Energy Security

Energy - Water - Food Nexus

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Common Issues - Kingdom of Saudi Arabia & Australia

Australia & KSA share a unique understanding of the water-energy-food nexus.

Drivers for new technology & new policy are complex – many shared by both countries

- Local issues that involve nonlinear relationships.
- Temporally varying energy & water balances.
- Range of Interdependencies & dependencies in power/energy - water - food networks/systems (pumps)
- Education & Research is key to innovation → integrated approach needed.

Short & medium term future of energy delivery dominated by coal (Australia) and oil (KSA) with emerging alternatives.

Nexus - technical perspective: common algorithms and technologies, collaborative research, human resource capacity, common policy & infrastructure planning.

- Smart/intelligent grid approach application to 'power/energy - water – food' systems.
- Common algorithms using similar sensors & applying similar big data and data mining techniques.
- Similar policy development frameworks
- Collaboration : sharing of lessons learnt from three networks/systems

Measures to Ensure Energy Security

- encouraging diversity of supply, infrastructure reliability & supply chain resilience.
- regulatory & policy certainty to attract necessary investment.
- monitoring the competitiveness impacts & costs to consumers of increasing energy prices.
- monitoring the level of investment needed to meet future energy demand, in light of the global demand for energy infrastructure capital, components & skilled labour.
- promoting the importance of well-functioning international energy markets to support energy security.
- minimising disruptions to energy supplies and respond quickly and effectively when disruptions occur.
- more efficient emergency response in the event of sudden energy supply change.
- deploying the best available energy technologies, practices & education.

Education & Research is key

Source: ENERGY SECURITY – CHALLENGES AND OPPORTUNITIES, available upon request, email: archie.johnston@sydney.edu.au

Observations

Our contribution is based on

- Understanding the capabilities in energy networks in Australia
- Experience in Australian projects ($600m Smart Grid, Smart City, $13m Future Grid)
- Recent experience in interacting with industry & university partners in Saudi Arabia

Worldwide approaches to policy making appears to be more retrospective rather than prospective.

Rapid increase in Food production in the Kingdom,

- Highly reliable on water supply
- Local distributors reinforced their expansion of food, closely correlated to security of energy and water - consistent with circumstances in Australia

Cyber security aspects of three networks are real and material:

- Power/energy - water - food networks are potentially vulnerable to both unintentional and intentional actions.
- Three systems have different weak ‘links’ and risk profiles, e.g. electrical networks
- Risk profiles of networks have common features in two countries
- Unique relationships cyber → power → water, fridge→ food?

Feedback Appreciated

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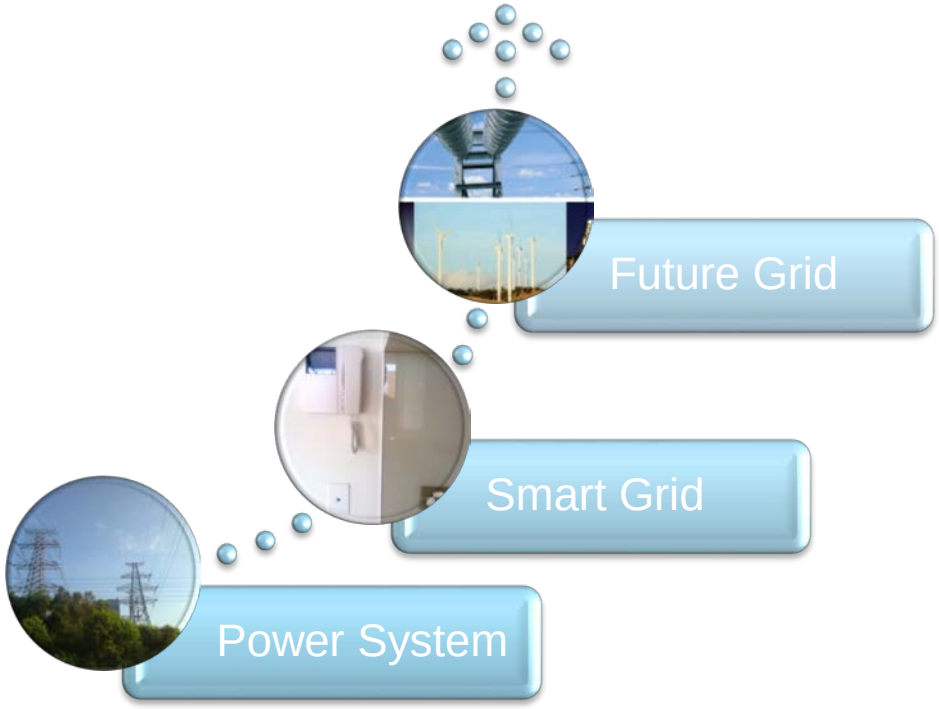
AUSTRALIA

Future (Smart) Grid



- Social: people and organisational domain
- Market and regulations
- Technologies: cyber-physical-customer-market,
- Evolutions
- Smart grid → smart infrastructure → smart living (smart transportation, smart city, smart …)