SA Energy Storage 2017

Energy storage solutions in SA at SA Energy Storage 2017

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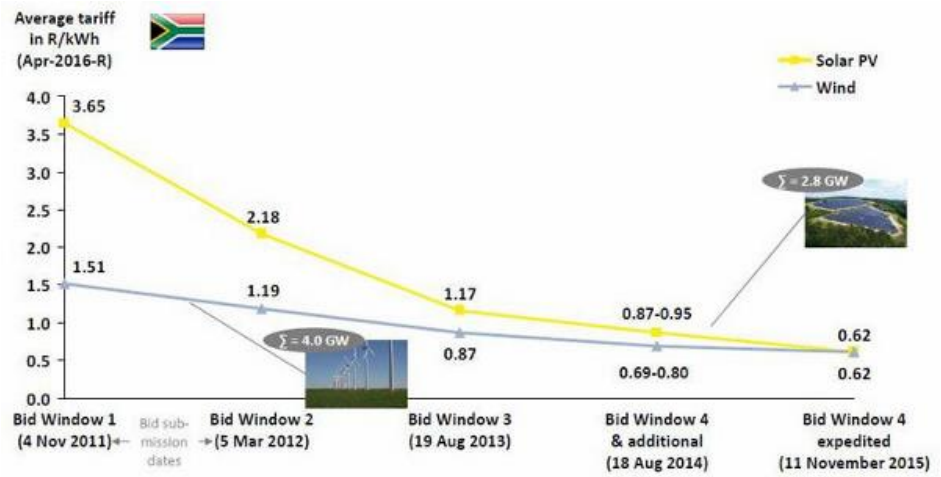
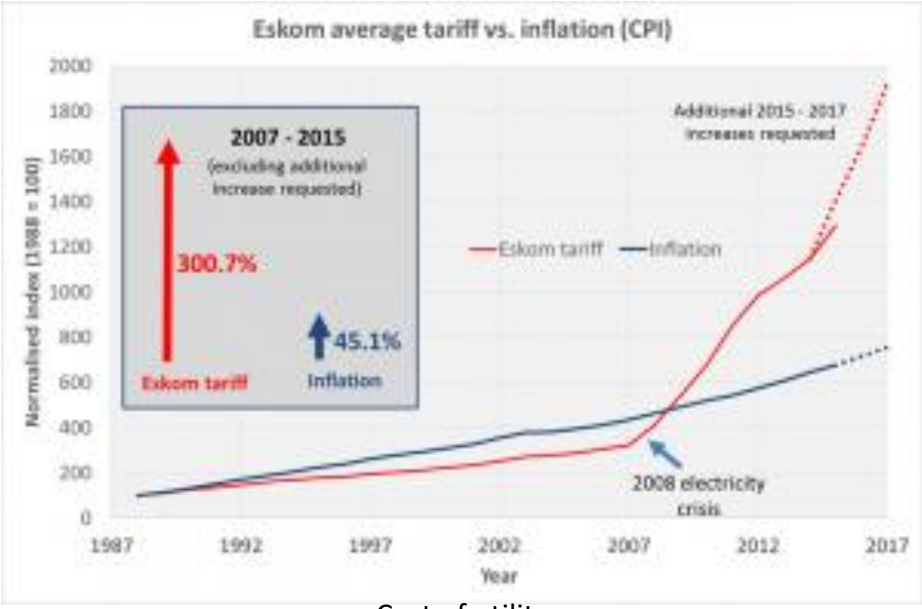
ee publishers

Introduction

- Cost of renewable energy steadily reducing
- Cost of utility supplied power increasing above inflation
- Renewable energy intermittent in nature



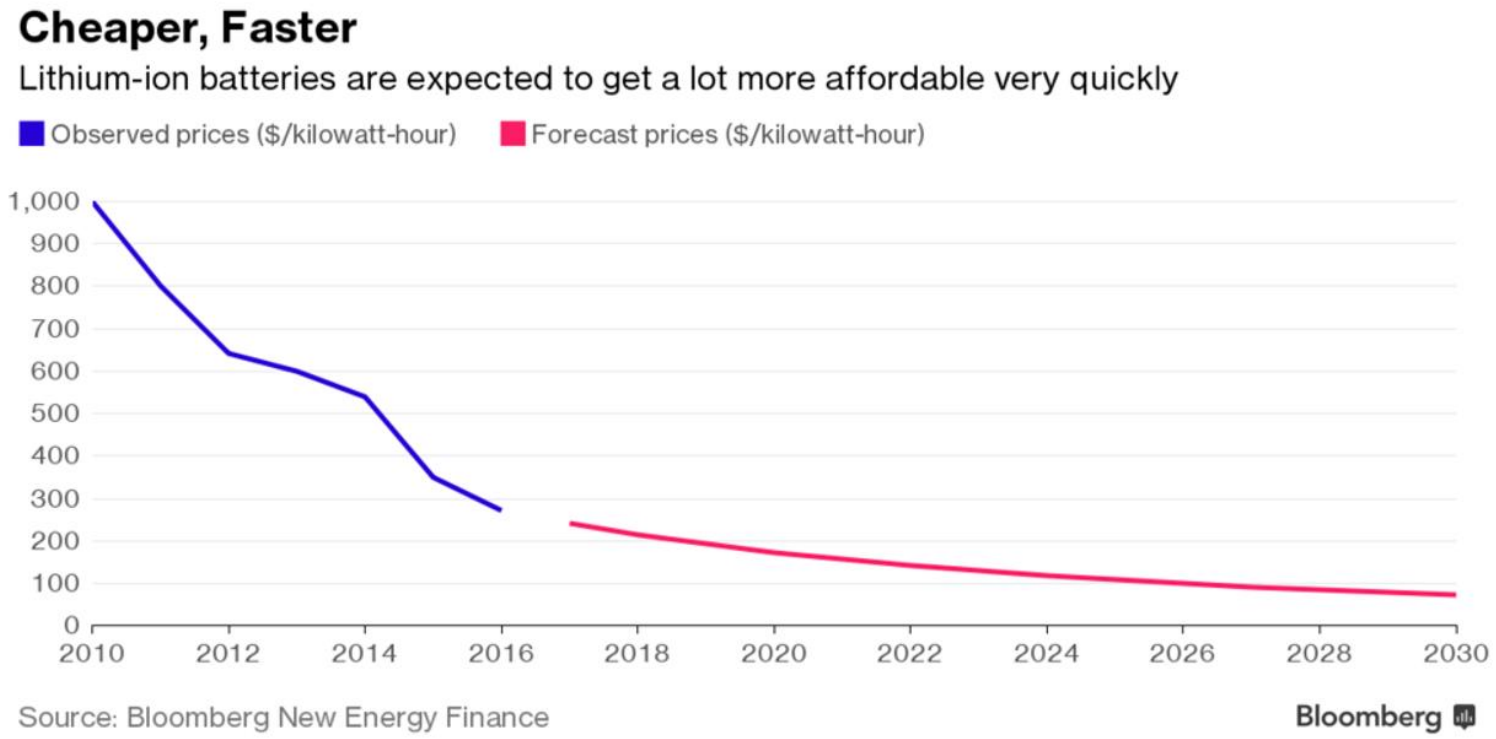
Cost of Renewable Energy



Cost of utility

Introduction

While costs were previously prohibitive, the costs of energy storage have come down significantly and is expected to drop faster, as per the Bloomberg example:



Lead-Acid

- Very mature technology
- Relatively inexpensive
- Used traditionally in automotive industry
- 0.8kWh to 1.5kWh
- Slow to charge
- Limited cycle life, which is reduced by deep cycling

Choose when:

- Weight is not a factor
- Input cost is a deciding factor
- Calendar life not a main concern

Lithium-Ion

- Well known in mobile technologies (cell phones, cameras, electric vehicles)
- 1kWh to 210kWh
- High specific energy and energy density
- High efficiency
- 1/4 of the weight compared to lead-acid
- High voltage per cell, high load currents
- Long lifecycle
- Initial cost is higher than lead acid, however this is rapidly reducing

Flow Batteries

- Converts energy from chemical to electrical from by pumping electrolyte through a membrane
- Scaled by changing the size of the tank and layout
- Virtually unlimited lifetime
- Mostly used in large scale stationary applications
- Market is developing scalable solutions

Selecting a battery

- Energy and power requirements
- Energy demand
- Surge demand
- Maximum charge current
- Operating temperature
- Voltage
- Discharge rate
- Self discharge
- Recharging
- Reliability

Cost Factors

CAPITAL

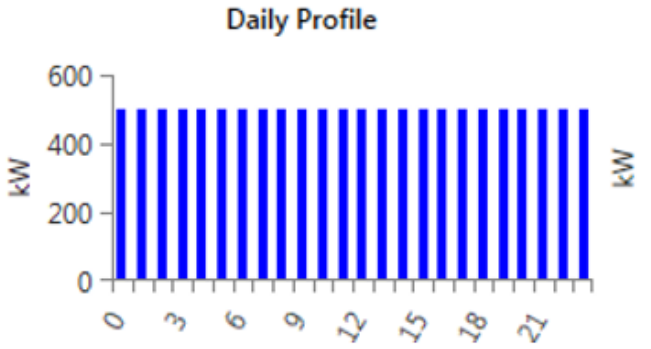
- Battery use (number of full or partial cycles)
- Battery performance
- Round trip efficiency
- Installation + Delivery

OPERATIONAL

- Location of installed system
- Application
- Additional equipment
- Vendors and commercial availability
- System size

Comparison

- 2 hypothetical systems using PV and
  - Lead acid
  - Lithium Ion
- Tested it over 3 possible load scenarios:
  - Industrial
  - Commercial
  - Community residential
- Costs from:
  - Johannesburg CityPower 2016 Time of Use rates
- Cost benchmarking:
  - Modules
  - Inverters
  - Batteries: lead acid and lithium



Industrial load profile

Commercial load profile

Community load profile

Results

- In all 3 load cases the LCOE for lithium-ion is lower than lead-acid over 25 years.
- There is also less surplus energy when charging lithium batteries as they can absorb a higher charging current.
- While the cost of the blended tariff is more than Eskom Megaflex, it is approaching the daytime tariff in municipal areas.

What is next

While we are keeping a keen eye on the market, we endeavour to offer our clients the best solution of combined renewable energy and energy storage.

Arup is conducting further studies to investigate the grid support services of energy storage combined with renewable energy generation.