Task XV
Fourth Experts Meeting

David Crossley
Operating Agent Task XV

22 to 24 March 2006
Country Energy
Port Macquarie, Australia

Agenda First Session

WEDNESDAY 22 MARCH

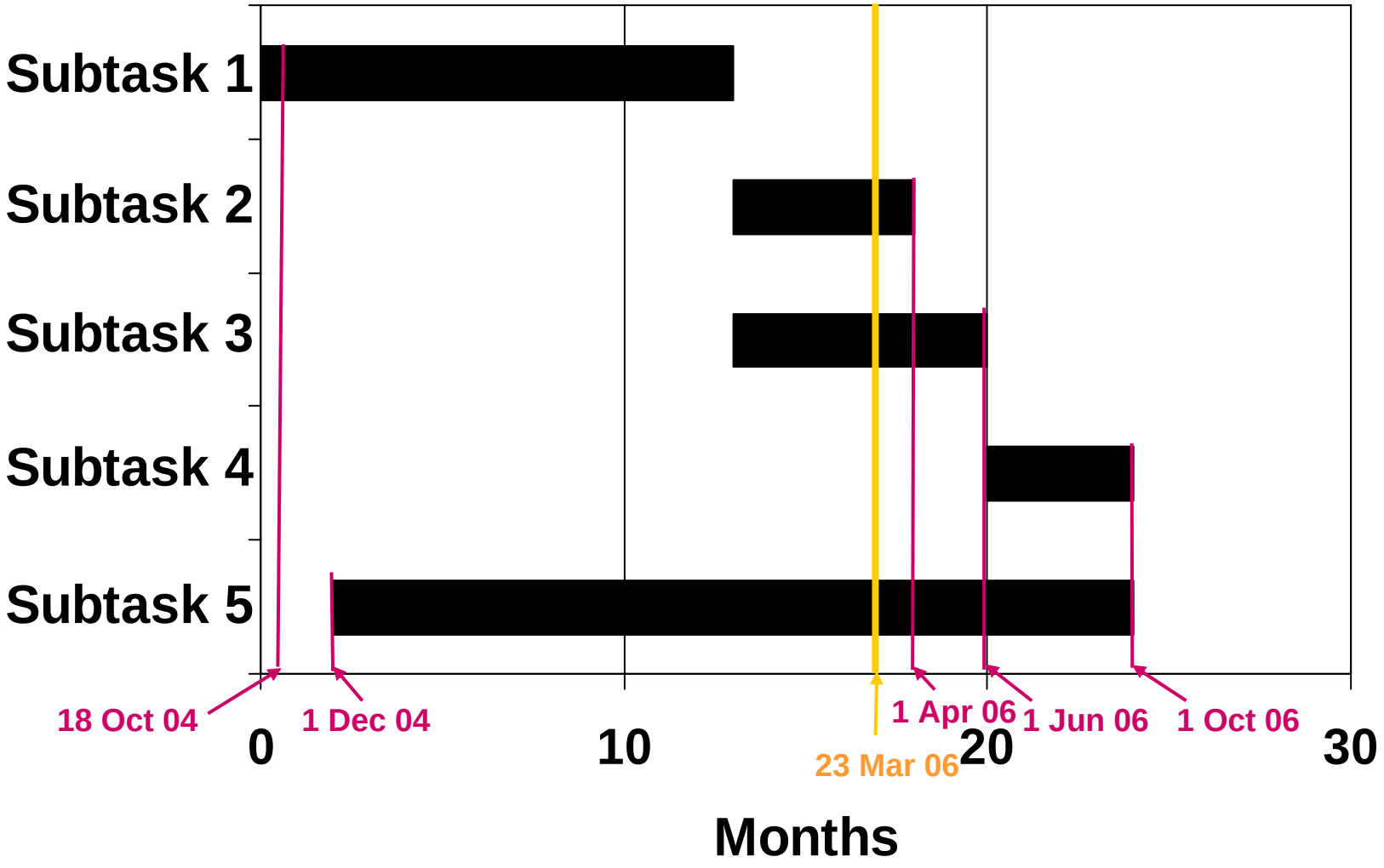
10.00 am	Welcome and local arrangements	Col Usher
10.15 am	Progress with the Task XV Work Plan as outlined in the Prospectus	David Crossley
10.30 am	Comments on progress with the Work Plan	Task Experts
10.45 am	Subtask 2, Activity 2-1: Value proposition for network-driven DSM: – Introduction	David Crossley
11.00 am	Refreshment break	
11.30 am	Estimates of the value of network-driven DSM projects implemented by Task XV participants (Part 1)	Task Experts
12.30 pm	Lunch	

Progress with the Task XV Work Plan

Task XV Work Plan

- Subtask 1: Worldwide Survey of Network-Driven DSM Activities
- Subtask 2: Assessment and Development of Network-Driven DSM Measures
- Subtask 3: Incorporation of DSM Measures into Network Planning
- Subtask 4: Evaluation and Acquisition of Network-Driven DSM Resources
- Subtask 5: Communication of Information About Network-Driven DSM

Task XV Timetable



Subtask 2 Network-Driven DSM Measures

Objective

- To further develop the identified network-driven DSM measures so that they will be successful in cost effectively achieving network-related objectives

Deliverable

- A report listing and summarising successful network-driven DSM measures and the specific network problems they address

Subtask 2 Network-Driven DSM Measures

- Activity 2-1: Value Proposition for Network-Driven DSM
- Activity 2-2: Effectiveness of Network-Driven DSM Measures
- Activity 2-3: Further Development of Network-Driven DSM Measures

Value Proposition for Network-driven DSM – Introduction

Activity 2-1: Value Proposition

- Activity 2-1 draws on work undertaken in another Task of the IEA DSM Programme: Task XIII on Demand Response Resources
- The Task XIII work is used to identify the value propositions for network-driven DSM measures, including the specific network problems which these measures can successfully address

Types of DSM Measures

1. Distributed Generation
2. Energy Efficiency
3. Fuel Substitution
4. Integrated DSM
5. Load Management: Load Shifting
6. Load Management: Direct Load Control
7. Load Management: Interruptibility
8. Load Management: Demand Response
9. Power Factor Correction
10. Pricing Initiatives

Purpose of Network DSM

- Network-driven DSM projects aim to achieve peak load reductions with various response times:
  - to relieve network constraints; and/or
  - to provide network operational services

Network Constraints (1)

- Network constraints have a time-related dimension because they may be:
  - peak related – occurring strongly at the system peak and lasting seconds, minutes or a couple of hours; or
  - non-peak related – less strongly related to the system peak, occurring generally across the electrical load curve and lasting several hours, days, months, years or indefinitely

Network Constraints (2)

- Network constraints also have a geographically-related dimension because they can occur:
  - generally across the network in a particular geographical area; or
  - specifically associated with particular network elements such as certain lines or substations

Network Constraints (3)

- To be effective in relieving network constraints, DSM activities must address both:
  - time-related and
  - geographically-related

  dimensions of network constraints

Network Operational Services (1)

- DSM measures have the potential to contribute to a range of network operational services, including:
  - voltage regulation
  - load following
  - active/reactive power balancing
  - frequency response
  - supplemental reserve
  - spinning reserve
- In addition, power factor correction may be regarded as a DSM measure

Network Operational Services (2)

- A critical requirement of network operational services is that they must be available:
  - for precisely the required time period
  - in sufficient quantity to achieve the operational objective (can be a forecasting problem for the system operator)

Benefits of Network-driven DSM

- Two types of possible benefits may be provided by network-driven DSM:
  - benefits that accrue to a particular stakeholder; and
  - market-wide benefits

Benefits to Stakeholders (1)

- For **network service providers (NSPs)**, there are two main benefits:
  - reduced network operating and maintenance costs; and
  - deferred or reduced capital costs for network augmentation.
- For **independent system operators (ISOs)**, the main benefit from implementing network-driven DSM measures is improved system reliability at a lower cost than other measures
- **Third party aggregators**, who manage and aggregate the provision of load reductions and demand response by individual end-users, receive direct payments from NSPs or ISOs

Benefits to Stakeholders (2)

- **End-users of electricity**, particularly those located in network-constrained areas, may benefit from:
  - increased network reliability
  - lower network use of system charges than would be the case without network-driven DSM
  - increased choice about how their energy services needs are met
  - a possible increase in the variety and number of customer services available
  - payments from NSPs, ISOs or third party aggregators

Market-Wide Benefits (1)

Economic Benefits

- Reduction in the average price of electricity in the spot market
- Reduced costs of electricity in bilateral transactions (over a 5 to 10 year period)
- Reduced hedging costs, eg reduced cost of financial options

Reliability Benefits

- Insurance value – lowered costs of extreme events, (ie low-probability/high-consequence events)
- Real option values – added flexibility to address future events
- Portfolio benefits – increase in resource diversity

Market-Wide Benefits (2)

Market Operation Benefits

- Reduced market power (situational and behavioural)
- Improved overall market efficiency from better interaction of demand and supply

Environmental Benefits

- Implementation of network-driven DSM measures may lead to more efficient use of resources across the whole market

Distribution of Benefits (1)

- Benefits from network-driven DSM may be received by one or more of a number of different stakeholders, including:
  - independent system operators
  - electricity network service providers
  - third party load reduction and demand response aggregators
  - end-users of electricity
  - generally, all electricity market participants

Distribution of Benefits (2)

- The distribution of the benefits from network-driven DSM among many different stakeholders means that an individual proponent of a network-driven DSM project is unlikely to capture all the benefits from the project
- This makes it difficult to develop a value proposition for particular network-driven DSM project that will be attractive for a prospective proponent
- To provide significant value to the project proponent, the total benefits from the project must be quite large and the proponent must be able capture a significant proportion of these benefits

Costs of Network-driven DSM (1)

- Costs of network-driven DSM projects may be borne by a number of different stakeholders, including:
  - the proponent of the network-driven DSM project
  - end-user participants in the project
  - electricity retailers
  - electricity market participants generally

Costs of Network-driven DSM (2)

Project Proponent

- The proponent of a network-driven DSM project usually bears all the direct costs of project implementation, comprising:
  - costs of setting up the project; and
  - annual operating costs

Costs of Network-driven DSM (3)

End-user Participants

- End-user participants may bear a range of direct costs associated with participating in a network-driven DSM project. Such costs may include:
  - O&M costs involved in reducing load at specific times and/or in particular locations
  - costs of reducing or altering the timing of production (including lost production, penalty shift rates etc)
  - costs of installing and/or operating on-site generation
  - costs of purchasing and installing direct load control equipment (if not paid for by the project proponent)
  - costs of installing power factor correction equipment (if not paid for by the project proponent)

Costs of Network-driven DSM (4)

Electricity Retailers

- An electricity retailer bears the cost of any reduction in the consumption of electricity resulting from the implementation of network-driven DSM projects
- Should electricity retailers be compensated for so-called "foregone revenue" resulting from DSM activities?
- There are difficulties in estimating the level of foregone revenue resulting from a DSM project and even questions about whether "foregone revenue" is a valid concept
- The problem is less acute where an electricity retailing business is combined with a network service provider
- The issue of foregone revenue can be acute in entities which comprise only an electricity retailing business

Costs of Network-driven DSM (5)

Electricity Market Participants

- Both the implementation costs of a network-driven DSM project and the resulting cost savings have to be allocated among the project proponent's customers, ie electricity market participants
- The equitable allocation among electricity market participants of the implementation costs and cost savings relating to network-driven DSM projects has the potential to be as highly contentious as the allocation of the costs of utility-implemented DSM programs in the United States in the 1980s and early 1990s

Measuring the Value of Network-driven DSM

- Three types of methodologies are available to to measure the value of network-driven DSM projects:
  - benchmark assessments
  - benefit-cost framework methodologies; and
  - cost-effectiveness framework methodologies based on reliability benefits

Estimates of the Value of Network-driven DSM Projects (Part 1)

Agenda Second Session

WEDNESDAY 22 MARCH

1.30 pm	Estimates of the value of network driven DSM projects implemented by Task XV participants (Part 2)	Task Experts
2.30 pm	Subtask 2, Activity 2-2: Effectiveness of network-driven DSM measures: – Introduction	David Crossley
3.00 pm	Refreshment break	
3.30 pm	Analysis of the effectiveness of network driven DSM projects implemented by Task XV participants	Task Experts
5.00 pm	Finish for the day	

Estimates of the Value of Network-driven DSM Projects (Part 2)

Subtask 2 Network-Driven DSM Measures

- Activity 2-1: Value Proposition for Network-Driven DSM
- Activity 2-2: Effectiveness of Network-Driven DSM Measures
- Activity 2-3: Further Development of Network-Driven DSM Measures

Effectiveness of Network-driven DSM Measures – Introduction

Activity 2-2: Effectiveness

- Activity 2-2 of Subtask 2 analyses the information contained in the Task XV case study database of network-driven DSM projects to determine the factors which result in a DSM measure being successful in cost-effectively achieving network-related objectives

Types of DSM Measures

1. Distributed Generation
2. Energy Efficiency
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Success Factors for Network-driven DSM

- Two types of factors may contribute to the success of network-driven DSM projects:
  - external factors that establish the context within which a network-driven DSM project operates; and
  - internal factors that are specific to each individual project and determine how the project is implemented

External Success Factors (1)

- From the Task XV case study database, it is possible to identify seven types of external success factors that may directly contribute to the success of network-driven DSM projects:
  - government policies
  - regulatory regime
  - market structure
  - commitment by project proponent
  - technology availability
  - commercial considerations; and
  - public relations benefits

External Success Factors (2)

Government Policies

- Government policies can contribute to the success of network-driven DSM projects in two ways:
  - they can create a favourable context in which network-driven DSM projects are seen as viable alternatives to supply-side options; and/or
  - they can impose obligations requiring the use of network-driven DSM projects instead of supply-side options

External Success Factors (3)

Regulatory Regimes

- Regulatory regimes act in a similar way to government policies in contributing to the success of network-driven DSM projects:
  - they can create a favourable context in which network-driven DSM projects are seen as viable alternatives to supply-side options; and/or
  - they can impose obligations requiring the use of network-driven DSM projects instead of supply-side options

External Success Factors (4)

Market Structure

- Network-driven DSM measures may be closely linked to the structure of the electricity market
- Typically, such measures aim to influence the behaviour of end-users
- There are two types of these measures:
  - measures that provide market-linked incentives to end-users;
  - measures that impose market-linked penalties on end-users.

External Success Factors (5)

Commitment by Project Proponent

- Because network-driven DSM is not the usual or generally accepted way in which network problems are resolved, strong commitment by the project proponent is usually important in most network-driven DSM projects
- Commitment by the project proponent is particularly important:
  - where distributed generation is used as an alternative to network augmentation
  - in integrated network-driven DSM projects; and
  - in most load management projects

External Success Factors (6)

Technology Availability

- The availability of a particular type of technology is crucial to the success of some network-driven DSM projects; indeed, some projects are designed specifically to take advantage of a particular type of technology
- Direct load control and demand response projects require specific types of technology to enable:
  - remote communication with, and control of, appliances and equipment; and
  - near real-time monitoring of the load reductions achieved
- The availability of a particular type of technology is also crucial for:
  - distributed generation projects
  - fuel substitution projects; and
  - some projects employing time of use pricing

External Success Factors (7)

Commercial Considerations

- Most network-driven DSM projects are justified on the basis that they are more cost-effective than supply-side options
- For some specific projects, commercial considerations are the most important success factor
- This is particularly the case where DSM measures are used to defer proposed network augmentations; in these types of projects, the main justification for implementing network-driven DSM measures is that they are more cost-effective than the network augmentation “build” option
- Commercial considerations are also important in projects where DSM measures are used to target peak load reductions generally on the network

External Success Factors (8)

Public Relations Benefits

- In some cases, achieving public relations benefits for the project proponent is a major success factor for a network-driven DSM project
- Public relations benefits may include:
  - increased customer loyalty
  - increased credibility for the project proponent; and
  - improved relations with governments and/or regulators
- There is no particular type of project for which public relations benefits are always a success factor, though public relations issues tend to be important in projects that require participation by large numbers of end-users

Internal Success Factors (1)

- Seven types of internal success factors can be identified from the Task XV case study database:
  - project objectives
  - target market
  - demand-side measures used
  - market barriers addressed
  - outreach and marketing
  - participation process and customer service; and
  - delivery mechanisms

Internal Success Factors (2)

Project Objectives

- Defining the project objectives is a fundamental first step in designing a network-driven DSM project
- For many projects, the clarity with which the project objectives are defined determines whether or not the project is successful
- The way in which the objectives for a project are defined often drives the design of the project and the selection of the individual project components
- Project objectives are important success factors for all network-driven DSM projects, especially for:
  - integrated DSM projects
  - many load management projects; and
  - pricing initiatives

Internal Success Factors (3)

Target Market

- For a network-driven DSM project to be successful, the target market chosen for the project should be directly related to achieving the project objectives
- Frequently, the target market will comprise a mix of end-use customers, market intermediaries and trade allies (such as appliance and equipment suppliers), each of whom has the ability to make a small contribution to achieving the project's objectives
- The mix of participants in a target market often plays a role in the cost-effectiveness of network-driven DSM projects
- The target market is an important success factor in all types of network-driven DSM projects, with the exception of distributed generation

Internal Success Factors (4)

Demand-side Measures Used

- The specific demand-side measures used in the project is a crucial success factor for all network-driven DSM projects
- For a project to be successful, the demand-side measures must be:
  - capable of achieving the objective set for the project; and
  - targeted at the project target market
- Consequently, the selection of the demand-side measures to be used in a project is primarily driven by the project objective and the project target market.
- A third major driver is the cost of each demand-side measure, including the cost of any equipment involved and installation and maintenance costs

Internal Success Factors (5)

Barriers Addressed

- The underlying objective for all network-driven DSM projects (with the exception of distributed generation projects) is to change the the behaviour of energy end-users
- This change can usually be achieved most effectively if the specific factors preventing the change ("barriers") can be identified and action taken to overcome these barriers
- Frequently, this will involve providing incentives to encourage the desired behaviour change or disincentives to discourage undesirable behaviour
- To a greater or lesser extent, most network-driven DSM projects are explicitly or implicitly designed to overcome barriers
- Usually, the most successful network-driven DSM projects are those that clearly identify the relevant barriers and implement actions that are targeted to directly overcome those barriers

Internal Success Factors (6)

Outreach and Marketing

- Outreach and marketing is an important success factor in those network-driven DSM projects where achieving the project objectives involves encouraging a large number of small end-use customers to change their energy using behaviour
- Outreach and marketing is important in:
  - energy efficiency projects
  - integrated DSM projects; and
  - pricing initiatives

Internal Success Factors (7)

Participation Process and Customer Service

- Participation process and customer service comprises the procedures, forms, communications, and other interactions that occur among participants in a network DSM project and the project proponent and project implementers
- Participation process and customer service can both be critically important success factors for some types of projects, particularly those projects involving interactions with a large number of electricity end-users, including:
  - most integrated DSM projects
  - pricing initiatives; and
  - some load management projects

Internal Success Factors (8)

Delivery Mechanisms

- The delivery mechanism of a network-driven DSM project comprises the actual means whereby the end-users' electricity-related behaviour is changed
- Delivery mechanisms are very varied and may include:
  - the provision of targeted information and/or financial incentives; and
  - the physical installation of hardware
- The effectiveness of delivery mechanisms is an important success factor for projects that involve:
  - advanced metering and direct load control
  - the payment of a financial incentive to reward changed end-user behaviour
  - the provision of information

Analysis of the Effectiveness of Network-driven DSM Projects

Agenda Third Session

THURSDAY 23 MARCH

9.00 am	Presentation on the Bonneville Power Authority 'non-wires solutions" pilot project	Terry Oliver
10.00 am	Discussion on the BPA pilot project	All
10.30 am	Refreshment break	
11.00 am	Subtask 2, Activity 2-3: Further development of network-driven DSM measures: – Introduction	David Crossley
11.30 am	Discussion on further development of network-driven DSM measures (Part 1)	All
12 noon	Commencement of Country Energy Seminar on Network-Driven DSM (Lunch)	

Subtask 2 Network-Driven DSM Measures

- Activity 2-1: Value Proposition for Network-Driven DSM
- Activity 2-2: Effectiveness of Network-Driven DSM Measures
- Activity 2-3: Further Development of Network-Driven DSM Measures

Further Development of Network-driven DSM Measures – Introduction

Activity 2-3: Further Development

- Activity 2-3 of Subtask 2 will further develop the network-driven DSM measures to improve their effectiveness in achieving network-related objectives
- The result of this development process will be a concise description of each measure, a list of the network problems it can address, and details about how the measure should be implemented for it to be most effective

Types of DSM Measures

1. Distributed Generation
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8. Load Management: Demand Response
9. Power Factor Correction
10. Pricing Initiatives

Further Development of Network-driven DSM Measures (Part 1)

Agenda Fourth Session

FRIDAY 24 MARCH

9.00 am	Discussion on further development of network-driven DSM measures (Part 2)	All
10.30 am	Refreshment break	
11.00 am	Subtask 3: Incorporation of DSM Measures into Network Planning – Introduction	David Crossley
11.30 am	Discussion on how to proceed with Subtask 3	All
12.30 pm	Finish of Experts Meeting	

Further Development of Network-driven DSM Measures (Part 2)

Incorporation of DSM Measures into Network Planning - Introduction

Task XV Work Plan

- Subtask 1: Worldwide Survey of Network-Driven DSM Activities
- Subtask 2: Assessment and Development of Network-Driven DSM Measures
- Subtask 3: Incorporation of DSM Measures into Network Planning
- Subtask 4: Evaluation and Acquisition of Network-Driven DSM Resources
- Subtask 5: Communication of Information About Network-Driven DSM

Subtask 3 DSM and Network Planning

Objective

- To investigate how existing network planning processes can be modified to incorporate the development and operation of DSM measures over the medium and long term

Deliverable

- A report on ways in which network planning processes can be modified to incorporate DSM measures as alternatives to network augmentation

Subtask 3 DSM and Network Planning

- Activity 3-1: Interaction between Network-Driven DSM, Electricity Markets and Regulatory Regimes
- Activity 3-2: Identification of Network Planning Processes
- Activity 3-3: Options for Modifying Network Planning Processes

How to Proceed with Subtask 3

NSW Code of Practice for Distributors (1)

- In the State of New South Wales, Australia, the Code of Practice *Demand Management for Electricity Distributors* was developed by an industry working group managed by the State Government's Department of Energy
- The purpose of this *Code* is to prescribe a methodology for the market-based development of options for supporting the electricity network (including DSM, embedded generation and storage options) and their evaluation at the same time and in the same manner as investments in network augmentation (ie building "poles and wires")
- Options may be identified by electricity customers or third parties, or by the electricity distributor itself
- Option evaluation is carried out by means of a competitive process

NSW Code of Practice for Distributors (2)

- The planning process specified in the *Code* comprises the following elements:
  - a process for informing the market by disclosing appropriate information about the current and future state of the electricity network
  - a process for fully and consistently specifying any constraints in the network
  - a process for fairly and consistently evaluating proposals to overcome these constraints
- The *Code* contains detailed protocols specifying how each of these processes should be carried out

NSW Code of Practice for Distributors (3)

- Each electricity distributor is required publish an annual *Electricity System Development Review* and to develop generic support options for the electricity network
- The distributor is then required to disclose information relating to specific forecast network constraints; and to consult with customers and other interested parties in relation to these constraints
- If appropriate (as defined by a "Reasonableness Test") the distributor is required to issue a Request for Proposals (RFP) for network support, including detailed information on the support required
- Organisations which could provide network support then make proposals in response to the RFP

NSW Code of Practice for Distributors (4)

- Typical proposals may include:
  - the owner of a generator in an office building or factory offering to run the generator during times of system peak on the electricity network
  - an energy service company offering to implement energy efficiency measures at customers' premises in the location where network support is required
  - an owner of a large manufacturing facility offering to reschedule their production process so as to be able to turn off their equipment during peak times
  - a proponent offering a distributed generation solution

NSW Code of Practice for Distributors (5)

- Each of the proposals includes a price which the proponent requires to be able to provide the offered network support
- The distributor evaluates the proposals and then determines a preferred option
- The distributor and the proponent then negotiate about implementing the proponent's proposal