– POLICY BRIEF –

# A Least-Cost Energy Study of Namibia

## Analysing the costs, risks and impacts of pursuing an energy future reliant on hydropower versus solar and wind

Namibia is at a crucial point in the development of its energy system and must make difficult choices on how to increase its electricity supply to meet current and future demand in a way that delivers social benefits and climate resilience. Namibia's energy plans project a significant expansion of hydropower and fossil fuels, which already dominate the domestic energy mix, despite the country's abundant renewable resources.

TMP Public[1] recently produced the Least-Cost Energy Investment Study for Namibia which uses energy modelling to provide least-cost energy investment pathways for Namibia through 2040. The study assesses the comparative costs of developing solar and wind energy in Namibia with the Baynes hydropower project, which officials have prioritised as central to Namibia's electricity generation plans. This analysis prices in the likely costs of delays and considers forward-looking climate factors for different energy technologies to produce a least-cost pathway for Namibia's energy future.

## Key findings:

- **Solar and wind with storage make up the largest share of Namibia's energy future** under a least-cost energy investment scenario to both 2030 and 2040, cumulatively accounting for 70% and 77% of the country's installed capacity, respectively.
- **There are no cost-based arguments for new hydropower**. The least-cost model does not include any new hydropower until 2040 once the cost of grid connection is factored in.
- **Solar and wind come out on top on all counts** when considering costs, social and environmental impacts and risks, as well as forward-looking climate factors for different energy technologies. Solar and wind were found to be cheaper, lower impact and higher opportunity than hydropower.
- **Rapid rollout of solar and wind is feasible in Namibia**, with lower financial and sustainability costs than hydropower alternatives. In spite of large land requirements, they can be more easily collocated alongside existing land uses, like agriculture or mining. Similarly, their modular nature means they can be sited closer to areas of demand, and according to specific demand requirements, thus reducing the need for extensive grid infrastructure that is often required for large hydropower.
- **The Baynes hydropower project is likely to be delayed by 2.5 years, or in worst-case by up to 14 years** because of high social and environmental risk exposure. Baynes and an alternative Epupa dam were previously shelved after considerable opposition from local and international groups in 2014.
- **Electricity from Baynes will conservatively cost 66-166% more than existing local wind and solar alternatives by the time it comes online in 2031.** Electricity from Baynes would be expensive, even in comparison to other large hydropower projects in Africa. These high costs are likely to drive up the cost of electricity for Namibia's energy consumers.
- **Solar and wind options are both financially more competitive than hydropower and they can be developed in less than half the time.** The 37MW Hardap PV project was developed within 2 years and provides electricity at less than half the cost expected from Baynes. **Baynes, meanwhile, would not be online until 2031 or later**, with environmental challenges and local opposition likely to delay an already slow and difficult process.
- **The Kunene River basin is heavily climate exposed and extreme drought periods have already created energy shortfalls for Namibia because of its over-reliance on the Ruacana dam.** These events are likely to become more frequent and severe by 2030, exacerbated further by competing upstream water demands.
- **The growing risk that climate change poses creates strong incentives for energy planners to favour solar and wind** and to balance an energy system already over reliant on hydropower. Solar and wind technologies are far more climate resilient and can be dispersed in a way that considerably reduces the chances of a single climate event disrupting the entire energy system.

1 TMP Public is a non-profit consultancy and think-tank that solves complex social and environmental problems through research, analysis and advisory services. TMP has expertise in finance, technology, and social and political sciences and their work spans developed and developing countries on six continents. Since 2009, TMP has helped to measure, analyse and manage social and environmental risks (or opportunities) that arise from our rapidly changing world. Today, TMP is increasingly focused on understanding and preparing for climate change impacts on key systems in the 2020s, which include critical minerals and energy, food systems, and biodiversity and ecosystems.

## Recommendations for Namibian decision-makers

- Consider pursuing a least-cost energy pathway primarily based on solar, wind and energy storage.
- Strongly reconsider pursuing the Baynes project, which is not cost-competitive and is highly vulnerable to climate change.
- Consider adopting multiple assessment approaches in technology planning processes that take greater account of social, environmental and climate factors, along techno-economic considerations.
- Consider following the analysis found in this report and the draft IRP 2022, which supports investment in wind and solar rather than hydropower and fossil fuels. Reducing hydropower reliance is urgent in the context of climate change.
- Support comprehensive risk assessments and data sharing for energy investments to avoid damaging megaprojects like Baynes or proposed "fracking", while derisking private investment in good projects.
- Consider raising the limit of the Modified-Single Buyer model (currently at 30% of total energy consumption), which could boost investor confidence and create a further enabling environment for new solar, wind and storage capacity.
- Insist on high social and environmental standards for energy projects, including FPIC principles in social engagement and robust climate risk assessment.
- Identify partnerships of developers and energy consumers to help invest in much needed energy storage capacity (including long-duration), which can make future investment more attractive.