



Grid-locked

Grattan Healy, MnaG Workshop, Athlone, 11th May 2012



Development models

- **Germany**

- Planning (maybe) = Grid + REFIT

- **Ireland**

- Grid (maybe) = Planning (maybe) + REFIT (maybe)



Like the hammer game





Development status

- **Grid connection**

- takes up to 15 years; 'firm access' up to 20 years

- **Planning increasingly uncertain**

- SACs/SPAs/AAs & distances from houses

- **REFIT finally in place**

- after 2+ years with no scheme;
- doesn't cover constraint/curtailment



Fundamental issue: Grid

- **Delay**

- 15 yrs to connect; 20 years to be 'firm'

- **Cost**

- Connection cost, grid code, maintenance

- **Non-dispatch**

- Grid inadequate: constraint & curtailment



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	



GRID ISSUES	SPECIFICS	CAUSE(S)	SOLUTION(S)	EFFECT(S)
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		



GRID ISSUES	SPECIFICS	CAUSE(S)	SOLUTION(S)	EFFECT(S)
NON-DISPATCH				
Constraint	<p>Waste of free green energy;</p> <p>No REFIT payment for output lost due to grid limitations;</p> <p>No SMP for output lost under non-firm;</p> <p>Design of REFIT (to remove market/grid uncertainty) undermined;</p> <p>Can't finance projects;</p> <p>Grid not sharing information or encouraging innovation;</p>	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: <ul style="list-style-type: none"> - 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	<p>No comprehensive curtailment criteria or proper reporting;</p> <p>Grid development not keeping pace with generation applications, or own high demand projections.</p>	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 dispatch/access & guaranteed transmission compromised by FOR and Min Gen.	Revise dispatch rules to give full rights to RES-E	Priority of dispatch Priority access Guaranteed transmission;
		Facilitation of Renewables (FOR) limits imposed due to inertia etc: <ul style="list-style-type: none"> - ROCOF issue, - wind and fossil grid codes, - lack of static VAR Compensators etc on network. 	DS3 programme should: <ul style="list-style-type: none"> - Sort ROCOF relays, - implement grid code for fossil, - implement grid code for wind, - Static VAR Compensators etc on system. 	Fossil truly as back-up
		High level of Min Gen: <ul style="list-style-type: none"> - 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; <ul style="list-style-type: none"> - 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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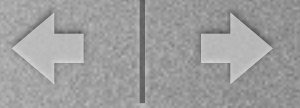


Official response

1. Delay grid access
2. Slowly address constraint and curtailment
3. Allocate the losses (SEMC)
4. Don't maintain REFIT support for lost output
5. Therefore slow development

But still expect to meet targets!?





Tie-breaks

- or, sharing out the pain
- or, asking us which way we want to be shot



Tie-breaks

- Ireland largely ignoring EU legal duty to facilitate wind
- SEMC treating EU grid rules as secondary to minimizing cost
- SEMC sees constraint and curtailment as a given
- DS3 is limited program to deal with it over time
- Seen as useful to further slow development



Consultation Option I

- **GRAND-FATHERING**
- intended to protect existing projects
- loading unknown level of pain on newer projects, which won't build (industry stops)
- fail on both if curtailment linked to firm access



Consultation Option 2

- PRO RATA
- share unknown curtailment over all wind, new & old
- undermines financing, because existing projects compromised
- compromise project financing (independents)
- leave to balance sheet financing (semi-states, utilities)



Consultation Option 3

- PRO RATA TO TARGET
- Limit level of pro-rata curtailment for projects to get to target
- Grandfather thereafter
- Not addressing issue, still leaves uncertainty
- Will severely slow development



Consultation Option 4

- PRO-RATA, NO MARKET PAYMENT
- Pro-rata of curtailment
- no market payment for any curtailment
- may seem to minimize cost
- but, reducing PPAs, if available at all
- further punishing wind for lack of grid



Variation on Option 3

- IWEA considering criteria to select projects for reaching target and getting grandfathered:
 - Planning permission for the windfarm
 - Executed connection offer
 - Planning permission for any grid connection assets (verified in writing by system operators)
 - Executed PPA in place
 - Evidence that the necessary debt and equity is available
 - Land agreements
 - Third party wind reports
 - Authorisation to construct
 - Generation licence



CONCLUSIONS

- Government ignoring duty to facilitate wind
- SEMC treating cost as more important than legal duty to facilitate wind
- result is unknown damage to supported projects, targets compromised
- left with squabble over which projects will get built at all
- semi-states and utilities winning that fight
- Need **Grid Sorted & REFIT on availability**



Planning = Grid + REFIT

THANK YOU FOR YOUR ATTENTION

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