ofgem

Promoting choice and value for all gas and electricity customers

Innovation Incentives for Distribution Network Operators

Gareth Evans
Technical Directorate - Ofgem, UK
gareth.evans@ofgem.gov.uk

Innovation Incentives for Distribution Network Operators

- Ofgem – a brief introduction
- Distribution Companies in Great Britain
- Background to the IFI & RPZs
- Developing the initiatives
- Key points of the IFI
- Key points of RPZs
- The need for a Good Practice Guide

Ofgem – our primary responsibilities

Principal objective

- Ofgem is the regulator for Britain's gas and electricity markets – established by legislation

- Protecting customers is our first priority. We do this by:
  - **promoting competition** wherever appropriate, and
  - **regulating effectively** the monopoly companies which run the gas pipes and electricity wires

Other duties

- We have other priorities too. We:
  - help secure **Britain's energy supplies**
  - help energy markets and industry achieve **environmental improvements**, and
  - take account of the needs of **vulnerable customers**

A leading voice in Europe

Ofgem is a leading regulatory voice in Europe

- We are developing policies for an energy market which will bring:
  - **competitive prices, and**
  - **improved security of supply**

  for business and domestic customers
- We are also engaging on technical issues relating to electricity networks

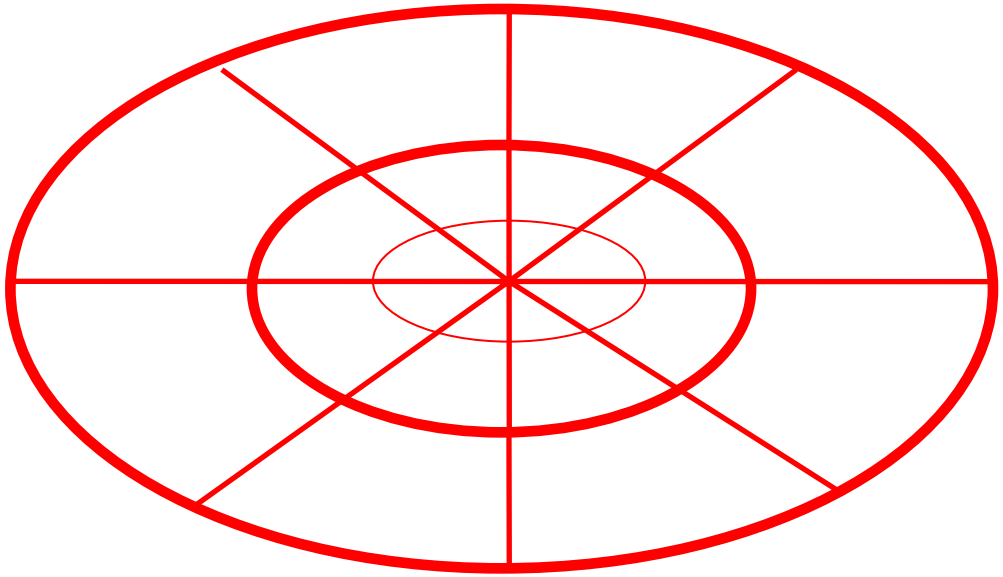
www.ofgem.gov.uk

ofgem

Promoting choice and value for all gas and electricity customers

Distribution Companies in Great Britain

Networks….

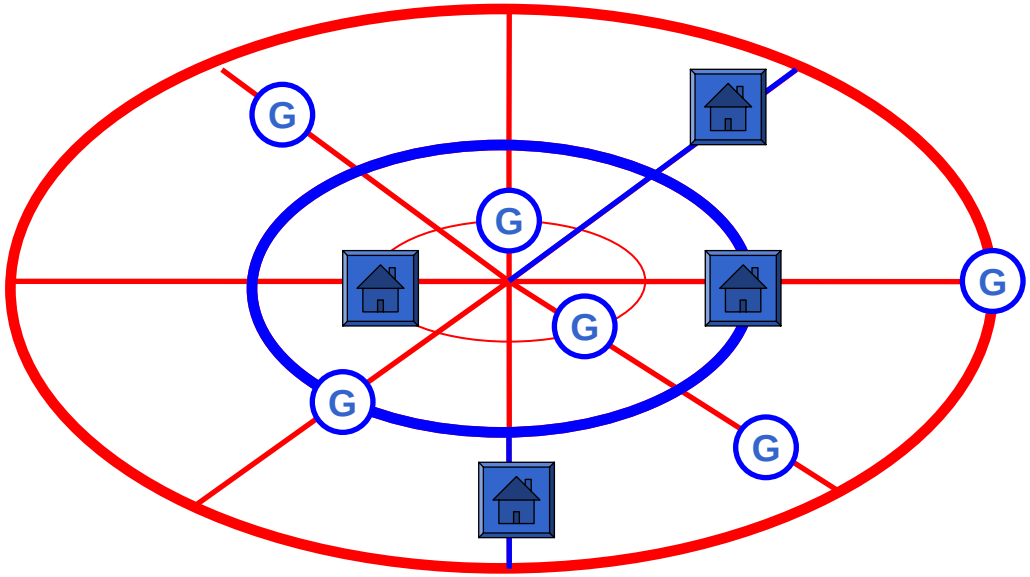


The unsung heroes…

…ignored until they constrain

…or cost too much

…and the challenges ahead

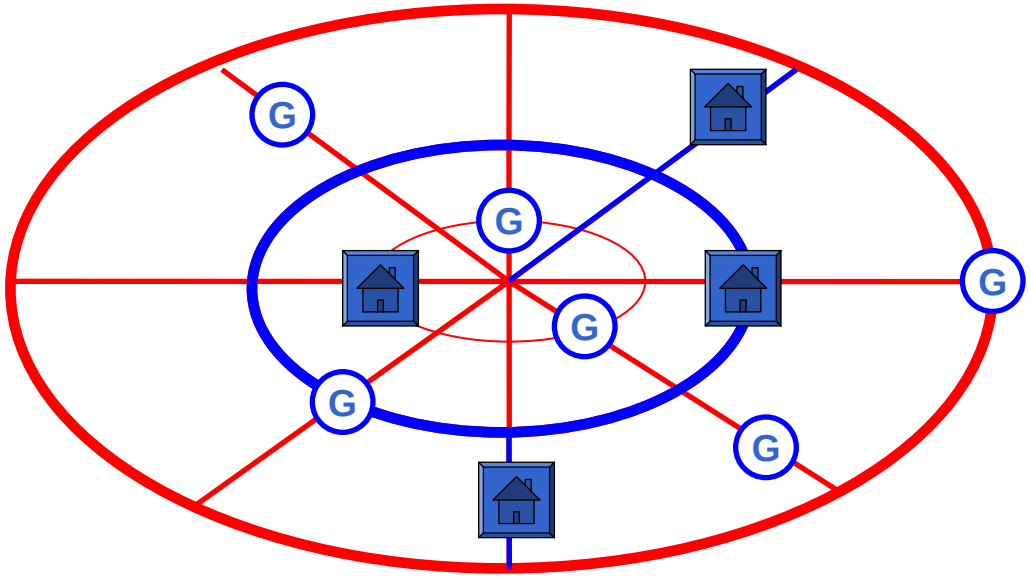


Maintain existing assets…

…renew assets efficiently

…facilitate DG & DSM

…and the challenges ahead



Critical role in facilitating a low carbon future

Network Regulation

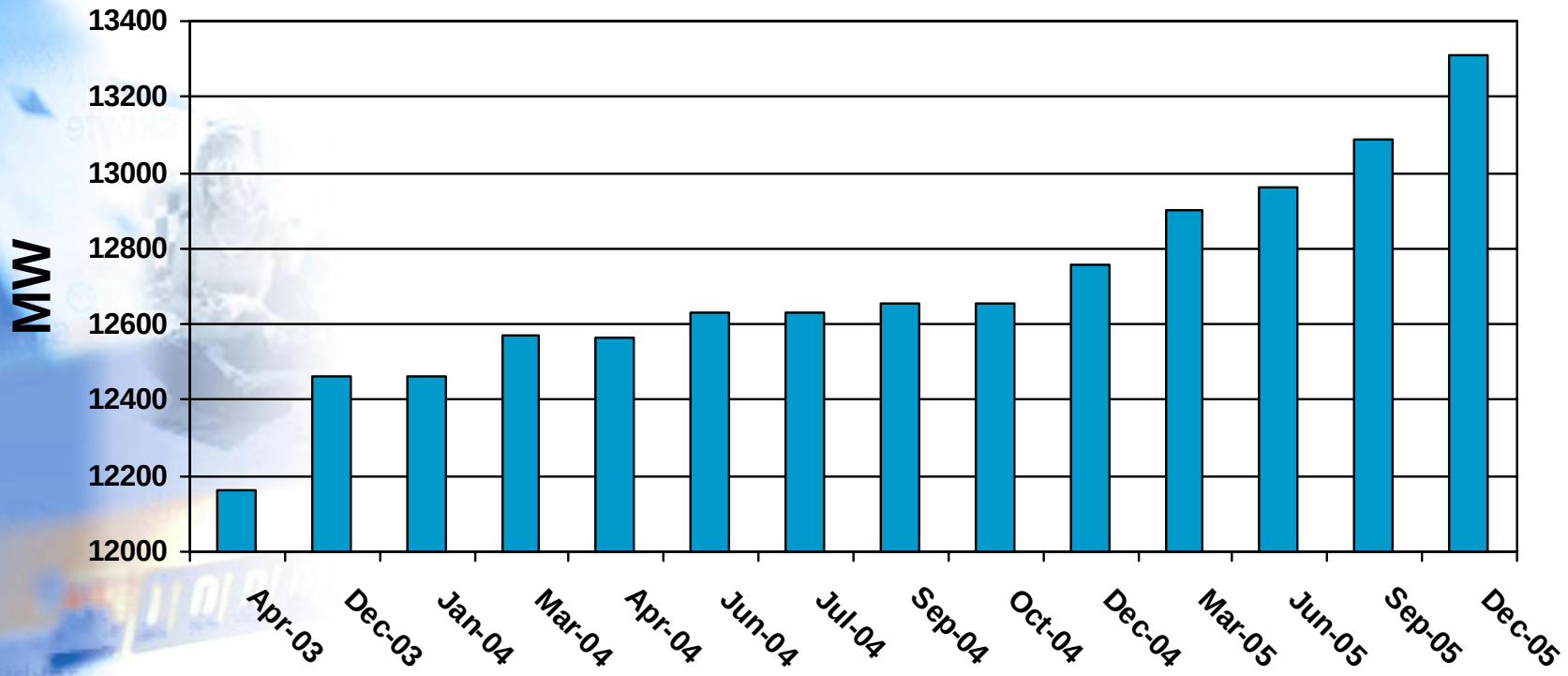
- 14 major distribution license holders, owned by 7 companies
- Price Control Review every 5 years
- The companies submit their plans for the coming 5 year period – capital investment and operating costs
- Ofgem considers these plans, with the companies, and forms a view about the efficient level of costs for each company
- This in turn sets the allowable revenue for each company for each of the five years
- The company sets its charges for the use of its system to generate the allowable revenue

Background to the IFI & RPZs

Background to the IFI & RPZs

- Work started on the 2005 distribution price control in 2003
- We identified with the companies that the growth of DG could have a major impact
- Concerned that innovation was suppressed and that this could cause costs to be higher than necessary

Installed DG Capacity
(Up to and including 132kV)



Source – ENA published data

New generating technologies

Sources: Capstone, Whispergen and Windsave

Registered Power Zones

A mechanism to encourage DNOs to develop and demonstrate new, more cost effective ways of connecting and operating generation that will deliver specific benefits to new distributed generators and broader benefits to consumers generally.

Innovation Funding Incentive

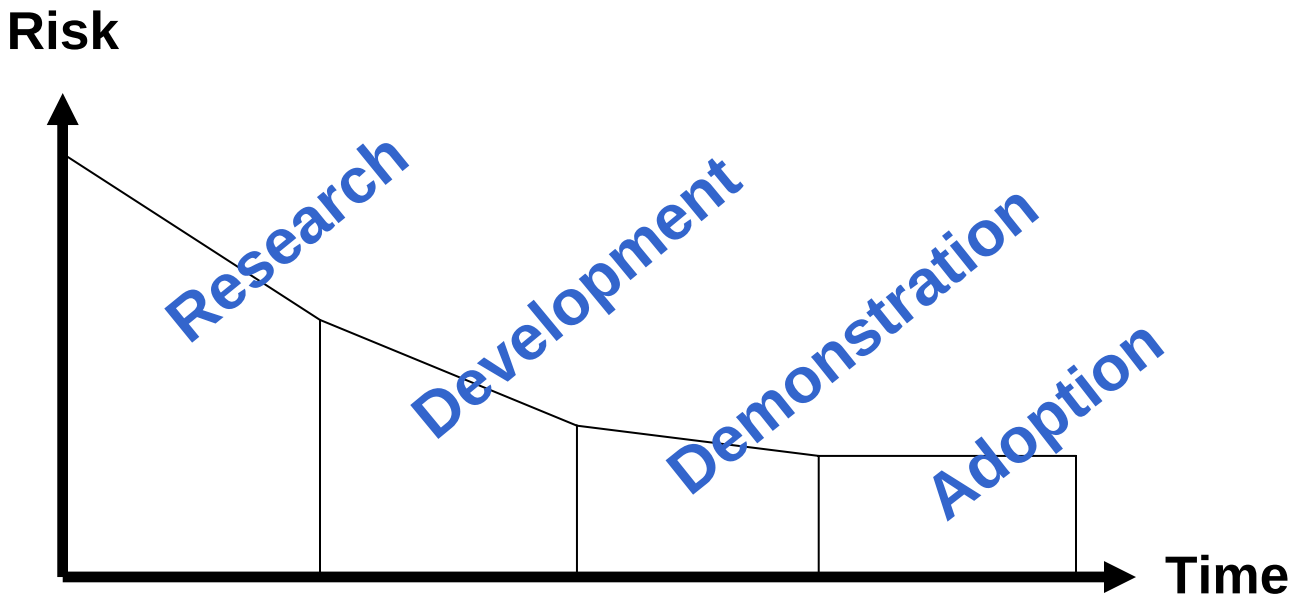
A mechanism to encourage DNOs to invest in appropriate R&D activities that focus on the technical aspects of network design, operation and maintenance. The principal objective of the IFI is to deliver benefits to consumers by enhancing network efficiency in operating costs and capital expenditure.

In summary…

Distribution companies are facing significant challenges and the IFI and RPZs are intended to help address them by encouraging innovation

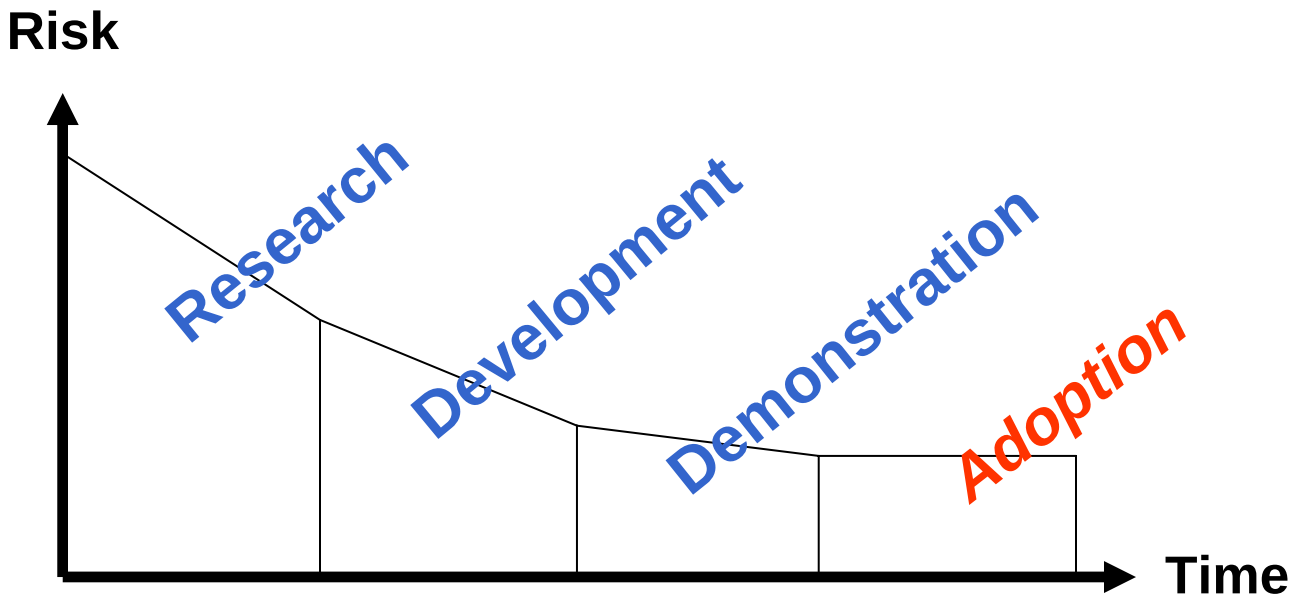
Developing the initiatives

The innovation process



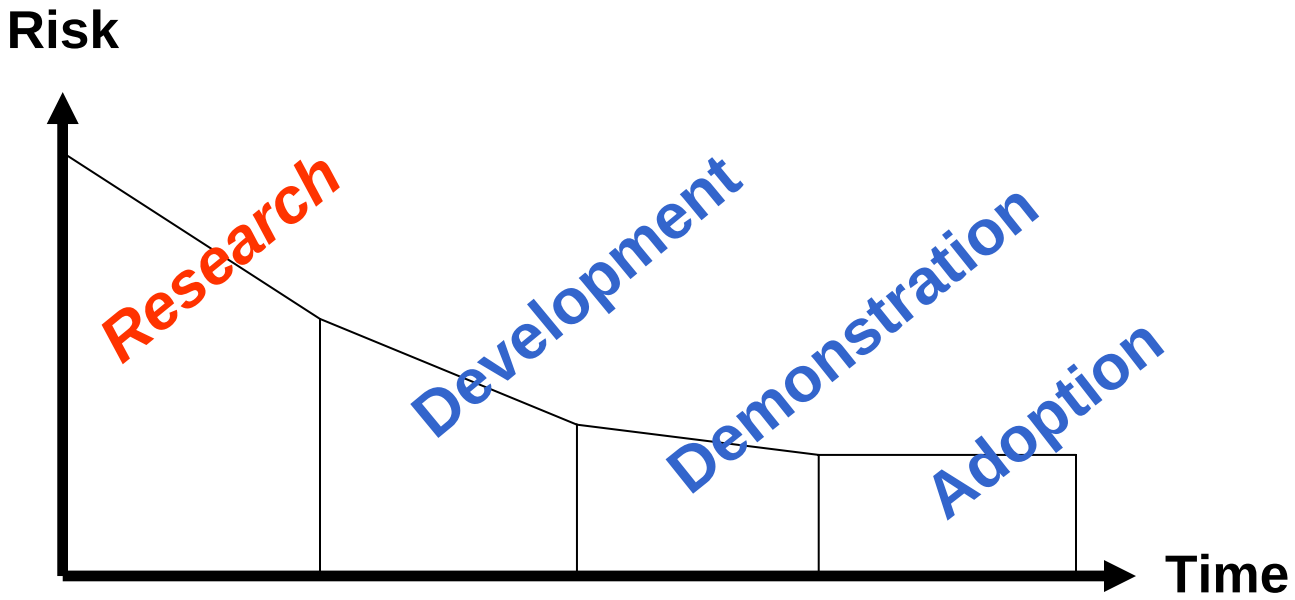
Multi-stage process to convert ideas to products/solutions

The innovation process



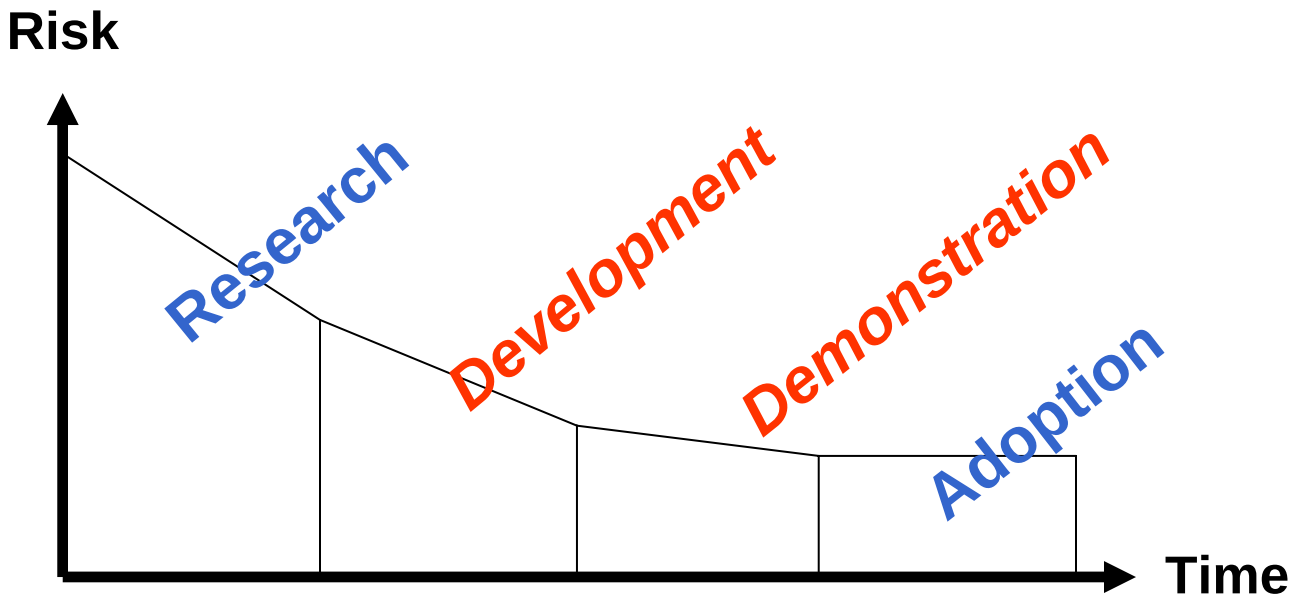
RPI – X & Capex
Treatment effective

The innovation process



Manufacturers and research community lead

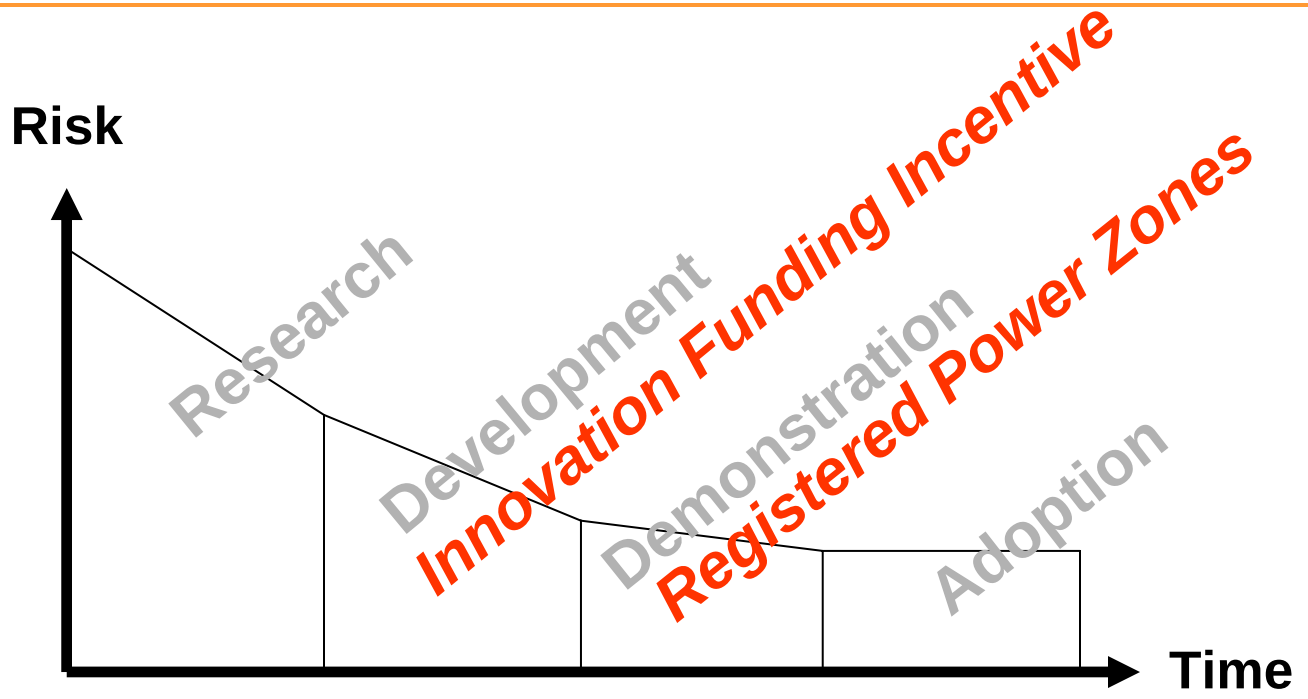
The innovation process



DNO involvement necessary here:

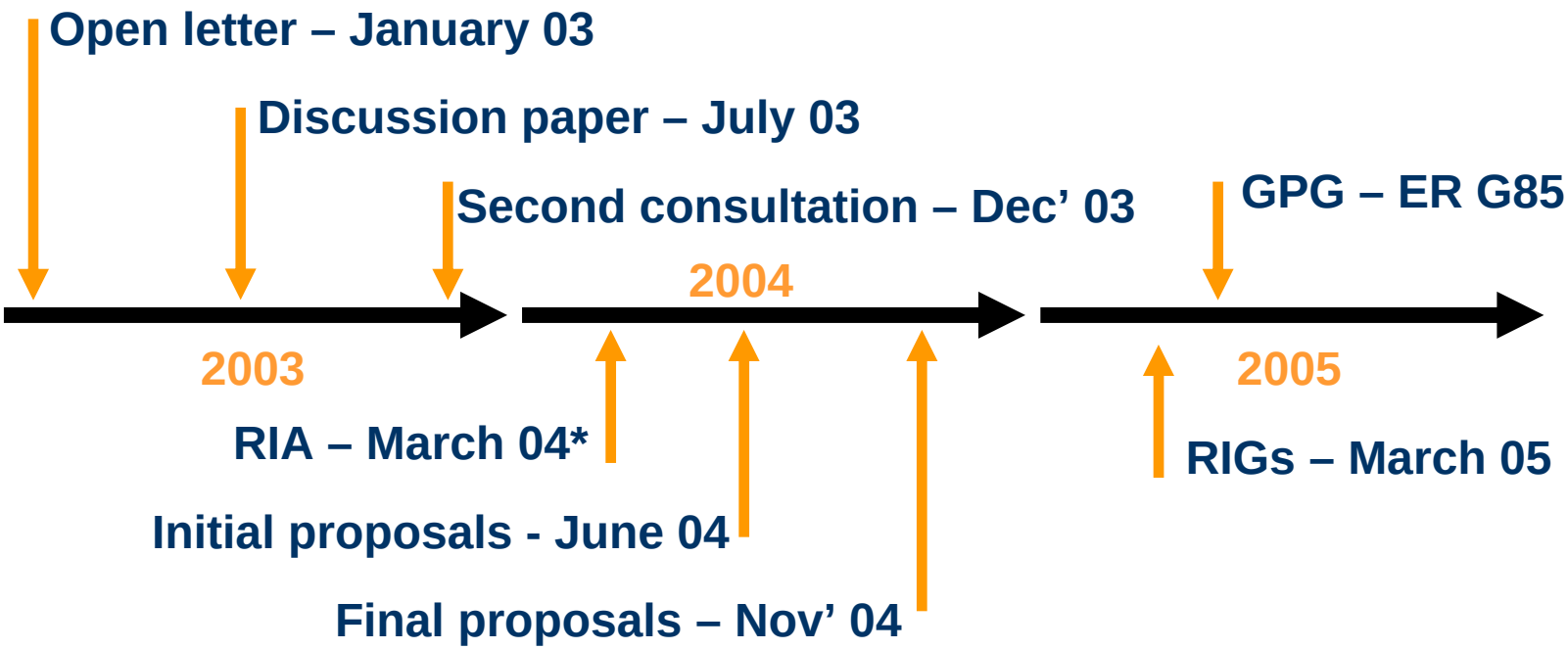
a distinguishing feature is the requirement for field testing and the inadequacy of laboratory simulations alone

The innovation process



IFI & RPZ – Targeted incentives for DNOs

Time line & key steps



*Mott McDonald/BPI Report published in April to support the RIA

Key points of the IFI

IFI - In Outline

- A '% of turnover' allowance for innovation – 0.5%
- 90% pass-through in Year 1 and 80% average pass-through over the 5 years
- Expenditure allowed on a 'use it or lose it' basis
- Good Practice Guide is a requirement
- Annual, open, reporting of activities to promote best practices

IFI – Eligible Projects

- To enhance the technical development of distribution networks
- Deliver benefit (e.g. – financial, supply security and quality, environmental, safety) to end consumers
- All aspects of distribution system asset management
- Project justification - costs will be exceeded by the benefits to customers
- This justification will be published in the IFI Annual Report of each participating DNO.

Defining “Technical”

"Being of a scientific and/or engineering nature and benefiting the design, construction, commissioning, operation, maintenance and decommissioning of the Primary plant and equipment employed in the distribution of electrical energy and/or of the secondary plant and equipment employed to control, protect and maintain such Primary plant and equipment"

IFI Project Initiation

- Ofgem not involved
- DNOs to initiate projects consistent with IFI criteria
- Ofgem believes that open reporting will ensure a high standard of project quality control
- Ofgem audit if/when necessary

Innovation Funding Incentive

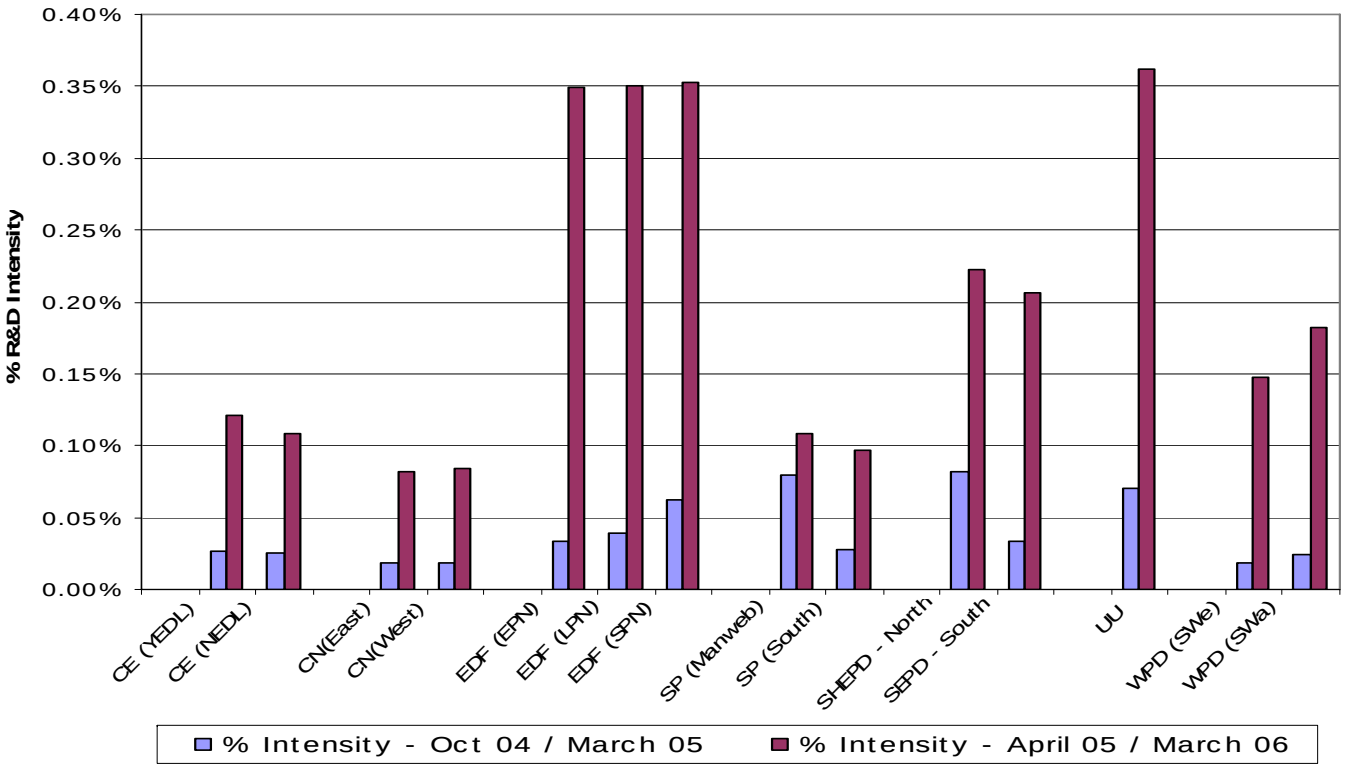
The se[illegible]nd [illegible]ts on their I[illegible] a[illegible]s

$30 million

Opportunity*

*Approximate total 05/06 IFI budget

DNO R&D Intensity



Key points of the RPZ

RPZ – In Outline

- Ofgem registers, but does not approve projects
- Hybrid £/kW incentive increased for RPZs for 5 years by £3/kW of new generation
- Returns increased to balance higher risks – no cap on individual project returns
- Cap of £0.5m per year per licensee to fund RPZ incentive
- Open reporting of RPZ projects to promote best practices

RPZ – Ofgem Guidance

- Ofgem Guidance Document published – April 05
- Explains the registration requirements and process
- Registration requirements
  - New/incremental generation
  - Must be eligible for the DG Incentive
  - Must demonstrate innovation
  - Must add value for DG customers
  - Generators must be informed
  - Compliance with the GPG

RPZ – Defining Innovation

- **Equipment** – genuinely new design/technology
- **System design/topology** – novel approach to system design, in particular to increase the utilisation of assets
- **System operation/control** – novel approaches to the operation and control of a distribution system (voltage, power flow, fault level) that facilitate the connection and operation of DG.
- **Supply continuity & quality** - the use of DG to enhance supply continuity and quality and/or offer a novel alternative to the use of traditional network reinforcement to meet licence standards.

Ofgem propose an advisory panel of independent specialists having R&D and Industrial experience who can be called upon to determine whether projects are genuinely innovative. Neither their role nor Ofgem's will be to approve the technical viability of projects.

RPZ – Degree of Innovation

- **Degree of Innovation –** defined in the GPG as having four levels
  - Incremental
  - Significant
  - Technological substitution
  - Radical
- **Significant innovation** – the minimum level of innovation required fro RPZ registration
  - e.g. New equipment, designs or processes that have not been previously explored, but which have the same fundamental purpose as existing equipment, designs or processes.

RPZ – Progress so far

- **RPZ 1** Central Networks – connection of wind generation using dynamic line rating technology
- **RPZ 2** Scottish & Southern Energy – connection of renewable generation on Orkney using active network management
- **RPZ 3** EDF Energy – connection of wind generation using novel voltage control technology

RPZ 1 – CN East Coast *

Connection Requirement

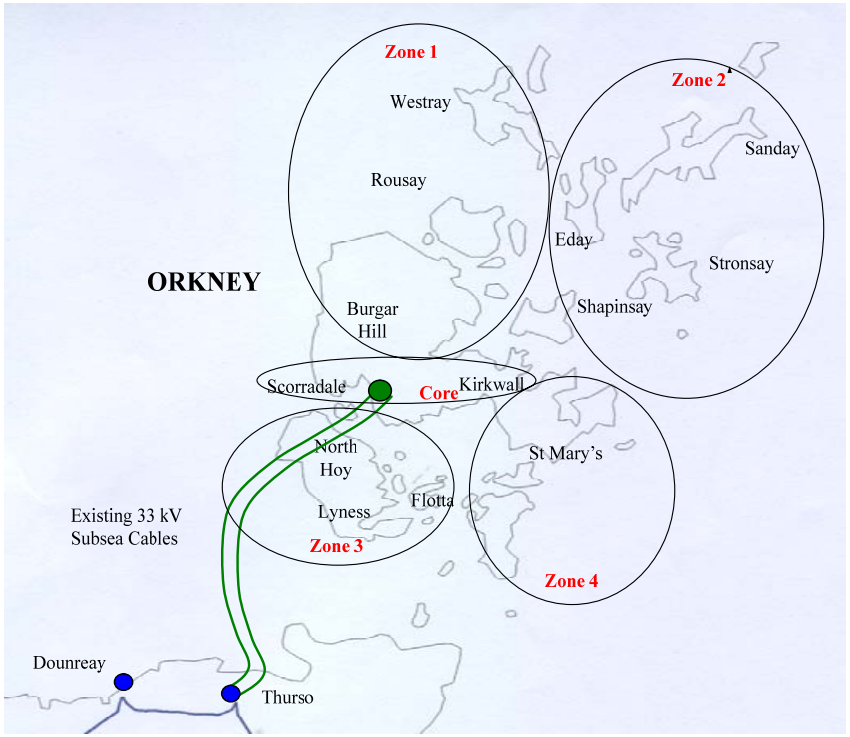
- 191 MW of wind generation connected/accepted within RPZ boundary
- Further four applications totalling 77.5 MW.....but remaining network capacity 35MW
- 132kV line reinforcement would cost £3 to £5 million

Technical Innovation

- Novel software application to provide
  - Active export control
  - Real time load measurement
  - Dynamic circuit ratings
- Dynamically optimises the thermal capacity of the network to increase the generation connection capacity
- Introduces contracted output constraints for the generators

* Information courtesy of Central Networks

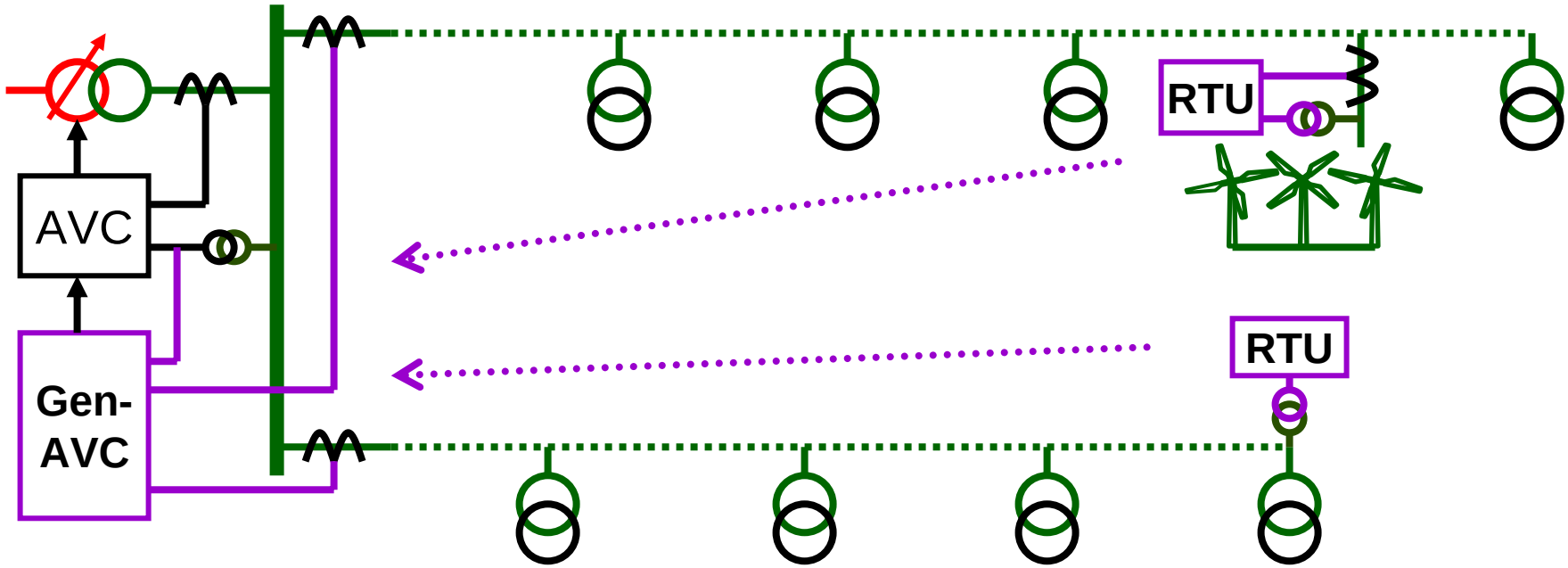
RPZ 2 – Active Network



Graphic courtesy of Scottish & Southern Energy

- Circuit power flow monitoring
- Intelligent responses identified
- Generator control actions initiated
- Responses monitored and acted on

RPZ 3 – Enhanced Voltage Control



Remote voltage measurements are sent to an intelligent voltage control device (GenAVC) that interfaces with a conventional AVC scheme (11kV network)

ofgem

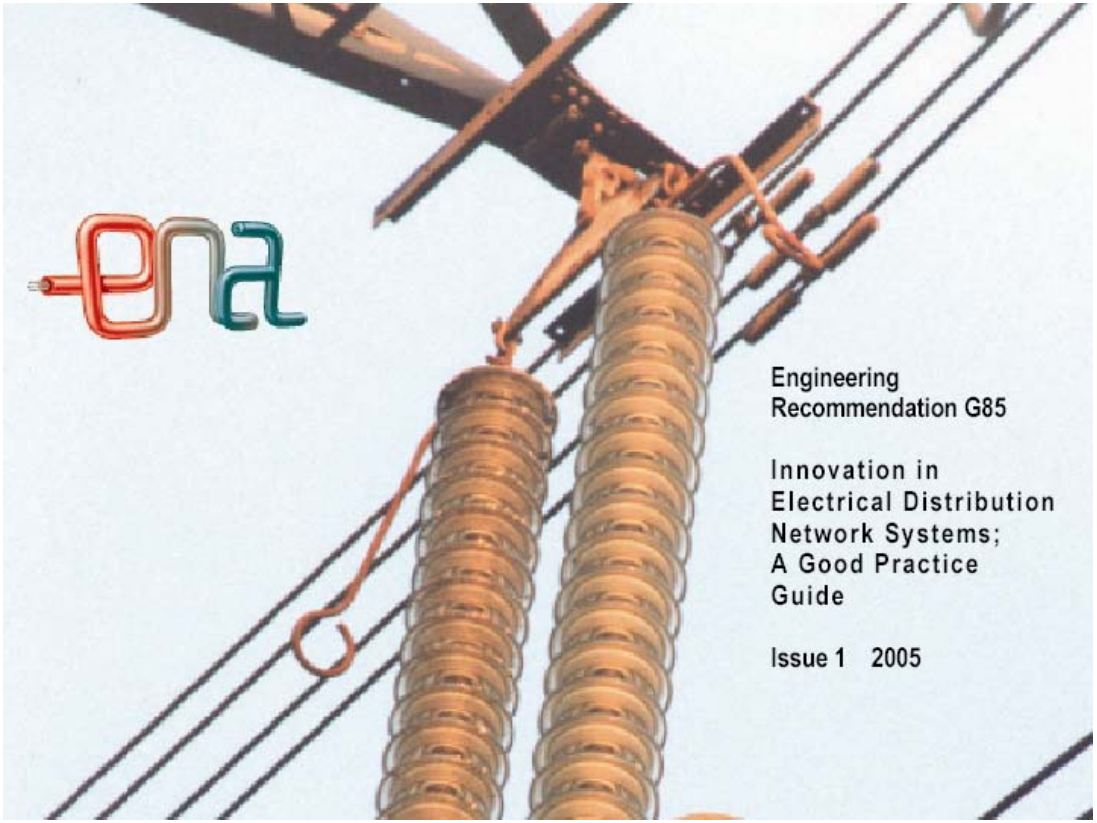
Promoting choice and value for all gas and electricity customers

The need for a Good Practice Guide

The need for the GPG

- A new ‘venture’ for the DNOs
- GPG primarily to ensure consistency of approach to
  - Protect customers – they are paying 80%
  - Provide additional guidance for DNOs – reducing the risk of non-compliance
  - Generally promote good practice
- Ofgem welcomes constructive co-operation that enhances benefits to customers

The Good Practice Guide



Concluding remarks

- We are not technology constrained
- We are constrained by the inertia in the asset base
- Revolution is not really an option but innovation is

The challenge is to achieve timely evolution of distribution systems so that they provide customers with the services they need efficiently and economically – IFI & RPZ are designed to help

ofgem

Promoting choice and value for all gas and electricity customers