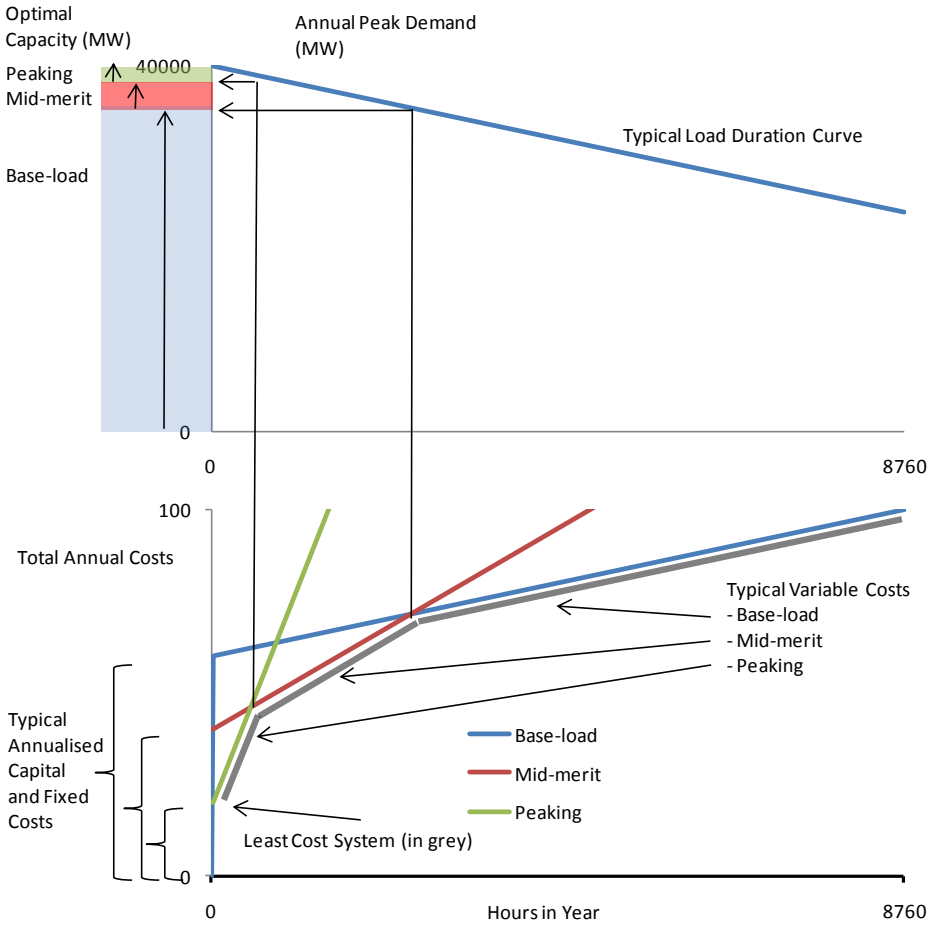
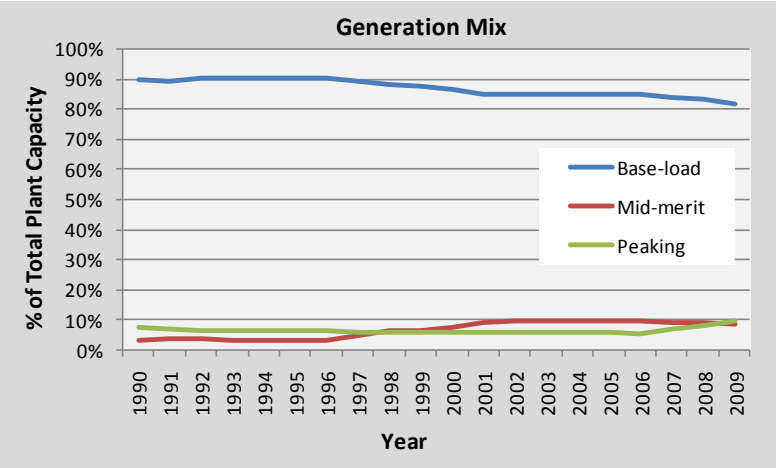
Generation Mix - IRP 2010 Input Parameter information sheet (Supply input)

This sheet is to be used as the primary stakeholder engagement tool. This document provides the information that will allow the stakeholders to make a meaningful contribution to the IRP Input parameters.

Parameter	**Generation Mix**
Purpose	The Generation Mix indicates the committed and non-committed plant (and then for each of these categories the base-load, mid-merit, peaking, nuclear and renewable plant types). The Generation Mix is **normally an outcome** of the IRP modelling process and is used for comparing alternative plans. A pre-optimisation Generation Mix can be determined and imposed on the plan to achieve specific objectives. For example, a higher energy adequacy can be assured by specifying a minimum amount of base-load plant (when fuel supply to existing plant is uncertain). The Generation Mix parameter is normally not used to achieve a desired outcome for a **particular plant technology**. It is more appropriate to bring the externality into the model to satisfy the objective. For example, constraining the supply system's CO_2 emissions will result in more renewable plant technologies entering the expansion plan in a "directed" optimal fashion. The Generation Mix therefore is an outcome of the IRP modelling process that optimally meets the generation requirements within a set of constraining policy objectives.
Impact on the IRP	The expansion plan without an imposed Generation Mix represents the economic optimal plan and plant mix, when excluding externalities. When a pre-determined Generation Mix is imposed, the expansion plan will have a higher cost. The Generation Mix will however meet the external objectives that led to the specification of the imposed Generation Mix.

The assumptions included in establishing the parameter values in this sheet	The Generation Mix classification is done as follows: Firstly, committed plant is identified as plant under construction and/or contracted. The remaining plant options are all non-committed plant. Then: → Base-load – coal-fired → Mid-merit – two-shifting coal-fired and combined-cycle gas turbines → Peaking – open-cycle gas turbines, pumped storage → Nuclear – all nuclear plant → Renewable – all renewable plant The classification is based on the comparative capital, fixed and variable costs of each technology, the fuel supply availability, nuclear or renewable and the ability to dispatch. The impact of the comparative costs on the Generation Mix for base-load, mid-merit and peaking is demonstrated in a simplified manner in the following diagram.  The capacity included in the Generation Mix for each plant should be the capacity credit for that facility. (Refer to the Reserve Margin sheet).
Parameter	The historical Generation Mix from 1990 to 2009 (for existing plant and nuclear and hydro included under the base-load or peaking categories).

Value



Emergency Resources are not included in the Generation Mix parameter. DSM is not included in the historical Generation Mix parameter as accurate data is not available. DSM fulfils the same function as supply options. It is best to include DSM in the Generation Mix parameter to get a fair comparison between plans.

Range of Parameter Value

The Generation Mix parameter's range is dependent on a variety of factors, most importantly the demand profile and the comparative cost characteristics of the new supply options. The Ancillary Services requirement, specifically the different reserve types and reactive power, also plays a role. The plant technologies supplying the Ancillary Services, and thus the Generation Mix, are influenced by these requirements.

The range of variation for the Generation Mix is limited. Deviations from the optimal scenario, increases costs and larger deviations might even compromise the system reliability.

The table shows and indicative future Generation Mix:

	Committed					Options (non-committed)				
	Base-load	Mid-merit	Peaking	Nuclear	Renewable	Base-load	Mid-merit	Peaking	Nuclear	Renewable
	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
2010	713	168	0	0	275	0	0	0	0	0
2011	459	168	1020	0	350	0	0	0	0	0
2012	738	84	0	0	200	600	0	0	0	0
2013	1461	0	666	0	0	0	0	0	0	0
2014	2199	0	666	0	0	0	0	0	0	0
2015	2024	0	0	0	0	0	0	0	0	0
2016	1381	0	0	0	0	0	0	0	0	0
2017	723	0	0	0	0	750	0	0	0	0
2018	0	0	0	0	0	750	0	0	0	0
2019	0	0	0	0	0	750	0	300	0	0
2020	0	0	0	0	0	750	0	0	1500	0
2021	-75	0	0	0	0	750	0	0	1500	250
2022	0	0	0	0	0	750	0	0	0	500
2023	-909	0	0	0	0	0	750	300	1500	750
2024	-1424	0	0	0	0	0	750	300	1500	1000
2025	-2740	0	0	0	0	2400	750	0	1500	1000
2026	-2280	0	0	0	0	1500	0	150	1500	1000
2027	0	0	0	0	0	1500	0	0	1500	1000

Preconditions

A full model run with an expansion plan is needed to calculate the Generation Mix parameter.

necessary to make possible for this parameter to be included in the IRP	If the Generation Mix is pre-specified, agreement is needed on the specific policy objective(s) requiring the setting of a Generation Mix. The impact of these objective(s) on the Generation Mix must be determined and agreed on before the equivalent model parameters are pre-set for the modelling process.
Parameter Owner	System Operator, Energy Planning