GRID ISSUES, Grattan Healy, Ierne Wind Energy Consulting, 3rd May 2012

GRID ISSUES	SPECIFICS	CAUSE(S)	SOLUTION(S)	EFFECT(S)
DELAY				
6-9 years to get a valid connection offer (2004-2013); 10 to 15 years to get connected (2004-2019);	Group processing, 'Gates', Wind in SEM	Complex rule sets for grouping and gates	**'Who owns pays' grid connection policy**	Shorten connection timeline to 2/3 years
	Connection cost sharing	Transmission shallow connection charging		Restore planning as a criterion for grid
	Planning can't be a criterion, due to long delays, so apply for grid first	Distribution deep charging		Get small projects out of groups
	Requires more complex rules on relocating, splitting, merging (COPP), etc	Multiple grid authorities	**Single grid owner and operator**	Simplify relocation and COPP
	Complex group dynamics: - connection method - grid deposits & second payments - contestability - firm/non-firm connections - disputes	Long delays caused by 'Wind in SEM', dispatch and tie-break rules consultation (2008-2012, so far)		No Gates?
	Small projects stuck in Groups			More economically efficient
20 years plus in total to get full firm access (2004-2024)	Firm access quantity (FAQ) analyses	REFIT paid on metered output only (grid risk imposed on supported wind projects)	**REFIT paid on available output,**	Fix REFIT & attribute grid risk to grid authorities, who can deal with it
			but restrict to 3 years before scheduled firm date	Last three years of non-firm period provide bankable income
	Constraint & curtailment estimation(s) (PGOR, +)	Conservative modelling provides firm dates many years after end of constraints	**'Substantially firm' approach**	
	Grid development progress limited and slow	Narrow plan/traditional approach	**Full strategic build of all aspects of grid, based on plannings**	Real strategic build to shorter timelines
		Excessive standard delivery times	**Shorter timelines**	
	Firm dates for majority of projects associated with delayed reinforcements, like N-S Interconnector	Inevitable delay beyond already long lead-times because of: - Grid consenting, - Grid wayleaving; - Bureaucracy; - Awaiting project commitments; - Less contracting (ESB).	**Full contracting & Full contestability**	

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COST				
Connection cost > €300k/MW, €500k in some cases	Connection often unviable share of project capital expenditure (barrier to entry)	Transmission shallow connection charging, sometimes leading to charging for grid itself (Grid West)	**'Who owns pays' grid connection policy**	Reduced project CAPEX and don't need higher REFIT
		Distribution deep charging		
		High network costs	**Charges based purely on costs and no overhead contribution**	
		Less contracting	**Contracting for all grid**	
		Low utilization of assets due to overly conservative modelling	**More reasonable modelling of grid capacity**	
			Dynamic line ratings, reflecting wind line cooling	
			Remedial and protection schemes	
			Static VAR Compensators on system etc (FOR)	
			Voltage and freq control with wind farms and statcoms at subs	
		Limited use of new technology	**Short circuit limiters**	
			On load tap changers	
			Arc suppression coil technology	
			Collapse Prediction Relays	
Costs from technical standards	Grid Code rules locally devised, over-cautious, discriminatory, enforced	Excessive and unique Grid Code standards for wind; some unhelpful wind derogations;	**Reasonable European grid code standards for wind turbines**	Greater use of standard turbines, lower cost
Maintenance costs	Charged from day one of operations	No grid connection warranty	**5 year warranty period with no maintenance charges**	Normal approach and reflects reality that there is no maintenance in the first years of the connection
		Full socialisation of all grid maintenance costs		

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NON-DISPATCH				
Constraint	Waste of free green energy; No REFIT payment for output lost due to grid limitations; No SMP for output lost under non-firm; Design of REFIT (to remove market/grid uncertainty) undermined; Can't finance projects; Grid not sharing information or encouraging innovation; No comprehensive curtailment criteria or proper reporting; Grid development not keeping pace with generation applications, or own high demand projections.	Generator size limits (105% MEC) unnecessarily preventing greater grid utilization,	**Incentivize max grid utilization by removing 105% MEC limit**	Allows bigger generators, and encourages 'droop' power curves
		and discouraging 'droop' power curves (which help system)		Reduce curtailment with droop power curves
		Grid delays (contracting, consenting)	**Strategic grid construction, new lines higher capacities (HTLS as standard), stations**	Greater capacity & utilization of grid
		Grid/project interaction delaying build		
		Not a smart system	**Smart grid system:** **- Dynamic line ratings** **- Remedial and protection schemes;** **- Short circuit limiters;** **- On load tap changers;** **- Arc suppression coil technology;** **- Collapse Prediction Relays.**	
		Overly conservative firm dates (causing losses)	**'Substantially firm' approach**	
Curtailment		Lack of Demand Side Management (DSM)	**Reversal to generation led - IT/Smart meters/DSM in SEM (possibly including voltage management)**	Paradigm shift to generation led; Priority of dispatch Priority access Guaranteed transmission; Fossil truly as back-up
		Priority dispatch/access & guaranteed transmission compromised by FOR and Min Gen.	**Revise dispatch rules to give full rights to RES-E**	
		Facilitation of Renewables (FOR) limits imposed due to inertia etc: - ROCOF issue, - wind and fossil grid codes, - lack of static VAR Compensators etc on network.	**DS3 programme should:** **- Sort ROCOF relays,** **- implement grid code for fossil,** **- implement grid code for wind,** **- Static VAR Compensators etc on system.**	
		High level of Min Gen: - fossil grid code derogations & non-compliance, - inflexible CCGTs operating as mid merit, - CCGTS not good for services, - mid-merit operating as peakers, - wrong fossil incentivization.	**Reduce Min Gen;** **- revise operational measures: conventional plant to do what it was designed for;** **- incentivize only flexible plant in queue (low min-gen mid-merit, quick response, high inertia;** **- remove derogations and enforce grid**	

			codes; **- improve or retire legacy plant;** **- more voltage and freq control with wind farms and statcoms at subs;** **- ROCOF control on conventional?**	
		Wind derogations	**Incentivize LVFRT etc for all wind farms to remove derogations**	
		Wind Grid Code: limited ramp rates a form of hidden curtailment	**Remove ramp rate limitations for wind in grid code and allow wind turbines to generate to their design algorithms**	
		Cumulative variables requiring very conservative wind turbine settings because operation off-algorithm problematic		
		No storage at moment	**Restart Turlough Hill and incentivize more storage**	
		Limited interconnection	**Incentivize more interconnection and manage exports**	
			Sort interconnection RE priority	
		Not incentivizing inertia, other services from wind and DC links;	**Ancillary services, inertia, proto-inertia,** **HVDC VSC grid services**	
		Tie transformer capacities	**Increase tie transformer capacities**	
		Tie-breaks/incomplete 'Wind in SEM' process	**HVDC meshed grid to support AC grid**	
		Solving constraint worsens curtailment		
		Wind variability affects reliability		
OVERALL			**Innovation program & fund & grid test beds**	Export solutions, create jobs
			Overall grid roadmap & oversight forum	Policy/paradigm shift

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