

# Mapping sectors for high employment and low carbon growth in South Africa

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TOWARDS A JUST TRANSITION - THE ROLE OF INDUSTRIAL POLICY

# Problem Statement

- South Africa is facing an **unemployment crisis**, with an unemployment rate of 43.2% by the expanded definition in quarter 1 of 2021.
- At the same time, the **threats of climate change are becoming ever more evident and the world is under increasing pressure to lower its carbon emissions**. The distributional effects of a lower carbon growth pathway will be an important part of the overall transition to a lower carbon economy, in South Africa and elsewhere.
- Previously, sectors have been characterised according to either their employment or carbon intensity, **but have not been mapped based on both measures**.
- This dissertation fills this gap by mapping sectors for a prospective high employment and low carbon growth pathway in South Africa. **Overall, the focus of this dissertation is to support a 'Just Transition' to a new growth pathway characterised by high employment and low carbon**

# Research Question

*Which sectors / subsectors have opportunities for high employment and low emissions growth in South Africa, and what are some policy measures that could realise this potential?*

# Methodology

- Construction of a two-by-two typology to explicitly map sectors / subsectors by both their employment multiplier rank and carbon intensity – using data from work by *Fiona Tregenna*<sup>1</sup> and *James Reeler*<sup>2</sup>
- This mapping lays the basis for providing an understanding of the implications of three policy measures across different sectors:
  - A wage subsidy
  - A carbon tax
  - A phase out of fossil fuel subsidies
- Jointly having the potential to jointly help shift the growth pathway of South Africa to one with higher employment and lower emissions.

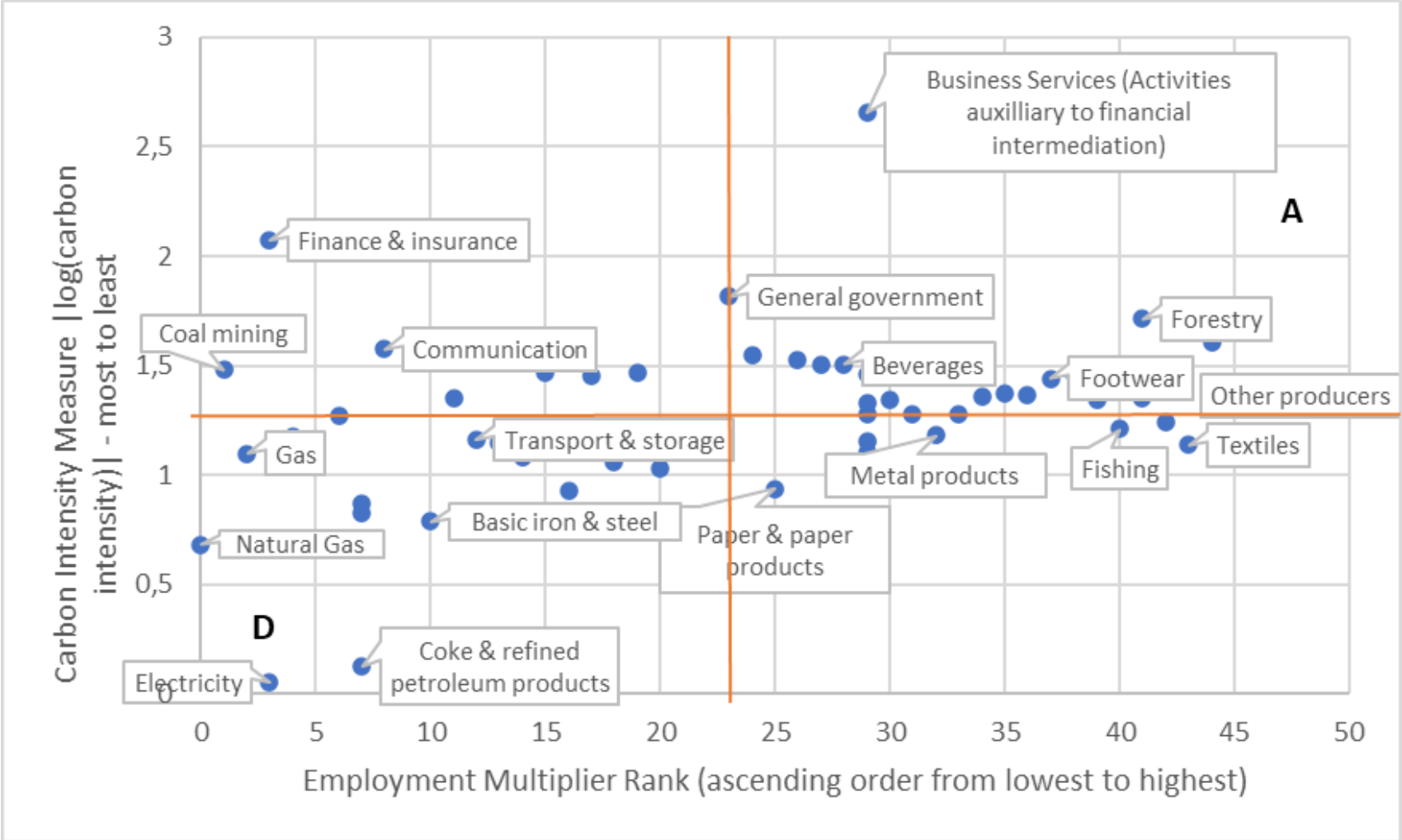
1. Tregenna, F. 2010. Sectoral Labour-Intensity in South Africa. South Africa: National Economic Development and Labour Council (NEDLAC). Available: [https://new.nedlac.org.za/wp-content/uploads/2014/10/labour\\_intensity\\_report\\_2010.pdf](https://new.nedlac.org.za/wp-content/uploads/2014/10/labour_intensity_report_2010.pdf) [2020, November 29].

2. Reeler, J. 2021. Income inequality and mitigation burdens: An examination of climate mitigation fair shares for South African households. Cape Town, South Africa: UCT. (in press).

# Methodology

- On the one hand, a wage subsidy applied to all sectors would provide larger benefits for more employment intensive sectors and so incentivise growth therein.
- On the other hand, the phasing out of fossil fuel subsidies and a more punitive carbon tax would place more financial pressure on relatively capital and carbon intensive sectors

# Mapping of employment multiplier rank against carbon intensity of sectors



# Filled in typology using both employment rank and carbon intensity measure of sectors / subsectors

<p><b>Low carbon intensity</b></p>	<p>C. Coal mining (21); Finance &amp; insurance (81, 82); Post &amp; telecommunication (75); Manufacturing n.e.c, recycling (392, 393, 395); Other transport equipment (384-387); Other private services (92, 94-96); Health (med, dent, vet) &amp; social work (93)</p>	<p>A. Other producers/activities (99); Clothing (313, 314, 315); Catering and accommodation (64); Forestry (12); Furniture (391); Leather (316); Wood and wood products (321, 322); Wholesale and retail trade (61, 62, 63); Footwear (317); Food (301-304); Motor vehicles, parts &amp; accessories (381-383); Machinery &amp; equipment (356-359); Printing, publishing &amp; recorded media (324-326); Business Services (83, 85, 87), Beverages (305); Tobacco (306); Professional &amp; scientific equipment (374-376); TV, radio &amp; communication equipment (371-373); General government (91)</p>
<p><b>High carbon intensity</b></p>	<p>D. Gas sector (natural) (2211); Gas (412); Electricity (411); Collection, purification &amp; distribution of water (42); Coke &amp; refined petroleum products inc. nuclear fuel (331-333); Mining of metal ores (24); Other mining &amp; quarrying (221, 25); Basic precious &amp; non-ferrous metals (352); Basic chemicals (334); Basic iron &amp; steel (351, 353); Transport &amp; storage (71-74); Plastic products (338); Other chemicals &amp; man-made fibres (335, 336); Non-metallic minerals (342); Gold mining (23); Glass &amp; glass products (341); Rubber products (337); Electrical machinery &amp; apparatus (24)</p>	<p>B. Textiles (311, 312); Agriculture(11); Fishing (13); Building construction (502); Metal products excluding machinery (354, 355); Civil engineering &amp; other construction (501, 503-505); Business services (84, 86, 88); Paper &amp; paper products (323)</p>
	<p><b>Low employment</b></p>	<p><b>High employment</b></p>

# Some Results (1)

- **Quadrant D:**

- 'Gas sector' (natural gas) and 'Gas' ('manufacture of gas; distribution of gaseous fuels through mains') are both carbon intensive subsectors, as well as the being the two least employment intensive in the South African economy.
- 'Electricity'- electricity generation and distribution have high carbon emission intensities as well as being ranked second to last in terms of employment multiplier.

- **Quadrant A:**

- Clothing', 'Leather', 'Footwear', 'Catering and accommodation', 'Forestry', Furniture', 'Wood and other wood products', 'Food', 'Motor vehicles, parts & accessories', 'Printing, publishing & recorded media', 'Business services (SIC 83, 85, 87)', 'Beverages', 'Tobacco', 'Professional & scientific equipment', TV, radio & communication equipment', and 'General government' in particular have an important role to play for a high employment growth pathway due to their relatively high employment multipliers. **Faster growth here would be important for a high employment and low carbon growth pathway**



# Some Results (2)

- **Quadrant B:**

- ‘Textiles’, ‘Agriculture’, ‘Fishing’, ‘Building construction’, ‘Metal products excluding machinery’, ‘Civil engineering and other construction’, ‘Business services (SIC 84, 86, 88)’, and ‘Paper & paper products’ are the sectors that are found in quadrant B. This means that they have higher employment multipliers but also have relatively high carbon intensities. **BUT many of these sectors only *just* fall into quadrant B and not A, and are thus not as high in carbon intensity compared to the sectors in quadrant D. This means that the employment in these sectors is still significant for the South African economy and its new growth pathway – especially the ‘Textiles’, ‘Agriculture’ and ‘Fishing’ sectors.**

































- **Quadrant C:**

































- ‘Finance and insurance’, ‘Post and telecommunication’, ‘Manufacturing n.e.c., recycling’, ‘Other transport equipment’, ‘Other private services’, ‘Health and social work’ are the sectors that are found in quadrant C. This means that they **may have low carbon intensities but are not relatively employment intensive** - on their own they will not be able to move the South African economy onto a high employment and low carbon growth pathway, and so preference should go towards supporting faster growth in sectors / subsectors found in quadrant A.

**A more specific response to the research question can be seen in Chapter 4. Figure 4, identified in particular as opportunities for high employment and low carbon growth in South Africa the following sectors / subsectors (SIC codes in brackets) (quadrant A):** *Other producers/activities (99); Clothing (313, 314, 315); Catering and accommodation (64); Forestry (12); Furniture (391); Leather (316); Wood and wood products (321, 322); Wholesale and retail trade (61, 62, 63); Footwear (317); Food (301-304); Motor vehicles, parts & accessories (381-383); Machinery & equipment (356-359); Printing, publishing & recorded media (324-326); Business Services (83, 85, 87), Beverages (305); Tobacco (306); Professional & scientific equipment (374-376); TV, radio & communication equipment (371-373); General government (91).* **Alongside Textiles (311, 312); Agriculture(11); and Fishing (13) found in quadrant B.**

- The typology constructed in this dissertation thus becomes a **useful tool to analyse the implication of various policies across sectors / subsectors** of the economy (based on both their employment multiplier rank and carbon intensity).
- The phasing out of fossil fuel subsidies and / or the introduction of a higher carbon tax will largely impact firms in quadrant D, with the magnitude of this effect increasing as the carbon intensity of the firm increases. Firms that are higher emitters would thus feel these policy measures the most. Specifically, those granted large fossil fuel subsidies in the past, namely, Eskom ('Electricity') and Sasol ('Basic Chemicals'). Furthermore, firms in quadrant D are not relatively employment intensive and so a wage subsidy would not make a significant difference.
- On the other hand, the implementation of a wage subsidy would incentivise firms that are relatively labour intensive to grow at a faster rate, increasing overall employment. Firms that are found in quadrant A would in general see larger inducement to faster growth. Additionally, these firms have relatively low carbon intensities, meaning that the direct effects of the phasing out of fossil fuel subsidies and / or the introduction of a higher carbon tax will be insignificant.

*Illustrative summary of the implications of policy measures for various sectors, using a scale from 1 to 5 based on the estimated size of the effect*

Sectors and respective quadrant	Phasing out of fossil fuel subsidies	Carbon tax	Wage subsidy	Estimated overall policy effect
<b>'Agriculture' (B), 'Fishing' (B), and 'Forestry' (A)</b>	Employment:  Carbon emissions: 	Employment:  Carbon emissions: 	Employment:  (4) Carbon emissions: 	Employment:  (4) Carbon emissions: 
<b>'Clothing' (A), 'Textiles' (B), 'Leather' (A) and 'Footwear' (A)</b>	Employment:  Carbon emissions: 	Employment:  Carbon emissions: 	Employment:  (5) Carbon emissions: 	Employment:  (5) Carbon emissions: 
<b>'Machinery and equipment' (A), 'Wood and wood products' (A), 'Building construction' (B), 'Metal products excluding machinery' (B), and 'Civil engineering and other construction' (B)</b>	Employment:  Carbon emissions: 	Employment:  Carbon emissions: 	Employment:  (2) Carbon emissions: 	Employment:  (2) Carbon emissions: 
<b>'Food' (A), 'Beverages' (A), and 'Tobacco' (A)</b>	Employment:  Carbon emissions: 	Employment:  Carbon emissions: 	Employment:  (3) Carbon emissions: 	Employment:  (3) Carbon emissions: 

<b>'Gas sector (natural)' (D)</b>	Employment:  Carbon emissions:  (4)	Employment:  Carbon emissions:  (4)	Employment:  Carbon emissions: 	Employment:  Carbon emissions:  (4)
<b>'Gas' (D)</b>	Employment:  Carbon emissions:  (3)	Employment:  Carbon emissions:  (3)	Employment:  Carbon emissions: 	Employment:  Carbon emissions:  (3)
<b>'Electricity' (D)</b>	Employment:  Carbon emissions:  (5)	Employment:  Carbon emissions:  (5)	Employment:  Carbon emissions: 	Employment:  Carbon emissions:  (5)
<b>Mining - Other mining and quarrying (D)', 'Mining of metal ores (D)', 'Basic precious and non-ferrous metals (D)', 'Basic iron and steel (D)', 'Basic chemicals (D)', 'Non-metallic</b>	Employment:  Carbon emissions:  (2)	Employment:  Carbon emissions:  (2)	Employment:  Carbon emissions: 	Employment:  Carbon emissions:  (2)

**While the policies explored above can be important levers, policy is not a panacea and there are bound to be various unexpected externalities and policy implementation adjustment costs.** South Africa will need to consider a variety of ‘adjustment support measures’ for transitioning to a lower carbon economy, and analysis needs to span across all the sectors / subsectors of the economy in order to enable a shift in the country’s growth pathway. It is important to consider all the quadrants in Chapter 4. Figure 4, because value chains, jobs, and livelihoods rely on firms situated in these quadrants. In particular, sectors / subsectors in quadrant D will need these ‘adjustment support measures’ in order to soften the transition to a low carbon economy (that could see their growth trajectory slowing). **This is especially apparent in the context of a ‘Just Transition’, and the workers and communities that rely on jobs found in quadrant D.**

# Further Research

- **Further disaggregation of data by specific sectors** – e.g. , electricity, gas, and steam are grouped as one sector but ultimately they need to each have separate measures, and thus separate raw data.
- **Disaggregating and understanding ‘Other producers / activities’** – least carbon intensive and highest employment intensity .
- **Skills levels associated with each sector as well as sector size** - a dynamic mapping of each sector in terms of sector size, skill levels associated, alongside the carbon / employment intensity measures could yield some interesting and useful results going into the future and considering a ‘Just Transition’.



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