The Impact of Infrastructure Investment in South Africa

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INTRODUCTION

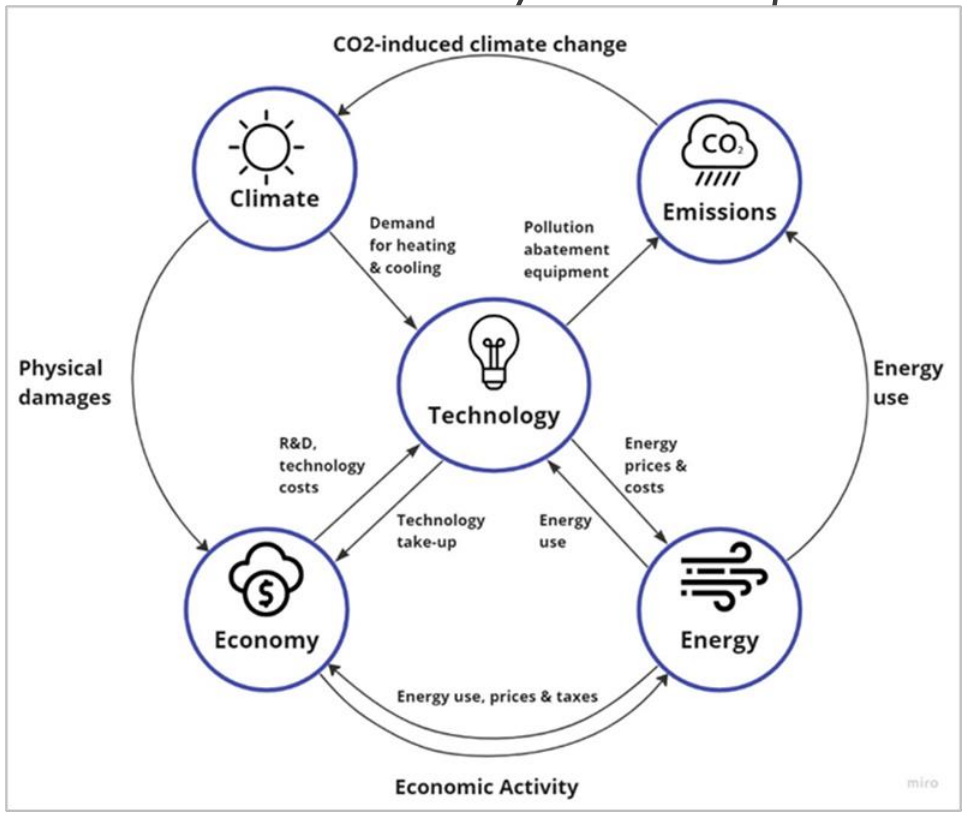
- Infrastructure investment is key to **stimulating economic growth, increasing employment, and reducing inequality**. Increasing both private and public sector investment has been a strategy taken by several countries to stimulate economic growth.
- South Africa, too, has pursued this as a strategy post-1994 to generate inclusive growth and achieve long-term economic and social goals. Several policies have been developed to enable this. More recently, the National Development Plan (NDP) and the Economic Reconstruction and Recovery Plan (ERRP), have sought to increase both private and public infrastructure investment in the country.
- Various measures have been taken to increase infrastructure investment, including the creation of the Budget Facility for Infrastructure (BFI), the establishment of Infrastructure South Africa (ISA) and the R100 billion Infrastructure Fund, and the revision of the PPP-framework.
- This paper aims to empirically examine the potential **impact of the remaining allocation in the R100 billion Infrastructure Fund on GDP and employment in the country**. This study assesses the infrastructure expenditure impact across various sectors to motivate for infrastructure investment in projects within sectors where the impact of the investment is expected to be most significant on growth and employment.

INFRASTRUCTURE FUND

- The Infrastructure Fund, which was announced in 2018 by President Cyril Ramaphosa, is a collaboration between the National Treasury of South, ISA, the Development Bank of South Africa (DBSA) and project owners. The National Treasury has provided seed funding of R100 billion over ten years into the Infrastructure Fund to unlock private sector investment and infrastructure delivery in the country.
- Aligning with the priorities identified in the NDP and NIP 2050, the Infrastructure Fund focuses on investment into economic and social infrastructure including amongst others electricity, water, transport, telecommunication, education, and health. Infrastructure development in these sectors is anticipated to open opportunities for growth.
- Since the inception of the Infrastructure Fund, R3 billion has been allocated to infrastructure project/programme implementation. This study considers the remaining funds of the Infrastructure fund with a remaining timeframe from 2023 to 2028 as an exogenous shock to the model.
- While the Infrastructure Fund is premised on catalysing private sector investment, this paper does not make assumptions on the magnitude of private sector investment that can be unlocked through the Infrastructure Fund. The paper also does not consider the institutional arrangements of the Infrastructure Fund.

METHODOLOGY: BACKGROUND TO THE E3ME MODEL

Figure 1: The feedback mechanism between the Energy, Environment and Economy model components

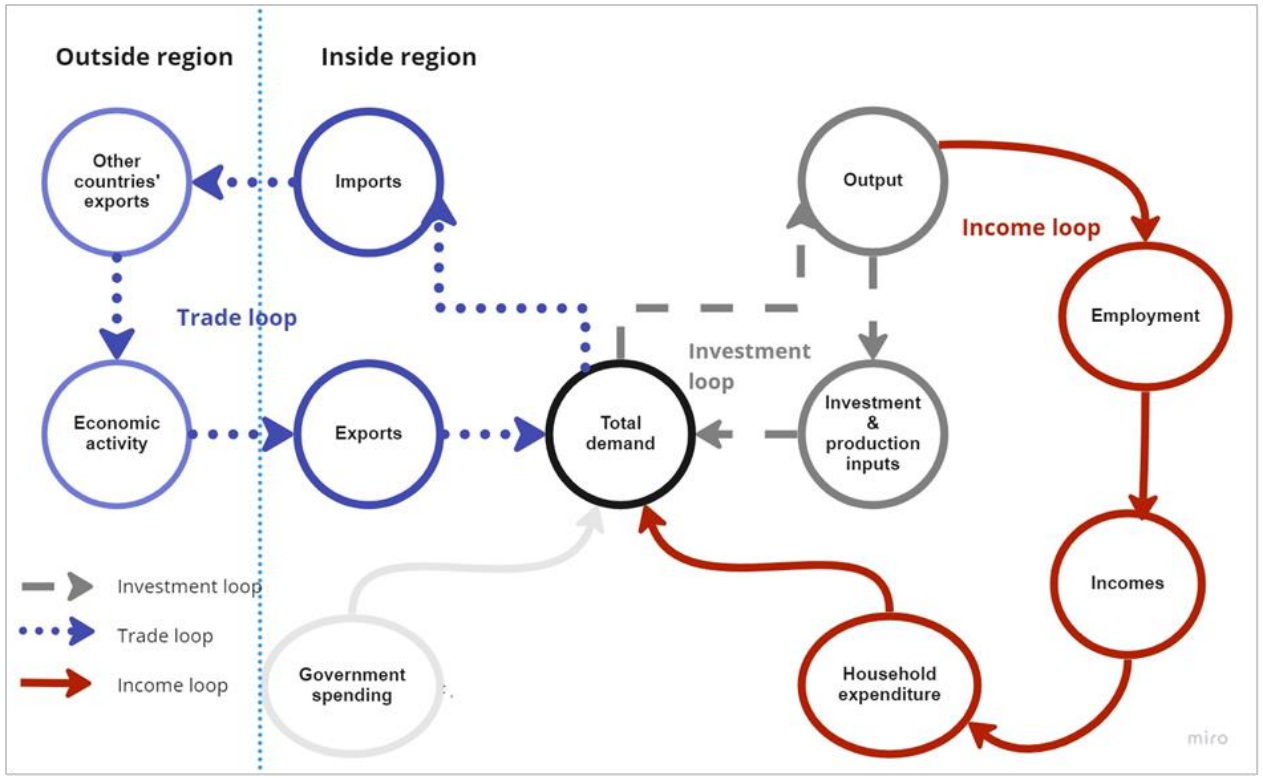


Source: Cambridge Econometrics E3ME manual (2019)

- The E3ME model, developed by the European Commission's research framework and Cambridge Econometrics, is a structural macroeconomic model suited for analysing impacts of Energy-Environment-Economy (E3) policies; allowing two-way linkages between the energy system, environment, and economy.
- Various data sources are used in the model including national accounts data, population, labour force and employment data, trade data, energy demand and emissions data.
- The modelling approach based on the national accounting framework disaggregated to 43 industries and 29 stochastic equation sets by employing cointegration and error-correction methodology.
- Of specific importance to this paper is the E3ME's economic module, which accounts for changes in economic activity by persons, households, firms and other groups in society.

METHODOLOGY: BACKGROUND TO THE E3ME MODEL

Figure 2: A diagram illustrating E3ME's economic structure

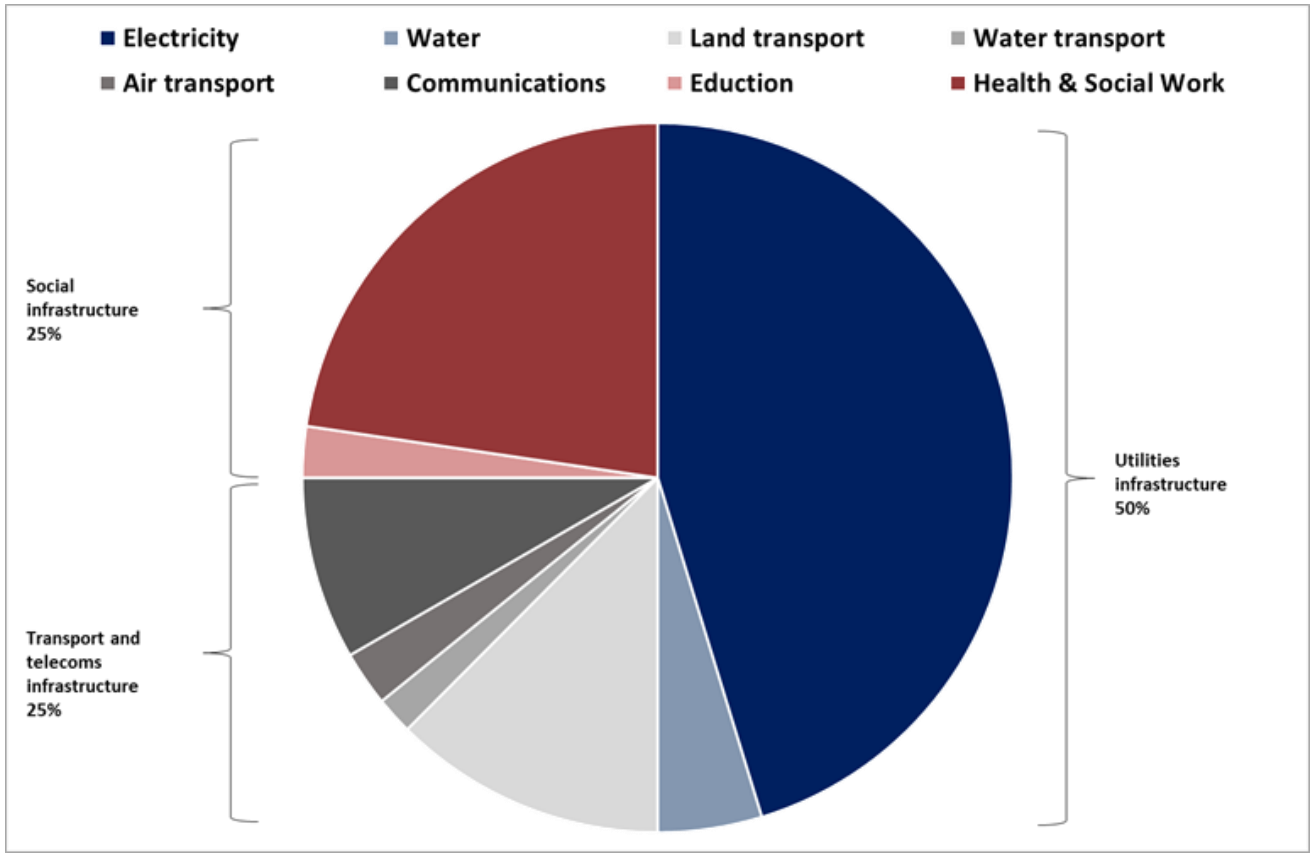


Source: Cambridge Econometrics E3ME manual (2019)

- **Sector interdependency loop**: This loop captures the impact that a change in one sector will have on other sectors. An increase in output from one sector requires an increase in input which may be drawn from suppliers in another sector.
- **Income loop:** This loop captures the increase in labour demand as a sector increases its output and grows. As more people are employed, incomes increase and consumption expenditure with it, which in turn increases total demand and feeds back into the economy.
- **Investment loop:** As firms and the demand for the goods or services that they supply increase, they invest in expanding their production capacity. Production investments increase the demand in sectors that produce investment goods (e.g., construction, engineering) and their supply chains.
- **Trade loop:** Imported goods and services are necessary when the uptick in domestic demand cannot be met by domestic supply. The model allows for interactions between different countries and captures the impact when there is an increase in demand for imported goods from another country.

METHODOLOGY: MODELLING INFRASTRUCTURE INVESTMENT

Figure 3: An illustrative graph of the distribution of investment into economic and social infrastructure under Scenario 1



Scenario 1: the bulk of the investment is channeled towards **utilities infrastructure** (electricity and water in a 90:10 ratio) and the remainder is equally divided between transport and telecoms and social infrastructure.

Scenario 2: the bulk of the investment is channeled to the **transport and telecoms sector** (land transport, water transport, air transport and communications in a 50:10:10:30 ratio) and the remainder is equally divided between utilities and social infrastructure.

Scenario 3: the bulk of the investment is channeled to **social infrastructure** (health and social work, and education in a 90:10 ratio) and the remainder is equally divided between utilities, and transport and telecoms infrastructure.

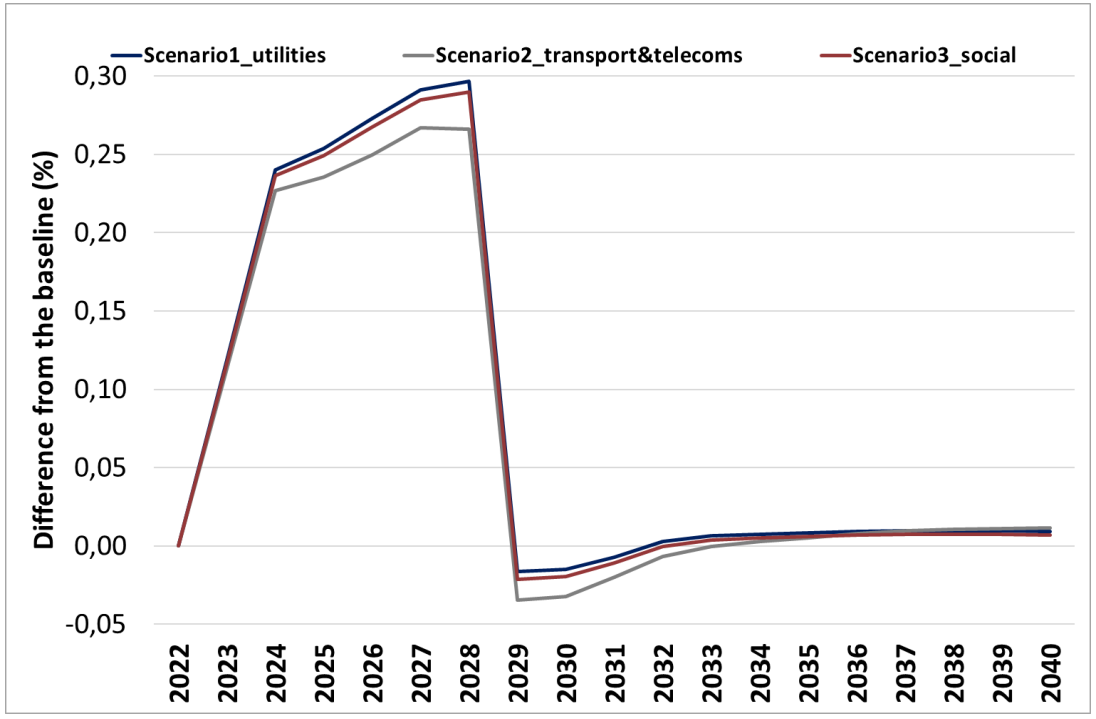
RESULTS INTERPRETATION

- Simulation results are quantified estimates of the relative impact of the Infrastructure Fund on the various indicators and should **not be interpreted as predictions.**
- Generally accepted method of reporting the impact of the policy change on economic, social, and environmental indicators is the **difference from the baseline.**
- E3ME model highlights the **demand-side impacts in an economy**
  - In theory, one can expect that the impacts of infrastructure investment would be felt on both the demand-side (a near-term stimulus effect) and the supply-side (in the long-run, an increase in economic capacity, and a potential reduction in unit costs).
  - The demand-side E3ME model captures the changes in the demand for goods and services produced in a sector rather than the impact of a factor on the ability to supply goods or services. Therefore, these results likely underestimate the long-run benefits of this investment spending, as the model does not capture the potential supply-side impacts.

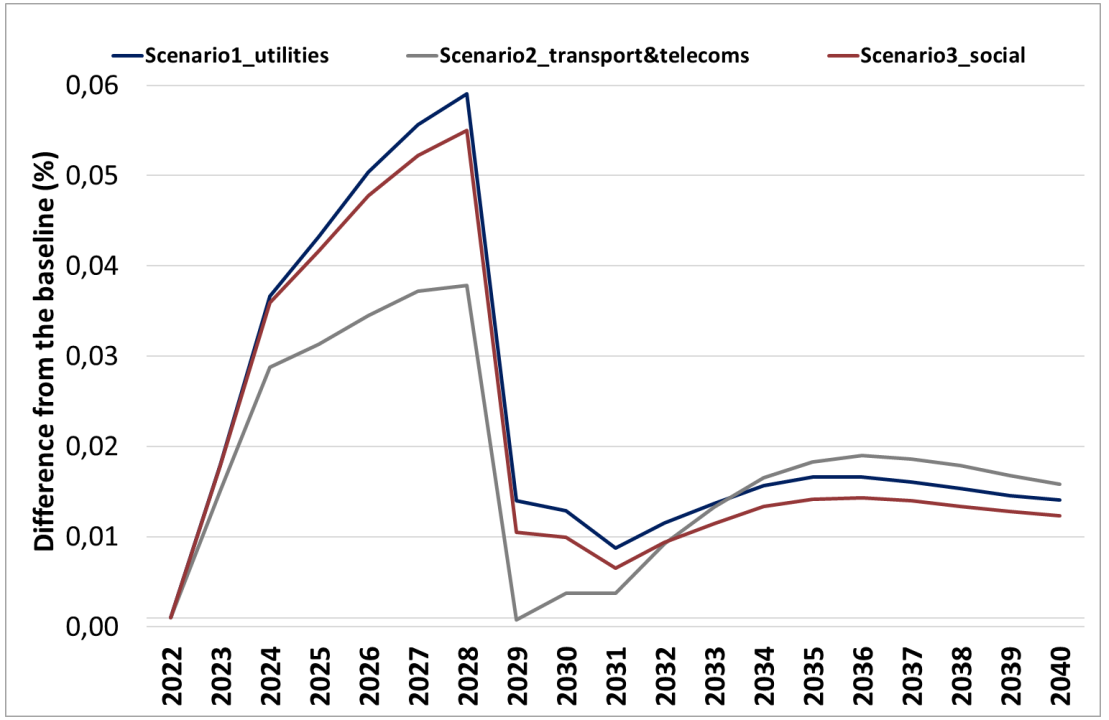
RESULTS: AGGREGATE GDP AND EMPLOYMENT

- By 2028, **GDP is expected to be 0.3% higher compared to baseline**. Largest impact on economic growth under Scenario 1 (Utilities).
- Pass-through effect most pronounced in investment loop (2.0%), followed by intermediate demand (0.2%)
- External investment in utility, social or telecoms and transport infrastructure results in a **small but permanent improvement in aggregate economic activity** relative to the baseline.

Aggregate GDP outcomes



Aggregate employment outcomes

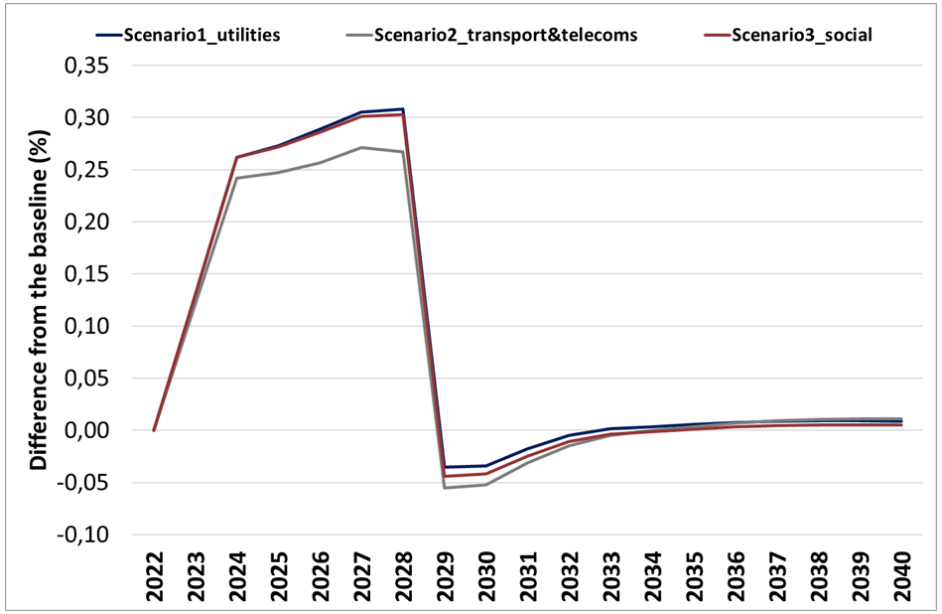


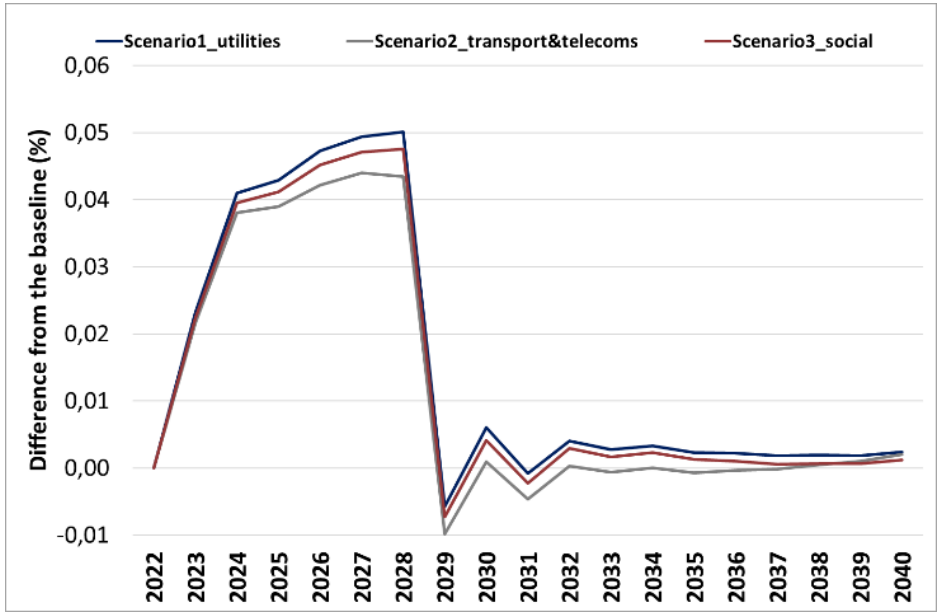
- Increase in investment has a positive impact on employment. **Employment increases and peaks at 0.06 per cent** above the baseline by 2028. Most pronounced when the largest share of investment is allocated towards utilities, followed by investment into social infrastructure.
- Infrastructure investment will increase employment as labour will first be required to construct this infrastructure and second to increase output by material suppliers.
- Lagged effect on employment.

RESULTS: PRIMARY SECTOR GDP AND EMPLOYMENT

- **Primary sector economic activity and employment increases with an investment shock.**
- By 2028, primary sector GVA is expected to be 0.3 per cent higher than the baseline as a result of the R97bn investment in economic and social infrastructure but tends to zero in the long term.
- Employment is expected to increase by approximately 0.05 per cent by 2028, with employment growth tending to zero in the long run.
- The results are **driven by the mining sector** and are mainly due to an increase in demand for intermediate inputs from the mining sector, or the type I multiplier.
  - The mining sector has strong forward linkages to the construction of economic and social infrastructure- therefore increase demand for intermediate inputs supplied by the mining sector.
- Scenario 1 and Scenario 2 yield the greatest impact.
  - Renewable energy plants (solar PV, wind, batteries) as well as power cables in distribution and transmission networks uses materials such as steel, copper, manganese, nickel, chrome, and alluminium, sourced from the mining sector.
  - Economic and social infrastructure construction activities also require other building materials such as cement and bricks with raw materials, such as limestone

Primary sector GDP and employment

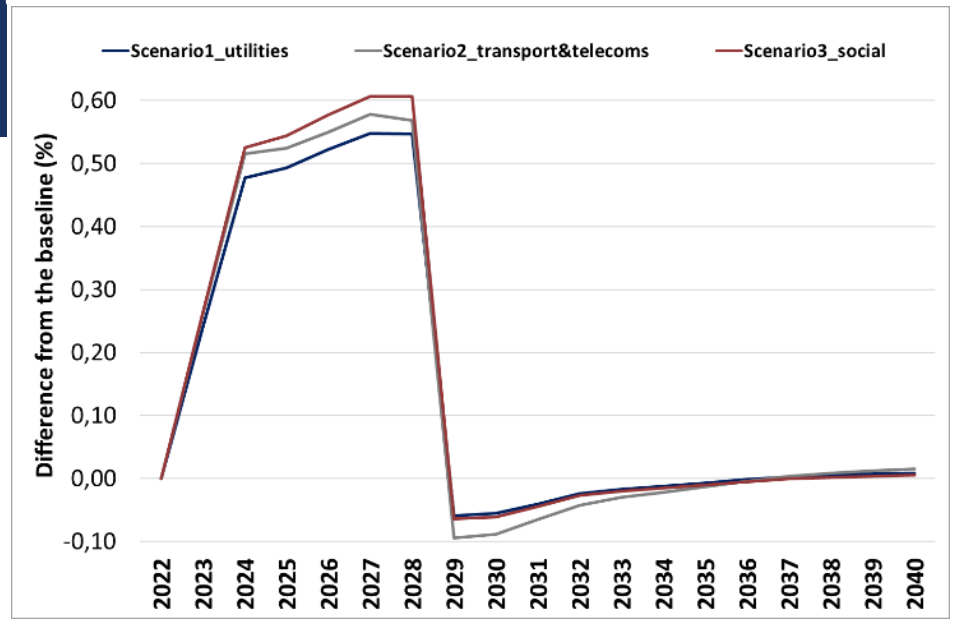


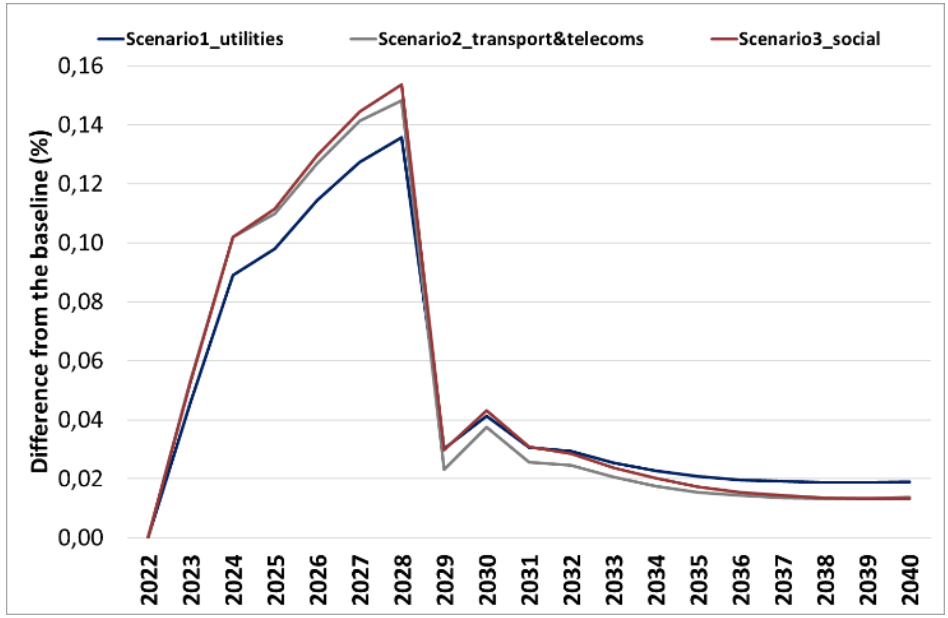


RESULTS: SECONDARY SECTOR GDP AND EMPLOYMENT

- **Relative to the primary and tertiary sectors, the investment impact is the greatest in the secondary sector.**
- By 2028, economic growth in the secondary sector is anticipated to be 0.6 per cent higher than the baseline.
- Employment is expected to increase by approximately 0.15 per cent by 2028, with employment growth remaining positive over the long term.
- The drivers of the uptick are the construction and manufacturing sectors, both of which contribute directly to enabling infrastructure delivery.
  - **Manufacturing sector:** manufactured intermediate goods are primary inputs into most infrastructure projects; uptick in demand for construction materials, thus enabling them to expand their outputs and operational capacity, and increase employment.
  - **Construction sector**: Intermediate goods are then utilised by the construction sector. The sector is labour-intensive and provides employment opportunities for individuals of various skills levels.. The demand for services provided by the construction sector increases with infrastructure investment, and it is thus the sector that drives the aggregate increase in employment.
- Greatest return to both employment and GDP when largest proportion of investment is made towards Scenario 3 (Social infrastructure)

Secondary sector GDP and employment

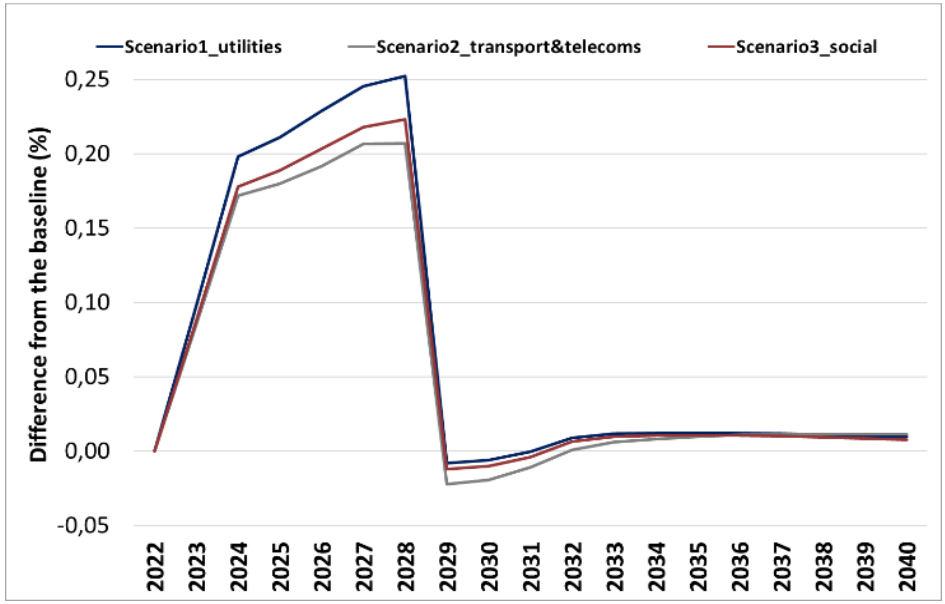


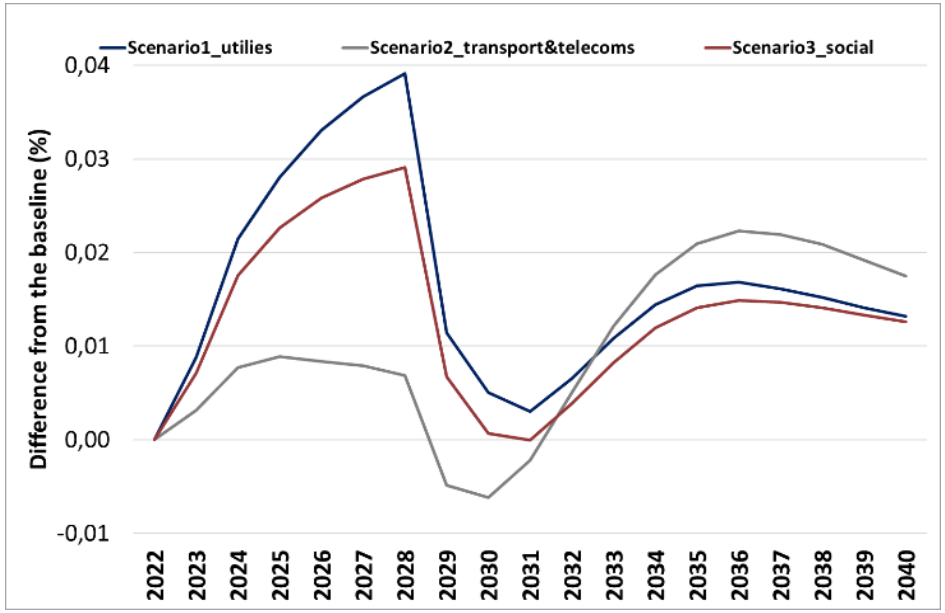


RESULTS: TERTIARY SECTOR GVA AND EMPLOYMENT

- **Tertiary sector results positive, but impact is the smallest.**
- Output is expected to increase by 0.25 per cent above baseline growth by 2028.
- Marginal increase in employment of 0.04 percentage points above 2028 baseline. In the long-run, employment contribution peaks at just above 0.02 per cent above the baseline in 2036.
- The positive tertiary sector results are driven by engineering services, transport and telecomms sub-sectors – **considered to be support functions.**
  - Engineering services provide include project management activities, distinct from civil engineering works under the construction sector.
  - Transport sector is important for moving goods and labour, both for the primary and secondary sectors.
  - Communication means are necessary for mobile personnel on the construction site, also facilitate the collection and management of data to optimize project development.
- These results are obtained when the largest share of investment is directed to infrastructure in utilities (Scenario 1). Transport is expected to play a greater role in utilities projects as (TIPS):
  - South Africa continues to import more of its wind and solar PV characteristic products such as gearboxes, blades, towers, solar panels, and converters.
  - For REIPPP bid window 4, transport costs for wind farms were 13 per cent of total costs.

Tertiary sector GDP and employment





POLICY RECOMMENDATIONS

Based on the findings from the modelling exercise, the following can be concluded:

- In line with literature, we conclude **that infrastructure investment can stimulate both economic growth and employment creation.**
- This research will enable infrastructure investment to be **targeted at a sectoral level.**
  - A study such as this can contribute to policy discussions surrounding targeted investment expenditure which aims to prioritise employment and/or economic growth.
  - Based on the findings, it is suggested that the **bulk of investment be allocated towards electricity and water** given that it yields the greatest impact on overall economic growth and employment creation.
  - With reference to the Infrastructure Fund, this study motivates for investment into capacity building for submitting entities and project sponsors in specific sectors, such as water and electricity, wishing to submit projects for funding through the Infrastructure Fund.
- **Measures targeting skills improvements should be taken in expectation of the infrastructure investment programme as the greatest number** of employment opportunities are expected to be for semi- and high-skilled individuals. Skills development relevant to sectors such as construction and manufacturing will be most needed with increased infrastructure investment.
- Given South Africa's substantial reliance on importation of inputs, **there should be emphasis on expanding the production of value-added manufactured goods to meet the additional demand for intermediate goods.**

CONCLUSION

- In line with the literature, the study finds that on aggregate, there is a positive impact on growth and employment when investing in economic and social infrastructure.
  - By 2028, GDP is expected to be 0.3 per cent higher compared with the baseline while employment increases and peaks at 0.06 per cent above the baseline by 2028.
  - These results are attained under Scenario 1, where the bulk of investment is in utilities.
  - The secondary sector is expected to benefit the most from investment in economic and social infrastructure.
  - The results under the three scenarios do however yield similar outcomes in terms of the magnitude of impact, and a greater shock to investment is needed to determine the extent to which the scenarios differ significantly.
- The results of the study not only highlight the extent of the positive gains government can expect from the implementation of the Infrastructure Fund investments, but also highlights the sectoral impact behind the results. This can enhance policy planning, allowing governments to, a priori, establish the types of investments that will have the greatest impact.