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Local or National Grids?

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UCT

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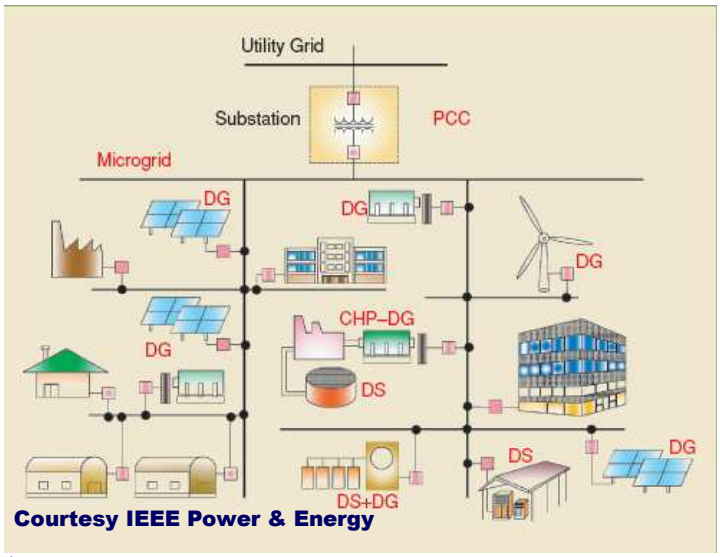
Integrated Resource Planning – the Next Generation Grid



Courtesy IEEE Power & Energy

Indices of Performance

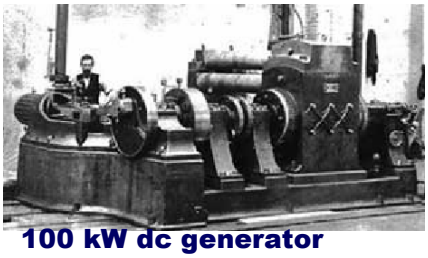
- Security of supply Sustained economic growth
- Human well being
- Environmental protection

- None must be compromised

Overview

- Grids - A brief History
- The so-called natural monopoly
- What is technically desirable?
- In South Africa what are the distributed resources that we are talking about??
- IET conservation and resource hierarchy
- What has been achieved elsewhere?
- What have we observed locally?
- Challenges
- What is actually needed?
- Concluding remarks
- The future

Grids: A brief background



100 kW dc generator

- Sept 1882 Thomas Edison's Pearl Street NY plant opened
- Other investors followed
- Allocated franchises
- A range of problems were encountered
- Lack of system standardization
- Corruption in procuring franchises
- Overhead costs factored in.
- 1898, Samuel Insull proposed regulation by state agencies
- Would establish rates and set service standards.
- Bigger system, more revenue would be generated, spreading out fixed costs.
- Provide the right mix of customers to utilize the plant for as much of the day as possible.

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The so-called natural monopoly –Background

- Insull's proposals soon adopted by most states.
- Utilities began to assume certain common characteristics.
- Soon the idea of the so-called natural monopoly utility took root.
- This regime was to serve industry for the next 100 years.
- But the laws of natural competition could not be defied indefinitely.
- Cracks finally surfaced
- Administrative complacence, inefficiency, etc
- The aging transmission and distribution infrastructure.
- Under-investment in energy efficient equipment
- Concerns for primary energy availability
- Environmental concerns
- All threatened security of supply

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What is technically desirable?

- Resource, generation and users should be located in the same place.
- It's costly to deliver energy
- EU wholesale price is 3-5Ect, but retail 10-15 ct
- In SA main resource coal is located in Mpumalanga.
- So is generation.
- But loads are in distant locations, e.g. CPT. etc
- But do we have other resources in CPT?
- Yes and fundamental logic dictates that we utilize the resources next to load first……if not as complements …….

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But what are these resources?

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You and I are the most abundant and cost effective distributed energy resource

- Can create equivalent generation in seconds!!
- But appears to be the most ignored resource in South Africa.
- We can't simply throw technology at energy and .. ..**voila!!**…it all happens!!
- Visit the ESKOM DSM website
- Good tips on energy conservation /efficiency
- But..No consumer input solicited…even if to solicit all important buy-in.
- We should learn from Japan (Govt guidelines & consumer implements)

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IET Conservation and Resource Hierarchy

Sustainable (local grid)	Energy Conservation *Changing behaviour to reduce demand*
	Energy Efficient Technologies *Using technology to reduce demand*
	Renewable, Sustainable Energy Sources *Setting a course to replace fossil fuels*
	Conventional Energy Sources *Using low/no-carbon technologies*
Unsustainable (National grid)	Traditional Exploitation of Conventional Energy Sources

The next most widely available resources in SA

- sunshine
- wind
- Industrial waste heat.
- These are green resources
- Located next to load centers.

What has been achieved outside SA?

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What has been achieved elsewhere?

- Europe, India, China and Japan ..58% growth in grid connected (PV) over last 5 years
- 28% annual growth in wind over the past 15 years.
- 2006 global installed wind stood at 74 GW and set to increase to more than 200 GW by 2011 (200% growth)
- 1334 MW added to Chinese grid and bringing its installed capacity to 2588 MW with an ambitious growth target of 5% by 2010 and 10% by 2020.
- India added 1840 MW and increased its total capacity to 6228 MW.
- US (in 2007) added 45% total wind power generating capacity
- Investment of over $9 billion into US economy, which accounted for about 30% of the entire new power-producing capacity added nationally. Re target 500% by 2022!!! Signed into law 7th Dec 2007
- 31 July 2008 Germany beats 2010 RE target of 12.5% http://www.pointcarbon.com/news/1.953593
- "There is little doubt that wind energy has become mainstream",
- The issue therefore is, not if but, when all the utilities of the world will ultimately embrace the new system.
- But where are we?

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What have we observed locally?

- Electric power issues have fast impacted on transport sector..issues like cost of diesel.
- SA is 7th largest emitter per capita
- Many other not so easily recognizable socio-economic effects of our inaction. Soon CPT could be infested with Malaria
- Preliminary studies at UCT show that a penetration of 50% of residential solar water heating could result in an immediate drop in peak transmission losses of 1500 MW or 2 coal plants…Active area (PV, wind) should achieve more
- Compare to 7 year timeline for one coal plant.
- And the impact on economy stagnation due to lack of energy supply in the intervening period.

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Challenges

- Change from passive to complex active networks
- First challenge is human skills resource to assess design, install and maintain the relevant systems.
- Capital costs still high for many of technologies…But this is because economics models do not consider externalities.
- Lack of enabling legislation
- Lack of transparency in energy info for new investors
- There is that all human weakness—Intransigence by a complacent incumbent system.

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New skills needed in whole range

- Power Systems Operation,
- Planning,
- Policy,
- Markets,
- Analysis,
- Control

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CONCLUDING REMARKS :

Benefits of IRP

- Exploitation of dispersed resources, human and natural
- Local exchange and storage of surplus electric energy
- Minimizing transmission and distribution costs and losses
- Improved resilience to disruptions through self-sufficiency.
- Greater end user engagement in energy investment and management
- Potential for more energy efficient social practices.
- Strong political will is an indispensable tool

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Future

- None of these measures is a panacea on its own.
- Real solution lies in the combination of old and new systems…teaming up and not competing
- Combined with cultural behavioural change
- Climate change is not just a fancy slogan
- But true energy conservation must be validated by unimpeded economic growth

We do not inherit the environment from our parents

but borrow it from our children.

Thank you.