

# Energy

## Key opportunities

# Utility scale renewable energy

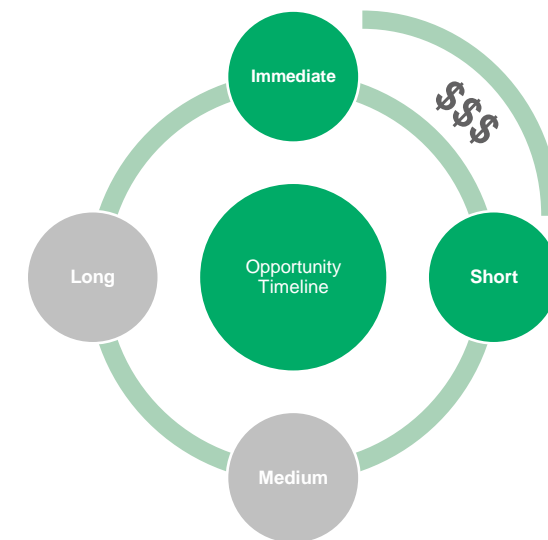
REIPPPP (Renewable Energy Independent Power Producers Procurement Programme)

## Context

- 4 bid windows executed:
  - close to R200 billion investments attracted (20% international investment)
  
- 6.4GW procured to date
  - 4.3GW of which is connected/operational

## Opportunity

- Bid window 5 expected in **Quarter 2 of 2021**  
Bid window 6 expected in **August 2021**  
Bid window 7 expected in **January 2022**
  
- Battery storage: 513 MW, RFP expected in **August 2021**
  
- Target: **20.4 GW by 2030** (New build)
  - Onshore Wind: 14.4 GW
  - Solar PV: 6 GW
  
- Large scale RE manufacturing capabilities reignited at Atlantis Special Economic Zone
  - Tax, land, import, export, skills



TECHNOLOGY	POTENTIAL MARKET VALUE (based on IRP 2019 allocations)
Solar	R 99 billion
Wind	R 271 billion
Distributed Generation	R 48 billion

Decommissioning of 35 000 MW coal plants by 2050

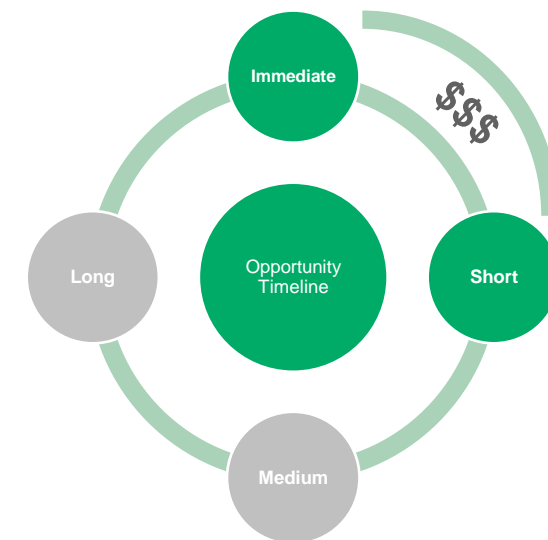
# Utility scale renewable energy

## REIPPPP rounds, distributed generation and energy storage

OPPORTUNITY	STAKEHOLDERS	KEY DRIVERS	BARRIERS	TERM	MACRO IMPACT
<b>Continuation of the REIPPPP based on the IRP 2019 allocations</b>	<ul style="list-style-type: none"> <li>– IPPs, EPCs, OEMs, O&amp;Ms</li> <li>– Local manufacturers</li> <li>– Financiers</li> </ul>	<ul style="list-style-type: none"> <li>– Bid window 5, 6, 7 expected in Quarter 2 of 2021, August 2021 and January 2022, respectively (6 800 MW of solar and wind by 2024)</li> <li>– Decommissioning of 35 GW coal by 2050</li> <li>– Eskom EAF restraints</li> </ul>	<ul style="list-style-type: none"> <li>– Consistency and scale of procurement</li> </ul>	<ul style="list-style-type: none"> <li>– Short to medium term (1-5 years)</li> </ul>	<ul style="list-style-type: none"> <li>– Economy &amp; jobs recovery</li> <li>– Eskom’s financial constraints</li> <li>– Just Transition</li> <li>– South African Infrastructure Plan</li> </ul>
<b>Distributed generation (1 – 10MW)</b>	<ul style="list-style-type: none"> <li>– Municipalities</li> <li>– Mining companies</li> <li>– Eskom</li> <li>– IPPs</li> </ul>	<ul style="list-style-type: none"> <li>– Municipalities in good financial standing can apply to either buy/procure new generation capacity</li> <li>– Possibility of lifting licensing cap from 1 MW to 50 MW</li> <li>– Mining sector allowed to self-generate, only required to register with NERSA</li> <li>– Wheeling opportunities</li> <li>– Uncapped MW between 2019 – 2022</li> </ul>	<ul style="list-style-type: none"> <li>– Municipal off-takers (cost-reflective tariff)</li> <li>– Policy uncertainty on third party transactions</li> <li>– Private PPAs structuring</li> </ul>	<ul style="list-style-type: none"> <li>– Short term (1-3 years)</li> </ul>	<ul style="list-style-type: none"> <li>– Increasing cost of Eskom’s electricity</li> <li>– Eskom’s EAF: Availability and reliability of energy supply</li> </ul>
<b>Utility-scale batteries development and deployment</b>	<ul style="list-style-type: none"> <li>– IPPs, EPCs, O&amp;Ms, OEMs</li> <li>– Local manufacturers, financiers</li> <li>– Mining sector</li> <li>– Global financing institutions</li> </ul>	<ul style="list-style-type: none"> <li>– Battery Energy Storage System (BESS) - (min. 80MW/320 MWh usable capacity for 7 months)</li> <li>– Global financing institutions</li> <li>– Grid stability &amp; MEC</li> <li>– Drive hydrogen export market</li> </ul>	<ul style="list-style-type: none"> <li>– Price of batteries in SA market deviates least cost path</li> <li>– Limited policy on battery integration</li> <li>– Infrastructure and R&amp;D studies</li> </ul>	<ul style="list-style-type: none"> <li>– Medium term (5 years)</li> </ul>	<ul style="list-style-type: none"> <li>– Price of battery storage declining (global)</li> </ul>

# Small scale embedded generation

Last 12 months ~300MW<sub>p</sub> roof top PV installed in South Africa



## Context

- Delay in REIPPPP and load shedding ignited SSEG
- Dominated by rooftop solar PV (C&I and agricultural)
- Current installed capacity of ~2GW<sub>p</sub> (GIS data ~4GW)
- 50 municipalities across South Africa having already introduced rules

## Opportunity

- Market could grow by as much as 7.5GW of installed capacity by 2035
- Total available market of R5 billion p.a. **~R75 billion by 2035**
- Secondary market for PV system components - Panels **~R5 billion in the next 5 to 10 years**. Inverters **~R2 billion in the next 5 to 10 years**

OPPORTUNITY	STAKEHOLDERS	KEY DRIVERS	BARRIER	TERM	MACRO IMPACT
Solar Installations C&I / Agri (<1MW)	<ul style="list-style-type: none"> <li>- EPCs,</li> <li>- Project developers,</li> <li>- Installers</li> <li>- PPA funders</li> </ul>	<ul style="list-style-type: none"> <li>- Selective PPAs &amp; bankability</li> <li>- High, sustained demand – still large market potential</li> <li>- Innovations in business models                             <ul style="list-style-type: none"> <li>- Rebuy / O&amp;M</li> <li>- Bundling</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Cash constrained end users</li> <li>- 1MW Cap &amp; generation licenses</li> <li>- Regulatory uncertainty</li> <li>- Cost cutting / quality trade-off to win contracts</li> </ul>	<ul style="list-style-type: none"> <li>- Immediate</li> <li>- Short Term (1-3 years)</li> </ul>	<ul style="list-style-type: none"> <li>- Rising Eskom tariffs</li> <li>- Load shedding</li> <li>- Carbon Tax Bill</li> <li>- Covid-19 Lockdown</li> <li>- Economic downturn</li> </ul>

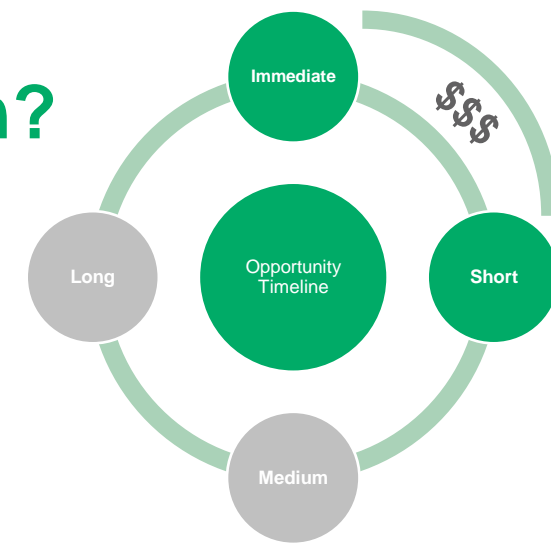
# Why this uptake of small scale embedded generation?

## Rooftop PV system bundling

- Aggregating smaller rooftop PV projects to reach a scale where they become attractive to larger investors by reducing transaction costs and spreading the risk across the new bundle

## Modernisation of existing buildings for energy efficiency

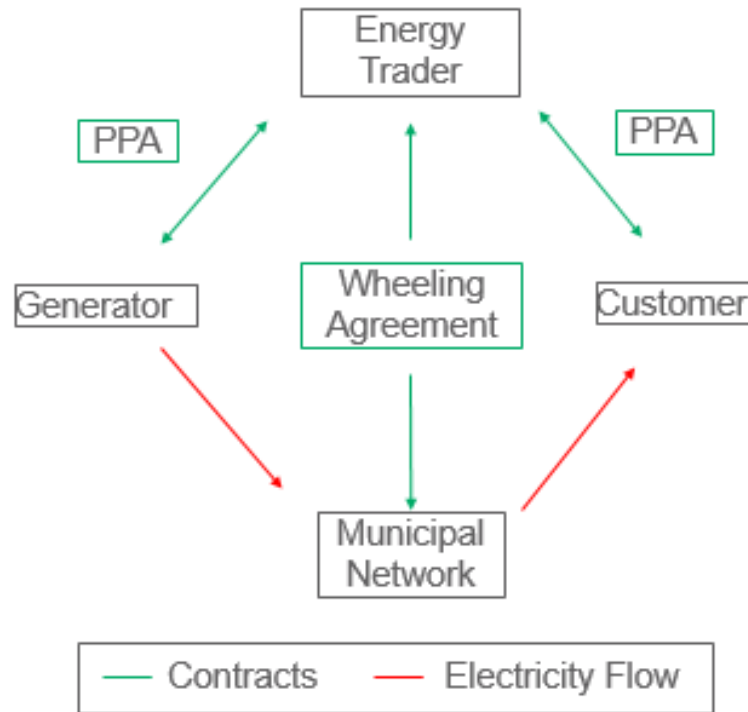
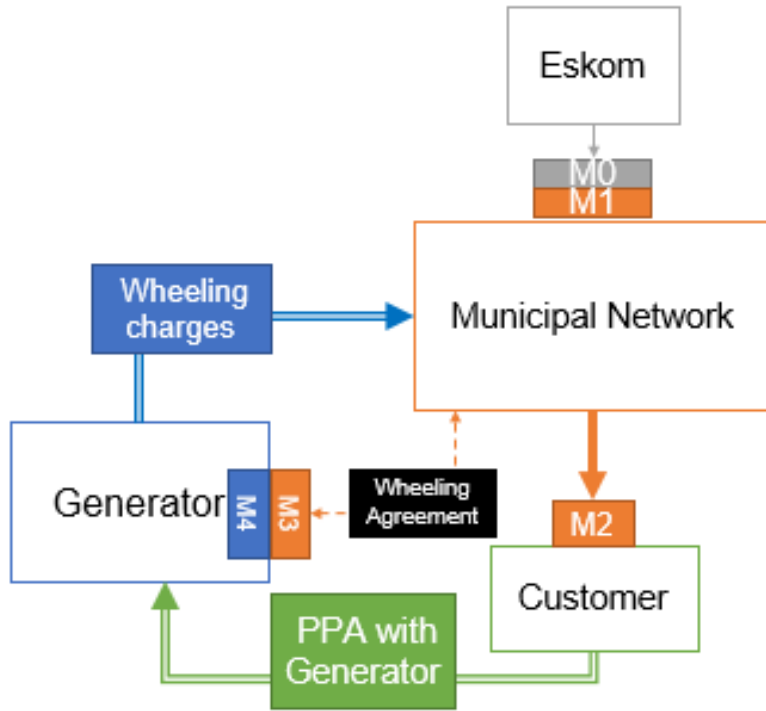
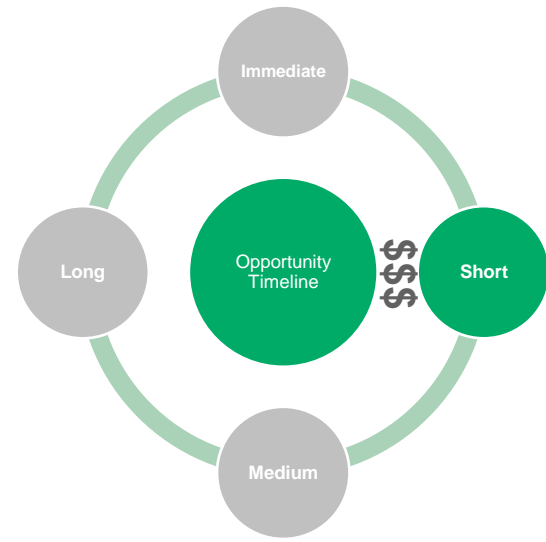
- The retrofitting of South Africa's large stock of existing buildings is expected to become the largest sector within the green building industry by 2020



OPPORTUNITY	STAKEHOLDERS	KEY DRIVERS	BARRIERS	TERM
<b>C&amp;I Storage</b>	<ul style="list-style-type: none"> <li>EPCs,</li> <li>Project developers,</li> <li>Installers</li> </ul>	<ul style="list-style-type: none"> <li>Industry &amp; production line startup / shutdown cycles</li> <li>Peak cost shaving via energy arbitrage</li> <li>Decreasing cost of Li ion batteries</li> <li>Simplified maintenance vs diesel storage tanks / generators</li> </ul>	<ul style="list-style-type: none"> <li>Poor understanding and undervaluation by stakeholders</li> <li>Requires more complex, flexible &amp; customized solutions than typical installations e.g. peak shaving vs backup power vs demand response</li> </ul>	Short term (1 - 3 years)
<b>Aggregated EE Interventions (New build &amp; retrofits)</b>	<ul style="list-style-type: none"> <li>ESCOs</li> <li>Financiers</li> </ul>	<ul style="list-style-type: none"> <li>12L Tax Incentive</li> <li>SANS10400XA – building energy efficiency regulations. PV &amp; solar geysers reduces net consumption</li> <li>Access to sites</li> </ul>	<ul style="list-style-type: none"> <li>Contracting fees</li> <li>Marketing &amp; business development</li> <li>Bankability / access to capital</li> </ul>	Immediate

# Distributed generation

1-10MW wind, solar and biogas – wheeling and trading



- Plant capacities range from 17 kW to 5,5 MW energy equivalent
- Mostly private sector (abattoirs, piggeries, food and bev companies)

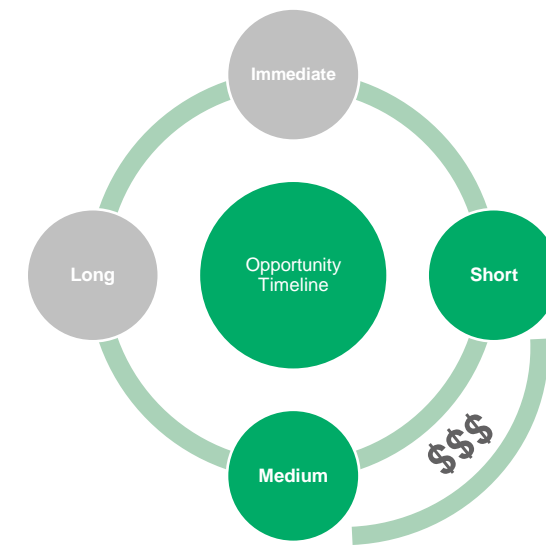
# Energy storage

## Building energy resilience – Hydrogen and battery storage

The SA **energy storage** market is expected to grow to **R15~30 billion by 2035**

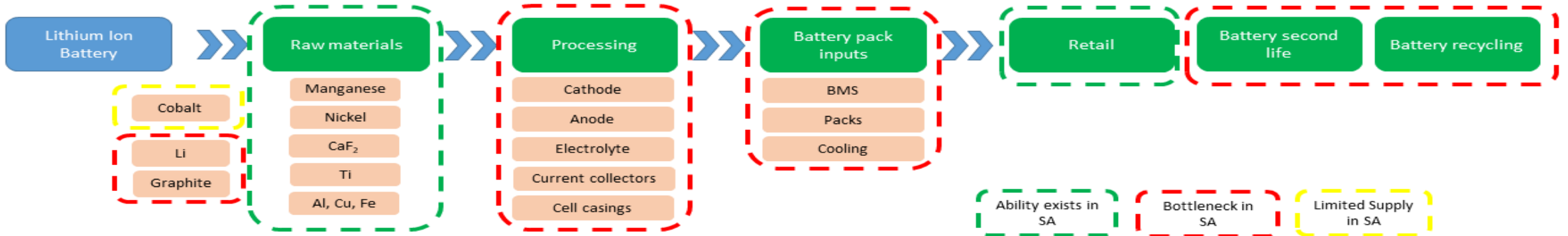
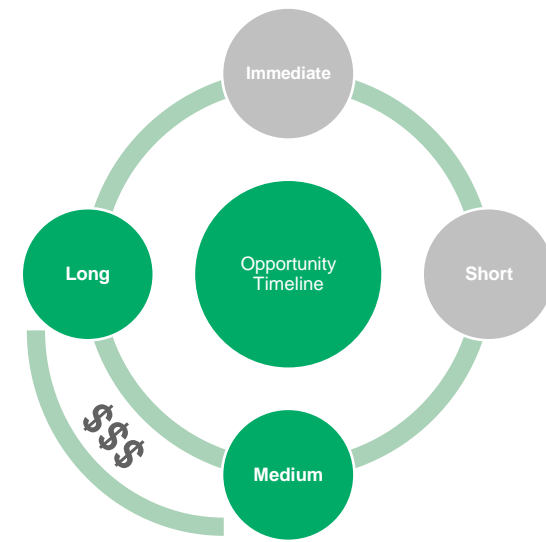
- Interest in hydrogen, lithium-ion and vanadium redox flow
- Demand charge reduction and backup power for municipalities
- Frequency regulation
- Deferring upgrades to transmission and distribution (T&D) infrastructure
- Additional market growth - Eskom's need for almost 1.4 GWh of additional daily balanced energy storage and private sector/customer side investment in demand side management and backup power
- Vanadium redox flow batteries highlighted by Eskom as favoured technology – 2020/21 tender
- Vanadium deposits in South Africa – amongst the highest in the world

**Behind-the-meter battery storage** - 8 storage applications most likely to gain traction in South Africa before 2035. Applications for PV self-consumption and backup power represent the behind-the-meter opportunities for high-end customers. Increased resource adequacy, grid management, and capital expense deferral are some of the opportunities for distribution utilities.



# Lithium-ion battery production

- SA possesses 78% of the world's manganese. Moreover, other raw materials required in the cathode are mined in sub-Saharan Africa.
- In light of the safety challenges of transporting lithium-ion batteries (LIBs), manufacturing in SA also represents a strong entry point to the wider African market.



OPPORTUNITY	KEY DRIVERS	BARRIERS	TERM
Lithium-ion batteries (LIB) production	<ul style="list-style-type: none"> <li>Increasing need for lithium-ion batteries across all sectors</li> <li>Availability of nickel &amp; manganese in South Africa</li> <li>Availability &amp; relative ease of access to lithium &amp; cobalt.</li> <li>Emerging need of Mn-rich electrodes that can compete with 'in vogue' Nickel-rich compositions (security of supply)</li> </ul>	<ul style="list-style-type: none"> <li>Establishing strong public-private partnerships. In particular, partnerships that extend beyond South Africa, as with Argonne and University of Limpopo</li> <li>Better understanding of global Manganese-oxide demand</li> <li>Policy support</li> </ul>	Medium – Long

Nickel-Metal-Chloride (NMC) is the most prevalent and the fastest growing battery type