

REGIONAL EMPLOYMENT IMPACTS OF THE KYOTO PROTOCOL

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INTRODUCTION

In this analysis we consider the potential regional impacts in New Zealand of implementing the Kyoto Protocol. This is based on provisional work produced by ABARE for Ministry for the Environment in 2001 published in “Economic outcomes of the Kyoto Protocol for New Zealand”, ABARE Report to New Zealand Ministry of Agriculture and Forestry, November 2001.

The scenarios modelled by ABARE vary the countries that would participate in the Kyoto Protocol, and abatement policies in agriculture. In all, six different scenarios were published, these are outlined briefly in table 1.

In this brief study we calculate changes in employment in regional level implied by different ABARE scenarios. The ABARE modelling included output of changes in employment by sector. We use these sector scenario results to calculate the implied change in regional employment.

METHOD

Our analysis is very simple. We translate changes in employment by sector, from the ABARE results, into changes in employment by region using:

$$\Delta E_R = \sum_S E_{RS}(1996) \times \Delta E_s$$

where ΔE_R is the implied change in employment in a region, $E_{RS}(1996)$ is the actual level of employment in each region in each sector in 1996, and ΔE_s is the predicted change in employment by sector.

The accuracy of this method is limited by the assumption that any changes in employment in a sector will be uniformly spread across regions. It ignores any lumpiness of employment loss. For example if there were three steel plants and the model predicted a 33% loss of employment in the steel sector we would assume that all plants reduce employment by 33% rather than that one of the three plants closes.

We produced an implied employment change, ΔE_R , for each of the six scenario's included in ABARE's Table B.18. The details of how these scenarios differ are included in the following table. For further details about the ABARE scenarios see ABARE (2001).

Scenario	<u>Country participation</u>		<u>Carbon charge coverage</u>	
	United States	Australia	New Zealand	Rest of participating Annex B
1	out	In	full	full
2	out	In	full	agriculture excluded
3	out	In	agriculture excluded	agriculture excluded
4	out	Out	full	full
5	out	Out	full	agriculture excluded
6	out	Out	agriculture excluded	agriculture excluded

DATA

For actual employment, $E_{RS}(1996)$, we use levels of employment in 1996 for different industries in each Territorial Local Authority, from Statistics New Zealand Census of Population and Dwellings. The industry classifications used are given in appendix 1.

For predicted change in employment by sector, ΔE_s , we used employment changes by sector from Table B.18 in ABARE (2001). The sector breakdowns used are given in the appendix. ABARE sectors were based on ICOC classifications whereas Statistics New Zealand use ANZSIC96 codes so we created a concordance between the sector groupings. This is given in the appendix.

RESULTS

Territorial Authority (1995 classification)	Percentage Change in Employment (by scenario)					
	1	2	3	4	5	6
<i>National Change</i>	-0.2	-0.3	0.1	-0.2	-0.3	0.1
FAR NORTH DISTRICT	-0.7	-1.2	0.2	-0.8	-1.1	0.2
WHANGAREI DISTRICT	-0.5	-0.8	0.2	-0.6	-0.8	0.1
KAIPARA DISTRICT	-4.0	-6.2	0.1	-4.3	-6.2	0.0
RODNEY DISTRICT	0.1	0.1	0.1	0.1	0.2	0.1
NORTH SHORE CITY	0.7	1.1	0.2	0.8	1.2	0.2
WAITAKERE CITY	0.7	1.2	0.2	0.8	1.3	0.2
AUCKLAND CITY	0.7	1.1	0.2	0.7	1.2	0.2
MANUKAU CITY	0.6	1.0	0.0	0.6	1.0	0.0
PAPAKURA DISTRICT	0.3	0.6	-0.2	0.4	0.6	-0.2
FRANKLIN DISTRICT	-1.1	-1.5	-0.9	-1.3	-1.6	-1.0
THAMES-COROMANDEL DISTRICT	0.0	-0.1	0.1	-0.1	0.0	0.1
HAURAKI DISTRICT	-3.0	-4.5	0.0	-3.2	-4.5	0.0
WAIKATO DISTRICT	-2.6	-4.0	-0.2	-2.8	-4.0	-0.3

MATAMATA-PIAKO DISTRICT	-4.5	-6.8	0.0	-4.8	-6.7	-0.1
HAMILTON CITY	0.4	0.5	0.1	0.4	0.6	0.1
WAIPA DISTRICT	-2.1	-3.3	0.1	-2.3	-3.2	0.1
OTOROHANGA DISTRICT	-4.9	-7.7	0.1	-5.4	-7.6	0.1
SOUTH WAIKATO DISTRICT	-1.7	-2.5	0.1	-1.8	-2.5	0.1
WAITOMO DISTRICT	-2.5	-4.9	0.0	-3.0	-4.9	0.0
TAUPO DISTRICT	-0.2	-0.5	0.2	-0.3	-0.4	0.1
WESTERN BAY OF PLENTY DISTRICT	-0.3	-0.4	0.2	-0.3	-0.4	0.2
TAURANGA DISTRICT	0.6	0.9	0.2	0.6	0.9	0.2
ROTORUA DISTRICT	-0.1	-0.1	0.2	-0.1	-0.1	0.2
WHAKATANE DISTRICT	-1.4	-2.0	0.3	-1.5	-2.0	0.2
KAWERAU DISTRICT	0.9	1.5	0.4	1.0	1.5	0.4
OPOTIKI DISTRICT	-1.6	-2.5	0.3	-1.7	-2.5	0.3
GISBORNE DISTRICT	0.0	-0.4	0.3	-0.1	-0.4	0.3
WAIROA DISTRICT	-1.3	-3.1	0.1	-1.7	-3.2	0.1
HASTINGS DISTRICT	0.2	0.1	0.3	0.2	0.1	0.3
NAPIER CITY	0.6	0.9	0.3	0.6	0.9	0.3
CENTRAL HAWKE'S BAY DISTRICT	-2.8	-5.8	0.1	-3.4	-5.8	0.1
NEW PLYMOUTH DISTRICT	-0.4	-0.7	0.0	-0.5	-0.6	0.0
STRATFORD DISTRICT	-4.4	-6.7	0.0	-4.8	-6.7	-0.1
SOUTH TARANAKI DISTRICT	-5.4	-8.1	-0.1	-5.8	-8.1	-0.2
RUAPEHU DISTRICT	-1.2	-2.7	0.3	-1.5	-2.7	0.3
WANGANUI DISTRICT	0.0	-0.2	0.2	-0.1	-0.2	0.2
RANGITIKEI DISTRICT	-2.2	-4.3	0.3	-2.6	-4.3	0.2
MANAWATU DISTRICT	-1.7	-3.0	0.2	-1.9	-3.0	0.2
PALMERSTON NORTH CITY	0.3	0.4	0.3	0.3	0.4	0.3
TARARUA DISTRICT	-4.5	-7.9	0.1	-5.1	-7.9	0.0
HOROWHENUA DISTRICT	-0.4	-0.4	0.3	-0.4	-0.4	0.3
KAPITI COAST DISTRICT	0.5	0.8	0.3	0.5	0.8	0.3
PORIRUA CITY	0.7	1.1	0.3	0.7	1.1	0.3
UPPER HUTT CITY	0.7	1.0	0.3	0.7	1.1	0.3
LOWER HUTT CITY	0.6	1.0	0.1	0.7	1.1	0.1
WELLINGTON CITY	0.8	1.1	0.4	0.8	1.2	0.4
MASTERTON DISTRICT	-0.7	-1.5	0.3	-0.8	-1.5	0.3
CARTERTON DISTRICT	-1.9	-3.3	0.2	-2.1	-3.3	0.2
SOUTH WAIRARAPA DISTRICT	-2.1	-3.7	0.2	-2.4	-3.7	0.2
TASMAN DISTRICT	0.2	0.4	0.3	0.2	0.3	0.2
NELSON CITY	0.7	1.1	0.3	0.7	1.1	0.2
MARLBOROUGH DISTRICT	-0.1	-0.4	0.3	-0.2	-0.4	0.2
KAIKOURA DISTRICT	-1.9	-3.3	0.3	-2.2	-3.3	0.2
BULLER DISTRICT	-1.9	-2.9	-0.9	-2.1	-2.8	-0.9
GREY DISTRICT	-0.4	-0.7	-0.3	-0.5	-0.7	-0.3
WESTLAND DISTRICT	-1.5	-2.4	0.1	-1.7	-2.3	0.1
HURUNUI DISTRICT	-4.5	-8.7	0.2	-5.2	-8.6	0.2
WAIMAKARIRI DISTRICT	-0.3	-0.7	0.1	-0.4	-0.7	0.1
CHRISTCHURCH CITY	0.6	1.0	0.2	0.7	1.1	0.2
BANKS PENINSULA DISTRICT	-0.3	-0.7	0.3	-0.4	-0.7	0.3
SELWYN DISTRICT	-1.0	-2.0	0.3	-1.2	-2.0	0.2
ASHBURTON DISTRICT	-2.2	-4.2	0.1	-2.5	-4.2	0.1
TIMARU DISTRICT	-0.7	-1.5	0.2	-0.9	-1.5	0.1
MACKENZIE DISTRICT	-0.3	-0.7	0.1	-0.4	-0.6	0.1
WAIMATE DISTRICT	-5.8	-11.2	0.1	-6.7	-11.2	0.1
WAITAKI DISTRICT	-1.7	-3.4	0.0	-2.0	-3.4	-0.1
CENTRAL OTAGO DISTRICT	-1.8	-3.8	0.1	-2.2	-3.8	0.1
QUEENSTOWN-LAKES DISTRICT	0.2	0.2	0.2	0.2	0.3	0.2
DUNEDIN CITY	0.3	0.3	0.2	0.2	0.3	0.2
CLUTHA DISTRICT	-4.7	-9.1	0.1	-5.4	-9.0	0.1
SOUTHLAND DISTRICT	-4.7	-8.9	0.0	-5.4	-8.9	0.0
GORE DISTRICT	-2.1	-4.3	-0.1	-2.5	-4.3	-0.2
INVERCARGILL CITY	-0.8	-1.7	-0.3	-1.1	-1.7	-0.4
NOT APPLICABLE	0.4	0.6	0.2	0.4	0.7	0.2

LIMITATIONS AND CAVEATS

The accuracy of our decomposition is limited by:

- our assumption that change in employment uniform across regions,
- the accuracy of the ABARE results (Note that it is also based on old ABARE results, new results have since been released.)

The ABARE model assumes that the economy is at full employment. This means that these are long run impacts. In the short run jobs might be lost in contracting sectors but new jobs may not yet be created in expanding sectors.

APPENDIX

CONCORDANCE BETWEEN ABARE SECTOR CLASSIFICATIONS (ICOC) AND STATISTIC NZ SECTOR CLASSIFICATIONS (ANZSIC)

ABARE	Statistics New Zealand
Industry	Industry
Coal	Black Coal Mining Brown Coal Mining
Oil and Gas	Oil and Gas Extraction Other Mining Services Industrial Gas Manufacturing Gas Supply
Petroleum and Coal Products	Petroleum refining Petroleum and coal product manufacturing nec
Electricity	Electricity Supply
Iron and Steel	Basic Iron and Steel Manufacturing Iron and Steel Casting and Forging Steel Pipe and Tube Manufacturing Structural Steel Fabricating Structural Metal Product Manufacturing nec Metal Container Manufacturing Sheet Metal Product Manufacturing nec Hand Tool and General Hardware Manufacturing Spring and Wire Product Manufacturing Nut, Bolt, Screw and Rivet Manufacturing Metal Coating and Finishing Fabricated Metal Product Manufacturing nec Prefabricated Metal Building Manufacturing Sheet Metal Furniture Manufacturing
Nonferrous metals	Alumina Production Aluminium Smelting Copper, Silver, Lead and Zinc Smelting, Refining Basic Non-Ferrous Metal Manufacturing nec Aluminium Rolling, Drawing, Extruding Non-Ferrous Metal Rolling, Drawing, Extruding nec Non-Ferrous Metal Casting Non-Ferrous Pipe Fitting Manufacturing Architectural Aluminium Product Manufacturing
Chemicals, Rubber and Plastic	Fertiliser Manufacturing Synthetic Resin Manufacturing Organic Industrial Chemical Manufacturing nec Inorganic Industrial Chemical Manufacturing nec Explosive Manufacturing Paint Manufacturing Medicinal and Pharmaceutical Product Manufacturing Pesticide Manufacturing Soap and Other Detergent Manufacturing Cosmetic and Toiletry Preparation Manufacturing Ink Manufacturing

	<p>Chemical Product Manufacturing nec Rubber Tyre Manufacturing Rubber Product Manufacturing nec Plastic Blow Moulded Product Manufacturing Plastic Extruded Product Manufacturing Plastic Bag and Film Manufacturing Plastic Product Rigid Fibre Reinforced Manufacturing Plastic Foam Product Manufacturing Plastic Injection Moulded Product Manufacturing</p>
Clothing	Textile, Clothing, Footwear and Leather Manufacturing
Meat Products	<p>Meat Processing Poultry Processing Bacon, Ham and Smallgood Manufacturing</p>
Dairy Products	<p>Milk and Cream Processing Ice Cream Manufacturing Dairy Product Manufacturing nec</p>
Food	<p>Fruit and Vegetable Processing Oil and Fat Manufacturing Flour Mill Product Manufacturing Cereal Food and Baking Mix Manufacturing Bread Manufacturing Cake and Pastry Manufacturing Biscuit Manufacturing Sugar Manufacturing Confectionery Manufacturing Seafood Processing Prepared Animal and Bird Feed Manufacturing Food Manufacturing nec Soft Drink, Cordial and Syrup Manufacturing Beer and Malt Manufacturing Wine Manufacturing Spirit Manufacturing Tobacco Product Manufacturing</p>
Pulp, paper and publishing	<p>Pulp, Paper and Paperboard Manufacturing Solid Paperboard Container Manufacturing Corrugated Paperboard Container Manufacturing Paper Bag and Sack Manufacturing Paper Product Manufacturing nec Paper Stationery Manufacturing Printing Services to Printing Newspaper Printing or Publishing Other Periodical Publishing Book and other Publishing</p>
Other Wood	<p>Log Sawmilling Wood Chipping Timber Resawing and Dressing Plywood and Veneer Manufacturing Fabricated Wood Manufacturing Wooden Structural Component Manufacturing Wood Product Manufacturing nec Prefabricated Building Manufacturing nec Wooden Furniture and Upholstered Seat Manufacturing Mattress Manufacturing (except Rubber) Furniture Manufacturing nec</p>
Minerals	<p>Iron Ore Mining Bauxite Mining Copper Ore Mining Gold Ore Mining Mineral Sand Mining Nickel Ore Mining Silver-Lead-Zinc Ore Mining Metal Ore Mining nec Gravel and Sand Quarrying Construction Material Mining nec Mining nec</p>
Nonmetallic minerals	<p>Glass and Glass Product Manufacturing Clay Brick Manufacturing Ceramic Product Manufacturing Ceramic Tile and Pipe Manufacturing Ceramic Product Manufacturing nec Cement and Lime Manufacturing Plaster Product Manufacturing Concrete Slurry Manufacturing</p>

	Concrete Pipe and Box Culvert Manufacturing Concrete Product Manufacturing nec Non-Metallic Mineral Product Manufacturing nec
Light Manufacturing	Machinery and Equipment Manufacturing Recorded Media Manufacturing and Publishing
Other Manufacturing	Jewellery and Silverware Manufacturing Toy and Sporting Good Manufacturing Manufacturing nec
Construction	General Construction Construction Trade Services
Trade and Transport	Basic Material Wholesaling Machinery and Motor Vehicle Wholesaling Personal and Household Good Wholesaling Motor Vehicle Retailing and Services Road Transport Rail Transport Water Transport Air and Space Transport Other Transport Services to Transport Storage Communication Services Motor Vehicle Hiring Other Transport Equipment Leasing
Private Services	Petroleum Exploration (Own Account) Petroleum Exploration Services Mineral Exploration Services Accommodation, Cafes and Restaurants Personal and Household Good Retailing Finance Insurance Services to Finance and Insurance Commercial Property Body Corporates Commercial Property Operators and Developers nec Real Estate Agents Holder Investor Farm Animals Non-Financial Asset Investors nec Plant Hiring or Leasing Architectural Services Surveying Services Consultant Engineering Services Technical Services nec Data Processing Services Information Storage and Retrieval Services Computer Maintenance Services Computer Consultancy Services Legal Services Accounting Services Advertising Services Commercial Art and Display Services Market Research Services Business Administrative Services Business Management Services Employment Placement Services Contract Staff Services Secretarial Services Security and Investigative Services (except Police) Pest Control Services Cleaning Services Contract Packing Services nec Business Services nec Motion Picture, Radio and Television Services Libraries, Museums and the Arts Sport and Recreation
Public Services	Sewerage and Drainage Services Scientific Research Government Administration Defence Education Health Services Community Services Other Services

Other Services	Residential Property Body Corporates Residential Property Operators nec Water Supply
Wheat and Other Cereal Grains	Grain Growing
Crops	Cut Flower and Flower Seed Growing Vegetable Growing Grape Growing Apple and Pear Growing Stone Fruit Growing Kiwi Fruit Growing Citrus Growing Berry Fruit Growing Other Fruit Growing nec Tobacco and Hops Growing Cultivated Mushroom Growing Crop and Plant Growing nec
Forestry	Forestry and Logging
Fisheries	Commercial Fishing
Livestock for meat	Grain-Sheep and Grain-Beef Cattle Farming Sheep-Beef Cattle Farming Beef Cattle Farming Poultry Farming (Meat) Pig Farming Deer Farming Mixed Livestock Livestock Farming nec Aerial Agricultural Services Hunting and Trapping
Other Animal Products	Beekeeping Poultry Farming (Eggs) Horse Farming
Dairy cattle	Dairy Cattle Farming
Wool	Sheep Farming Shearing Services Services to Agriculture nec