drivers of this change are not clear. The most likely explanation is a switch from dairy to horticulture, which has a higher value in France.

Asking the Right Questions

A number of conclusions can be drawn from this analysis but this is not the purpose of the booklet. It is important that readers draw their own conclusions. More importantly, even before reaching for answers, the information raises a number of prior questions, particularly for the work of the Review Panel.

Without exception, all countries in the survey fundamentally base their climate change policy responses on their specific emission profiles. In other words, policy responses are modulated to the varying ability of the different sectors to reduce emissions without undermining growth and to the importance of that sector to their economy.

This alignment between emission profile and policy response is a useful framework in which to consider changes to the NZETS. Specifically, it enables a set of 'framework' questions to be asked that provide the opportunity, at least initially, to lift our focus away from the morass of technical detail and the often well-rehearsed debates about speed of action and stringency of obligation.

The initial questions that the information set out in the preceding sections raise are:

a. how does New Zealand's emission profile compare to the emissions profiles of other countries?

b. is the economic burden of adjustment implied by the emission profiles comparable?

c. is the NZETS appropriately targeted at the source of New Zealand's emissions problem?

d. does the action taken by New Zealand's trade competitors based on their emission profiles compare to that taken in New Zealand?

e. does the nature of New Zealand's emission profile make it commensurately more difficult to reduce emissions relative to the comparators?

f. would emission reductions have occurred in any case as the underlying economics of fuel and resource availability change?

g. what do the differences in emission profiles imply for ease of action for the comparator countries/for New Zealand?

The answers to these (and other) questions will hopefully allow for a more informed, strategically focused conversation about overall sense of direction and, in turn, provide the strategic framework or boundaries within which matters of technical detail can then be addressed.

For example, the responses to these questions might imply a particular direction and emphasis for the emergence of a dominant policy response or multiple responses and how the Review Panel might approach the issue of comparability of effort and economic burden across countries.

Conclusion

Fundamentally the review of the NZETS will boil down to an assessment of how a domestic emissions trading scheme can contribute to an international objective of reducing emissions in a way that maximises the opportunities and minimises the costs.

This is a complex matrix in which difficult trade-offs are required to be made. An assessment of the emissions profiles of other countries, relative to New Zealand's, is the key to unlocking this.

While a number of conclusions about what this analysis of emission profiles might mean for the design of the NZETS could be drawn, we have deliberately avoided doing so. Rather it is our preference that the questions that arise from this analysis and the answers to them be used to steer the direction in which any changes in the scheme's design parameters may be pointed.

A richer, better informed discussion framed by the work of the Review Panel should emerge as a result.

BusinessNZ will be regularly engaging with businesses, policy makers and stakeholders in this debate, and making formal submissions to represent the interests of all New Zealand businesses.

Appendix A: Country Emissions Profiles

This appendix provides an overview of emissions trends, the impact of land use, land use change and forestry (LULUCF), and economic activity for each country considered in this report. We note the following features of the data used for this analysis:

- **Sector-level emissions trends.** Annual trends in greenhouse gas emissions are shown based on data from the World Resources Institute Climate Analysis Indicators Toolkit (CAIT). The data sources for the emissions trends can be found at page 15 of the CAIT manual (available online at http://cait.wri.org/downloads/cait_ghgs.pdf)
- **LULUCF.** CAIT does not contain data on the effect of LULUCF on emissions in most countries. We have used country reports to the UNFCCC to provide an indication of the overall effect of LULUCF on emissions. This limits the sample of LULUCF estimates to developed countries
- **Economic growth.** The charts also plot GDP in each country, measured at market exchange rates (inflation adjusted against a 2005 base).

Figure A.1 **Sector Emissions in the United States**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)

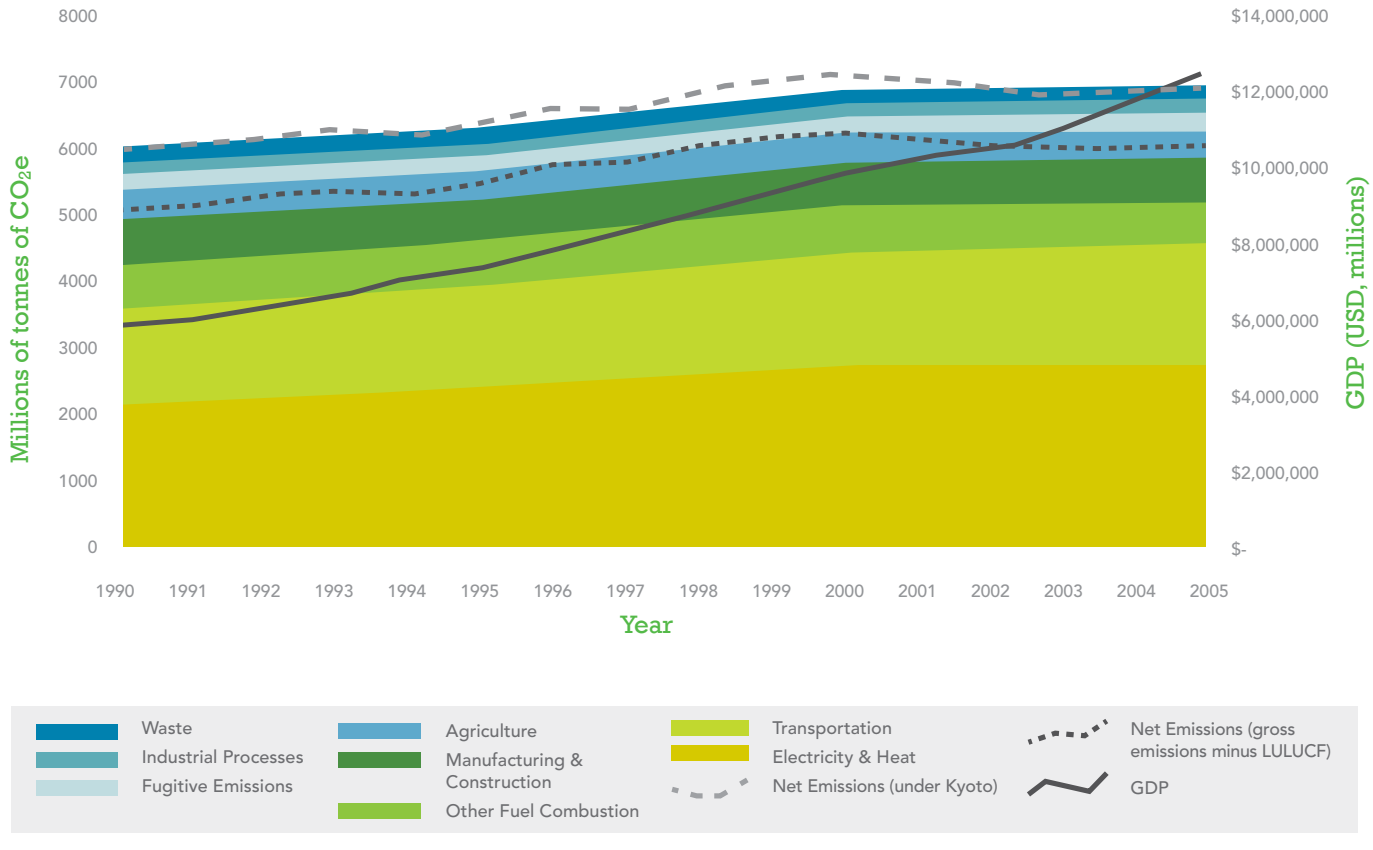


Figure A.2 **Sector Emissions in the United Kingdom**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)

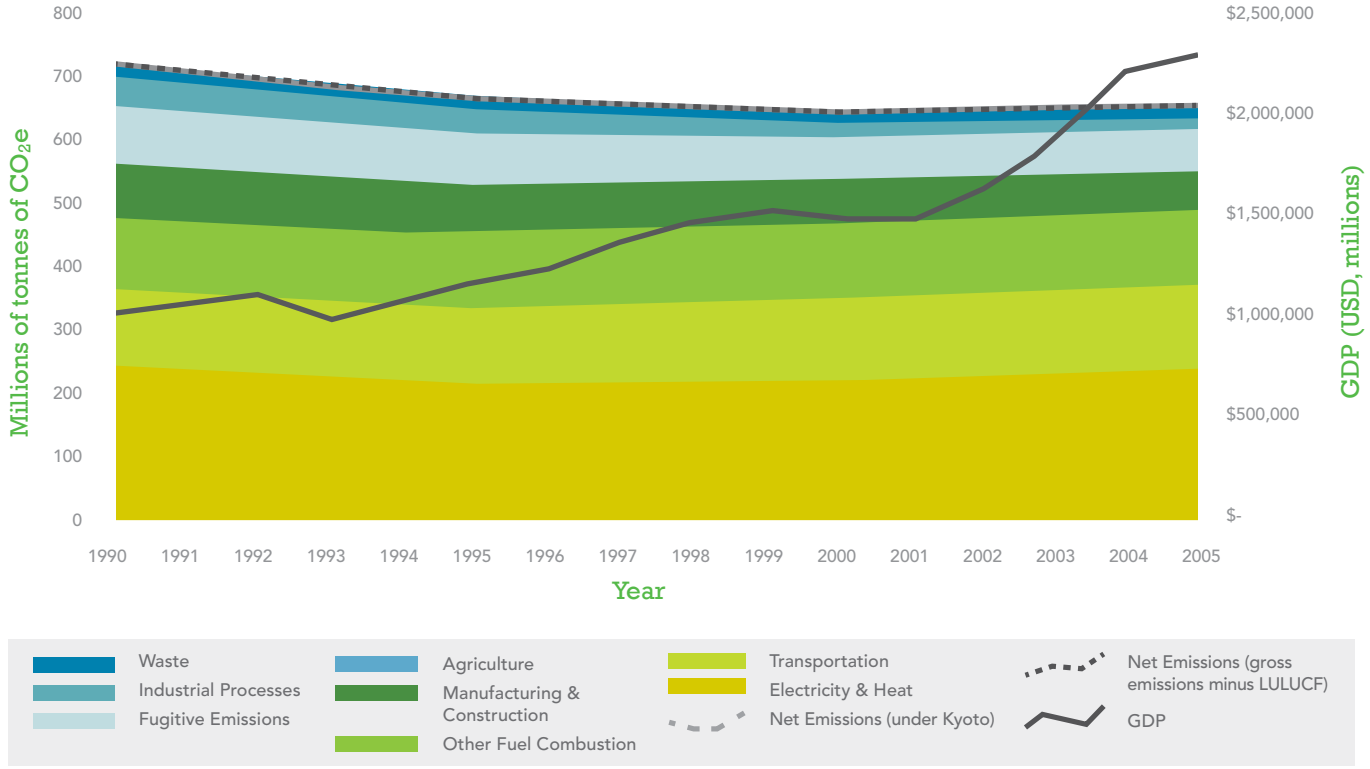


Figure A.3 **Sector Emissions in Germany**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)

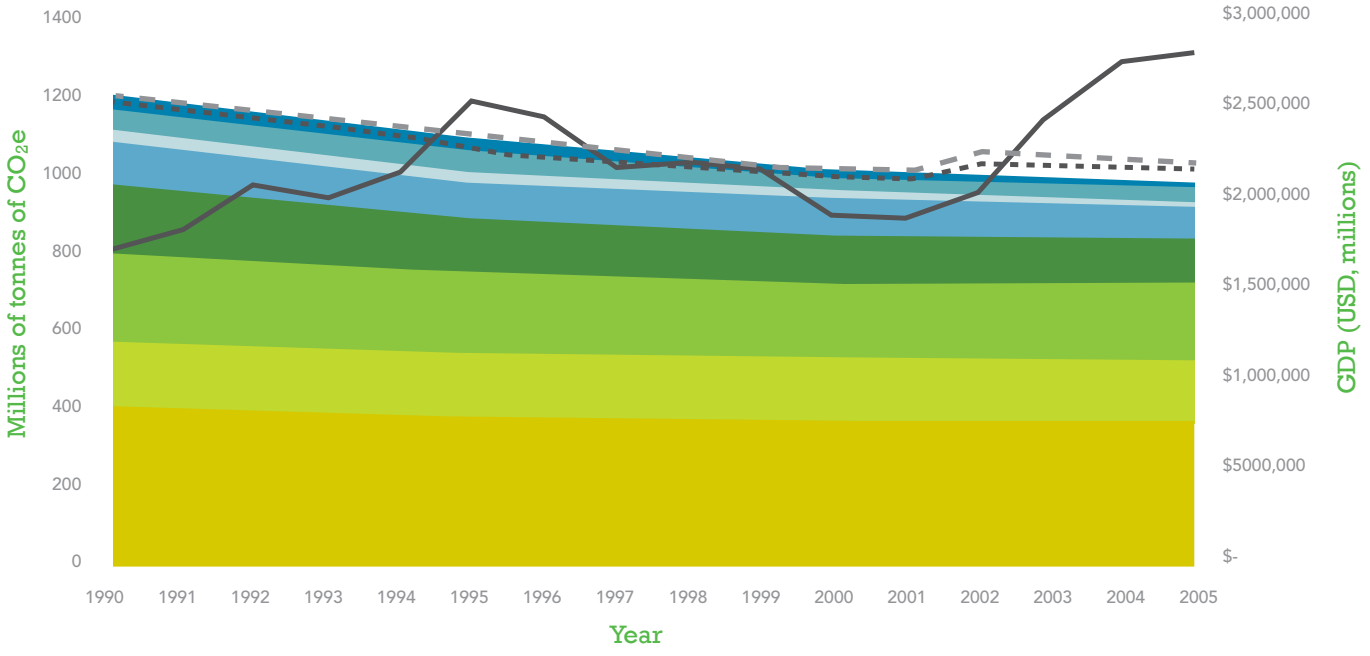


Figure A.4 **Sector Emissions in France**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)

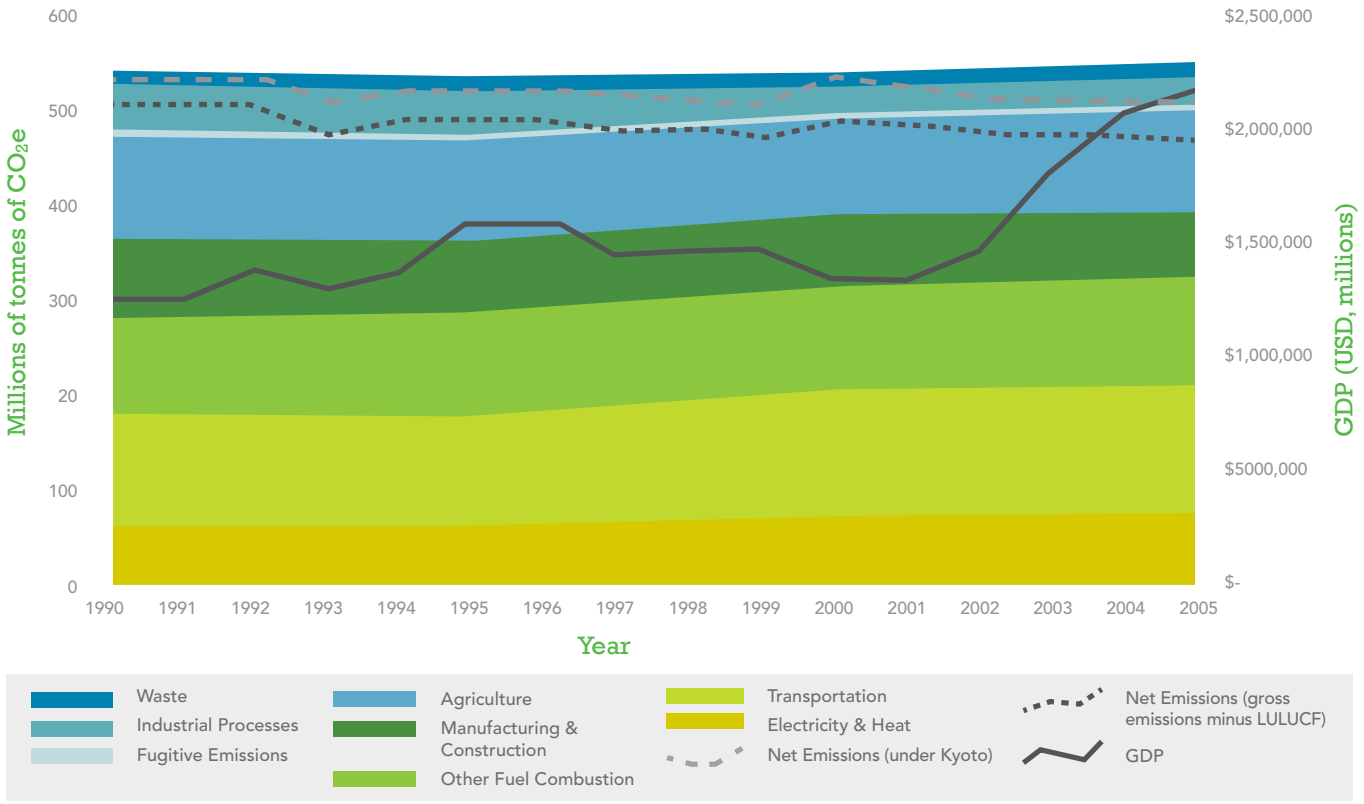
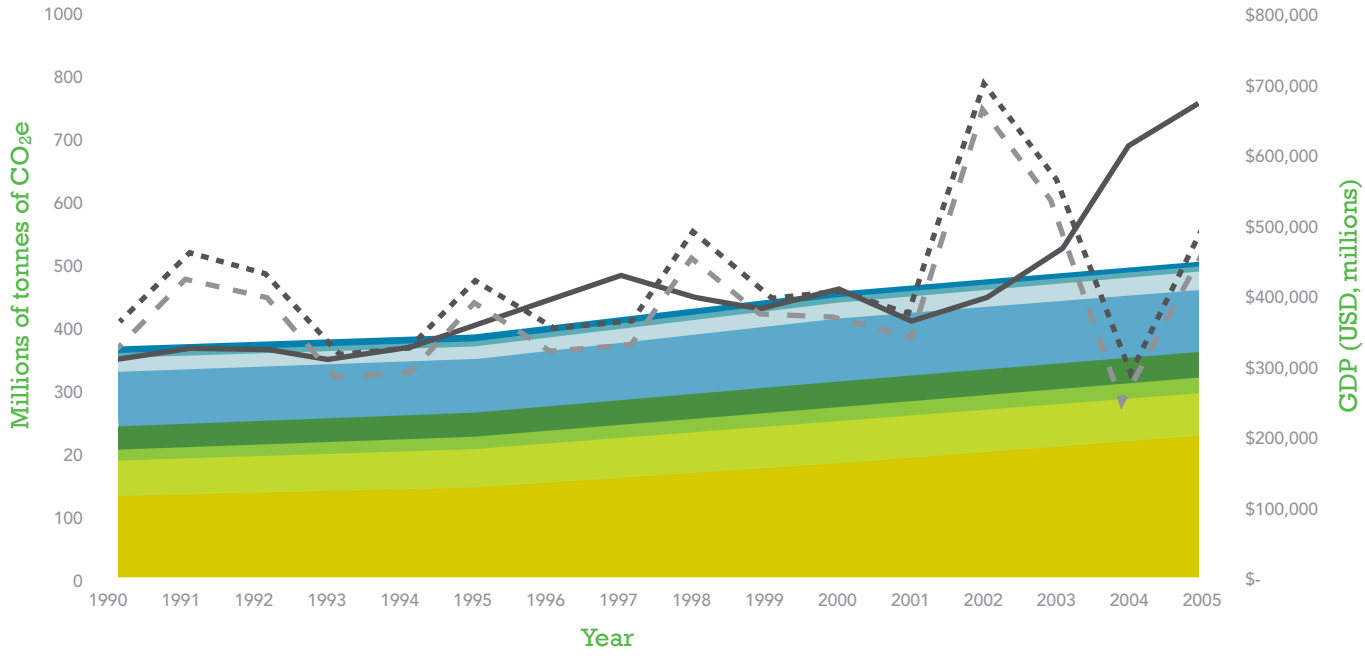


Figure A.5 **Sector Emissions in Australia**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)



Net emissions for Australia vary considerably from year to year due to the impact of wildfires and droughts.

Figure A.6 **Sector Emissions in Japan**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)

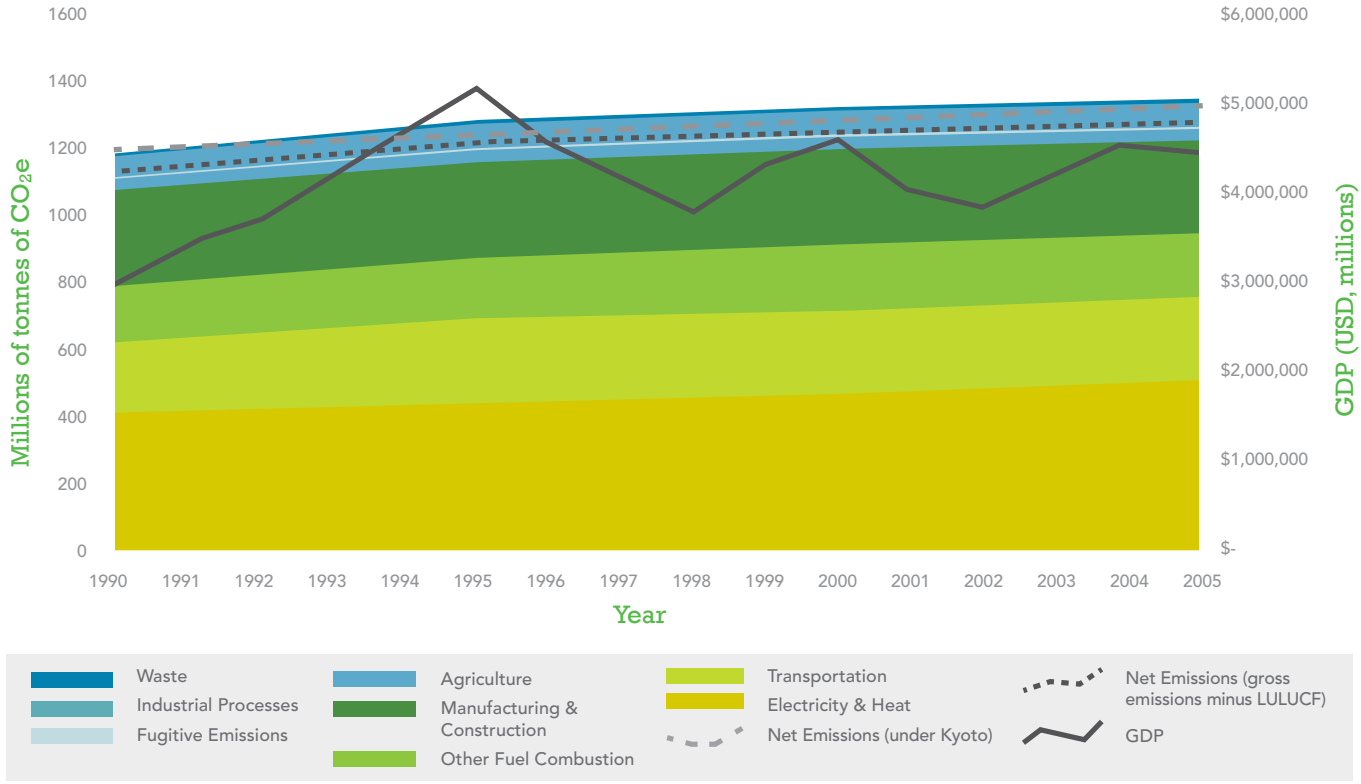


Figure A.7 **Sector Emissions in China**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)

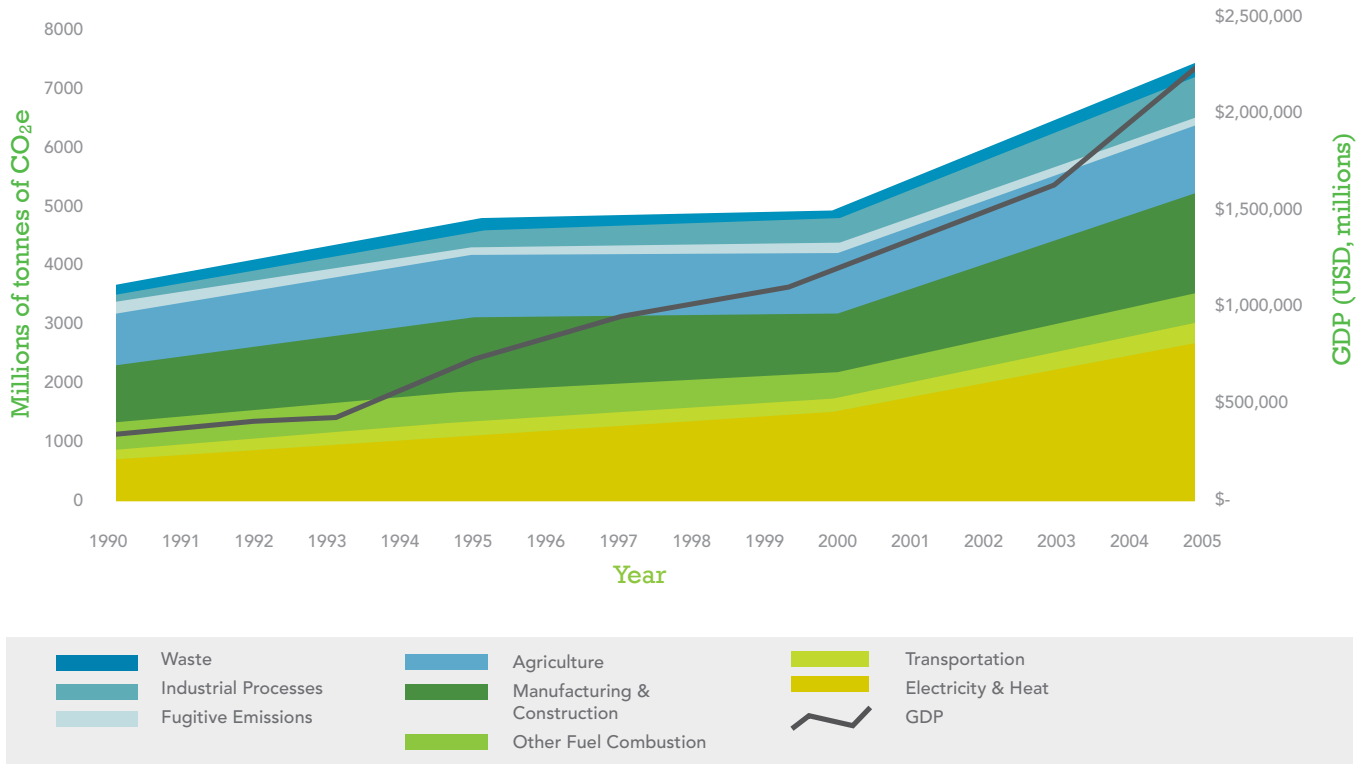


Figure A.8 **Sector Emissions in India**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)

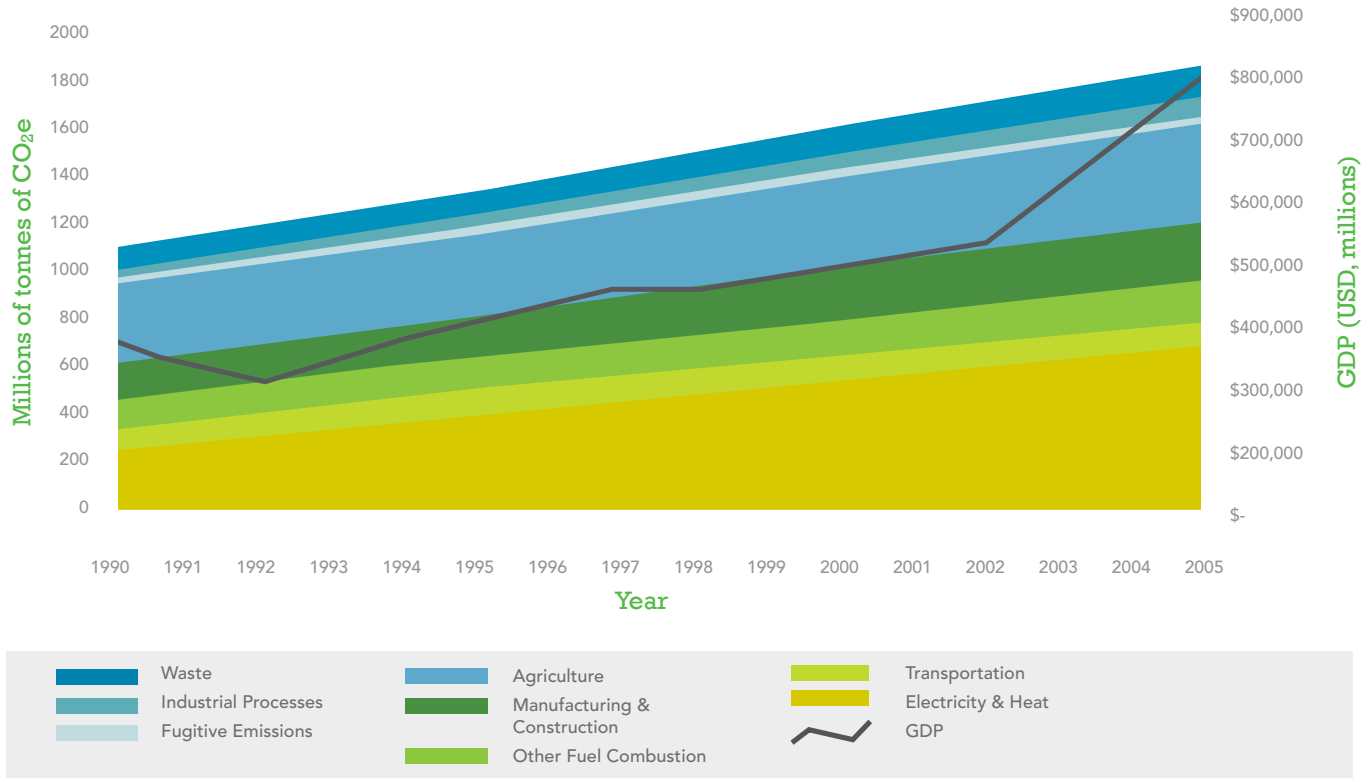


Figure A.9 **Sector Emissions in Brazil**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)

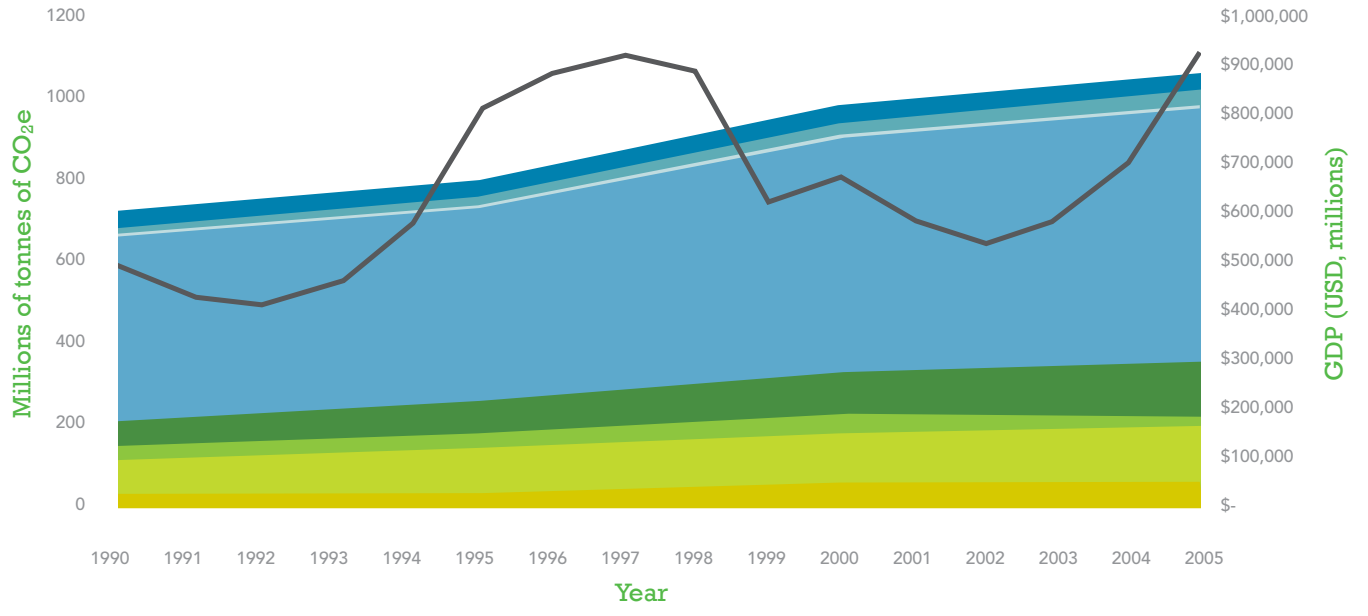
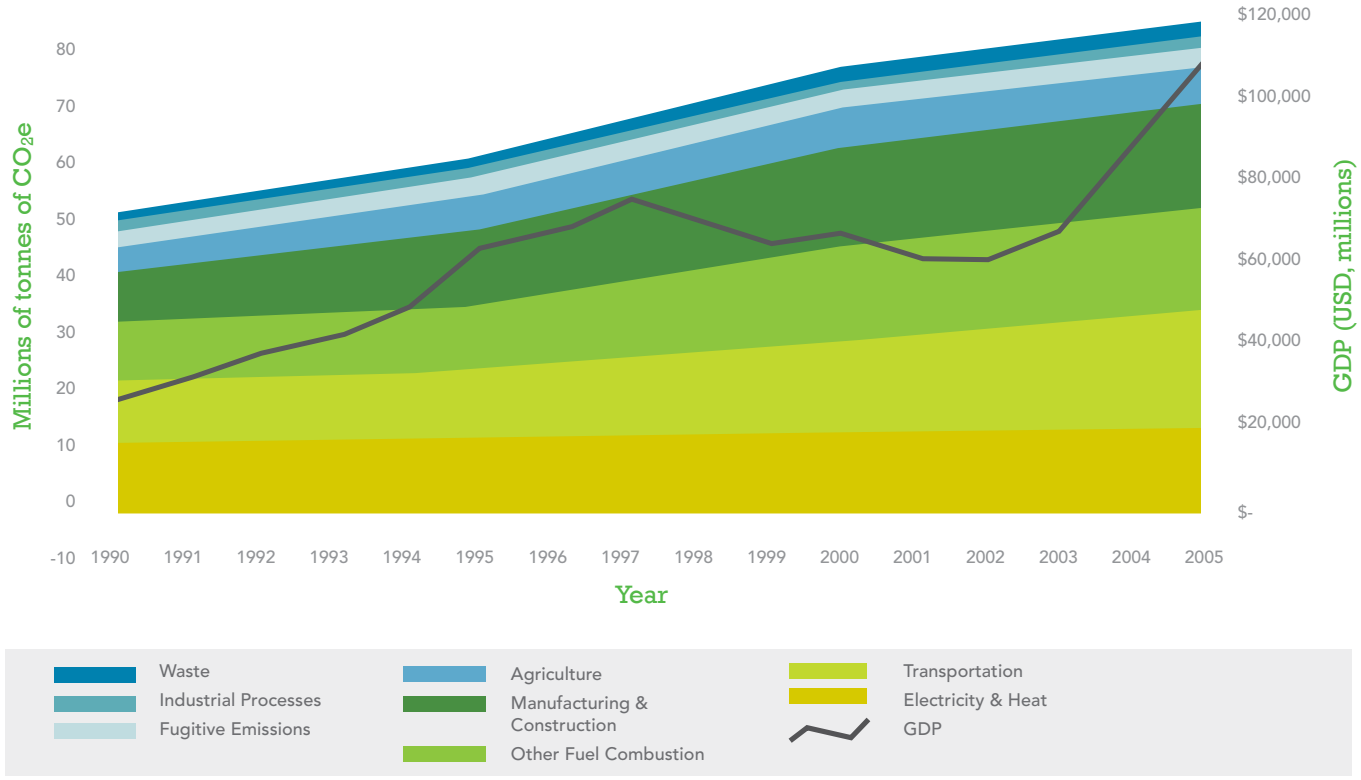


Figure A.10 **Sector Emissions in Chile**

Source: World Resources Institute (emissions), World Bank (GDP), UNFCCC (LULUCF)



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