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Sustainability Transitions

Update on financing long-term infrastructure development

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Rationale/problem statement:

- SA has massive infrastructure backlogs
- Large-scale investments are required
- National Treasury's assumptions prohibit expansionary spending
- SARB's assumptions prohibit QE-type stimulus
- How much is needed?
- Where will the funding come from?
- What are the macro-economic implications?



South Africa's Water-Energy-Food Nexus in the context of Climate Change: A Research Agenda



May 2023

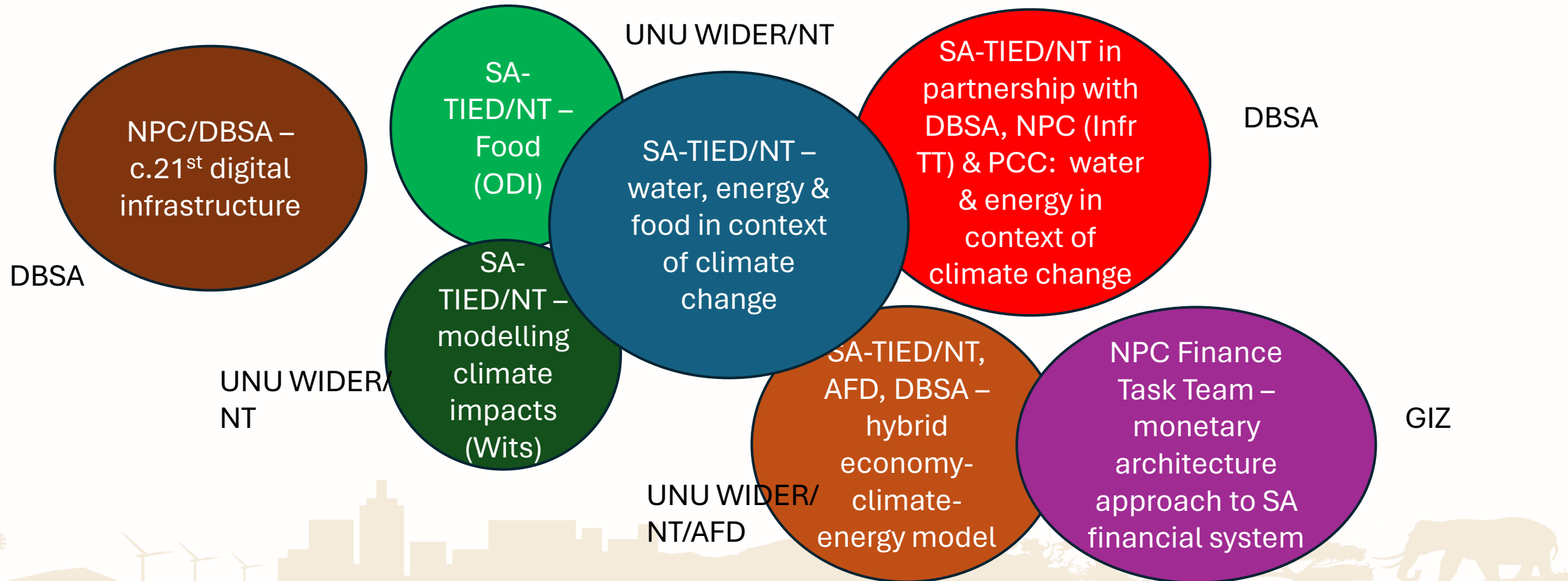
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Prepared for Workstream 5: Water, energy & food in the context of climate change of the
Southern Africa – Towards Inclusive Economic Development (SA-TIED) project.



Structure & funding of the partnership:

Partnership: NPC, NT (via SA-TIED/UNU WIDER), DBSA & PCC



NT, SA TIED, UNU WIDER

- Phase 2: 2023-2025
- Six workstreams: enterprise development; public revenue mobilization; structure transformation; macro-fiscal policy; reform implementation; WEF in the context of climate change – WS 5
- WS 5: Policy lead: Georgina Ryan, Academic lead: Mark Swilling
- 3-year project, funded via UNU WIDER and NT
- Core CST team: TK (SA-TIED), Mlondi (hybrid modelling), Juliet (monetary architecture) and Mark (overall strategic guidance)



Water & Energy:

- Partners: NT/SA-TIED, PCC, NPC, DBSA
- Funded by DBSA
- Multistakeholder Steercos for both
- Core question - water: what are the investment requirements to achieve water security by 2050?
- Core question – energy: what are the investment requirements to achieve energy security and net zero by 2050?
- Water report is complete, on NPC website, next step is a round table dialogue with the financial sector to ask: under what conditions can the gap between existing expenditure and required expenditure be narrowed?



Water:

- *Baseline*: no policy change, median climate change impacts, current energy mix, achieving SDGs and NDP goals by 2030 through conventional technologies only, maintenance of existing levels of IAP clearing, a continuation of existing allocations to agriculture, and existing levels of (in)efficiency in the integrated bulk supply system.
- **R256 billion** required annually between 2023 and 2050 to achieve water sector objectives (SDG 6.1, 6.2 and 6.4) - R91 billion more than current investment levels. R7.16 trillion required through to 2050.
- *Sustainable alternative*: wet climate, transition away from coal, sharing of some water taps, aggressive water conservation/demand management, increased clearing of IAPs, reduced allocations to agriculture, and improved bulk water system efficiencies.
- Annual investment requirement could be reduced to **R214 billion** per annum for the sustainable alternative – R75 billion more than current levels of investment.
- *Worst scenario*: dry climate, no energy transition, full conventional technologies, no management of IAPs, increased allocations to agriculture, and a decline in system efficiencies - achieving the SDGs requires an investment of **R314 billion** (2022 Rands) per annum - funding gap of R149 billion per annum (nearly 50% increase)



Energy:

- Deadline: July
- Covers the whole value chain: generation through to transmission/distribution
- Combination of energy and economic modelling
- Builds on but goes beyond all the current estimates (NBI, CST, WB,UCT, Eskom, etc)
- Most NB: will include a section that goes beyond the water report, i.e. based on interviews with financial sector actors, an assessment of what needs to change to increase public and private investment in the energy transition



Food:

- BAU: low population growth, no agricultural expansion, no afforestation target, low productivity increases in the agricultural sector, an evolution towards a high-sugar-content and processed-food diet (including meats and fat), and no change in postharvest losses – in short, unsustainable and costly food system
- Under BAU, climate change will exacerbate the negative consequences of these impacts
- This current trends pathway will be contrasted to a sustainable pathway that will demonstrate the investment requirements to achieve more sustainable outcomes



Climate modelling

- Wits Global Change Institute
- Combination of global and regional models to generate more useful granular detail
- Key impacts on WEF:
 - Heat waves – longer, more intense, worse impacts
 - Day zero event for Gauteng
 - Loss of the maize crop
 - Worsening storms along the Richards Bay/Maputo coastline, and along the Limpopo valley



Hybrid modelling - the quantitative perspective

- Core question: what are the macro-economic implications of the energy transition?
- Existing CGE (computerised general equilibrium) models are inadequate – do not include finance, and no climate change damage factors
- As a result: (a) unrealistic assumptions about what is possible – just normative scenarios without an assessment of what is affordable given certain levels of debt, FDI, tax revenues, fiscal expenditure, domestic investment, etc. (b) no recognition of the impacts of climate change
- CGE models assume economies tend naturally towards equilibrium, therefore minimize state intervention
- Hybrid models assume economies tend towards disequilibrium, especially in context of climate change – hence state intervention is necessary
- Investment requirement studies will generate the key financial data, climate modelling will provide damage factors, SARB data will be used to build the model – core team comprises staff from AFD, DBSA, NT and CST
- SA's first hybrid non-equilibrium model that includes finance & climate
- Will have a huge impact on policy making which, for the first time, can draw on more robust modelling results than currently exist

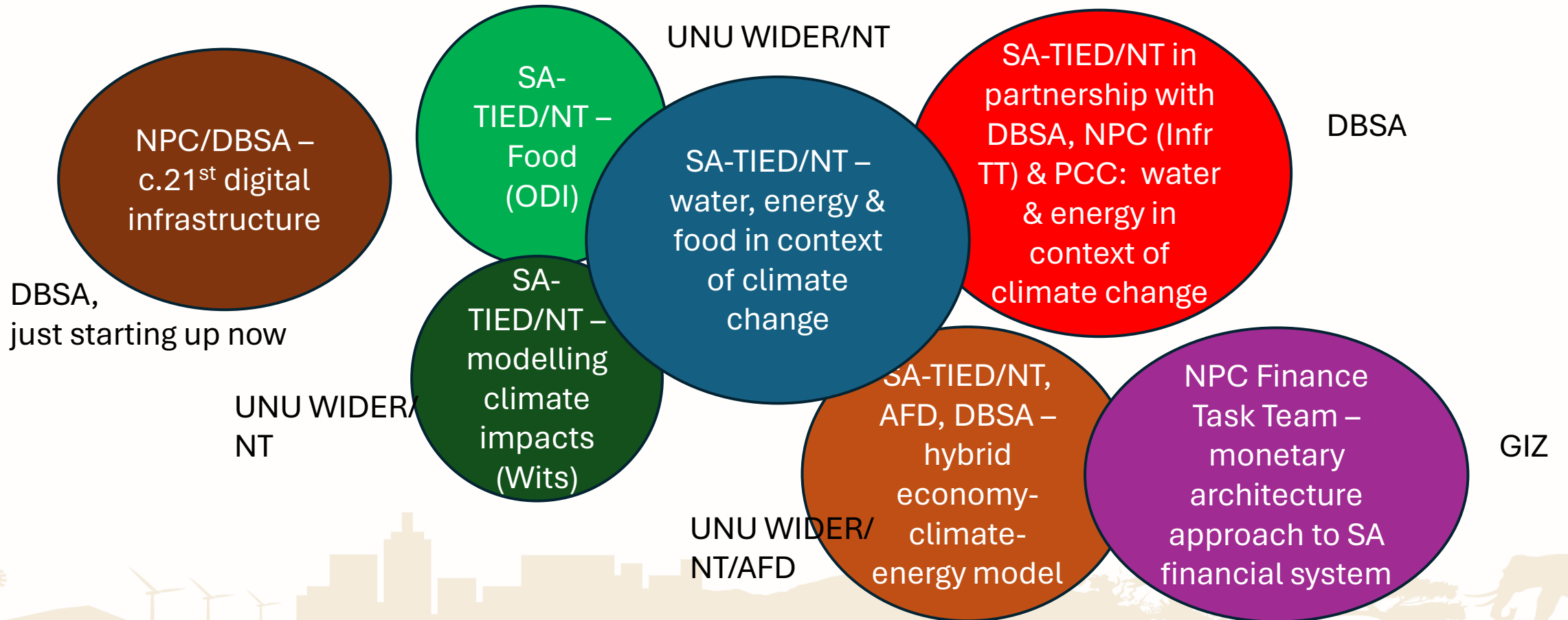


Monetary architecture approach - qualitative perspective

- No matter the outcome of the empirical studies & quantitative modelling, the outcome is predictable – we need to invest a lot more in our major infrastructures!! (duh)
- For the first time, we will have comprehensive assessments of how much will be needed
- For the first time we will have a model that makes it possible to demonstrate how infrastructure investments positively affect macro-economic variables in the context of climate change
- So where do we find the extra capital if NT and SARB continue with their current policies?
- What is a financial system? The architecture of a (credit-based) financial eco-system is a complex web of interlocking balance sheets – everyone's asset is someone else's liability and vice versa. Given this, it can be mapped.
- Experts commissioned to write background papers on all the sub-sectors to be tabled at a workshop in May, including graphic artists, so that we can map the system
- Next step: identify the 'elasticity spaces' where there are balance sheets that can be leveraged by reconfiguring the relationships between them – classic complexity move, i.e. the whole changes as relationships between the parts change
- Examples: DBSA transfer to SARB, rooftop solar, Reg 28/pension funds, Infrastructure Fund



Structure & funding of the partnership:



Some lessons from a CST perspective

- Read my lips – it is about managing complex relationships!
- Keeping things loosely coupled, allow for emergence
- Thought leadership – thinking big is necessary, and possible
- This is a form of transdisciplinary research – embedded, engaged, contributing to solutions, but later on critical analysis of the entire process/outcome will be possible (‘truth to power’ not useful now)
- Keep re-telling the story, but don’t expect everyone to understand the whole picture – they will pick what is relevant to them
- Consultants have a role to play if clear and strong guidance is provided
- Good example of how knowledge can help build state capability
- Never lose sight of the depth of the crisis, extent of state capture, and why we do this work

