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Appendix B

Potential Transmission Solutions

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Table B1: Potential transmission solutions

The table shows alternative options immediately below and build options on the following page.

Category	TCSNP option	Nature of constraint			
		Thermal	Voltage	Stability	Fault Levels
Operational Options	Availability contract (<i>contract to make generation available, capped, more flexible and so on to suit constraint management</i>)	✓	✓	✓	
	Reactive demand reduction (<i>this could ease voltage constraints</i>)		✓		
	Enhanced generator reactive range through reactive markets (<i>generators contracted to provide reactive capability beyond the range obliged under the codes</i>)		✓	✓	
	Automatic MW redistribution (<i>Contracted for certain boundary transfers and faults</i>). For example, contracted services from Demand side, generation deload/ intertrip, energy storage charge/ import and discharge/ export	✓	✓	✓	
	Generation advanced control systems (<i>such as faster exciters which improves transient stability</i>)		✓	✓	
Alternative Options	Co-ordinated Quadrature Booster (QB) Schemes (<i>automatic schemes to optimise existing QBs</i>)	✓	✓		
	Automatic switching schemes for alternative running arrangements (<i>automatic schemes that open or close selected circuit breakers to reconfigure substations on a planned basis for recognised faults</i>)	✓	✓	✓	✓
	Dynamic ratings (<i>circuits monitored automatically for their thermal and hence rating capability</i>)	✓			
	Addition to existing assets of fast switching equipment for reactive compensation (<i>a scheme that switches in/out compensation in response to voltage levels which are likely to change post-fault</i>)		✓	✓	
	Protection changes (<i>faster protection can help stability limits while thermal and fault level limited capabilities might be raised by replacing protection apparatus such as current transformers (CTs)</i>)	✓		✓	✓
Reduced-build Options	HVDC de-load Scheme (<i>reduces the transfer of an HVDC Intralink either automatically following trips or as per control room instruction</i>)	✓	✓	✓	
	Re-tensioning or re-profiling overhead lines (<i>so they sag less, insulator adjustment and ground works to allow greater loading which in effect increases their ratings</i>)	✓			

Category	tCSNP option	Nature of constraint			
		Thermal	Voltage	Stability	Fault Levels
Build Options	Overhead line re-conductoring or cable replacement (<i>replacing the conductors on existing routes with ones with a higher rating</i>)	✓			
	Reactive shunt compensation (MSC, SVC, reactors) <i>improves voltage performance and relieves low and high voltage constraints.</i>		✓	✓	
	Series compensation, which can be used to control circuit power flows (both series capacitors and reactors), reduce circuit voltage depression (series capacitors), reduce fault current (series reactors) and have effect on stability.	✓	✓	✓	✓
	Switchgear replacement (<i>to improve thermal capability or fault level rating which in turn provides more flexibility in system operation and configuration. This would be used to optimise flows and hence boundary transfer capability</i>).	✓			✓
	OHL reconfiguration (<i>turn-in works at substations</i>)	✓	✓	✓	
	Uprating of circuits (<i>for higher voltage levels</i>)	✓	✓	✓	
	Power flow control devices (<i>a type of Flexible AC Transmission System device that can be used to alter power flows over a circuit</i>)	✓	✓	✓	
	New build (HVAC/HVDC) – <i>new plant on existing or new routes.</i>	✓	✓	✓	✓