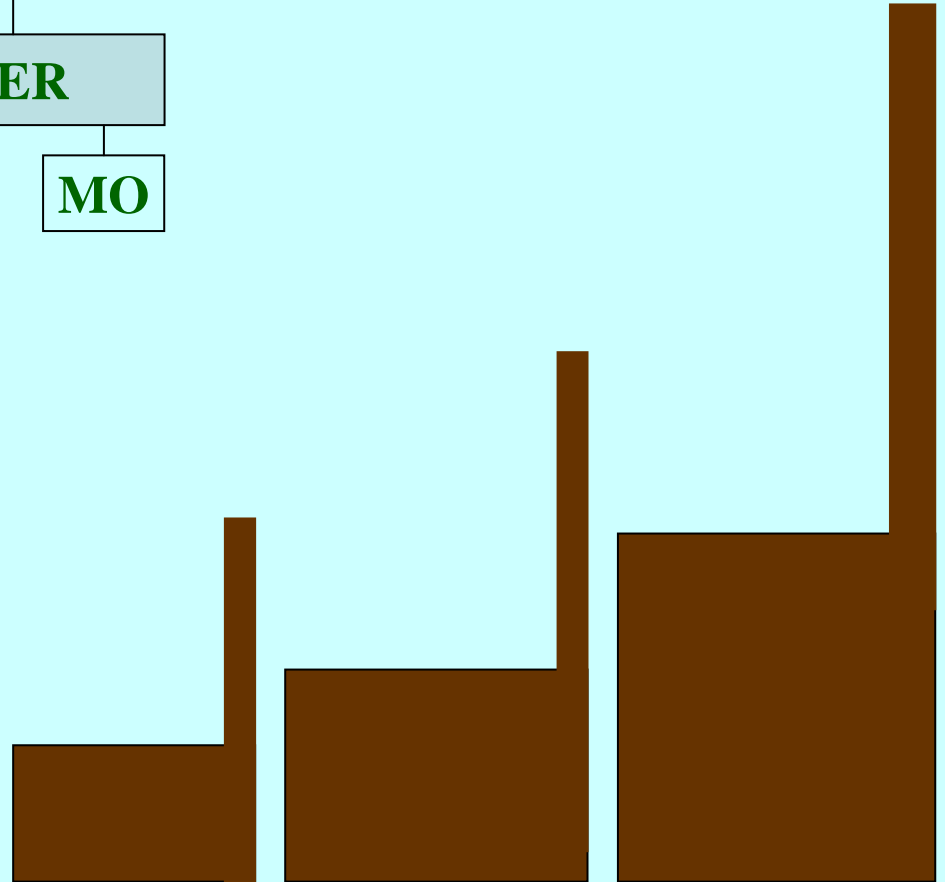
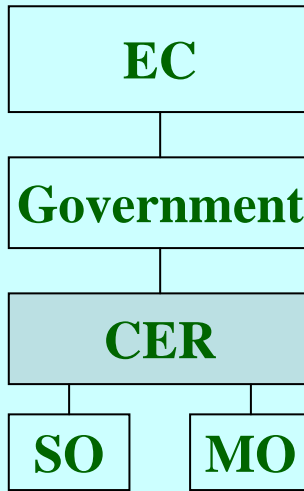


Generation Mix: Wind Generator Perspective

Dave O'Connor





GREEN PAPER



Department of the Environment,
Heritage and Local Government
For Policy Development,
Delivery and Administration

TOWARDS A SUSTAINABLE ENERGY FUTURE FOR IRELAND



<http://www.dcmnr.gov.ie/NR/ronlyres/54C78A1E-4E96-4E28-A77A-3226220DF2FC/26716/EnergyGreenPaper1October2006.pdf>

“The Government is concerned to ensure that adequate provision is made to encourage the development of an electricity portfolio which can support and complement the aggressive targets for renewable growth.” *(Page 52)*



<http://www.dcmnr.gov.ie/NR/ronlyres/54C78A1E-4E96-4E28-A77A-3226220DF2FC/26716/EnergyGreenPaper1October2006.pdf>

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“Appropriate mix of baseload and *flexible* plant” *(Pages 51, 65)*



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“*Responsive* generation portfolio” (Pages 13, 32)





<http://www.dcmnr.gov.ie/NR/ronlyres/54C78A1E-4E96-4E28-A77A-3226220DF2FC/26716/EnergyGreenPaper1October2006.pdf>

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“Appropriate mix of baseload and *flexible* plant” (Pages 51, 65)

“*Responsive* generation portfolio” (Pages 13, 32)

“*Flexible* and *responsive*” (Pages 11, 52, 91)



Need for Responsiveness and Flexibility

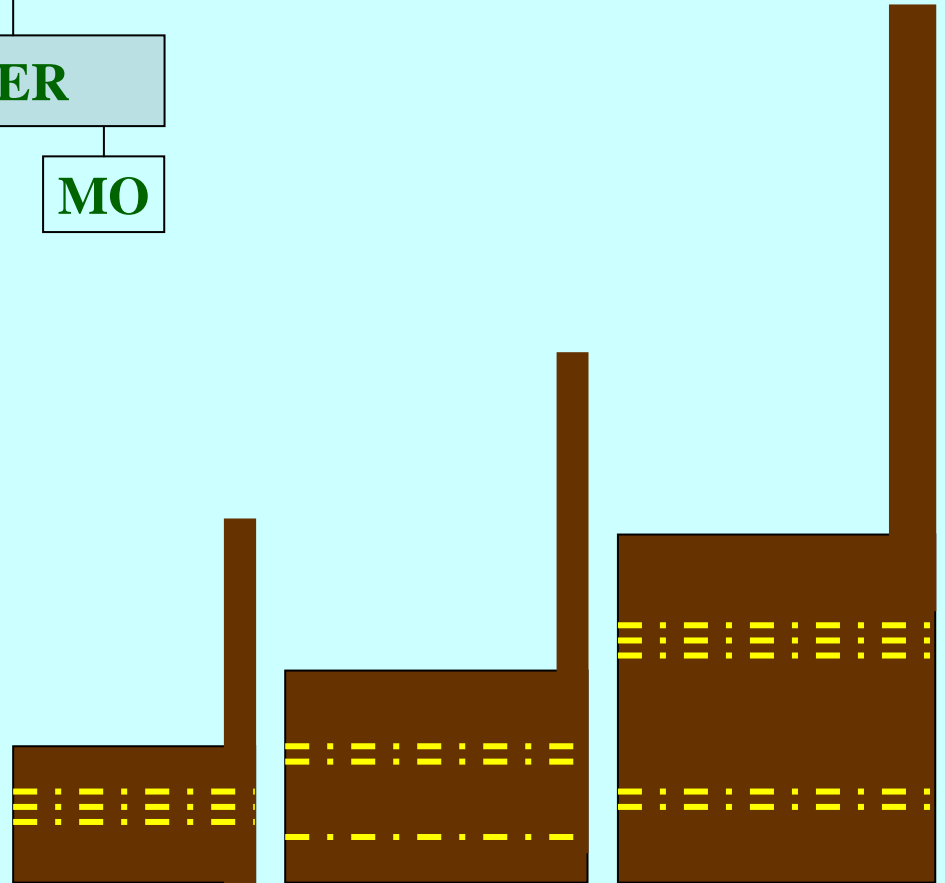
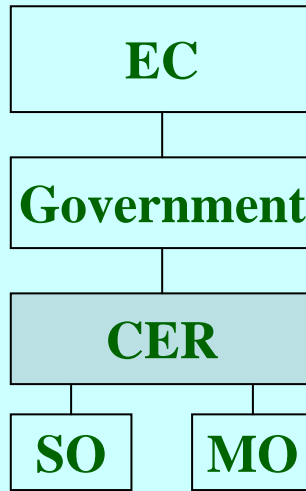
Responsiveness is needed within seconds to cover for:

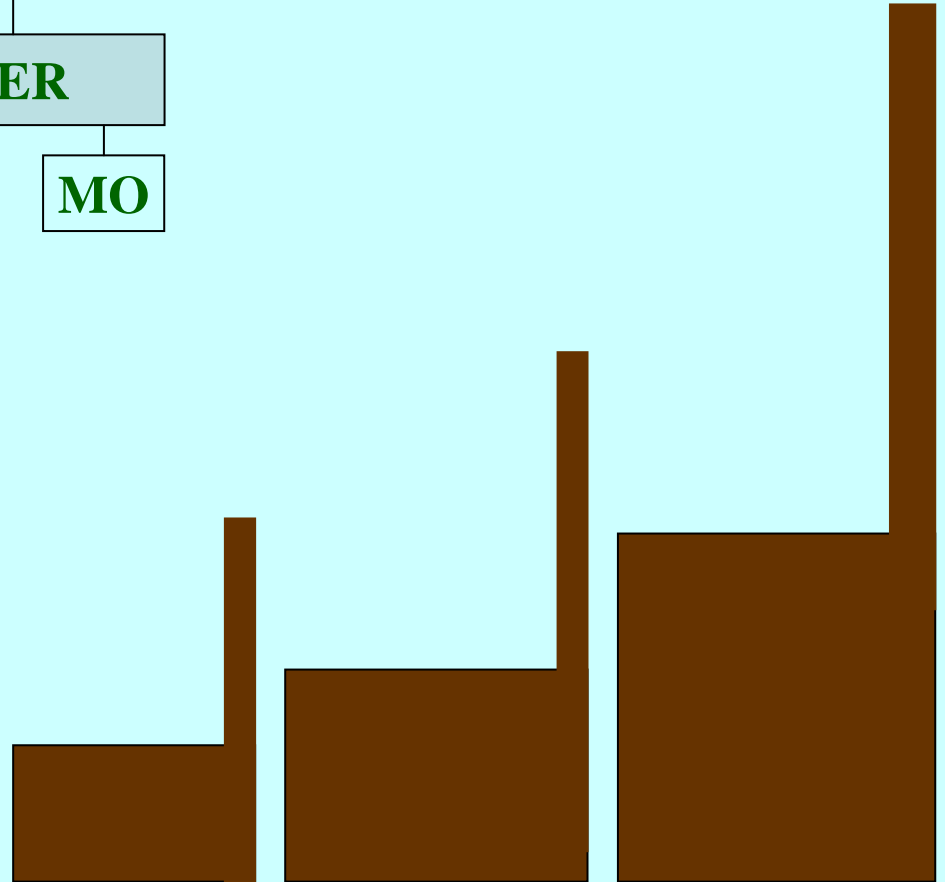
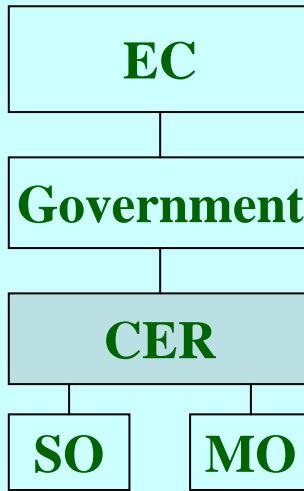
- instantaneous tripping of the largest brown generator

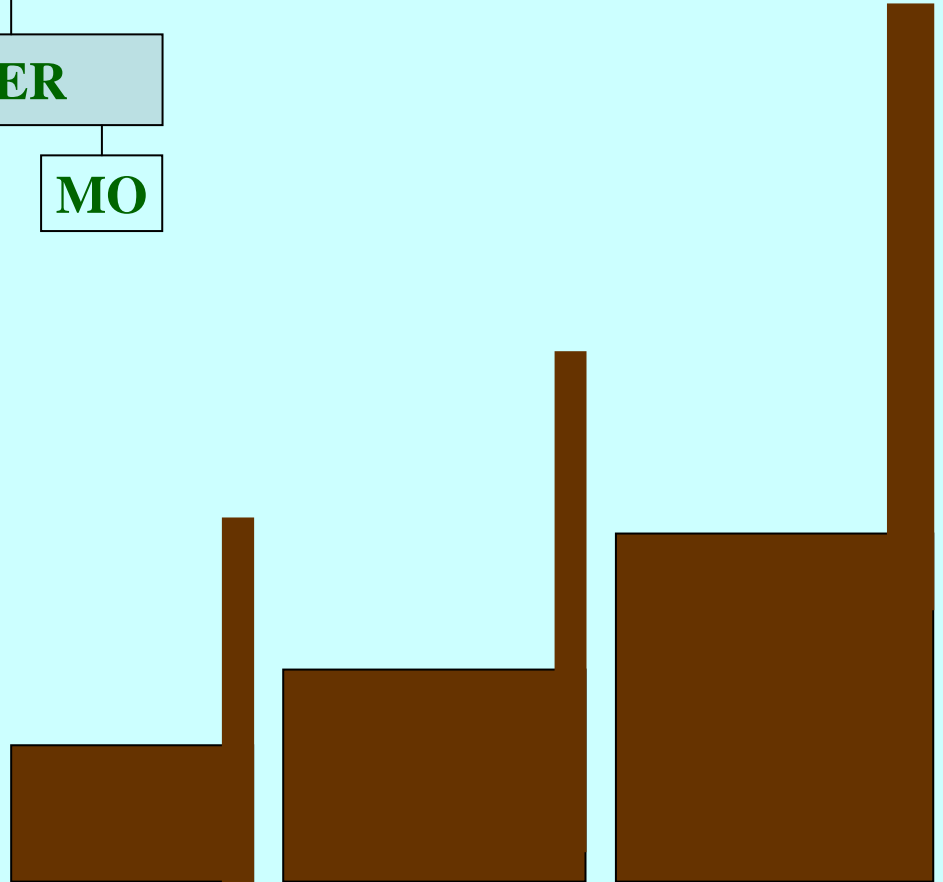
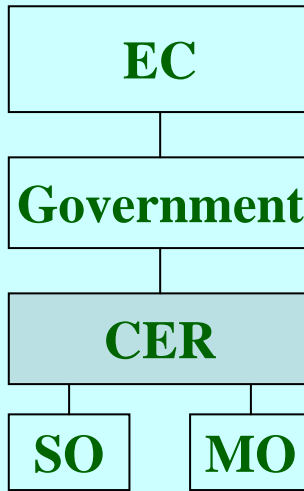
Flexibility is needed in the minutes-to-hours timescale to cover for:

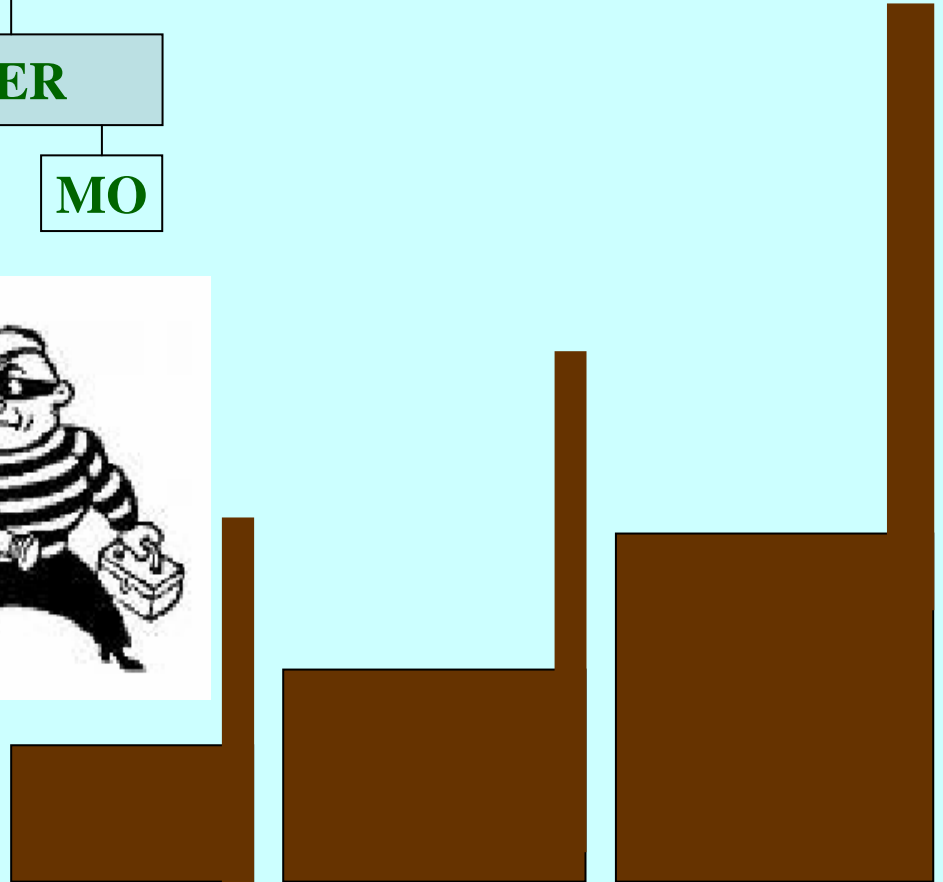
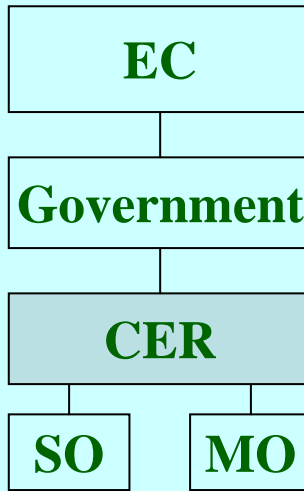
- aftermath of instantaneous tripping of the largest brown generator
- gradually changing customer demand
- gradually changing wind generation











STATUTORY INSTRUMENT

S.I. No. 60 of 2005

EUROPEAN COMMUNITIES (INTERNAL MARKET IN ELECTRICITY)
REGULATIONS 2005.



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<http://www.irishstatutebook.ie/ZZSI60Y2005.html>

“The Commission shall ... publish a report ...
outlining ... any measures taken or envisaged to
address any issues identified”



Report on Ireland's Security of Supply of Electricity

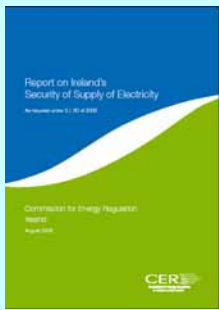
As required under S.I. 60 of 2005

Commission for Energy Regulation
Ireland

August 2006

CER 
Commission for Energy Regulation
An tAidmheas Buidéil Teicníc





<http://www.cer.ie/cerdocs/cer06187.pdf>

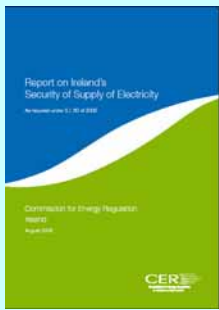
Developing Appropriate Plant Mix

The impact of increasing levels of wind on the system is resulting in the need for increased levels of flexible plant to compensate for the variations in output from wind ...

The GAR identifies the need to encourage the building of additional flexible plant or greater flexibility within the current portfolio.

The Commission is of the view that the design of the new market will provide for the correct signals to prevail and indicate the need for the appropriate mix of plant to be developed without intervention.





<http://www.cer.ie/cerdocs/cer06187.pdf>

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GENERATION ADEQUACY REPORT 2006–2012

Transmission System Operator Ireland
Published November 2005



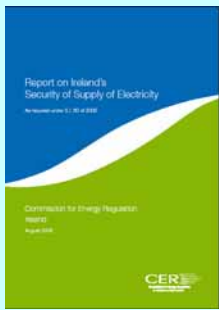


http://www.eirgrid.com/EirgridPortal/uploads/Publications/GAR0612_web.pdf

The increasing proportion of wind generation on the system makes it necessary to ensure that *the rest of the generation portfolio* will have sufficient flexibility to compensate for the inherent variability in the wind resource ...

the remaining plant portfolio will be required to operate in a more flexible manner.





<http://www.cer.ie/cerdocs/cer06187.pdf>

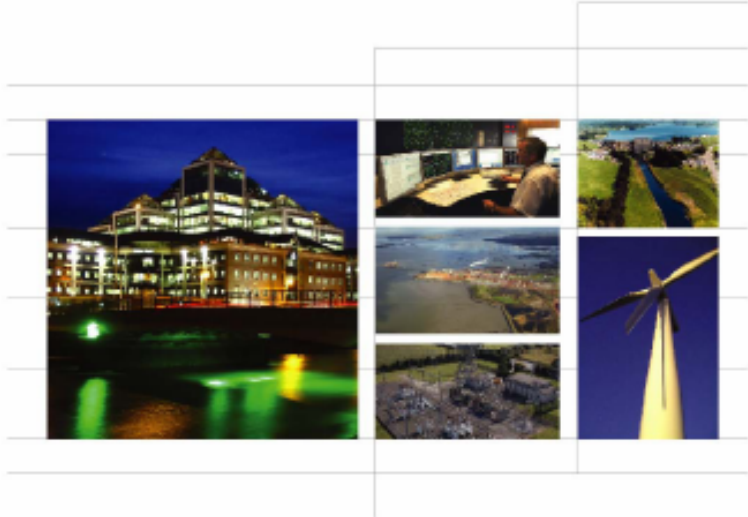
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Grid Code

Version 1.2 May 2005

 National Grid

www.eirgrid.com



'Flexibility' Required by The Grid Code: An Analogy



- Wait *4 hours* after starting it before you think about stopping it
- Wait *4 hours* after stopping it before you think about starting it
- Then wait *a further 3 hours* to get it started if the engine is hot
- Wait *a further 9 hours on top of that* to get it started if engine is cold
- Can then do the equivalent of 0 – 60 in *a further 4 hours*
- Don't even think about trying to slow it down below *35% speed* *



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- Can then do the equivalent of 0 – 60 in *a further 4 hours*
- Don't even think about trying to slow it down below *35% **

* 50% in the case of the “CCGT” model



Responsiveness Required by The Grid Code

- Stipulated amounts required are derisory
- No generator has to provide any at all at full output ...
... despite the fact that two spectacular means of boosting power at full output – covering steam turbines and gas turbines, respectively, and thus every element of every combined cycle – although specifically highlighted in The Grid Code are not required in any way by it.



We Believe

Every generator is capable of changing from any load to any other load at any time and holding any load indefinitely.



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Every generator is capable of changing from any load to any other load at any time and holding any load indefinitely.

Operating them at low load or no load offers compound benefits:

- increased load pickup capability of each generator
- reduced fuel consumption and emissions of each generator
- fewer generators need be operated to provide the pickup.



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Basic gas turbines can be operated at *negative* load, thereby providing *double* the response while consuming only *half* the fuel compared to the best operation stipulated in The Grid Code.



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Basic gas turbines can be operated at *negative* load, thereby providing *double* the response while consuming only *half* the fuel compared to the best operation stipulated in The Grid Code.

The very large gulf identified between some assumptions that EirGrid is making and our view of what's appropriate should be bridged as soon as possible through open dialog and debate.





ALL-ISLAND MODELLING - GENERATOR PARAMETERS

<http://www.allislandproject.org/allislandgeneratorparameters.html>



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	
(l)	Ramp-up rate	
(m)	Ramp-down rate	
(n)	Minimum up-time	
(o)	Minimum down-time	
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	15
(l)	Ramp-up rate	
(m)	Ramp-down rate	
(n)	Minimum up-time	
(o)	Minimum down-time	
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	15
(l)	Ramp-up rate	6
(m)	Ramp-down rate	
(n)	Minimum up-time	
(o)	Minimum down-time	
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	15
(l)	Ramp-up rate	6
(m)	Ramp-down rate	6
(n)	Minimum up-time	
(o)	Minimum down-time	
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	15
(l)	Ramp-up rate	6
(m)	Ramp-down rate	6
(n)	Minimum up-time	3
(o)	Minimum down-time	
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	15
(l)	Ramp-up rate	6
(m)	Ramp-down rate	6
(n)	Minimum up-time	3
(o)	Minimum down-time	2
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	15
(l)	Ramp-up rate	6
(m)	Ramp-down rate	6
(n)	Minimum up-time	3
(o)	Minimum down-time	2
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	3



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	15
(l)	Ramp-up rate	6
(m)	Ramp-down rate	6
(n)	Minimum up-time	3
(o)	Minimum down-time	2
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	3 3



Flexibility: Non-Compliance with The Grid Code

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(l)	Ramp-up rate	6
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(n)	Minimum up-time	3
(o)	Minimum down-time	2
(s)	Synchronising time: <ul style="list-style-type: none">• from cold• from warm• from hot	 3 3 8



Flexibility: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1	Parameter	Generators Non-Compliant Without Derogation
(k)	Minimum stable capacity	15
(l)	Ramp-up rate	6
(m)	Ramp-down rate	6
(n)	Minimum up-time	3
(o)	Minimum down-time	2
(s)	Synchronising time: <ul style="list-style-type: none"> • from cold • from warm • from hot 	3 3 8

$\Sigma = 46$



Responsiveness: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1(u)	Parameter	Generators Non-Compliant Without Derogation
(i)	Primary operating reserve	
(ii)	Secondary operating reserve	
(iii)	Tertiary 1 operating reserve	
(iv)	Tertiary 2 operating reserve	



Responsiveness: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1(u)	Parameter	Generators Non-Compliant Without Derogation
(i)	Primary operating reserve	8
(ii)	Secondary operating reserve	
(iii)	Tertiary 1 operating reserve	
(iv)	Tertiary 2 operating reserve	



Responsiveness: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1(u)	Parameter	Generators Non-Compliant Without Derogation
(i)	Primary operating reserve	8
(ii)	Secondary operating reserve	1
(iii)	Tertiary 1 operating reserve	
(iv)	Tertiary 2 operating reserve	



Responsiveness: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1(u)	Parameter	Generators Non-Compliant Without Derogation
(i)	Primary operating reserve	8
(ii)	Secondary operating reserve	1
(iii)	Tertiary 1 operating reserve	13
(iv)	Tertiary 2 operating reserve	



Responsiveness: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1(u)	Parameter	Generators Non-Compliant Without Derogation
(i)	Primary operating reserve	8
(ii)	Secondary operating reserve	1
(iii)	Tertiary 1 operating reserve	13
(iv)	Tertiary 2 operating reserve	12



Responsiveness: Non-Compliance with The Grid Code

Sub-clause of CC.7.3.1.1(u)	Parameter	Generators Non-Compliant Without Derogation
(i)	Primary operating reserve	8
(ii)	Secondary operating reserve	1
(iii)	Tertiary 1 operating reserve	13
(iv)	Tertiary 2 operating reserve	12

$\Sigma = 34$



Summary

- 1996 – 2006
- 80 instances of non-compliance without derogation just in relation to *Flexibility* and *Responsiveness*
- Based on CER's own data
- Magnitude of non-compliances and derogations
- Distance from Best Available Technology
- No issue identified to EC
- Threat to curtail wind generation
- Without compensation



Ultimately there will be a central Grid Code with chapters for gas-fired stations, coal stations and all the rest including wind and other renewable energy. There will be specific requirements for each one of those.

Commissioner Tom Reeves

28th January 2004

<http://debates.oireachtas.ie/DDebate.aspx?F=AGJ20040128.xml&Ex=All&Page=3>



14 February 2006

Mr. Tim Cowling
Chairperson
TWEA
Ardna
Carrick-on-Shannon
Co. Roscommon

RECEIVED
FEB 2006
Our Ref: 25712

Re: Grid Code

Dear Mr. Cowling,

I refer to your letter to the Commission for Energy Regulation, dated 24th January 2006, relating to the Grid Code.

In relation to technology-specific Grid Code requirements, the current Grid Code stipulates specific technical requirements for all forms of generation plant.

Presently there are separate chapters for wind and small-scale generation. There may be certain technology types that also warrant having a separate chapter in the future, for example, CCGT and other renewable technology but this has not been considered necessary so far.

Any party who considers that it is necessary to amend the Grid Code can make their suggestions known to ESB National Grid. These suggestions will then be brought to the Grid Code Review Panel (an industry representative group which meets 3-4 times a year to discuss and review the Grid Code) for consideration.

In relation to your second query, there are no derogations for Synergen and Hantstown listed on the Register of Granted Grid Code Derogations, as these derogations have not yet been finalised and are still in the derogation process. ESB National Grid will endeavour to complete these derogation assessments within the coming weeks.

If you have any further queries please do not hesitate to contact me.

Yours sincerely,



Michael G Tutty
Commissioner



There may be certain technology types [other than wind] that also warrant having a separate chapter in the future, for example CCGT and other renewable technology but this has not been considered necessary so far.

Any party who considers that it is necessary to amend the Grid Code can make their suggestions known to ESB National Grid. These suggestions will then be brought to the Grid Code Review Panel ... for consideration.

Commissioner Michael Tutty

6th February 2006



Lack of Transparency

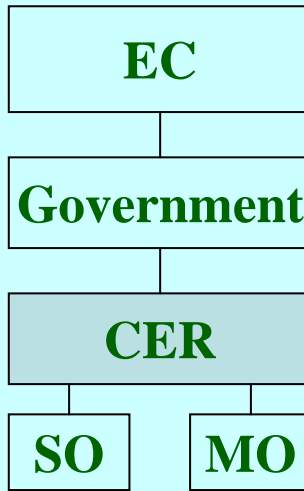
- Don't know configurations or capabilities of brown generators
- Don't know which of them have been granted which derogations nor the grounds for nor the extent of them
- Don't have sight of EirGrid analysis or reports
- Don't know how its system operation strategy adapting to new reality
- Can't decouple Generation Mix issues from System Operation issues
- No sense of the overall optimum solution being aggressively sought
- No evidence of anyone owning the issues that impact heavily on us



Conclusions

- None of the issues identified is of our making
- Responsibility for resolving them lies with others
- They impact generally on all customers
- They impact specifically and immediately on us in that because of them we're threatened with having our output curtailed without compensation
- Furthermore, any failure to deliver the optimum generation mix and system operation strategy will also unfairly depress the value of our product in the pool market
- Radically increased transparency is a prerequisite for trust
- If the threat is lifted and trust restored we will cooperate fully in seeking a fair and proper resolution.







Annual Customer Conference 2006

Croke Park Conference Centre, Dublin

18th & 19th October 2006

