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

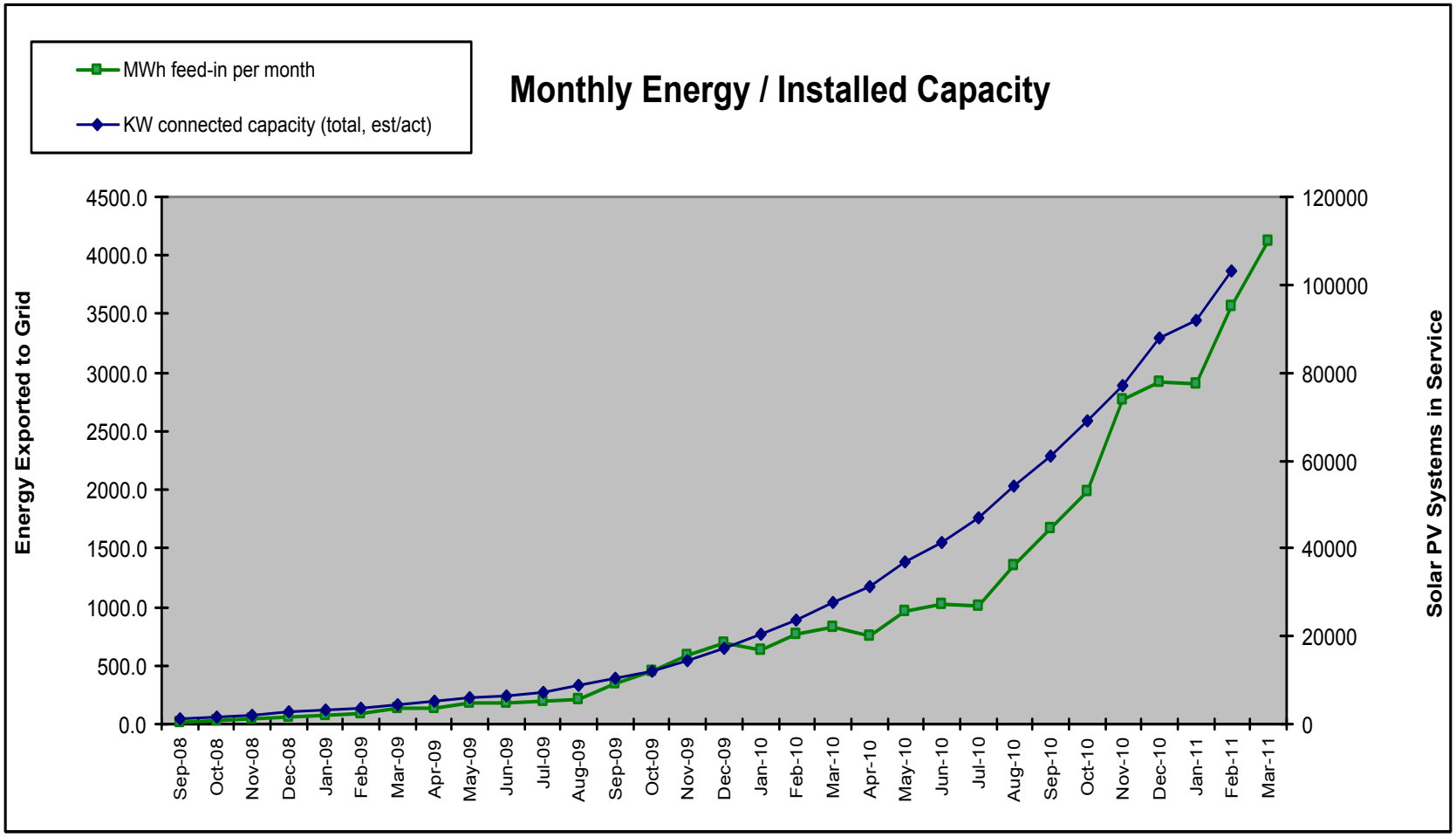
Thanks

- Bon voyage et bon courage!

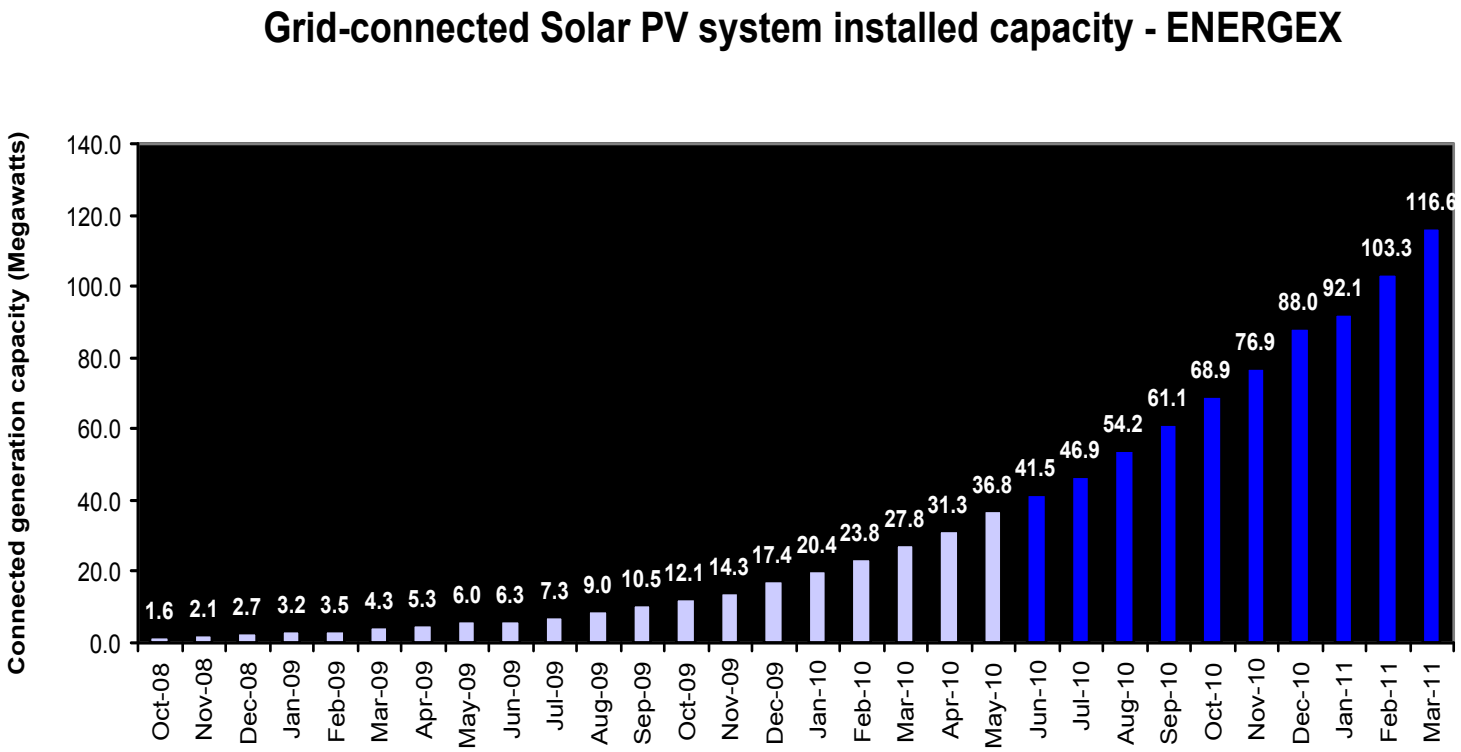
Closing thoughts

- 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



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