Contextualizing of Organized Labour Position on Carbon Tax in South Africa using a Qualitative System Dynamics Model

By: Dr Martin Kaggwa
Executive Research Director Sam Tambani Research Institute

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Presentation Outline

- Introduction and context
- South Africa (SA) Carbon Tax Policy (CTP): structure and arguments for and against
- The conventional one way causal model of SA's Carbon Tax Policy
- SA Carbon Tax Policy as Qualitative System Dynamics (SD) Model
- Insights from SA's CTP articulated as SD Model
- Conclusion and recommendations

Introduction and context

- Climate Change (CC) and its adverse effects generally acknowledged
- Challenge for developing countries is how to deal with CC against other social economic challenges
- Mindful of its other challenges SA sought to introduce a carbon tax policy but needed consensus from all key stakeholders
- Organised labour position on the policy has ranged from complete reject to request for delay
- This study was aimed at establishing credibility of labour's position through qualitative system dynamics modelling

South Africa Carbon Tax Policy

Aim, working mechanism and structure

- Targets businesses that produce high emission products and services
- Supposed to act as a disincentive for using high emission processes subsequently reducing country's carbon footprint
- Tax generally set at low levels to avoid potential adverse effects to local production. Agriculture and waste sector exempted

South Africa Carbon Tax Policy

Thresholds

Sector	Tax free threshold	Trade exposure additional allowance	Process emissions additional allowance	Maximum offset	Total tax avoided
	This % of a company's emissions will not be taxed at all.	Extra exemption for sectors that may be disadvantaged in competing with foreign companies who are not carbon-taxed.	Extra exemption for sectors that can do little about the emissions involved in production, without changing their business substantially.	Companies can deduct offsets from their emissions, which reduces the emissions they will be taxed on.	
Agriculture, forestry, land use	60%	-	40%	-	100%
Waste	60%	-	40%	-	100%
Iron & steel	60%	10%	10%	5%	85%
Aluminum	60%	10%	10%	5%	85%
Cement	60%	10%	10%	5%	85%
Glass & ceramics	60%	10%	10%	5%	85%
Chemicals	60%	10%	10%	5%	85%
Fugitive emissions: coal	60%	10%	10%	5%	85%
Petroleum (coal-to-liquid & oil refinery)	60%	10%	-	10%	80%
Pulp & paper	60%	10%	-	10%	80%
Sugar	60%	10%	-	10%	80%
Other	60%	10%	-	10%	80%
Electricity	60%	-	-	10%	70%

South Africa Carbon Tax Policy

Pro-arguments

- Policy can contribute towards reducing emission in the country without adversely affecting employment
- The tax creates a precedent for producers to take full responsibility of funding externalities

Arguments against

- The tax will adversely affect competitiveness of the local firms due to increase in operation costs
- Direct regulation rather than an indirect one (tax), is more appropriate in forcing producers to internalise production externalities given market imperfections

One-way causal model for SA's carbon tax policy

Articulation of South Africa's carbon tax model was largely based on a one-way causal model

- From a manufacturer's perspective:

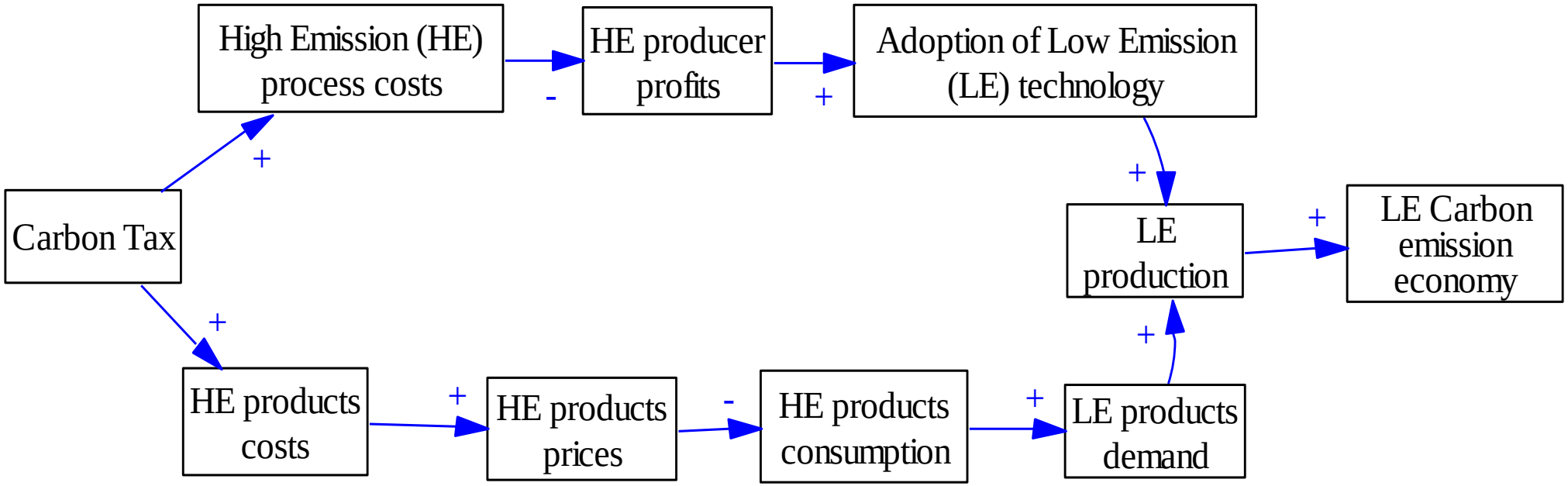
  Carbon tax increase cost of producing HE products and profit reduction in HE sector, ultimately shift production to LE production - ULTIMATELY leading to a cleaner production environment

- From the consumer's perspective:

  Carbon tax increases prices of high emission products, motivates use of low emission products, decrease consumption of HE products, leads to lower demand of HE emission ultimately reducing the country's carbon print

One-way causal model for SA's carbon tax policy

Conventional causal relationships



One-way causal model for SA's carbon tax policy

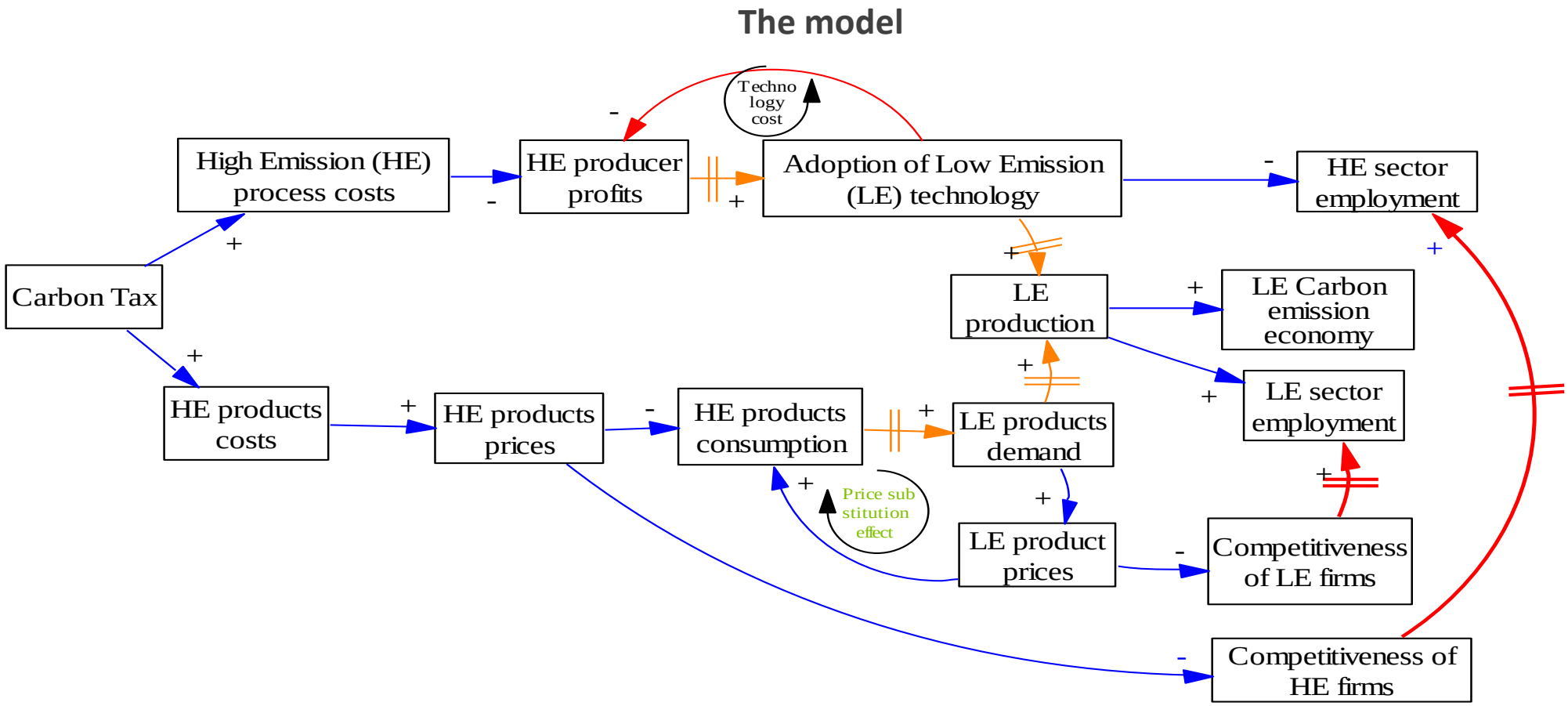
- Model limitations – the model does not take into account:
  - Double (two-way) causality
  - Time lags
  - Non-linearity
- SD modelling takes into account these aspects - however non-linearity is subtle in qualitative model
- Hence the importance of transformation of the one-way causal model into a qualitative System Dynamics (SD) model

Qualitative Systems Dynamics Model of South Africa's Carbon Tax Policy

Transformation of the one-way causal CTM model into an SD models required

- Recognising and making explicit double causal relations/feedback effects, time lags and non-linearity)
- Introducing of additional variables were included in the carbon tax SD model:
  - Employment in high emission sectors
  - Employment in low emission sectors
  - Low emission product prices
  - Competitiveness of local firms
  - LE technology cost (auxiliary variable)
  - Price substitution effect (auxiliary variable)

Qualitative Systems Dynamics Model of South Africa's Carbon Tax Policy



Insights from the articulation of SA's Carbon Tax Policy as a SD Model

There are omitted effects in the one-way causal articulation of SA's CTP that can lead to inaccurate conclusions on the policy

- Cost of (LE) technology – If LE technology is equal or more expensive than HE technology, adoption of LE production processes driven by profits will not happen
- Increase demand for LE products likely to increase prices of LE products [law of demand] limiting expected increase LE products demand. Anticipated consumption and production of LE products will be uncertain.
- The cost of LE technology and the increase in prices of LE products likely to affect competitiveness local firms which will negatively affect employment in the long term

Conclusions and Recommendations

Many factors will influence the impact of carbon tax on employment the South African economy. From this study the following are more probable

- Job losses in the high HE sectors of the South African economy such as the coal sector which employ many people low skilled nationals
- Loss of competitiveness edge of local firms

Recommendation

- In general, have local employment safe-guards before the introduction of CTP
- In particular, facilitate access to low cost clean technology to HE local manufacturers which supplement but does not substitute workers