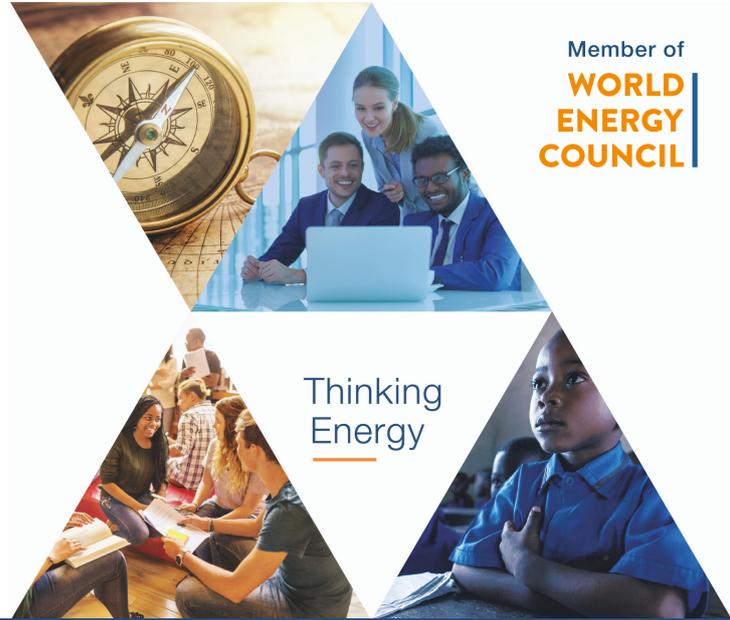




South African National Energy Association NPC
Thinking Energy

Opinion Piece



Thinking
Energy

ENERGY STORAGE TECHNOLOGIES WILL UNLOCK A "NEW GOLD RUSH" FOR SOUTH AFRICA

The central question at a recently convened workshop by the South African National Energy Association (SANEA) on Energy Storage was how to use growth in technologies and systems in energy storage to enable a "new gold rush" in South Africa, with all the socio-economic and environmental benefits it will bring. The workshop was attended by energy experts, government and industry leaders. Investing in energy storage technologies, especially battery storage and clean molecules such as green hydrogen, is key to unlocking new opportunities to provide a secure electricity supply and more jobs in South Africa's energy sector. It will build on South Africa's immense natural resources including metals, minerals, solar and wind power renewable energy.

Workshop participants heard that global investments into energy storage are expected to be worth USD50-100 billion by 2025 and more than USD 660 billion by 2040. Currently most of these investments are earmarked for destinations such as the US, China and the EU. South Africa and Africa at large are under-represented as investment destinations, despite being the source of key metals and minerals that form the basis of battery storage technologies and new value chains capable of producing green hydrogen at scale.

Access to clean, reliable, low cost electricity will be a key enabler of South Africa's post-Covid19 economic recovery

There are strong emerging battery storage technology value chains that have begun the exploitation and beneficiation of minerals and metals locally, and in the southern African region. South Africa has abundant reserves of metals and minerals such as Manganese, Vanadium, and Platinum Group Metals where South Africa alone accounts for over 75% of reserves. South Africa also has vast, relatively untapped endowments of solar and wind power and unused land that could be used for renewable power generation.

Access to clean, reliable, low cost electricity will be a key enabler of South Africa's post-Covid19 economic recovery and the national low-carbon energy transition. Workshop participants agreed that the deployment of renewable energy at scale should be coupled with the procurement of energy storage technologies to achieve the same level of availability as coal-fired power plants. There was a consensus that national efforts to foster the nascent energy storage technology industry could provide jobs, new infrastructure and even export-oriented industries in South Africa post Covid19.

Given the focus on infrastructure and job creation in the economic recovery plans, there should be room to explore and develop initiatives focused on minerals and metals beneficiation for battery storage value chains. Green hydrogen could also be a critical component of the economic recovery as it can make use of renewable energy produced at times when supply exceeds demand and can feed into other industries where hydrogen is an input material including transport, aviation and agriculture. A key challenge to achieving this is the absence of a cohesive national vision to guide the development of this emerging industry.

Government was encouraged by workshop participants to provide local and international investors with policy certainty, regulatory frameworks and tools, including incentives, that will encourage long term investment. It was acknowledged that some policy certainty of South Africa's future energy pathway is provided by the IRP 2019 which has outlined a pathway integrating more solar and wind power into the national power generation mix. As more renewables are integrated into the energy mix, there will be greater local demand for battery storage. Storage alone, however, will not solve the power supply deficit problems in South Africa. Part of the transformation needed in the energy sector to address this may be to enable greater uptake by consumers of relatively small-scale embedded renewable power generation coupled with battery storage.

It was highlighted that South Africa could gain recognition as a world leader in this industry by investing in building technical capacity and encouraging innovation around the provision of cost-effective energy storage. A key enabler of innovation is operating conditions in which experimentation and failure are not only allowed but expected as part of the process. Business and government would therefore have to persevere with investments in energy storage projects by spearheading new collaboration and strategic partnerships between government, higher education and industry.

A key issue that was a cross-cutting theme for the day, was that a just energy transition must be inclusive when including energy storage technologies. Participants at the workshop reiterated the importance of placing people at the centre of discussions about the energy transition. This requires enabling all sectors of society and the economy to benefit, including women, youth and workers whose jobs are at risk under future low-carbon energy scenarios. Skills development initiatives must therefore ensure that an adequate pipeline is developed to meet the needs of this growing green energy sector as South Africa transitions away from a carbon-based energy system.

The question is what type of skills are needed to achieve the transition, including harnessing opportunities for localisation of the battery storage industry and commercial production of clean molecules, identified as being critical components of the just transition. Government was encouraged to prioritise creating the policy frameworks to guide a socially just energy transition.

The central message emerging from the workshop discussions was that South Africa should: "Be bold, start soon, fail fast, and learn quickly." It was agreed that brave and visionary leadership is needed from all sectors of the economy to create a common vision and a roadmap for South Africa to become a frontrunner, and eventually a net exporter, of energy storage technologies to meet global demand. Like the first gold rush over 100 years ago, there is great potential for South Africa to leverage abundant natural resources and underpin a new era of inclusive economic development and prosperity.

The following sections present the recommendations that emerged from the discussions at the workshop on how to enable investment and create a thriving energy storage industry in South Africa.



Leadership

There is room for industry to take a stronger leadership role. The current lack of a unifying vision and the misalignment of expectations amongst stakeholders is challenging as stakeholders are often pulling in different

directions. Priority should be given to developing a common position. Such a vision should outline the role of energy storage technologies in South Africa, clearly mapping where the economic opportunities for different stakeholders exist in the industry or along value chains, including smaller scale entrepreneurs (with a focus on women and youth). This vision should also look to the global market and how South Africa can become an active player either in exporting technology, manufactured goods or knowledge/expertise.

Participants recommended the development of a forum that would initially have the task of outlining a common vision for the energy storage technology sector in South Africa and ultimately developing an implementation plan. This could take the form of a multi-stakeholder engagement forum.

A switch in mindsets amongst leadership across all sectors is needed in South Africa including recognition of the opportunities locally and in international markets for trade and export of South African battery storage and clean molecules. **Industry leaders in South Africa were encouraged to learn from Germany, where industry took a leading role to push the energy transition forward. One of the recommendations was a call for research about how other countries are navigating the energy transition, including the development and commercialisation of energy storage technologies and clean molecules. The objective of this would be to identify emerging good practice that could be adapted and applied in South Africa.**

Greater investment is needed in innovation through Research and Development by both government and industry to push the technological and market frontiers forward to commercialisation. Whilst there is still some uncertainty around the precise business models for commercialising some of these technologies and taking them to scale, South Africa needs to move the sector forward quickly to harness the opportunity.

South Africa must also invest in training future energy leaders who will be able to navigate the rapidly changing energy sector landscapes, including the shifting geo-politics and macro-economics associated with increasing amounts of renewables and energy storage technologies. As the business models and technologies are evolving rapidly, and becoming increasingly interlinked, energy leaders will need to be multi-disciplinary thinkers, capable of agile thinking and working across silos.



Policy alignment and regulatory support

The outlook of energy storage in South Africa will depend on creating conditions that encourage local and foreign investment.

Government must lead on providing policy and regulatory certainty that will encourage local and foreign investment in the sector. All efforts must be made to fast track the promulgation of the official government policies and strategies on energy storage and clean molecules. These include the energy storage roadmap and an official strategy on green Hydrogen. Urgent discussions are needed to outline the correct mix of policies and subsidies to trigger investment in South Africa. One example is how best to utilise the carbon tax funds and other government instruments to achieve this. Industry and labour should have a key role in finalising these policies and all care should be taken to ensure that engagement processes are inclusive and widespread.

Investors need assurance that they will be able to recoup their investments, therefore some specific policy consideration should be given by government to clarify how revenues will be generated including incentives and subsidies. Technology subsidies have been critical success factors in other markets such as South Korea and Australia.

Government can take a leading role in catalysing South Africa's entry into global energy storage and green Hydrogen markets through negotiating bilateral trade agreements with key international markets. International trade and exports will be vital for this industry since Europe, including Germany, do not have enough capacity to produce sufficient Hydrogen to meet domestic need. Here South Africa could learn from Japan which has taken a similar approach.

Workshop participants recommended that the IRP become more technology-agnostic with respect to the procurement of storage technologies so that procurement would be guided by lowest-cost approaches and function, rather than technology. Rapid advances in the development of the technologies means prescriptive approaches run the risk of becoming quickly out of date. An example is the exclusion of Concentrating Solar Power plants from the IRP 2019 based on outdated lifecycle cost information. The IRP should be a living document that is responsive to the rapid changes in technology development, feasibility, costs and market realities.

To catalyse the establishment of energy storage industry in South Africa, **a recommendation is that the next round of procurement under REIPPP should include a component of energy storage, in conjunction with Bid Window 5 renewable energy capacity.**

Localisation of the battery storage industry and commercial production of clean molecules will also be critical. Increasing local content requirements and localization efforts throughout the value chain is one strategy to catalyse investment in this sector.

The new gold rush should be built on the principles of stakeholder engagement, strategic partnerships, and collaboration

There is need to develop an energy storage technology roadmap for South Africa that clearly identifies and maps out where the opportunities lie for different stakeholders, what skills will be needed to implement this and how people can get involved. We must ensure that transparent, accessible stakeholder engagement processes are set up to be inclusive of all sectors of society, including women and youth, across gender, race, age, geographic, and rural-urban divides. A key consideration is the provision of information on energy storage technologies and the resulting entrepreneurship and job opportunities that is easily understood.

This industry is still in its nascent stages, much of the technology is still new: for example, few industrial scale Li-ion battery storage installations are older than 10 years. There are no industry standards as there is still much uncertainty about actual performance, battery degradation rates, safety hazards, life-cycle impacts on the environment, supply chain management, human and labour rights, battery decommissioning and disposal, etc.



One recommendation was that South Africa should invest in data collection systems on battery degradation and performance in actual operation, building on the excellent research that Eskom has been carrying out over the last 15 years. This information is vital for investors but also critical input for establishing end-of-life protocols and circular business models for battery storage technologies. Leveraging this, South Africa should also consider leading the development of an international data sharing platform (for Africa and perhaps beyond) to enable the development of best practice as well as standards for the industry.

Invest in skills development for the energy transition

South Africa urgently needs to develop an energy transition skills roadmap detailing what skills will be needed in the future under low-carbon energy scenarios. This must capture where the gaps lie in the current workforce, education curricula and green energy skills development pipelines. Skills development and training for government workers will also be critical as they will implement policy and regulatory frameworks— they need to understand enough about these technologies to be able to facilitate and not impede implementation. A common question is about how to reskill low-skilled workers, especially those whose jobs are at risk under the energy transition, to be more competitive in the future. One practical strategy to do this for the energy storage sector is to consider the wide array of nodes within the industry including manufacturing, commercialisation, sales and marketing, IP management, ICT skills for creating downstream software solutions for new energy system models e.g. blockchain technologies etc.

Tackling future skills shortages should be a joint responsibility between government, labour and industry. **One recommendation is to develop energy transition incubators to foster the development of new skills that will be necessary to support the development of an energy storage industry.** This would be an ideal vehicle for partnership between higher education institutions and firms that are involved in developing or rolling out these new energy storage technologies. Such incubators would help develop and entrench the skills within the local work force needed to sustain and grow the industry in South Africa.

Invest in national energy storage technology innovation ecosystem



South African energy stakeholders from government (DSI), industry, education and labour should partner to develop a structured national innovation ecosystem (NIE) specifically built to service the energy transition and develop energy storage technology and innovation.

This involves bringing parties together to develop a structured framework for partnership and investment between industry, education, government and labour to support and commercialise new energy storage technologies. A NIE for this sector would cover the complete life cycle and value chain of these technologies ensuring that resources can be equally allocated to R&D, pre-commercial activities, marketing and deployment. This will also ensure that there is public sector support for green skills development, as well as some public investment to seed Research and Development in this industry.

South Africa must develop capacity to work on cutting edge research on energy storage technology innovation at the same time it is building a foundational pipeline. There is a need to develop the skills of researchers to adapt and improve on cutting edge research making use of all the benefits of the 4th IR in machine learning, deep learning and big data. This could mean engaging with frontier research areas such as nanotechnology or optimising (adapting and improving) the latest energy storage technologies from other countries for use in the South African context.

Another recommendation was for South Africa to host an international conference targeting cutting edge research in energy storage technologies from public, academic and private sectors. This would gain SA access to world-class research and innovations in this industry but also allow for shared learning and potentially seed new strategic partnerships.

For long term sustainability of this industry, waste management and battery recycling will be key. The establishment of circular economies built around battery storage, particularly recycling rare earth minerals such as cobalt will be a game changer.

Whilst South Africa has taken a first step towards this with the recent updates to the Environmental Waste Management Act, we still need to develop energy storage business models that take the full lifecycle of these technologies into account.

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ABOUT SANEA

The South African National Energy Association (SANEA), founded in 1924, is the South African Member Committee of the World Energy Council. SANEA represents a hub for objective thought leadership on energy and related matters. In so doing, SANEA stimulates original thinking to catalyse transformation of the South African Energy Sector.

To benefit our stakeholders, we will draw on our World Energy Council affiliation and our local, regional, continental, and global networks to provide credible interventions that:

- Engage influential role players
- Stimulate objective thinking and critical assessment
- Encourage knowledge-sharing and debate
- Strengthen the professional energy network
- Enhance awareness of energy issues in South Africa
- Promote talent development