



Leapfrogging

The Leapfrogging and Large Infrastructure scenario

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This section explains the structure of the Leapfrogging and Large Infrastructure scenario, which could set Africa on a more positive human development trajectory than the Current Path forecast. The same scenario is used in the theme on [Large Infrastructure](#). The scenario is presented in Chart 8. The reader is also reminded to visit the scenario section in the Large Infrastructure theme and that other scenarios include sector-specific infrastructure, for example:

- The [Agriculture scenario](#) includes interventions on irrigation, groundwater extraction, rural road access and irrigation.
- The [Demographics, Health and WaSH scenario](#) include interventions in safe water and sanitation infrastructure.

The first set of interventions in the Leapfrogging and Large Infrastructure scenario emulates a more rapid transition to an energy solution that includes more solar and wind and better energy storage that is then used in intelligent power systems in decentralised micro, mini and off-grid solutions. To model such a scenario, we increase renewable energy production, reduce the capital cost-to-output ratio for renewables, and reduce electricity loss in [transmission](#). Specifically, energy production has been improved by 20%, cost to output reduced by 20% and electricity transmission loss reduced by 10% to 20% at different income levels. All of these mean more rapid technological progress than the Current Path forecast within the IFs forecasting platform.

The next step is to improve rural and urban electricity access. The size of the interventions ranges from an additional 15–27% rural electricity access by 2033 above the Current Path forecast and an additional 3–8% in urban areas. The impact is that, on average, electricity access in low-income African countries improves by 10 percentage points above the Current Path forecast by 2043, by six percentage points for lower-middle-income countries and by seven percentage points for Africa's upper-middle-income countries, with large country-to-country differences.

By 2043, 81% of Africans have access to electricity in the Large Infrastructure and Leapfrogging scenario compared to 73% on the Current Path forecast. Instead of 610 million Africans without electricity connections on the Current Path forecast, the 2043 number is 430 million. By 2043, the Leapfrogging and Large Infrastructure scenario realises an improvement of 819 million barrels of oil equivalent (BBOE) from other renewables (wind and solar), a significant 54% improvement on the Current Path forecast. But, because renewable production comes off a low base, it modestly improves its contribution to energy production by six percentage points to 23%. The modest result needs to be seen within the context of an African economy that is seven percentage points larger in the Large Infrastructure and Leapfrogging scenario compared to the Current Path forecast.

The second set of interventions includes a faster roll-out of mobile broadband and general improvement in ICT. Despite rapid uptake, Africa trails significantly behind others in this regard. We improve fixed broadband by 50% to 2033, Internet use by 20% and mobile broadband by 300%. The impact is that, on average, fixed broadband access increases to 37 instead of 27 persons per 100 by 2043, a difference equivalent to 220 million additional people. Because mobile broadband increases rapidly in the Current Path forecast, the Leapfrogging and Large Infrastructure scenario increases more rapidly to 2030 but eventually only realises an improvement of three additional persons per 100 people, a difference of 70 million people, by 2043. As a result, the contribution of the ICT sector to African economies increases by roughly US\$46 billion in 2043 above the Current Path forecast (equivalent to about 0.1 percentage point of GDP). Nevertheless, even then, the ICT sector will constitute less than 7% of the African economy.

In a third and final set of interventions, we emulate the impact that digitisation and modern technology could have on more rapidly formalising the informal sector. The intervention consists of reducing the informal sector share of GDP multiplier by 3–14% depending upon income level and reducing the informal labour share multiplier by 2%. The impact is that by 2043, the size of Africa's informal sector, as a per cent of GDP, is 2.6 percentage points smaller. The reduction in the total labour force employed in the informal sector is modest (two percentage points below the Current Path) by 2043.

Chart 8: The Leapfrogging and Large Infrastructure scenario

Logic	Intervention	Outcome	Impact
Rapid provision of electricity	Increase electricity access rate for urban and rural	Greater access to electricity	Increased energy production and decreased carbon emissions
	Reduction of electricity transmission and distribution loss		
Provision of renewable energy	Reduction in capital cost to output ratio in hydro, nuclear and other renewables	Increased contribution of renewable energies	
	Increase production of hydro and other renewable energies		
Better and more ICT	Increase access to fixed and mobile broadband	More digitisation	
	Reduction in cost of adding broadband connection		
	Reduce size of the informal sector		
Improved roads	Increase paved roads both urban and rural	Improved physical capital	
Greater investment in infrastructure	Increase government exp. on other infrastructure		

The Leapfrogging and Large Infrastructure scenario illustrates the impact of African governments taking maximum benefit from the potential of new technologies and the digital economy to extract development benefits for their societies.

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About the authors

Dr Jakkie Cilliers is the ISS's founder and former executive director. He currently serves as chair of the ISS Board of Trustees, head of the African Futures and Innovation (AFI) programme at the Pretoria office of the Institute, and is an extraordinary professor at the University of Pretoria. His 2017 best-seller *Fate of the Nation* addresses South Africa's futures from political, economic and social perspectives. His three most recent books, *Africa First! Igniting a Growth Revolution* (March 2020), *The Future of Africa: Challenges and Opportunities* (April 2021), and *Africa Tomorrow: Pathways to Prosperity* (June 2022) take a rigorous look at the continent as a whole.

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