



Transitioning Namibian Energy Landscape towards Renewables & Hydrogen

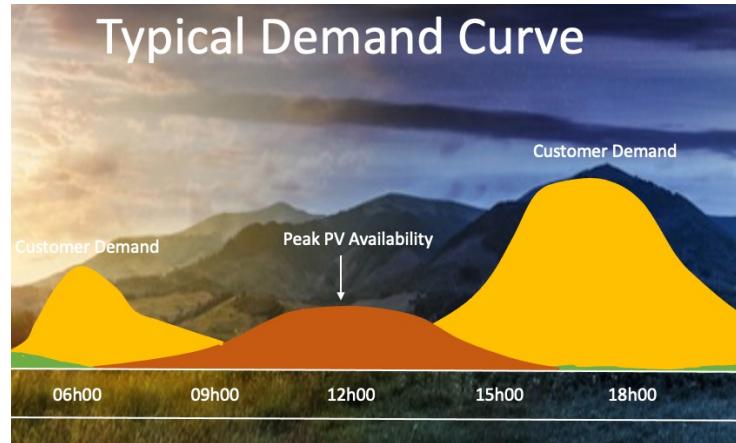
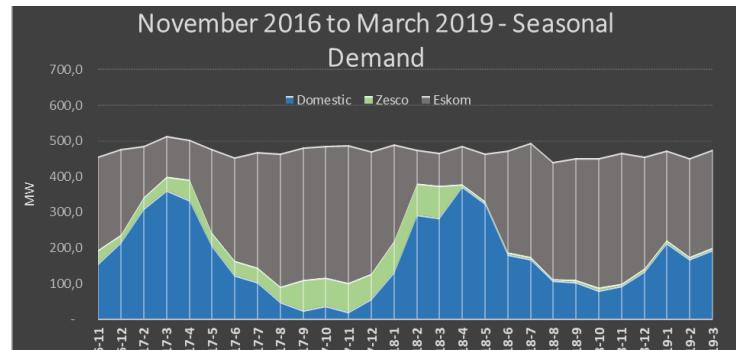
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The Namibian's Energy Landscape

Status Quo

- ❖ Namibia has no sustainable Base Load Power generation. Hydro is seasonal and existing Coal can be excluded and other liquid fuel generation does not qualify
- ❖ Security of Energy Supply and Tariffs Flagged as High Risk for Investors and specifically for the Mines
- ❖ Dependence on generation from ESKOM major cause for concern (Debt, Tariffs, Shortfalls, Civil Unrest, etc.) Limited to no diverse supply options in SAPP
- ❖ No Spinning Reserves or tangible Base Load preventing Blended or Differentiated Tariffs
- ❖ Introduction of Renewables combined with tangible Base Load will potentially unlock lower Tariffs for Namibian Industrial Users
- ❖ The MSBM not suitable for the Namibian energy market as Economies of Scale is required to facilitate lower tariffs



Transitioning Namibia's Energy towards Hydrogen



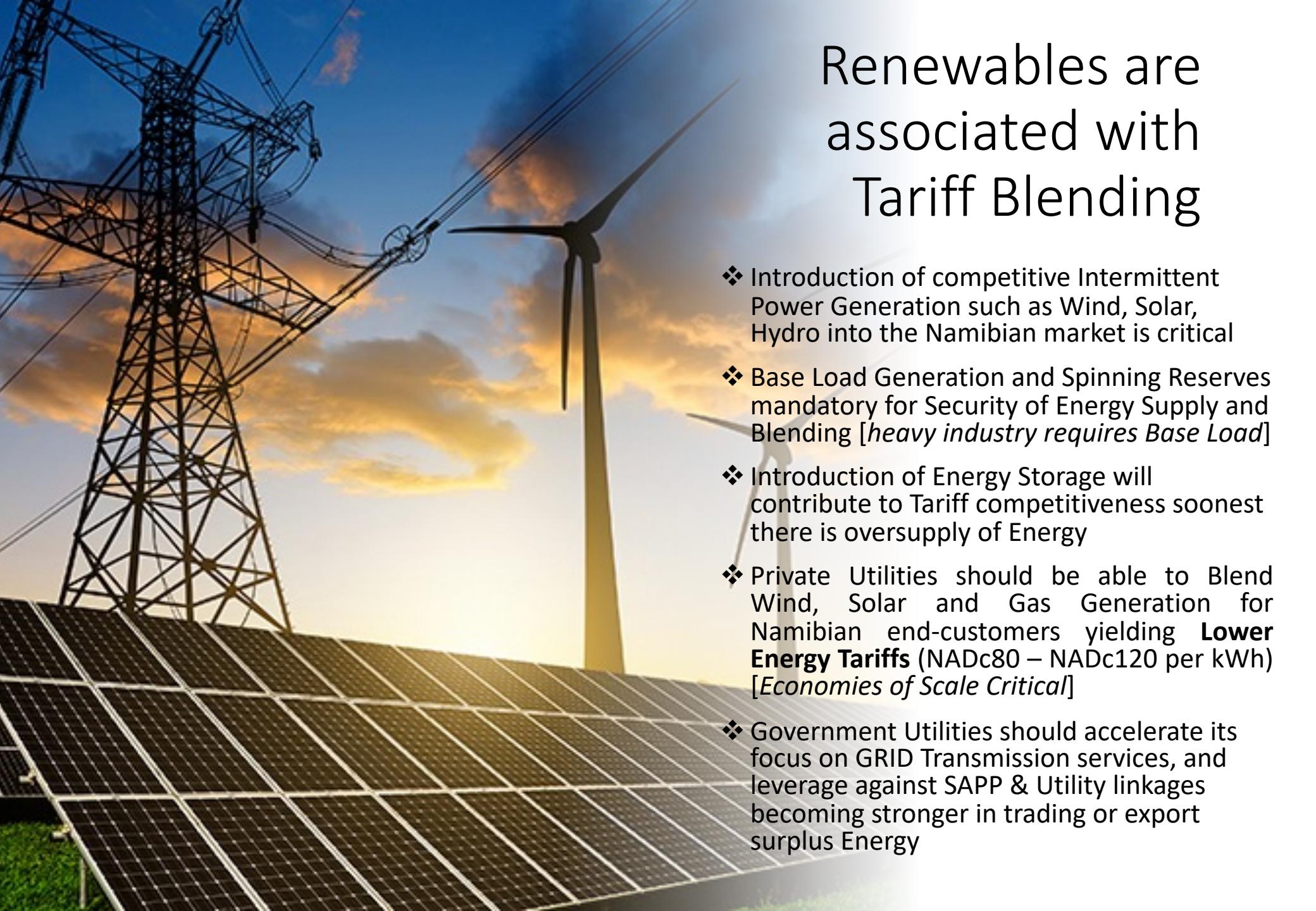
- ❖ Market driven by oversupply of Coal Energy Generation
- ❖ Loss of Energy Generation capacity due to fleet ageing and maintenance
- ❖ Introduction of Renewable Energy as part of Energy mix
- ❖ Paris Accords implications and impacts on phase outs
- ❖ Transition using Natural Gas migrating towards Hydrogen
- ❖ Implement Dependable Generation Technology
- ❖ Private Utilities to participate & facilitate Energy Blending
- ❖ Natural Gas to assist with reduction in Transport costs & emissions
- ❖ Enhancement of current Energy Grid
- ❖ Renewable Energy Penetrations to be accelerated
- ❖ The Namibian Grid must be super-charged to cater for large scale Renewable Energy
- ❖ Renewable Energy penetration deployment to be multiples of (3-5x) the Energy in use [*required for Hydrogen*]
- ❖ Drop-in Green Fuels to become available
- ❖ Hydrogen Generation possibilities for export and own use



2020



2030

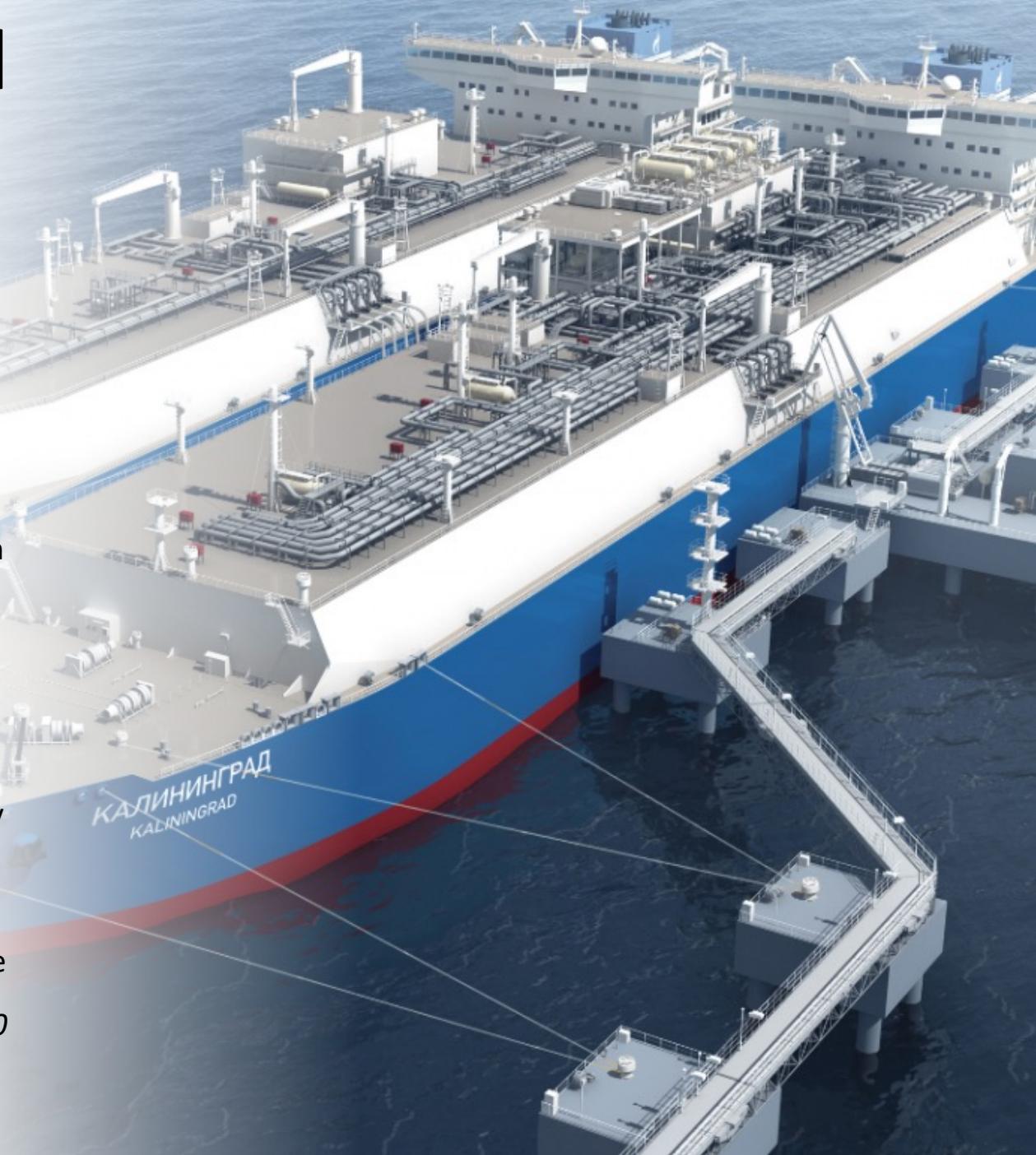


Renewables are associated with Tariff Blending

- ❖ Introduction of competitive Intermittent Power Generation such as Wind, Solar, Hydro into the Namibian market is critical
- ❖ Base Load Generation and Spinning Reserves mandatory for Security of Energy Supply and Blending [*heavy industry requires Base Load*]
- ❖ Introduction of Energy Storage will contribute to Tariff competitiveness soonest there is oversupply of Energy
- ❖ Private Utilities should be able to Blend Wind, Solar and Gas Generation for Namibian end-customers yielding **Lower Energy Tariffs** (NADc80 – NADc120 per kWh) [*Economies of Scale Critical*]
- ❖ Government Utilities should accelerate its focus on GRID Transmission services, and leverage against SAPP & Utility linkages becoming stronger in trading or export surplus Energy

Transitional Fuel Feedstock for Namibia

- ❖ Cleanest Fossil and Safest Fuel available in abundance and at affordable market prices
- ❖ Natural Gas can be blended with Hydrogen when available and eventually be replaced with Hydrogen in future once cost-effective
- ❖ Namport approved 1st GasPort – Walvis GasPort – in Walvis Bay (www.walvisgasport.com)
- ❖ Major International Oil Companies to join GasPort unlocking the delivery of LNG feedstock to the market. Security of supply is guaranteed
- ❖ Natural Gas, in either form of, LNG or CNG will become much more cost-effective Transport Fuel for the Future (saving against diesel >30%) [Mining Dumpers to convert to Hydrogen 2030 - Komatsu]





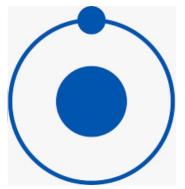
Namibia's 1st Gas-to-Power Plant Project

Nathaniel Maxuilili Power Plant (NMPP)

- ❖ The NMPP 586MW scale project will facilitate reduced and optimized Tariffs [*note that smaller projects cannot bring about savings*]
- ❖ Natural Gas as the feedstock of choice will ensure very competitive Tariffs
- ❖ NMPP location best suited in SADC for more enhanced generation capacities and potential exports
- ❖ Access to transmission GRID in Walvis Bay
- ❖ Power Plant design will bring Security of Energy Supply to Namibia (www.nmpowerplant.com)
- ❖ Hydrogen will potentially replace Natural Gas when competitive and or when alternative drop-in fuels are available

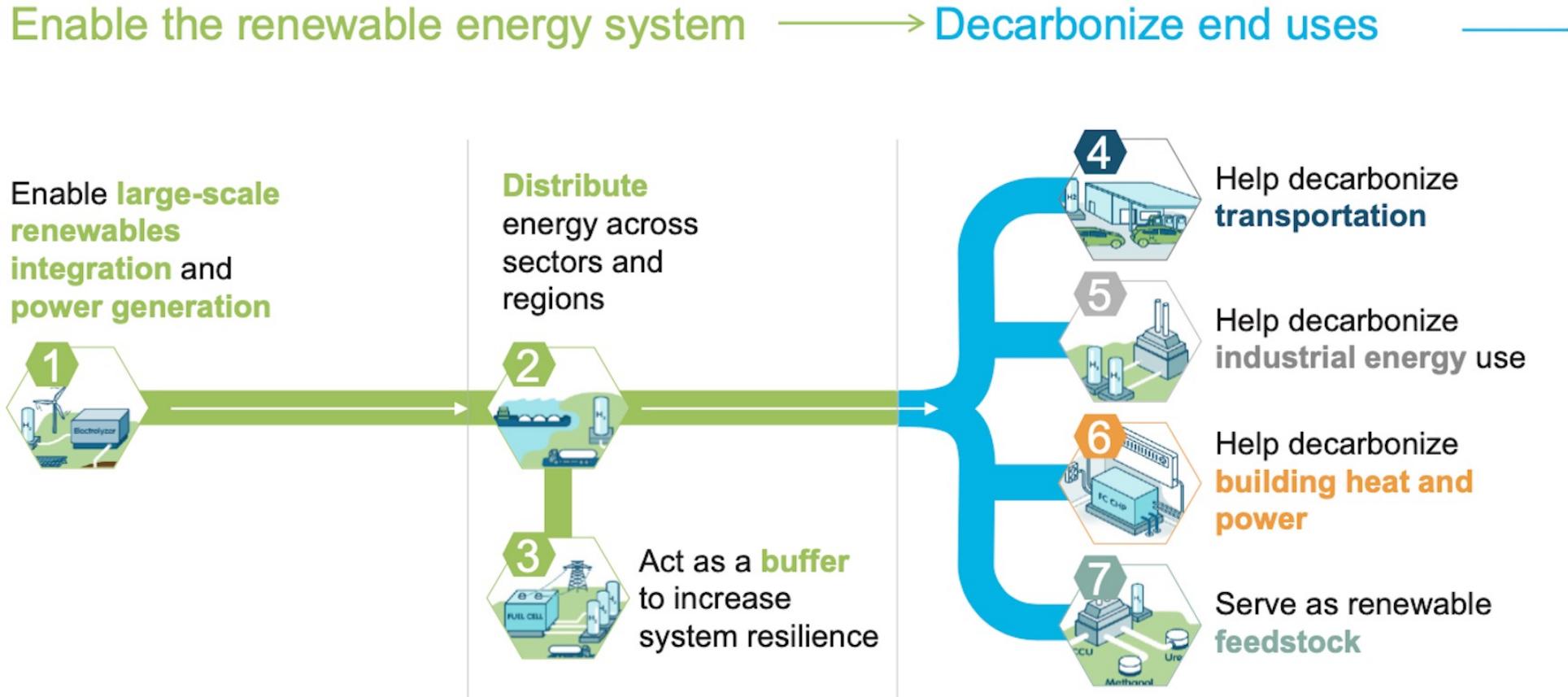


2030



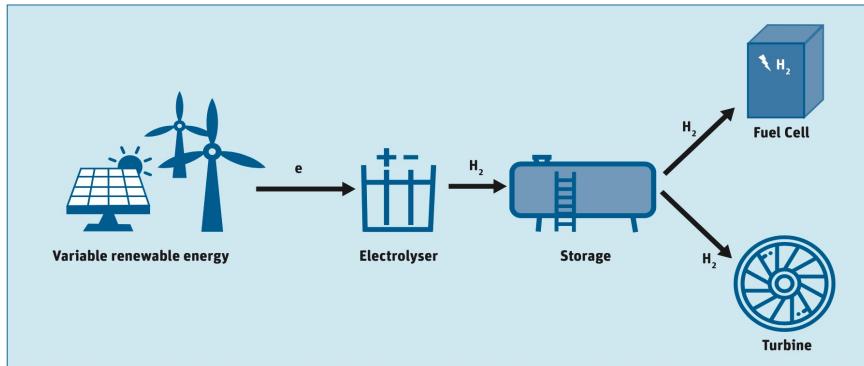
2050

Hydrogen Council Road Map



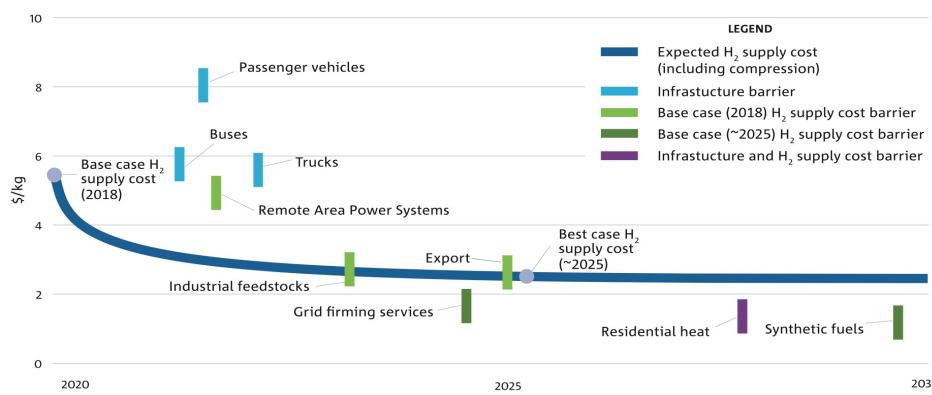
The Hydrogen Council outlined 7 distinct steps to decarbonize

Migration towards Hydrogen



Hydrogen is globally targeted as the Green Fuel of the future. [Information provided is based on Australian CSIRO data]

Currently, Hydrogen is too expensive today. At current prices, the cost of energy will be at least 300% more expensive



The cost of distilling or extracting Hydrogen with renewables is disproportionate, however planned initiatives will see the price becoming competitive by 2040 [AUD \$2/kg]

Other fuels such as Ammonia and Green Drop-in Fuels will see the light over the next 10-15years

Hydrogen for use in Mining vehicles will become competitive by 2030 but will slot in where Natural Gas is used

In Closing

Lower Energy Tariffs are possible through Private Sector Economies of Scale Solutions which will bring about Security of Energy Supply

Mining and Industrial Companies should consider forms of Syndication or Pooling, making Economies of Scale projects viable, resulting in achieving Lower Energy Tariffs

The Energy Market (Regulatory) should be structured around the Industry. Failure is imminent – if – Industry is structured around Energy Market (Reconsider regulations)

Renewables will facilitate Lower Energy Tariffs when combined in a Blended Approach. The combination of Wind, Solar, Hydro, Storage and Gas differ from Country to Country

Hydrogen may be a distant initiative but make decisions today that will allow Drop-in's or easy transformation to new greener fuels without significant penalties

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