Smart Grids and their Potentials in Namibia's Electricity Sector

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Working Definition: *Smart Grid*

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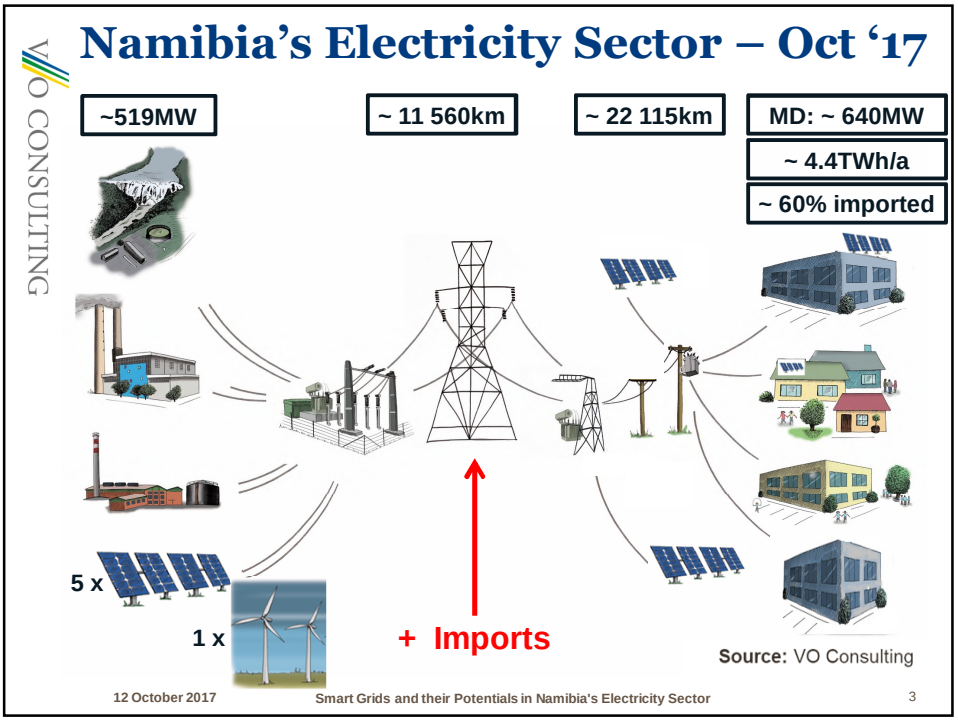
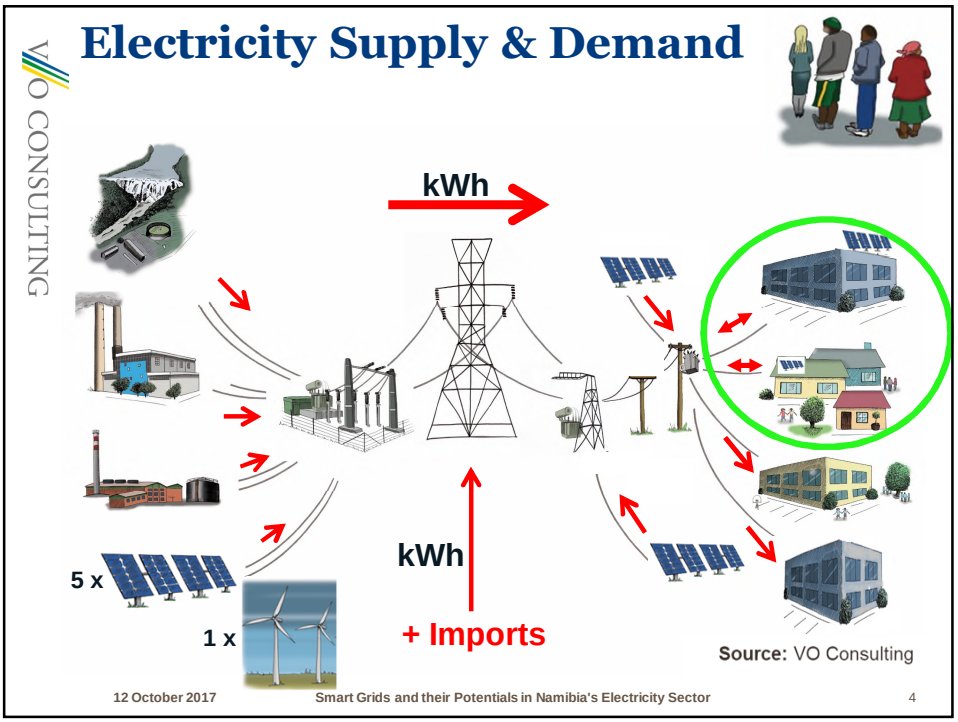
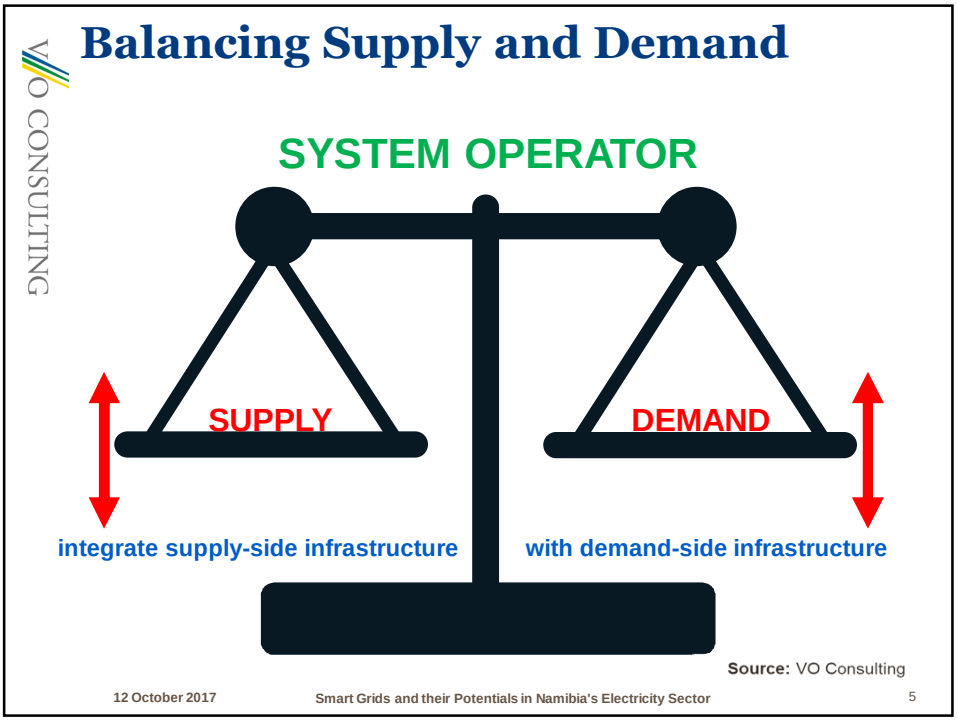
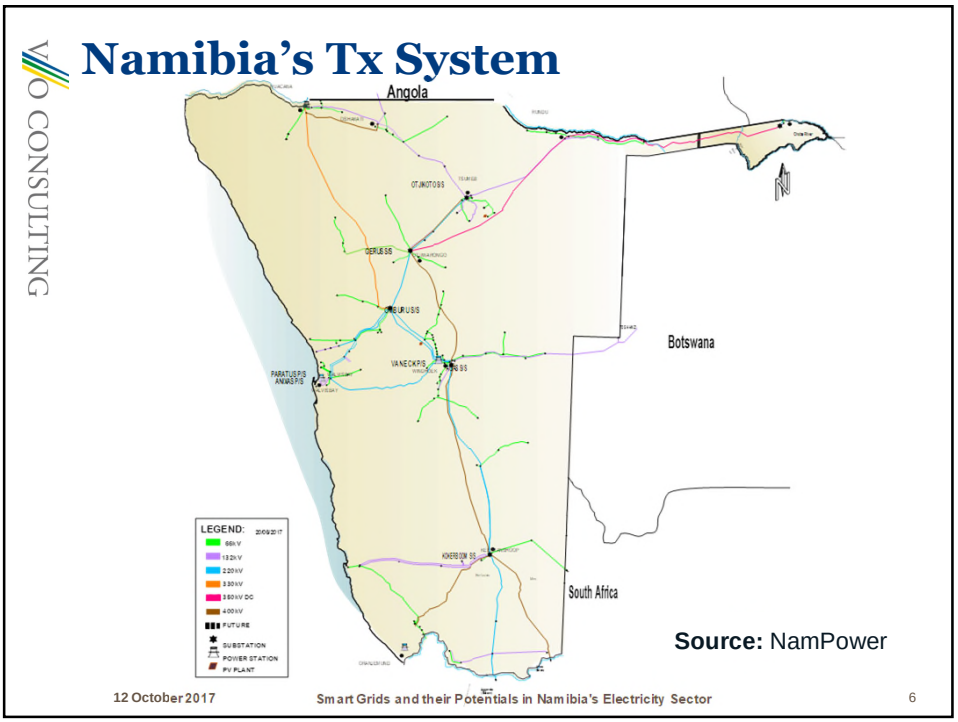
A Smart Grid

- **is a modern electricity transmission, distribution and supply grid**
- **that allows for the co-ordination of electricity generating plant, grid infrastructure, and electricity end-users,**
- **using information & communication technology**
- **to maximise the reliability, resilience and stability of the system as a whole,**
- **while minimising costs and negative impacts.**









Namibia's Gx Capacity– *excl embedded!*

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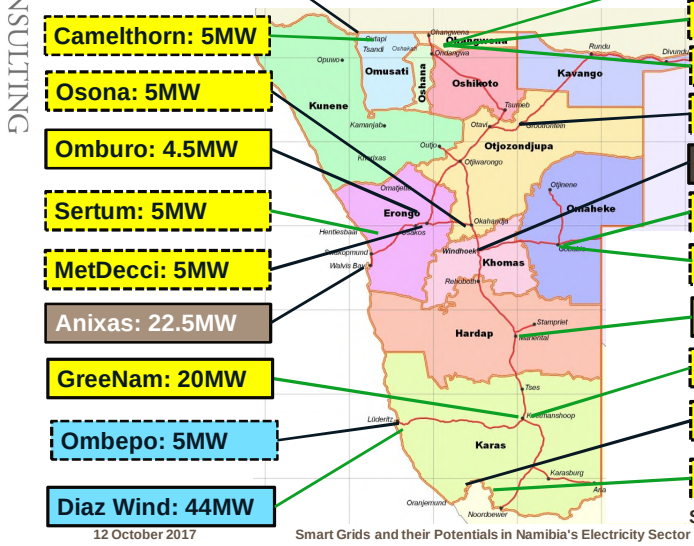
Ruacana: 347MW
Camelthorn: 5MW
Osona: 5MW
Omburo: 4.5MW
Sertum: 5MW
MetDecci: 5MW
Anixas: 22.5MW
GreeNam: 20MW
Ombepo: 5MW
Diaz Wind: 44MW

665MW



Unisun: 5MW
Tandii: 5MW
NCF: 5MW
HopSol: 5MW
Van Eck: 120MW
Benzel: 5MW
OKA Inv't: 5MW
Hardap:37MW
Momentous: 5MW
Aloe: 5MW
Alcon: 5MW

Source: VO Consulting

The Challenges

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- centralised network structure
- extensive north-south backbone
- long lines with few load centres

} high-cost assets

- rapid penetration of intermittent generation plant
- few in-network assets for direct control & response

while the following concerns remain highly relevant

- security of supply / import dependence
- limited access to electricity
- affordability of electricity

and

- a multitude of innovative technologies revolutionise the sector, and will significantly shape its future.

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Rationale for a Smart(er) Grid

- Namibia's solar resource is immense, and some good wind resources exist too, and others.
- The intermittent future has arrived.
- The choices: *try to rule it out*; ignore it; or *embrace it*.
- Transform our comparative advantages into competitive advantages.
- Strategic imperative: learn to manage intermittency
- Smarten up the grid -> storage, comm & control tools.

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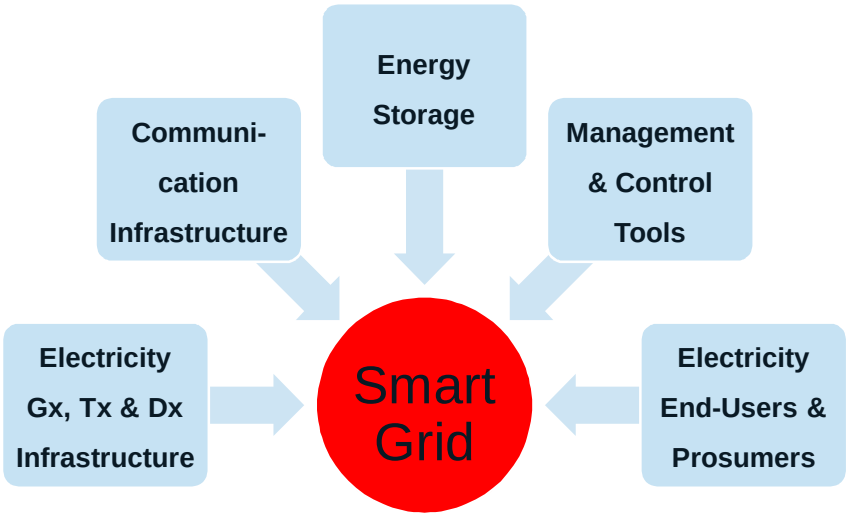
Ingredients of a Smart(er) Grid



Source: VO Consulting

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Elements of a Smart(er) Grid

- End-users & prosumers willing & able to participate
  - i.e. decide not to defect the grid and go it alone
- Portfolio of distributed electricity generation sources
  - to create a resilient & cost-effective local generation mix
- Modernised Tx, Dx and supply grid infrastructure
  - to allow for bi-directional transactive electricity exchanges
- Energy storage options
  - to optimise supplies, and provide ancillary services
- Grid-wide two-way communication infrastructure
  - to bi-directionally transmit & receive data across the network
- Management and network control tools
  - to monitor, control, protect, respond and ability to remedy.

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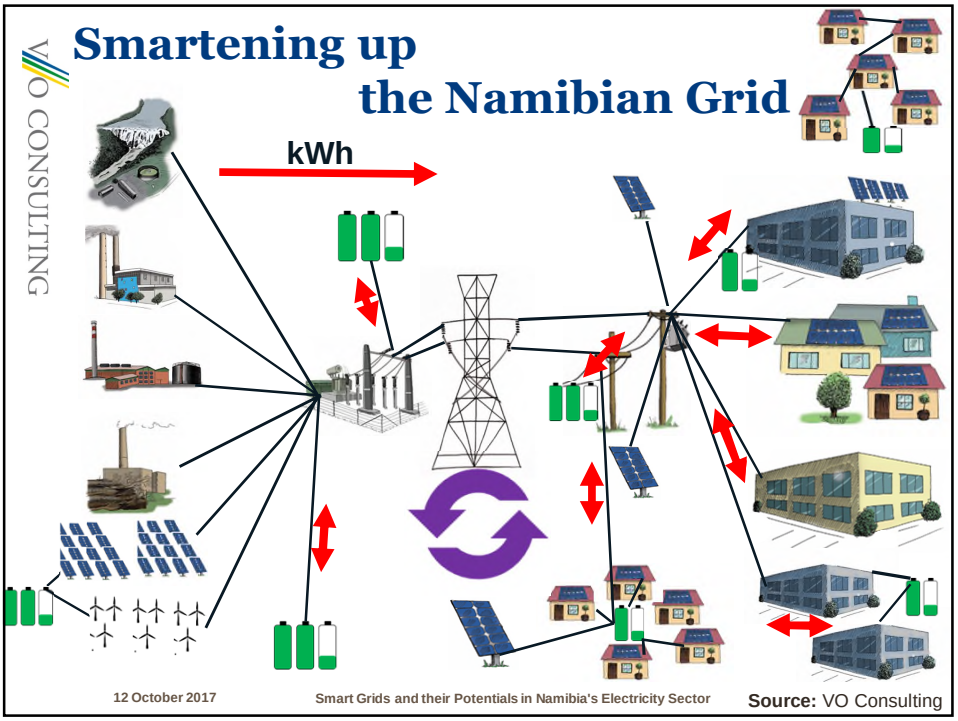
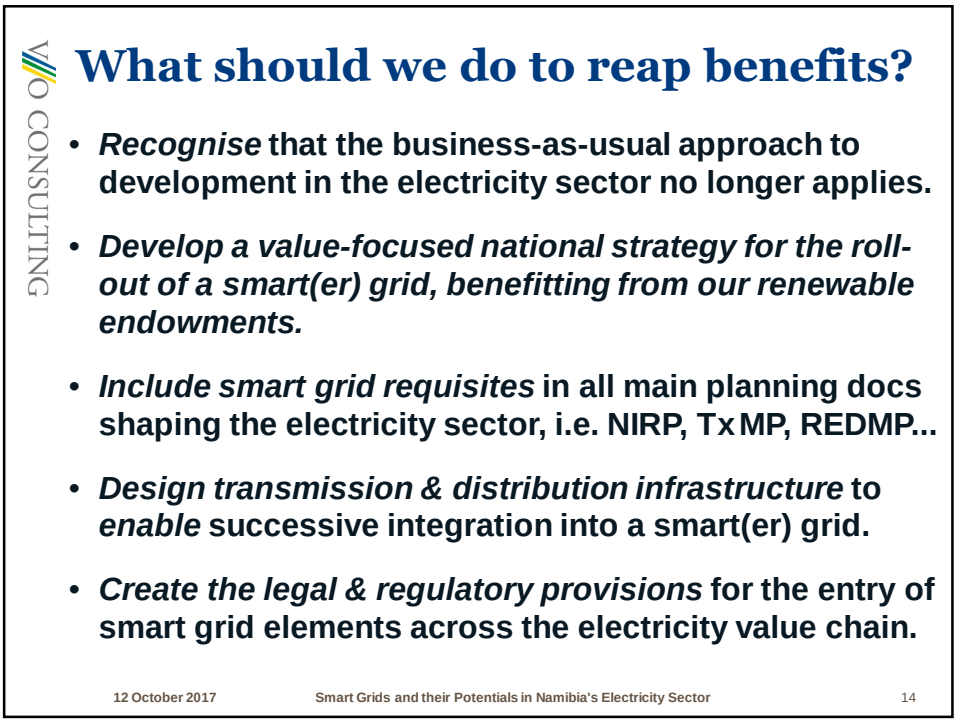
Towards the Grid of the Future

With strategic intent, we should

- focus sector-wide electricity developments
- to establish an increasingly smartened-up grid
- that integrates all main supply- & demand-side assets,
- benefitting from multiple distributed generation supplies,
- attracting & fairly rewarding public & private investments,
- to ensure that grid electricity supplies become and remain secure, increasingly accessible, and affordable,
- thereby enabling national development opportunities to the benefit of all people in Namibia.





Take Away Messages

- **Smartening-up the grid is essential to ensure that the grid is adding value for all participants, and to benefit from our plentiful renewable energy resources.**
- **Our future electricity mix will consist of a multitude of decentralised electricity supplies, some being non-firm.**
- **There is considerable value in a diversified supply mix powered by locally abundant energy endowments.**
- **To remain relevant, the grid must offer benefits that stand-alone systems do not offer – *deliberate design!***
- **A smart(er) grid integrates up- and downstream electricity assets to create value for the entire system.**

Thank you!

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