



Future Distribution Networks

Aidan Roberts



Outline

- Investigation Area
- Placements
- Highlights
- Closing thoughts

Investigation Area

- Proposed
 - Distributed Generation
 - Smart Networks
 - Network Operation
 - AMI
- Smart Networks/ Intelligent/ Smart grid
 - Intelligence - “The ability to **acquire** and **apply knowledge and skills**”
 - Acquire
 - Knowledge - Increased Monitoring/Information
 - Skills - Analytics/Modelling
 - Apply
 - Knowledge – Process & Guidelines
 - Skills – Technology functionality
 - A means of achieving high level energy policy objectives



EUTPS Definition

- “an electricity network that can intelligently integrate the actions of all users connected to it - generators, consumers and those that do both - in order to efficiently deliver sustainable, economic and secure electricity supplies.”



Placements

■ Proposed

- OFGEM (6 months) – September 2008
- EA Technology (6 months) – April 2009
- Landis + Gyr (6 months)
- EDF Energy Networks (6 months)

■ Actual

- OFGEM (6 months) – September 2008
- EA Technology (7 months) – April 2009
- Landis + Gyr (10 months) – February 2010



Ofgem - UK

- Policy Analyst
- Quality of Service Department
 - Worst Served Customer Policy
- Environment Department
 - Business Carbon Footprint (BCF) Methodology & Reporting Template
- Other
 - Innovation Funding Incentive (IFI)
 - Registered Power Zones (RPZs)
 - Distributed Generation (DG) Incentive



EA Technology Consulting -UK

- Consulting Engineer
- New Energy Technologies
- IEA Implementing Agreement - ENARD
 - Subtask 1 - Regulatory frameworks and business models conducive to the development of Smart Grids
- IEA Implementing Agreement – DSM - Task XIX:
 - Subtask 3 - Micro Demand Response and Energy Savings
- Strategic Technology Programme (STP) Module 5 “DER for Networks”
 - Report - “Smart Meters: Next Steps”



Landis + Gyr - France

- R & D Engineer
- Advanced Metering Systems
- Development of G3 PLC
 - ErDF specification
 - Maxim Modem
 - OFDM
 - IPv6 via 6LowPAN Adaption layer

G3 PLC

PLC Type	Carriers	Theoretical Data Rate (bps)	MV - MV Trial		MV - LV Trial		LV - LV Trial	
			Data Rate (bps)	Frame Error Rate (FER)	Data Rate	Frame Error Rate (FER)	Data Rate	Frame Error Rate (FER)
S-FSK	Single	2400	880	0%	763	12%	880	0%
OFDM	36	35 000	6092	0%	4175	1%	5700	0%
OFDM	92	128 000	2038	7%	1400	38%	630	40%



Technical Learning

- Technical
 - Ofgem
 - Regulation
 - Incentive mechanism development
 - Importance of consultation process
 - EA Technology
 - DSM
 - Smart Metering
 - National & International Collaboration
 - Exposure to “Smart Grid” activities around the world
 - L + G
 - Communications
 - Software Development
 - Standards & Interoperability



Personal development

- Confidence
- Adaptability
 - Languages
 - Cultures
 - Industries
- Awareness
 - Community
 - Social
 - Political
 - Environmental



Closing Thoughts

- Great experience
 - Career
 - Personal
- Some of my objectives not achieved
 - Lack of DNO placement
 - Timing – real developments over next 12 to 18 months
- Other new objectives were added



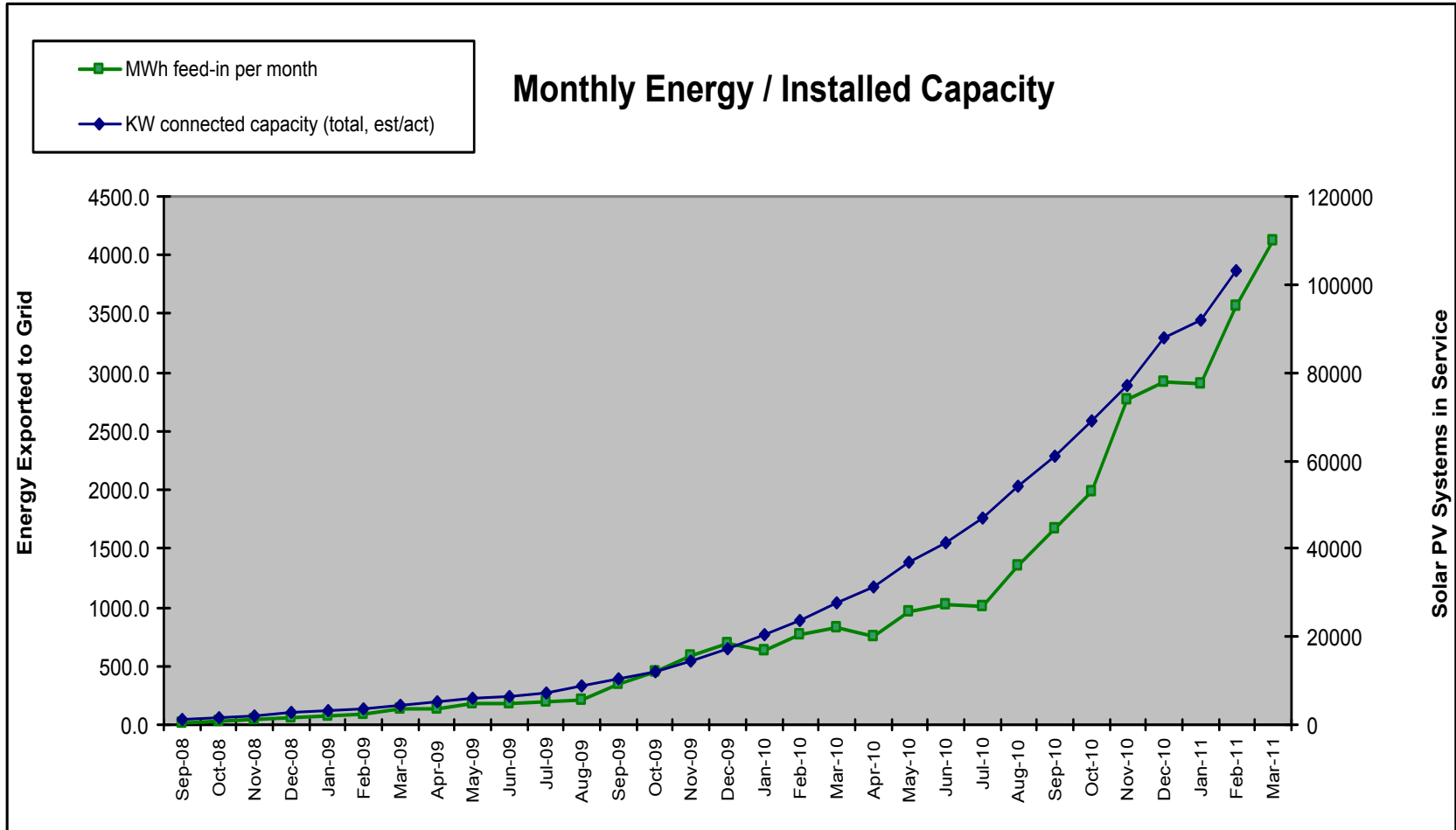
Thanks

- Bon voyage et bon courage!

Closing thoughts

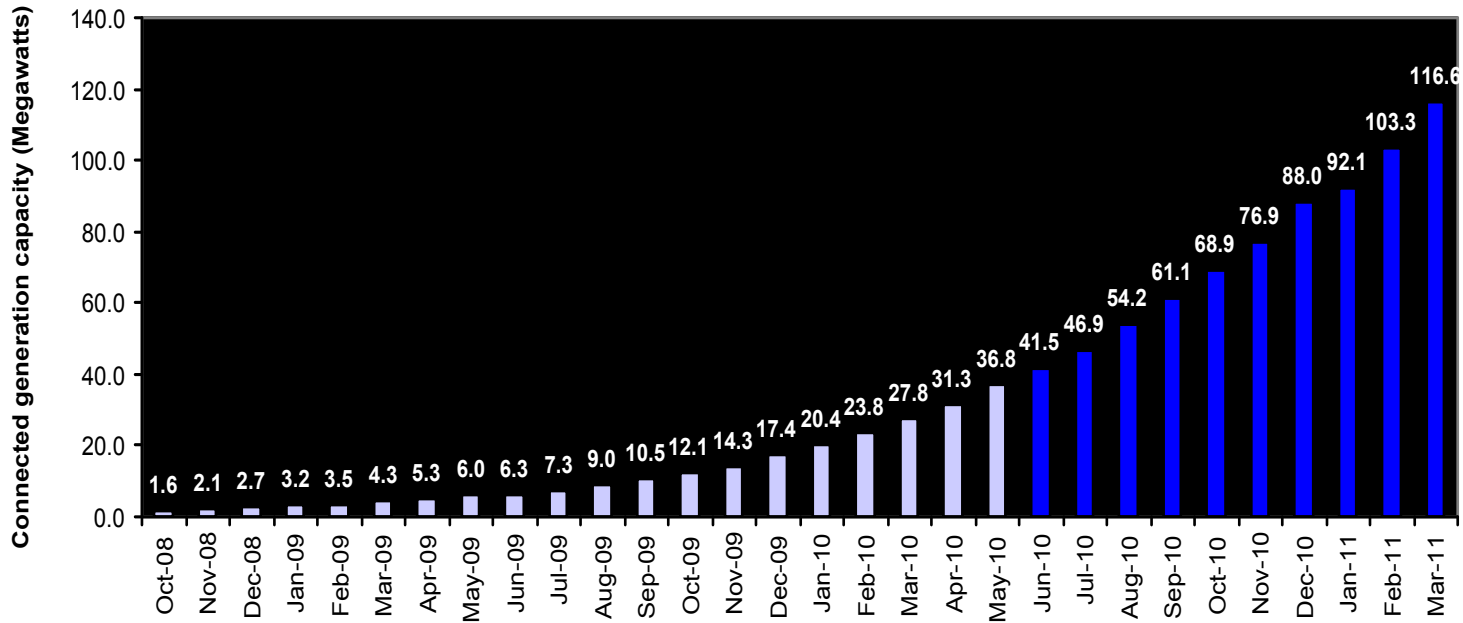
- The smart grid is a name given to a suite of technologies and associated applications that will help to deliver future energy policy objectives – sustainability, competitiveness and affordability
- Given the natural differences in drivers and operating environment, each implementation of a smart grid can be different
- The 'smart' in smart grid refers to greater understanding (monitoring), embedded intelligence and overlaid IC&T
- The smart grid is focused on Electricity Networks however networks cannot be separated from the overall electricity system
- Distribution networks are heavily impacted due to the lack of monitoring, high proportion of assets & natural interface to consumers
- A noticeable shift from 'generation-centric' to 'consumer-centric' networks
- Effective application requires understanding your drivers & scope of application but also being aware of the bigger picture
- There is much to be gained from Collaboration
 - Cross stakeholder (Distribution, Transmission, Generation, Manufacturers, Academia)
 - Cross borders (states or countries)
- Be aware and actively Influence energy policy and regulation
- Contrary to innovation in the past, smart grid is here to stay, as it is the only way to achieve policy objectives
- Smart grids wont just happen: a lot of work needs to be done, a lot of learning's and most likely a lot of mistakes
- Trials are important, they may be expensive and time consuming however they will save money in the long run and enable effective large scale application
- Culture change is needed to encourage lateral thinking
- Rollout staging is important particularly with large scale technologies. New systems should be designed to meet end state but will also need to handle transition periods
- Resources are needed for smart grid and business as usual
- Smart grid can attract a new workforce
- It is an exciting time to be an engineer in the ESI

Solar Bonus Scheme



Solar Bonus Scheme

Grid-connected Solar PV system installed capacity - ENERGEX





Outline

- 15-20 mins
- Idea is for each of you to present a summary of your overseas experiences under the scholarship – suggest you cover
 - – your objectives,
 - your program,
 - highlights of your technical learning,
 - highlights of personal development,
 - overall view on how worthwhile it was to you and in meeting the scholarships objectives