

Annual National Transmission Statement

1. Introduction

1.1 Purpose of ANTS

The purpose of the Annual National Transmission Statement (ANTS) is to provide an integrated overview of the current state and potential future development of major national transmission flow paths. This would include:

- forecasts of future constraints affecting the major national transmission flow paths;
- information on the nature, costs, scope, impacts and potential timing of augmentation proposals and identified in the individual Transmission Network Service Provider (TNSP) Annual Planning Reports (APR) and the ANTS review that relate to major national transmission flow paths.

The ANTS will synthesise and build on existing network planning information from existing sources into a single transmission statement which:

- details the major national transmission flow paths;
- forecasts inter-connector constraints; and
- identifies options to relieve these constraints.

1.2 Relationship to other reviews

1.2.1 Statement of opportunities

ANTS will be:

- Incorporated into the Statement of Opportunities (SOO);
- Complementary to supply-demand balance component of the SOO:
 - supply-demand outlook is developed from energy and supply projections
 - ANTS gives transmission network performance and outlook for transmission network

ANTS uses same criteria for identifying committed and advanced projects as is used in the SOO

1.2.2 Annual planning reports

- Jurisdictional intra-regional supply reliability and other transmission flow paths handled by Annual Planning Reports (APR)
- Carried out by jurisdictional planning bodies (JPBs)
- Demand forecasts used in the ANTS are to take into account APR projections
- ANTS to coordinate major national transmission flow path scenarios with known transmission augmentations identified in APRs

1.2.3 Annual interconnector review¹

- Annual interconnector review (AIR) to be replaced by ANTS.
- Until Code change process complete, the ANTS will incorporate the AIR and the AIR will in effect be one scenario of the ANTS.

2. Scope of ANTS

2.1 Major national transmission flow paths

“Major national transmission flow” path means those elements of the transmission networks used to transport significant amounts of electricity between generation centres and major load centres. ANTS will:

- Define criteria for major national transmission flow paths
- Identify major load and generation centres
- Identify NEM flow paths and likely congestion points for use in ANTS

2.2 Potential future options for major national transmission flow paths

Develop performance indicators (incidence of constraints, transfer capacity, flow duration) for existing major national transmission flow paths.

Consider expected performance and Network Control Ancillary Services (NCAS) projections over next 3-5 years

Feasible transmission network to meet demands for 10 years:

- to meet supply demand balance for summer and winter peaks
- secure after n-1 contingency operational criterion²

Each JPB to continue to meet their transmission reliability obligations

NCAS support projections for network options will be included

ANTS provides indicative transmission solutions; non-network options may be substitutes that are evaluated by the NSP during the approvals process and regulatory test.

3. ANTS Process

The process for preparing the ANTS is:

- identify major national transmission flow paths projections using market simulation and various energy supply scenarios to meet projected demands
- coordinate, in conjunction jurisdictional planning bodies, the major national transmission flow paths projections with intra-regional requirements identified in the APRs

¹ The AIR uses previous year's forecasts. If ANTS is to use more up-to-date forecasts, publication needs to be later (NEMMCO proposes end October). This would also affect SOO timing.

² That is, the power system will remain stable and plant will remain within limits following loss of any single transmission line or other single piece of transmission equipment.

- report options coming from the coordination step

3.1 Demand forecasts

- Consistent with demand forecasts used in the supply-demand section of the SOO
- Grown to give half-hourly forecasts for each load/generation centre modelled
- ANTS will publish historical load centre information
- More detail may be required to model load or generation centres (as with the current 5 region market model, there is expected to be sufficient aggregation of demands to avoid confidentiality issues for new loads and generators).
- Treatment of diversity – intra-regional with respect to major load centre in a region – will be consistent with supply-demand section of the SOO.

3.2 Market simulations

- Inputs include half-hourly demand profile, generation cost data, network model and any existing, committed and advanced projects
- Outputs of scenarios will include generation development outcomes (by fuel source and generation centre) and major national transmission flow path outcomes (flow duration curve showing upper and lower bounds, and probabilities of flows occurring, performance indicators)
 - Various fuel-sourcing and generation centre scenarios to be considered
 - Scenarios selected to highlight emerging major national transmission flow path development options that appear in all or most of the scenarios
 - Non-scheduled energy developments (for example, embedded, renewable and intermittent generation) would generally be incorporated as demand forecast offsets. No specific alternative technology energy scenarios would be considered
 - Energy supply developments (comprising new scheduled generating units and demand side participation) will be considered for the purpose of identifying major national transmission flow path options. Scenarios will not have any implication of a prescribed or preferred generation development plan.
 - 2004 ANTS will use AIR cost information developed under AIR consultation process
- Scenarios to be studied using market simulation software
- 2004 ANTS network model uses the current 5-region market model and constraint equations

4. Performance of existing major national transmission flow paths

- Summarise transfer capacities and congestion points over past 2-3 years
 - interconnectors
 - other major national transmission flow paths
 - congestion that affects dispatch within identified generation or load centres
- Identify any trends
- Identify recent and committed augmentations and the effects on transfer capacity

- Drivers based on historical performance and future projections
- Projected capabilities for existing major national transmission flow paths for use in market modelling
- Network control ancillary services (e.g. reactive power and demand reduction) projections to support network capability

5. Energy supply scenarios

- Scenarios used for the purpose of developing major national transmission flow path options rather than prescribing or forecasting future energy supply projects
- Energy supply projects could include generation, demand side participation or a combination of both.
- Similar to AIR – market premium based investment³ using data developed in consultation with interested parties
 - looking at 3-4 main scenarios out to ten years
- Committed projects assumed as proceeding; advanced projects to be included as a sensitivity case
- Confirm generation resource cost data through a consultation process
 - 2004 ANTS cost data uses data provided by an independent consultant developed for AIR through a consultation process
- Scenarios:
 - base short & long run marginal cost bidding scenario
 - alternative bidding sensitivities to test robustness of conclusions⁴
 - advanced proposals included
 - gas/coal relativity

6. Scenarios for developing flow paths

Determines major national transmission flow path projections taking into account the projected demands and a number of energy supply expansion scenarios, assuming (among other things) committed projects are built.

6.1 Data and assumptions

This section would describe the underlying assumptions and approaches used in the market simulation studies, including:

- network limits

³ As demand increases and surplus reserve reduces, the market simulator will dispatch higher cost plant. This in turn leads to higher prices. When the margin of the price above cost (or premium) reaches a threshold, new generation will be added by the market simulator. This would mimic investment in generation, which generally occurs when the (average) price reaches or exceeds the new-entrant price.

⁴ Because of the time taken to simulate some alternative bidding strategies, the sensitivity studies may only be assessed for a period of a few years rather than the full ten-year outlook.

- generation reserve margins
- short and long-run marginal cost (SRMC and LRMC) curves
- diversity of peak demands between NEM regions
- demand forecasts for regions and load/generation centres
- NCAS availability
- bidding strategies

6.2 Forecasts of congestion

Forecast congestion on major national transmission flow paths for development scenarios:

- peak flows as percentage of capability
- duration of overloads
- energy at risk
- projected NCAS support requirements and costs
- price-based indicators of the value of congestion⁵.

6.3 Major national transmission flow path capacity projections

Quantify additional major national transmission flow path capacity to meet demand and generation expansion scenarios while maintaining reliability standards (based on the 'gap' between the existing and projected capacities in the modelled network). The projected capacity would be expressed as a probability of requiring a specified MW transfer capability between each load and generation centre.

Projected capability for a major national transmission flow path will be the capacity that substantially removes congestion predicted by simulation studies. Criteria will be developed for 2005 ANTS but could include projected hours of congestion or accumulated settlement residues along a major national transmission flow path.

- Identify major national transmission flow path projections that are common for most or all generation scenarios
- Definition of key drivers and thresholds

7. Planning coordination

JPBs and NEMMCO to collaboratively develop transmission options, transfer capabilities, and indicative capital costs to address:

- transmission options to meet identified major national transmission flow path projections

⁵ Inter-regional settlement residues are an indicator of congestion costs between regions. The market simulation technique may be able to extend this concept to congestion costs along flow paths. This would assist in prioritising the remediation of congestion according to market impact. Flow path residues would not be valid for alternative bidding studies that are dependent on the prevailing region structure, and would not be reported.

- reactive power and other NCAS projections (eg load shedding or generator runback) to support the transfer target within technical parameters

NEMMCO due diligence via power system analysis and/or market simulations that the network options deliver the projected capability.

Identify relevant intra-State developments:

- coincident with major national transmission flow paths
- with potential to be located on future major national transmission flow paths

Identify any incremental works needed to coordinate major national transmission flow path planning with intra-State planning.

Relevant options identified by APRs are to be listed in an Appendix and would provide a summary of options relevant to major national transmission flow paths.

8. Options for development of major national transmission flow paths

Identification of key uncertainties (also consider as drivers)

List of committed transmission projects (summarise regional options from APRs) pertaining to major national transmission flow paths

List of possible future options which would address the forecast constraints and for each option identify the following:

- description of option including NCAS support projections
- indicative capital cost
- impact on transfer capability
- key drivers and thresholds
- indicative timeframe for being operational (year) – driven by forecast constraints – and indicative time before that (year) to initiate a project.

Identification of options common to most/all scenarios and some high-level, broad ranking (eg a few categories)

Network expectations:

- detail for 1, 2, 3, 4 years (as load flows for each scenario)
- scenarios further out for 6 and 10 years
- only network options considered, non-network options to be considered as part of formal regulatory test

9. Major National Transmission Flow Path Diagram

Proposed Major National Transmission Flow Paths

Node	Description	Summer peak load (MW)*	Generation capacity (MW)
NQ	Areas north of Broadsound	1250	800
CQ	Central Queensland	1900	4150
SWQ	Tarong area	200	2150
SEQ	Brisbane	4350	1450
NNS	NSW north of Liddell	800	150
NCEN	Sydney, Hunter Valley, Central Coast, West	10000	11650
CAN	Canberra/Yass	800	300
SNY	Snowy, Wagga, Northeast Victoria	800	3900
MEL	Melbourne, Geelong	5750	800
LV	Latrobe Valley	900	7000
POR	Portland	650	-
SESA	South East SA	100	150
RIV	SE NSW, SA Riverland, NW Vic	500	50
ADE	Adelaide	2100	2250
NSA	Northern SA	200	1100
TAS	Tasmania	1500	2500

* Approximate loads under regional summer peak conditions

