



**Response by Energia to Single Electricity
Market Committee Consultation Paper
SEM-12-028**

Treatment of Curtailment in Tie-Break Situations

25 May 2012

Table of Contents

1. Executive Summary	2
1.1 The critical importance of financial viability	3
1.2 Energia's thesis:	4
1.3 The financing evidence	6
1.4 Other key points	10
1.5 Evaluation of options against assessment criteria	13
2. General Comments.....	14
3. The Financing Evidence	19
4. Evaluation of Options	28
5. Key Conclusions	32

1. Executive Summary

Energia welcomes this opportunity to respond to this Single Electricity Market (SEM) Committee consultation paper SEM-12-028 on the treatment of curtailment in tie-break situations. Energia's view is diametrically opposed to that of the Irish Wind Energy Association (IWEA), despite being a full member of IWEA. Energia has consistently been a strong advocate of grandfathering curtailment on the basis of firmness and in this response we further demonstrate the necessity and efficiency of this with reference to financing evidence. Around **€4.5bn** of additional investment will be required in windfarm projects in order to finance the additional 3,000MW needed to reach the 2020 renewable targets. This cannot be supported by company balance sheets and will not be achieved without project financing.

We expect by now, given extensive debate and prolonged consultation, that the SEM Committee comprehensively understands the arguments for and against grandfathering versus pro rata curtailment in tie break situations, and we remain confident that its decision in section 3.5 of SEM-11-105 was fully reasoned and justified in line with its statutory objectives.

The SEM Committee previously concluded that the grandfathering of curtailment, relative to other options considered (pro-rata); **benefits customers, is the most efficient and cost effective approach, provides an efficient entry signal, improves bankability, improves investor confidence, provides consistency of decision making and certainty**, and will **facilitate achievement of renewable targets**. Energia completely supports that SEMC decision, albeit noting a required amendment with respect to gate 2 temporary connections, and is confident that a full assessment of the evidence will further support and confirm that the SEMC was right in its decision to grandfather curtailment on a firm access basis. It is firmly Energia's view that the evidence provided by IWEA and others to the SEMC prior to the re-opening of the decision failed to consider the critical impact of financeability and investment viability. Without such consideration their conclusions on project build-out are unsubstantiated.

It was a highly unusual step to re-open the previous decision after a sustained lobby by trade associations and others. The burden of proof for deviating from that decision must now rely very much on the integrity, robustness and objectivity of any "new evidence". As the SEM Committee will be well aware there is a great deal of hype and rhetoric within the industry on the allocation of curtailment, with predictions of dire consequences if a pro rata approach is not adopted.

The primary impact of a decision on the allocation of curtailment will be its consequences for efficient investment and entry signals, achievement of renewable targets, and resulting costs to the consumer (all intricately related) and this should be

the focus in the decision making process informed by carefully vetted and interpreted evidence.

We note that an option for temporary pro rata (Option 3) has been put on the table, described by the SEM Committee as a ‘middle ground position’. The suggestion is that pro-rata curtailment up to 40% renewable targets and then moving to grandfathering with reference to firmness could potentially address the shortcomings of an open ended pro rata approach but yet capture the benefits of grandfathering, resulting in the efficient achievement of renewable targets¹. It is our considered view, supported by evidence, that this approach (or variation thereof) is not materially different from open ended pro rata in terms of the financing implications, efficient achievement of renewable targets, efficient entry signals and costs to the consumer. This is because of the highly truncated impact of curtailment on financing and because any *temporary* aspect of pro rata curtailment would lack credibility².

There are two basic requirements to facilitate achievement of renewable targets in both jurisdictions; (1) infrastructure development (i.e. grid development and expansion) and (2) investment from windfarm developers in order to continue progression towards the renewable targets. The absence of either of these conditions would put the 2020 renewable targets out of reach. A decision on the allocation of curtailment further to this consultation will only affect the investment viability and will not determine grid development. There is also an important second-order implication for customers where substantial investment by EirGrid and NIE, paid for by customers, could be stranded due to the inability of developers to enter the market as to do so would be uneconomic. Grandfathering on the basis of firmness also provides a clear timeline for projects to connect in accordance with delivery of FAQ. Proponents of pro rata argue that grandfathering could lead to an inefficient use of grid assets, as projects will only build close to when they achieve firm access. We argue that if projects cannot be efficiently financed then the grid build is much more likely to become stranded.

1.1 The critical importance of financial viability

Energia has consistently stressed the importance of financial viability throughout the consultation process on tie breaks. As noted above, around **€4.5bn** of additional investment will be required in windfarm projects in order to finance the additional 3,000MW needed to reach the 2020 renewable targets. This cannot be supported by company balance sheets and will not be achieved without project financing.

¹ We assume ‘middle ground position’ does not refer to striking a compromise within the industry on an acceptable way forward given the polarised views on this issue.

² From a financing perspective, temporary pro rata will be considered de facto pro rata unless it is unambiguously and without discretion linked to a specific end-date from which grandfathering on the basis of firmness applies.

Energia has project financed 5 windfarm construction projects and re-financed 5 operational windfarms in the last 2 years, including projects on both sides of the border. Our most recent financing closed on 31 May 2011, and we remain active in the financing markets. We have project finance loans from 5 different banks, both Irish and international, and are also currently in active discussions with other banks on project financings for a further 100MW which are due to commence construction in 2012. Coming from this position we are well placed to comment and provide evidence on the financing implications of curtailment, which we think is a very important contribution to this response.

Any assessment of achieving renewable targets by 2020 must include a serious consideration of the impact of the allocation of curtailment on debt finance capacity and project economic viability. Without that, any analysis is fundamentally flawed. Arguments should not be made in the abstract, assuming that renewable targets will be met regardless of how curtailment is applied. To assume that targets will be met under pro rata curtailment (or some variation thereof) for example would wrongly pre-suppose that pro rata provides financing investment conditions on a similar basis to grandfathering. This is simply not the case as our experience and modelling demonstrates, and as discussed with lenders and financial institutions. The IWEA position has largely been an engineering-led view, which has failed to take account of the needs of the financing and investment community. Given the need for €4.5bn investment in wind generation projects this is a serious omission.

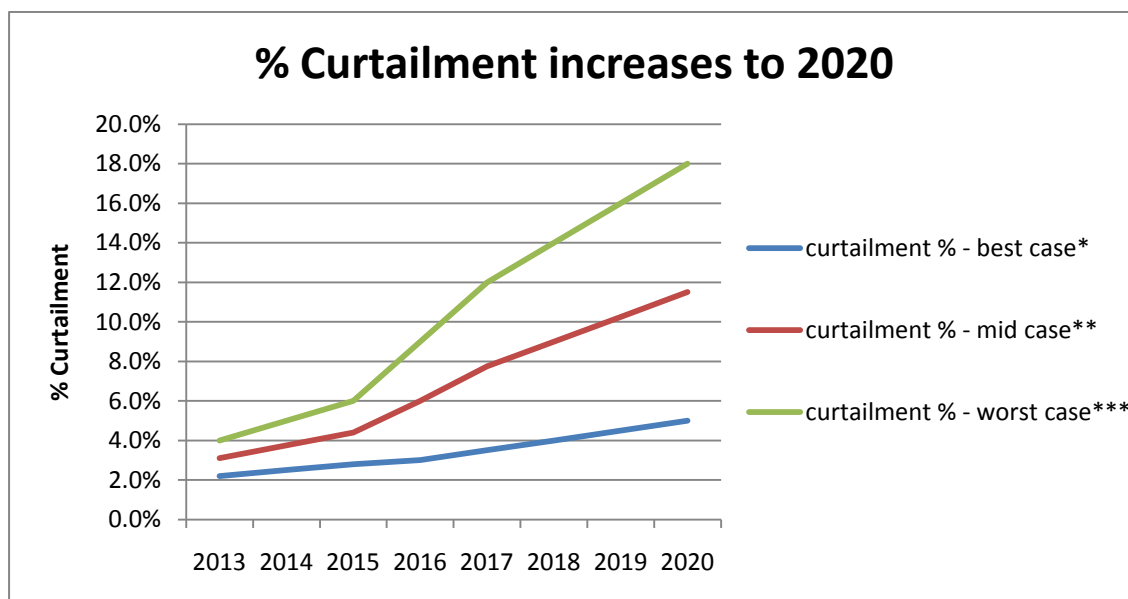
1.2 Energia's thesis:

- Financing efficiency and stability of the investment framework is essential if the necessary substantial levels of investment are to be achieved.
- Curtailment is a largely prospective phenomenon that is not well understood. The market has not experienced significant levels to date, and the island of Ireland will be at the forefront of experiencing curtailment given the need to achieve 2020 renewable targets through high levels of intermittent wind generation on a small islanded system.
- Whilst some key measures for mitigating high levels of curtailment have been identified by EirGrid, SONI and others, no-one has yet worked out a coordinated step plan to implement and achieve the best case curtailment scenario that has been modelled by them. The predicted best case levels of curtailment are based on optimistic assumptions of achieving (in the short-to-medium term) inter alia, full export across interconnections during times of high wind, and dramatically enhanced universal Rate of Change of Frequency (RoCoF) limits along with other DS3 actions increasing system non-synchronous penetration levels from 50% to 75% at any one time. EirGrid's own projections for 2020 in their June 2011 report show a range of curtailment on a pro rata basis of between 5% and 22%.

- The fact that these are unknowns means there is a significant risk that the best case will not materialise and that some higher level of curtailment than is commonly assumed has a more realistic probability of occurring. This is likely to be a mid-case, somewhere between achieving all mitigants, and achieving no mitigants. These are indicative views of curtailment projections, based on publicly available information, and we believe them to be broadly reasonable of the range of potential curtailment outcomes, instructive for the purposes of assessing the differential impact of the allocation of curtailment. We have not modelled curtailment levels ourselves, and the projected levels shown should be regarded as indicative. In our view a mid-case curtailment, shown in Figure 1 below, is likely to be factored into the planning of banks, technical advisors and investors, leading to a financing inefficiency, which we have assessed in this response would have an extremely detrimental impact on project economic viability, leading to between 40% and 65% fewer projects being viable in a *credible* 2018 pro rata scenario or an open ended pro rata scenario respectively, as compared with a grandfathering scenario³. Under grandfathering, the expectation is that projects with 100% FAQ will see minimal levels of curtailment of between 0.5% and 1% by 2020. This will protect existing investments and will provide the most efficient basis and lowest cost financing going forward. Under grandfathering non firm projects are likely to build within 1-2 years ahead of full firm access.
- With respect to existing projects, Energia understands that the banking community has adopted a united position that existing windfarms must be protected from the effects of future curtailment. This is a principle of grandfathering. The banking community are rightly concerned at the potential for project default if curtailment is applied to projects pro rata. They have indicated to Energia that if this were the case, the banks would see it as a retrospective regulatory change, which would be extremely damaging for the project finance market in Ireland. Energia has assessed that a 10% application of curtailment to a firm access REFIT 1 windfarm in any one year in which P90 capacity factor occurred could put it into financial default, depending on the level of market compensation receivable. This is an extremely alarming possibility if pro rata curtailment is applied.

³ This assessment is based on the results of a debt financing model, analysis of historical energy capture rates against a normal distribution curve, and Energia's considerable practical experience.

Figure 1: All island curtailment scenarios to 2020



*Indicative pro rata curtailment levels in best case scenario based on outputs from EirGrid, IWEA, Redpoint and Irish Grid Solutions. **Mid case is indicative view of pro rata curtailment assuming mitigation measures are only partially successful. ***Worst case is indicative view of pro rata curtailment assuming mitigation measures are wholly unsuccessful. The best case projection is consistent with EirGrid's lower range of 5% curtailment by 2020 and the worst case projection is a more optimistic view of EirGrid's upper range of 22% curtailment by 2020.

1.3 The financing evidence

In order to assess the impact of curtailment on the financial viability and debt capacity of onshore wind generation projects, Energia has developed a debt financing model in conjunction with PKF, a highly reputable financial modelling firm. We use this model to assess the potential for debt financing and returns for our development projects. We have used this model to provide quantitative realistic evidence that applying curtailment on a pro rata basis (or temporary pro rata basis) introduces a highly detrimental financing inefficiency. The key assumptions of the model, as set out more detail in a confidential annex, include revenues based on REFIT 2 support inclusive of 90% supplier payments⁴, a range of P50 energy captures covering 90% of wind farm projects, a range of curtailment scenarios as per Figure 1 above, a debt service cover ratio (DSCR) of 1.2, and capex of €1.5m per

⁴ The economics of Northern Ireland (NI) windfarms is better than their Republic of Ireland (RoI) counterparts due to ROCs and LECs under the NI renewable support schemes. However the principle is the same – i.e. grandfathering will lead to more efficient financing with lower equity requirements, higher gearing, and improved returns for more marginal projects.

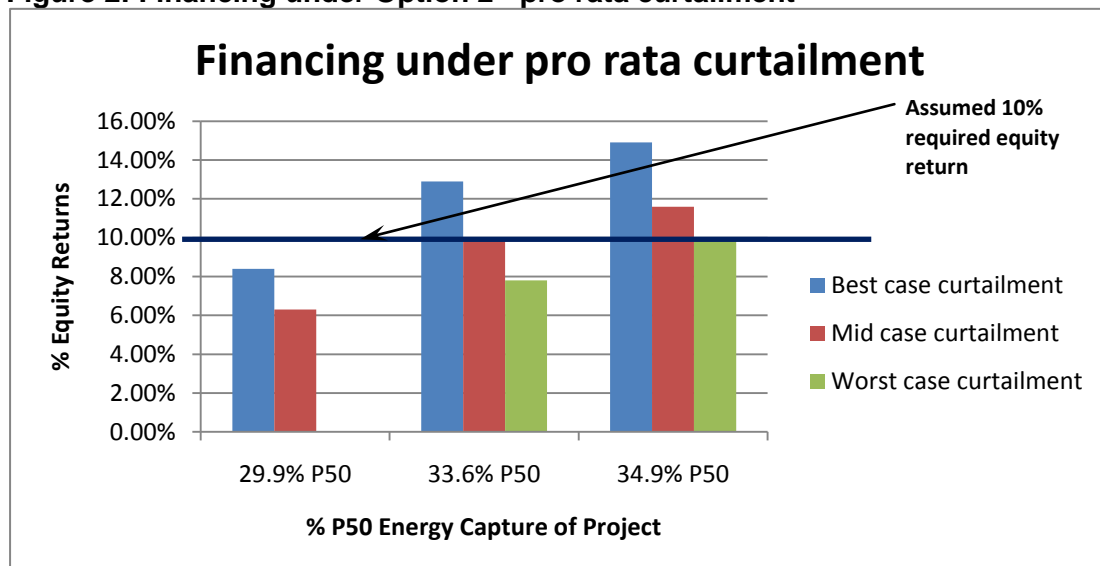
MW for a 10MW windfarm in the market. Similar indicative results would apply for larger windfarms, with the main difference being a lower average capex cost per MW.

Developers required rates of return can vary depending on project risk assessments. For the purposes of comparison between the curtailment allocation options, we assess the impact based on a 10% equity return hurdle rate applied against P50 output levels. Under grandfathering, we believe that equity hurdle returns should be lower for firm access projects, as they face a lower risk of volatility of curtailment outcomes and will access a higher debt capacity.

We think 10% on a P50 output basis is in fact a conservative view, and is within the range set out in the BNE assessment. If the required equity return rate is increased above this level financing on a pro rata basis would be even more detrimental to achievement of the 2020 targets.

A brief summary of the results is provided below.

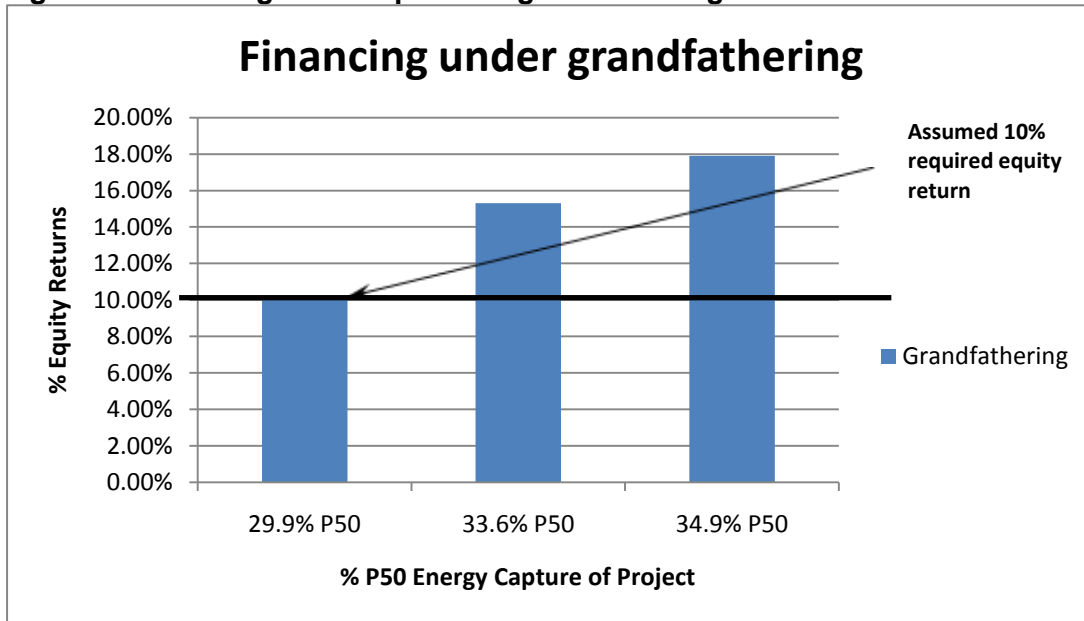
Figure 2: Financing under Option 2 - pro rata curtailment



*negative equity returns are not shown graphically in the 29.9% P50 scenario

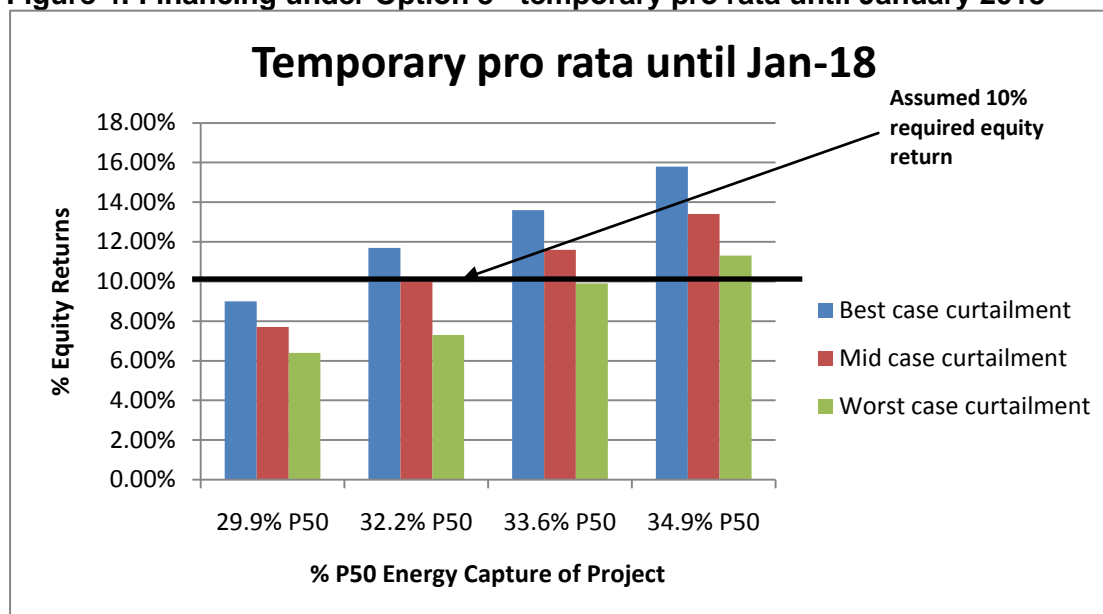
Under **Option 2**, Figure 2 shows that pro rata curtailment in the mid case scenario where not all curtailment mitigation measures are successful (most likely to be factored into the planning of banks, technical advisors and investors) introduces a detrimental financing inefficiency that would, assuming a required equity return of 10%, make financing wind generation projects unachievable for any project with a P50 energy capture of less than 33.6%. Table 2 in section 3 below shows that the mean capacity factor for windfarms in Ireland over the last 10 years is 32.4%. This is broadly comparable to a 10 year P50 capacity factor. Informed by analysis and experience, typically less than 35% of projects would be expected to have a P50 energy capture equal to or greater than this. Thus at least 65% of projects would not be economically viable under pro rata curtailment. This can be compared with the grandfathering scenario, illustrated in Figure 3 below.

Figure 3: Financing under Option 1 - grandfathering curtailment



Financing wind generation projects when curtailment is grandfathered on the basis of firmness as per **Option 1**, shown in Figure 3, clearly provides the most efficient financing outcome. Financing projects on this basis, assuming a required equity return of 10%, should be achievable for any project with a P50 energy capture of 29.9% or greater – informed by statistical analysis and experience this would typically include over 90% of projects.

Alternatively under **Option 3** when curtailment is *credibly* applied on a temporary pro rata basis until January 2018, followed by grandfathering on the basis of firmness, this does not ameliorate to any significant extent the detrimental financing inefficiency associated with the open ended pro rata curtailment of Option 2, as shown in Figure 4 below. This is because of the highly truncated impact of curtailment on financing, which also illustrates the detrimental impact of a delay in implementing curtailment mitigants under either Options 2 or 3.

Figure 4: Financing under Option 3 - temporary pro rata until January 2018

As shown in Figure 4, assuming a required equity return of 10%, financing wind generation projects under Option 3 would be unachievable for any project with a P50 energy capture of less than 32.2%. Informed by analysis and experience, only 60% of projects would typically be expected to have a P50 energy capture greater than or equal to this. Thus 40% of projects would not be economically viable under credible temporary pro rata curtailment to January 2018.

Option 4 of financing wind generation projects when curtailment is applied on a pro rata basis with generators taking the risk will have an even greater detrimental effect on project financing than Options 2 and 3 and should be dismissed on this basis alone. It is also, like Options 2 and 3, dependent upon the ability to accurately and consistently distinguish between constraints and curtailment, the TSOs have already confirmed in clarification note SEM-11-086 that this is not possible.

The implications of these results for achievement of renewable targets is summarised in Table 1 below.

Table 1: indicative % build out based on a P50 equity return hurdle rate of 10%

Indicative % build out rates based on P50 equity returns $\geq 10\%$ *		
	Projects Built Out	Projects Rejected
Grandfathered Curtailment (Option 1)	90%	10%
Pro Rata Curtailment (Option 2)	35%	65%
Temporary Pro Rata Curtailment (Option 3)	60%	40%

** assessment based on analysis and experience (see Section 3 for details)*

We would conclude from this that the grandfathering approach to curtailment is most likely to promote the achievement of the renewable targets for 2020 on economic viability and financing efficiency grounds. We understand that EirGrid expect to deliver sufficient FAQ for the achievement of the targets (see 1.4 below) and we also argue that there is headroom that could be accessed by enforcing long stop dates on capacity blocking connection agreements and there are further policy tools that could be used at a later stage, should delivery of FAQ fall behind programme.

We discuss the above results in further detail in section 3 of this response. Given the propriety nature of the model used and the commercial sensitivity of its input assumptions we provide a confidential annex with more details of the results and assumptions for the RAs to consider. We are confident in the integrity and robustness of our modelling and analysis and would welcome a meeting with the RAs to go through this in detail.

1.4 Other key points

- **FAQ delivery** – Energia understands that EirGrid are projecting that sufficient 100% FAQ will be available to support the 2020 targets by 2018. This finding contradicts the position put forward by IWEA and others. With respect to the delivery of Gate 3 Firm Access Quantities (FAQs) in particular, EirGrid has recently expressed its belief that there is scope for some improvements in firm access opportunities. EirGrid has initiated a project to investigate these opportunities, with one of the high level goals of this work being the facilitation of more access to the network⁵. It should also be noted that within the 5,200MW needed to achieve the targets on an all island basis, there is over 850MW of conventional plant connection offers blocking capacity for projects that are not being progressed, and may well have passed their longstop dates. A good example is the 445MW Ballykelly CCGT (Quinn/NAMA) which has made no progress and is likely to have passed its longstop date. If this blocked capacity is freed up, there is substantial headroom to achieve FAQ for the 2020 targets. Energia believes that FAQ is a reasonable proxy for the system's ability to manage the curtailment optimally for any windfarm. For example, transmission upgrades are necessary to ensure that excess generation is transferred to interconnectors, which are a key mitigant of curtailment. Energia does not accept the IWEA position that firm access is a 'wrong' basis for the allocation of curtailment.
- **Future intervention if necessary** - It should be noted that if a grandfathering approach is adopted based on firm access, and if it turns out that rate of delivery

⁵ Eirgrid Customer Connections Forum, 22 May 2012.

is slower than necessary for the achievement of the 2020 targets, regulators and Government departments will have further opportunities to intervene as appropriate in the coming years. For example in the Republic of Ireland, the follow on to REFIT 2 could be paid on availability, removing the financial risk of curtailment from a specific tranche of generators at that time. As would apply to Northern Ireland, serious consideration is already being given under EMR to pay windfarms on availability when they are curtailed. Alternatively, deemed firm access could be used to compensate non-firm generators if FAQ has not been delivered to them.

- **Cost to the consumer** - Energia understands that grandfathering will produce the lowest cost to the customer in 2020 (and should also do so in the preceding years)⁶. The estimated cost differential may be marginal between grandfathering and pro rata approaches based narrowly on a Dispatch Balancing Cost and SMP calculation, but there is no doubt that the efficient allocation of firm access through grandfathering will minimise excess curtailment, maximise financing efficiency from which the customer will benefit through a greater number of projects having financial viability to proceed, and will provide a clear timeline for projects to connect in accordance with delivery of FAQ (disincentivising investments where the network cannot accommodate them in the process)⁷.
- **Temporary connections** - Energia firmly supports Option 1 for grandfathering on the basis of firm access; however, the specific issue of Gate 2 temporary connections does need to be addressed as this was overlooked in the previous decision. Unless Gate 2 temporary connections are included in the grandfathering category there is a significant risk that they would see very high levels of curtailment until they achieve a permanent connection, and could go into financial default. This has the potential to undermine the debt financing market, and has been a significant reason for some participants to reject the grandfathering approach previously. This can be avoided by extending grandfathering of the allocation of curtailment to this category of windfarms. This would not change their firm access and hence compensation status, but would mean they experience manageable levels of curtailment for already financed existing projects.
- **Consistency of constraints and curtailment** – the SEM Committee will be aware that the treatment of constraints will differ between constraint group areas, and outside those areas. Energia are of the view that it is particularly important that the treatment of constraints and curtailment be aligned within constraint
















⁶ Over time all projects should progressively achieve firm access and the cost differential between pro rata and grandfathering curtailment on the basis of firmness should narrow.

⁷ Proponents of pro rata argue that grandfathering could lead to an inefficient use of grid assets, as projects will only build close to when they achieve firm access. We argue that if projects cannot be efficiently financed then the grid build is much more likely to become stranded.

group areas, where high levels of constraints and curtailment are most likely to occur. Within constraint group areas (where a particularly high level of constraints is expected and thus grandfathering applies in respect of constraints) the application of pro rata curtailment will undermine the efficiency and benefits of grandfathering constraints.

- **Highly material impact of delays in implementing curtailment mitigation measures** - the pro rata to 2018 scenario (followed by grandfathering) illustrates the highly (truncated) material inefficiency impact of curtailment on financing and the detrimental impact of a delay in implementing curtailment mitigants. Thus it is not just that all mitigants may not be implemented fully by 2020 but, perhaps of equal importance, that their implementation will be delayed. To put this point into context, ESBPG presented a paper to the DS3 Working Group estimating that it could take up to take up to 30 months (and at a considerable cost) to complete a review of their RoCoF capabilities covering control and instrumentation and mechanical and electrical impacts and that there would be no guarantee that RoCoF capabilities could be increased at the end of this process. Now this timeline could be brought forward to 12-14 months if prioritization is given to the larger (base load and mid merit) generating units but this process hasn't even commenced yet. ESBPG and other thermal generators want assurances that their costs will be covered first (estimated cost of investigations is c. €250k per unit). For ESB this would be c.€5m for the prioritized fleet. The TSOs have identified RoCoF as the critical path for increasing the SNSP limit beyond 50%.

1.5 Evaluation of options against assessment criteria

	Assessment Criteria	Option 1 (Grandfathering)	Option 2 (Pro Rata)	Option 3 (Temporary Pro Rata)	Option 4 (Pro Rata with generators taking all the risk)
1.	Impact on the consumer and Dispatch Balancing Costs (DBC)				N/A
2.	Facilitation of Ireland and Northern Ireland 2020 Renewable Targets				N/A
3.	Efficiency of Entry Signal				N/A
4.	Stable Investment Environment				N/A
5.	Consistency of treatment for constraints and curtailment				N/A

Please refer to section 4 of this response for discussion of the above. Note that Energia's view is that option 4 is not a feasible option.

2. General Comments

Energia has consistently supported a grandfathering approach to the treatment of curtailment in tie-break situations. The basis for this position is provided in our response to SEM-11-063. We now add quantitative evidence, assessing Options 1, 2 and 3 of the current consultation paper, and demonstrate their differential impact on the financial viability of projects. We conclude that Option 3 has a similar detrimental impact on project viability to Option 2, though it does slightly ameliorate the position compared to Option 2.

In the context of this consultation, it is worthwhile briefly reviewing the SEM Committee's rationale for the decision presented in the previous decision paper;

- *"A grand-fathering approach will result in saving to Dispatch Balancing Costs (DBC) for the all-island customer.... The SEMC believes that, on a net basis a grand-fathering/firm access hierarchy approach as identified in section 3.4 above to curtailment in tie-break situations is the most efficient and cost effective for the all-island customer, bearing in mind the delivery of the 2020 renewable targets."*
- *"From an economic theory perspective, grand-fathering of curtailment should provide a signal to the marginal renewable plant in future years of whether it is financially viable to connect to the system."*
- *"The SEMC believes that a grand-fathering approach to curtailment issues (post application of the principles and hierarchy set out in section 4.4 of SEM-11-062), akin to the treatment of constraints as outlined in section 3.4 above, will help the bankability of those Generators with firm connection offers or who are earlier in the "connection queue". The SEMC can see the argument that such an approach should enhance investor confidence and help delivery of renewable projects and, by extension, progress on achieving the 2020 renewable obligations, at least in the short to medium term."*
- *"The SEM Committee has taken this decision to provide as much certainty as possible to Generators who are closer to connection and more likely to contribute to meeting Ireland and Northern Ireland's renewable targets. While the SEMC accepts non-firm Generators will have to accept greater levels of curtailment in the short to medium term than they would have under a pro-rata approach, the approach is designed to Generators who have made investments, particularly those in the most efficient locations. This approach is consistent with grand-fathering of access rights in the SEM, as favoured by the SEM Committee."*

In summary, the SEM Committee has previously concluded that the grandfathering of curtailment, relative to other options considered (pro-rata); **benefits customers, is the most efficient and cost effective approach, provides an efficient entry**

signal, improves bankability, improves investor confidence, provides consistency of decision making and certainty, and will facilitate achievement of renewable targets.

Energia completely supports the SEMC decision, albeit noting a required amendment with respect to gate 2 temporary connections, and is confident that a full assessment of the evidence will further support and confirm that the SEMC was right in its decision to grandfather curtailment on a firm access basis.

It is firmly Energia's view that the evidence provided by IWEA and others to the SEMC prior to the re-opening of the decision was flawed and failed to consider the critical impact of financeability and investment viability. Without such consideration their conclusions on project build-out are meaningless.

There are two basic requirements to facilitate the achievement of renewable targets in both jurisdictions; (1) infrastructure development (i.e. grid development and expansion) and (2) investment from wind farm developers in order to continue progression towards the renewable targets. The absence of either one of these conditions would put the targets out of reach ahead of 2020. A decision on allocation of curtailment under this consultation will only affect the investment viability and will not determine grid development. There is also a second-order implication for customers where substantial investment by EirGrid and NIE, paid for by customers, could be stranded due to the inability of developers to enter the market as to do so would be uneconomic.

With respect to Grid 25, this is, *"EirGrid's strategy for the development of Ireland's transmission grid for a sustainable and competitive future. This strategy will support economic growth and job creation, provide a reliable supply of electricity for all consumers, provide the infrastructure to enable Ireland to realise its renewable potential and achieve the challenging 2020 target of having 40% of our electricity generated from renewable sources"*.⁸ Based primarily on EirGrid's grid strategy and analysis from SEAI, Minister Rabbitte recently expressed his confidence in Ireland achieving its 2020 renewable target.^{9,10} The Minister has also recently reinforced the importance of network development and expansion, and the need to ensure this is delivered.¹¹

With respect to the delivery of Gate 3 Firm Access Quantities (FAQs) in particular, EirGrid has recently expressed its belief that there is scope for some improvements in firm access opportunities. EirGrid has initiated a project to investigate these opportunities, with one of the high level goals of this work being the facilitation of

⁸ Eirgrid Grid 25 Newsletter, Issue 7, April 2012.

⁹ Minister Rabbitte, Dail Written Answer, 07 March 2012, Alternative Energy Projects (30/226).

¹⁰ Minister Rabbitte, *"It is expected that between what is already built in Gate 1 and Gate 2 and what has already contracted to build along with the remainder of Gate 3 is largely sufficient for the achievement of our 40% target, even if some Gate 3 developers ultimately decide not to accept their offer."* Dail Written Answer 02 May 2012, Elec Trans Network (34/144).

¹¹ Address by Minister Rabbitte at the Launch of the Eirgrid West Link Project, 4 May 2012.

more access to the network.¹² Energia would strongly suggest that firm access opportunities could be further enhanced by freeing up blocked capacity through enforcement of long stop dates in connection offers. We estimate that there is over 850MW of conventional plant connection offers blocking capacity for projects that are not being progressed, and may well have passed their longstop dates. A good example is the 445MW Ballykelly CCGT (Quinn/NAMA) which has made no progress and is likely to have passed its longstop date.

Despite the distinction we have already drawn between this consultation, noting that this decision will not impact network investment, it is nevertheless useful to highlight the views of policy makers and the transmission asset planners on this issue. Clearly confidence has been placed in the Grid 25 strategy to deliver the necessary grid infrastructure to facilitate achievement of renewable targets. Delivery will be key and as we have already seen, where delivery is behind expectations, appropriate targeted responses can be introduced. Should it subsequently turn out that FAQ delivery is not making the necessary progress, there are a number of Government, regulatory and operational policy levers, which could be used to intervene to ensure the targets will be met.

Curtailment has a cost with implications for customers. This consultation is about how to best manage/apportion this cost, while continuing to facilitate the achievement of renewable targets. The basis for the SEM Committee's decision in SEM-11-105 remains unchanged. There is no scope for compromise between the diametrically opposed views of market participants with respect to the previous SEM Committee decision. Energia notes the fundamental importance of re-affirming the previous decision of grandfathering curtailment on the basis of firmness, for reasons outlined in that decision, and then placing a greater focus on mitigating the underlying problem of curtailment.

The focus of this consultation should remain on the impact on the investment environment for developers, as previously outlined in SEM-11-105 as the stated basis for the SEM Committee's previous decision on the grandfathering of curtailment.¹³

It is first useful to consider the amount of investment required in wind farm project development alone in order for us to reach an all-island renewable target of 5,200MW. Taking the current level of installed wind capacity on the system as being 2,200MW, one can readily see that approximately 3,000MW of new wind farm capacity will be required on an all-island basis to reach the renewable targets in 2020. Assuming a cost of €1.5m/MW, this represents a required investment of €4.5 billion. Despite a few large companies' recourse to balance sheet financing in the

¹² Eirgrid Customer Connections Forum, 22 May 2012.

¹³ SEM Committee Decision Paper, SEM-11-105; *"The SEMC can see the argument that such an approach should enhance investor confidence and help delivery of renewable projects and, by extension, progress on achieving the 2020 renewable obligations, at least in the short to medium term."*, (p.17).

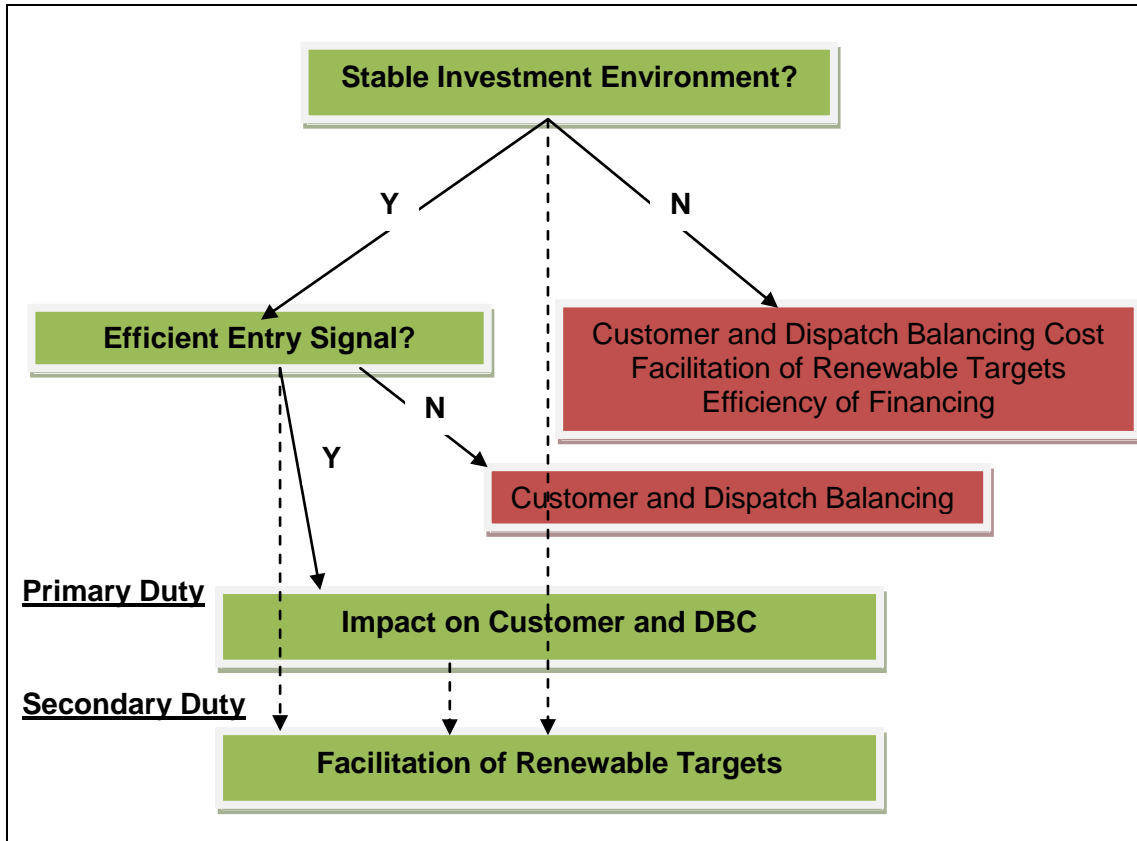
past, it is immediately apparent that this source of funding is not feasible in the context of the targets to be achieved. Project finance has played a considerable part in the achievement of current levels of wind capacity on the system but it is considered inevitable that this source of financing will become the primary and perhaps only option for delivering the vast majority of the remaining required investment.

Energia has extensive experience of project finance and since 2010 has had recourse to it in order to construct 80MW of operational windfarms on the island. Based on this experience and of that of the banks with which we have dealt, it is apparent that the availability of project finance to a developer will depend on a range of factors that primarily must ensure, at minimum risk, a stable and predictable cash-flow projection for the project. The exposure of existing and future developments to the current and increasing levels of curtailment on the system represent a potential risk to cash-flow projections. In order to minimise the adverse effects of this risk for future developments, the risk must be predictable, in the absence of this, significant inefficiencies will be introduced into the process. For existing projects, the effect of variable uncapped curtailment, coupled with the introduction of more windfarms, (a driver of curtailment), will jeopardise the viability of the financial model underlying the financing provided by both the bank and the investor.

Both debt providers and investors are important to the financial viability of a project. The more uncertain cash flow returns are, the less likely a bank is to provide finance. In the event that marginal projects are supported, banks will do so by offering terms reflective of their perceived risk of the project. This will require greater equity contributions from developers and as a result will lower the equity return for the developer. Thus, even if a marginal project does receive an offer of debt finance from a bank, it is more likely that the credit terms could be insufficient for the investor to proceed with the project, as it would not offer an economic return.

In making a decision on the allocation of curtailment it is crucial to focus on the need for a stable investment environment first and foremost and provision of efficient entry signals, as both fundamentally contribute to achievement of the SEM Committee objectives and duties, as shown in conceptual decision tree below. This decision affects the market and market dependent signals. It does not affect the investment in network infrastructure, the timely delivery of which, coupled with the market conditions outlined above, will allow for the efficient and cost-effective development of wind capacity that must be delivered to achieve our targets. Properly managed, this investment can benefit both investors and customers but conversely, market arrangements that do not align capacity investment with network investment risks creating a market driven by subsidy and not supported by it, to the benefit of all.

Conceptual decision tree



3. The Financing Evidence

We have already stressed the critical importance of project financial viability for achievement of renewable targets. In this section we provide a detailed assessment of the impact of the allocation of curtailment on debt finance capacity and project economic viability. The financing evidence provided herein is notably absent from the pro rata lobby of IWEA and others which has taken an engineering-led view of project build out and achieving renewable targets. Given the need for €4.5bn investment in wind generation projects this is a serious omission in their analysis.

In order to assess the impact of curtailment on the financial viability and debt capacity of onshore wind generation projects, Energia has developed a debt financing model in conjunction with PKF, a highly reputable financial modelling firm. We use this model to assess the potential for debt financing and returns for our development projects. We have used this model to provide quantitative realistic evidence that applying curtailment on a pro rata basis (or temporary pro rata basis until January 2018) introduces a highly detrimental financing inefficiency. We conclude that Option 1 is clearly preferable to Option 2 from a financing perspective, and is amenable to the efficient achievement of renewable targets. When curtailment is *credibly* applied on a temporary pro rata basis until January 2018, followed by grandfathering on the basis of firmness, as per Option 3, this does not ameliorate to any significant extent the detrimental financing inefficiency associated with the open ended pro rata curtailment of Option 2. This is because of the material inefficiency impact of curtailment on financing, which also illustrates the detrimental impact of a delay in implementing curtailment mitigants under either Options 2 or 3.

The key assumptions of the model, as set out more detail in confidential annex 1, include revenues based on REFIT 2 support inclusive of 90% supplier payments, a range of P50 energy captures covering 90% of wind farm projects, a range of curtailment scenarios as per Figure 1, a DSCR of 1.2, and capex of €1.5m per MW for a 10MW wind farm in the market. The results presented below show that at least 65% of REFIT 2 projects will not be financeable under pro rata curtailment, and that at least 40% will not be financeable under temporary pro rata (until January 2018). In contrast 90% of projects should be financeable if curtailment is grandfathering on the basis of firmness.

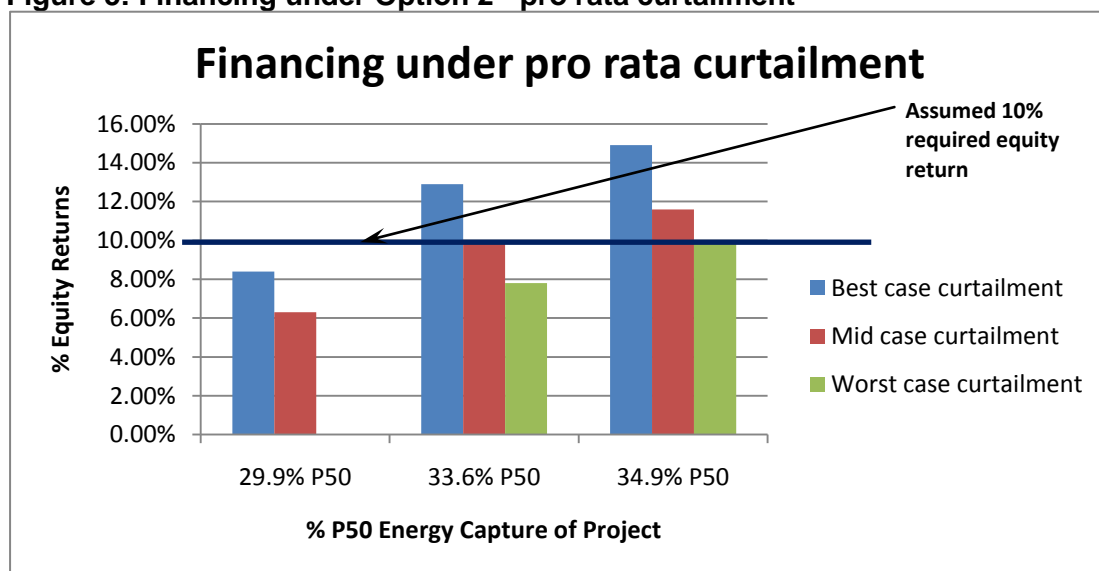
The context of our analysis has already been explained in the Executive Summary. It is based upon the premise that a mid case curtailment scenario, shown in Figure 1 earlier, is likely to be factored into the planning of banks, technical advisors and investors, leading to a financing inefficiency, which Energia has assessed would have an extremely detrimental impact on project economic viability under either pro rata or temporary pro rata versus the alternative of grandfathering.

Our assessment is based on the results of a debt financing model, an analysis based on historical energy capture rates used to construct a normal distribution curve, and our experience of investment returns analysis.

We begin our analysis with a bespoke debt financing model developed in conjunction with PKF and populate this with detailed realistic assumptions already described. This produces the following outputs for a 10MW project over various P50 energy capture rates under best, mid and worst case pro rata curtailment scenarios: (1) equity returns over a 20 year investment horizon; (2) debt capacity; and (3) equity requirements. The detailed results of this analysis are presented in tabular form in the confidential annex of this response (see confidential annex 2a and 2b).

These are summarised graphically below.

Figure 5: Financing under Option 2 - pro rata curtailment

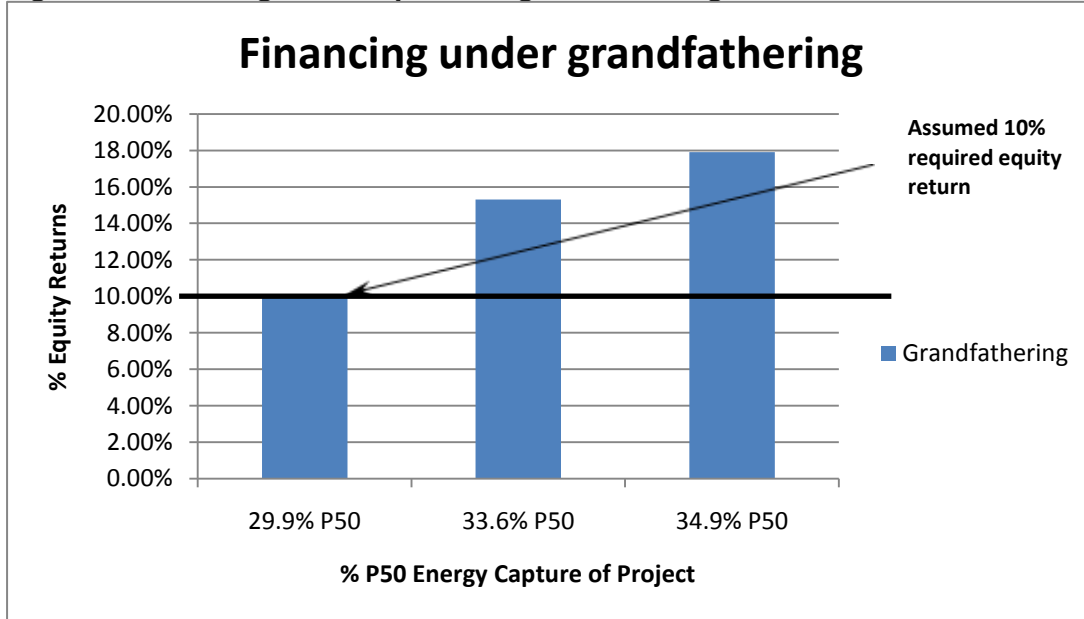


*negative equity returns are not shown graphically in the 29.9% P50 scenario

Under **Option 2**, Figure 5 shows that pro rata curtailment in the mid case scenario where not all curtailment mitigation measures are successful (most likely to be factored into the planning of banks, technical advisors and investors) introduces a detrimental financing inefficiency that would, assuming a required equity return of 10%¹⁴, make financing wind generation projects unachievable for any project with a P50 energy capture of less than 33.6%. Table 2 below shows that the mean capacity factor for windfarms in Ireland over 9 years is 32.4%. This is broadly comparable to a 10 year P50 capacity factor. This can be compared with the grandfathering scenario, illustrated in Figure 6 below.

¹⁴ Developers required rates of return can vary depending on project risk assessments. For the purposes of comparison between the curtailment allocation options, we assess the impact based on a 10% equity return hurdle rate. Under grandfathering, we believe that equity hurdle returns should be lower for firm access projects, as they face a lower risk of volatility of curtailment outcomes and will access a higher debt capacity.

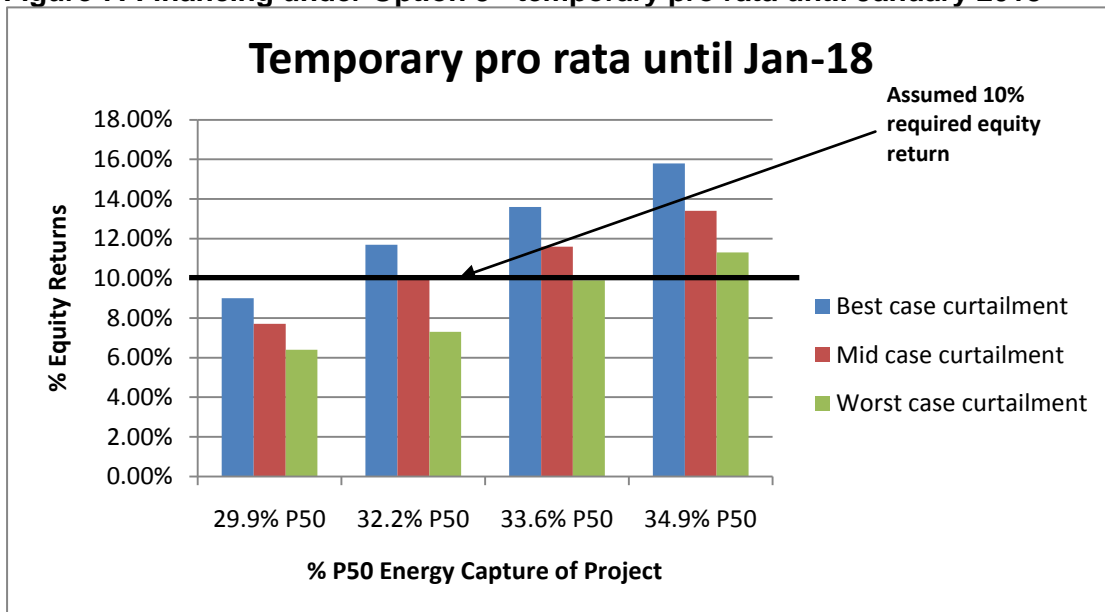
Figure 6: Financing under Option 1 - grandfathering curtailment



Financing wind generation projects when curtailment is grandfathered on the basis of firmness as per **Option 1**, shown in Figure 6, clearly provides the most efficient financing outcome. Financing projects on this basis, assuming a required equity return of 10%, should be achievable for any project with a P50 energy capture of 29.9% or greater.

Alternatively under **Option 3** when curtailment is *credibly* applied on a temporary pro rata basis until January 2018, followed by grandfathering on the basis of firmness, this does not ameliorate to any significant extent the detrimental financing inefficiency associated with the open ended pro rata curtailment of Option 2, as shown in Figure 7 below.

Figure 7: Financing under Option 3 - temporary pro rata until January 2018



As shown in Figure 7, assuming a required equity return of 10%, financing wind generation projects under Option 3 would be unachievable for any project with a P50 energy capture of less than 32.2%.

Option 4 of financing wind generation projects when curtailment is applied on a pro rata basis with generators taking the risk will have an even greater detrimental effect on project financing than Options 2 and 3 and should be dismissed on this basis alone. It is also, like Options 2 and 3, dependent upon the ability to accurately and consistently distinguish between constraints and curtailment, the TSOs have already confirmed in clarification note SEM-11-086 that this is not possible.

Debt providers and investors are both important to the financial viability of a project. The more uncertain cash-flow returns are, the less likely a bank is to provide finance. In the event that marginal projects are supported, banks will do so by offering terms reflective of their perceived risk of the project. This will require greater equity contributions from developers and as a result will lower the equity return for the developer. Thus, even if a marginal project does receive an offer of debt finance from a bank, it is more likely that the credit terms could be insufficient for the investor to proceed with the project, as it would not offer an economic return.

Taking the above into account, we now consider the implications of this for likelihood of project build out and achievement of the renewable targets. We reference the historical capacity factors in the All Island Generation Capacity Statement (GCS) 2011-20 and construct a normal distribution using the mean (32.433) and standard deviation (1.806) of this data, removing 2010 as an outlier (see tables 2 and 3 below for description of the data and summary statistics).

Table 2: Historically observed wind capacities

YEAR	Capacity Factor (%)	Source
2001	34	Source: GCS 2011-20
2002	34.1	
2003	34.7	
2004	33.4	
2005	32.5	
2006	31.4	
2007	29.1	
2008	31.7	
2009	31	
2010	23.8*	

*Outlier year

Table 3: summary statistics

Mean	2001-09	32.433
Std Dev	2001-09	1.806

We begin by assuming that future projects are similar to operational projects, such that they are expected, on average, to achieve a capacity factor of 32.4%.

Assuming that sufficient projects are consented and built to achieve 3,000MW necessary to achieve the 2020 targets, at 10% equity return and mid case pro rata curtailment we calculate the cumulative normal distribution at the three relevant capacity points; 29.9% (grandfathering threshold), 33.6% (pro rata threshold), and 32.2% (temporary pro rata threshold). At 29.9%, the cumulative normal distribution would indicate that 92% (3,156MW) of projects will be built (see Table 4 and Figure 8 below). At 33.6%, the cumulative normal distribution indicates that 25.9% (889MW) of projects will be built (see Table 4 and Figure 9 below). And at 32.2%, the cumulative normal distribution indicates that 55.1% (1,892MW) of projects will be built (see Table 4 and Figure 10 below).

Table 4: summary results from normal distribution analysis

Energy Capture	P(Build)	Target Project build pre financing impact of curtailment	Total Exp(Build) MW	2020 Targets achieved
29.9%	92.0%	3,432	3,156	Yes
33.6%	25.9%	3,432	889	No
32.2%	55.1%	3,432	1,892	No

This approach shows that grandfathering of curtailment will facilitate achievement of renewable targets whereas pro rata curtailment (even when credibly temporary until January 2018) would be likely to frustrate this goal from a financing perspective. This conclusion is based on the results of the debt financing model interpreted with reference to a normal distribution curve constructed from historical wind capacity factors. This is a prudent and objective approach. However, recognising that the actual distribution of windfarm projects may not fit a standard normal distribution curve, based on our experience and portfolio of 10 operating windfarms we provide a further view, which assumes a higher percentage of projects will have an energy capture above 33.6% going forward. This is because new projects will typically have increased hub and tip heights over historic projects, and new projects will also access improved power curves from technological advances.

Table 5: summary results from analysis and experience

Energy Capture	Energia View P(Build)	Target Project build pre financing impact of curtailment	Total Exp(Build) MW	2020 Targets achieved
29.9%	90%	3,432	3,089	Yes
33.6%	35%	3,432	1,201	No
32.2%	60%	3,432	2,059	No

The implications of these results for achievement of renewable targets is summarised in Table 6 below.

Table 6: indicative % build out based on a P50 equity return hurdle rate of 10%

Indicative % build out rates based on P50 equity returns $\geq 10\%$ *		
	Projects Built Out	Projects Rejected
Grandfathered Curtailment (Option 1)	90%	10%
Pro Rata Curtailment (Option 2)	35%	65%
Temporary Pro Rata Curtailment (Option 3)	60%	40%

* assessment based on analysis and experience (see Section 3 for details)

We would conclude from this that the grandfathering approach to curtailment is most likely to promote the achievement of the renewable targets for 2020 on economic viability and financing efficiency grounds. We understand that EirGrid expect to deliver sufficient FAQ for the achievement of the targets and we also argue that there is headroom that could be accessed by enforcing long stop dates on capacity blocking connection agreements and there are further policy tools that could be used at a later stage, should delivery of FAQ fall behind programme.

Figure 8: Impact of grandfathering curtailment according to normal distribution of historic energy factors

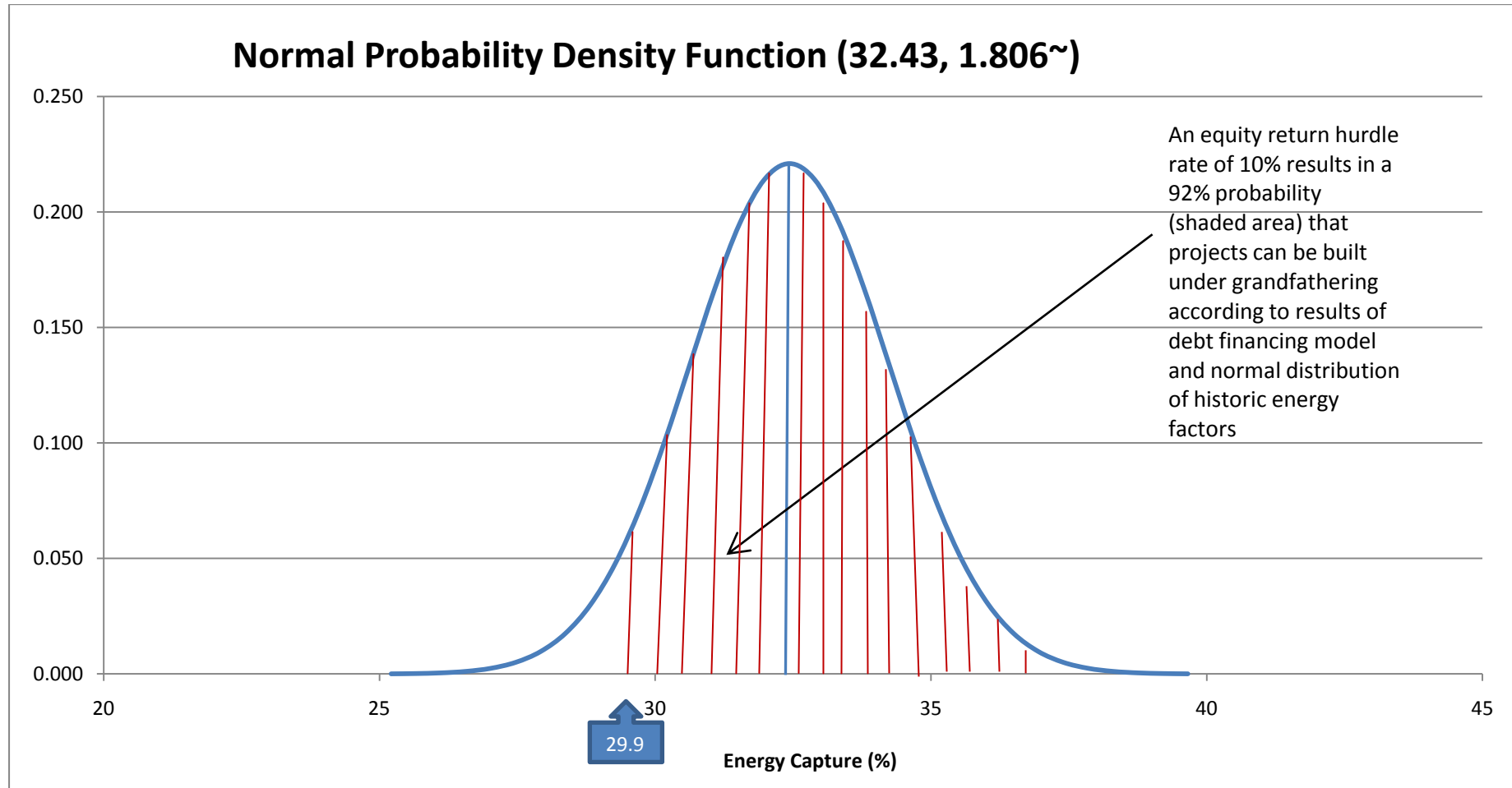


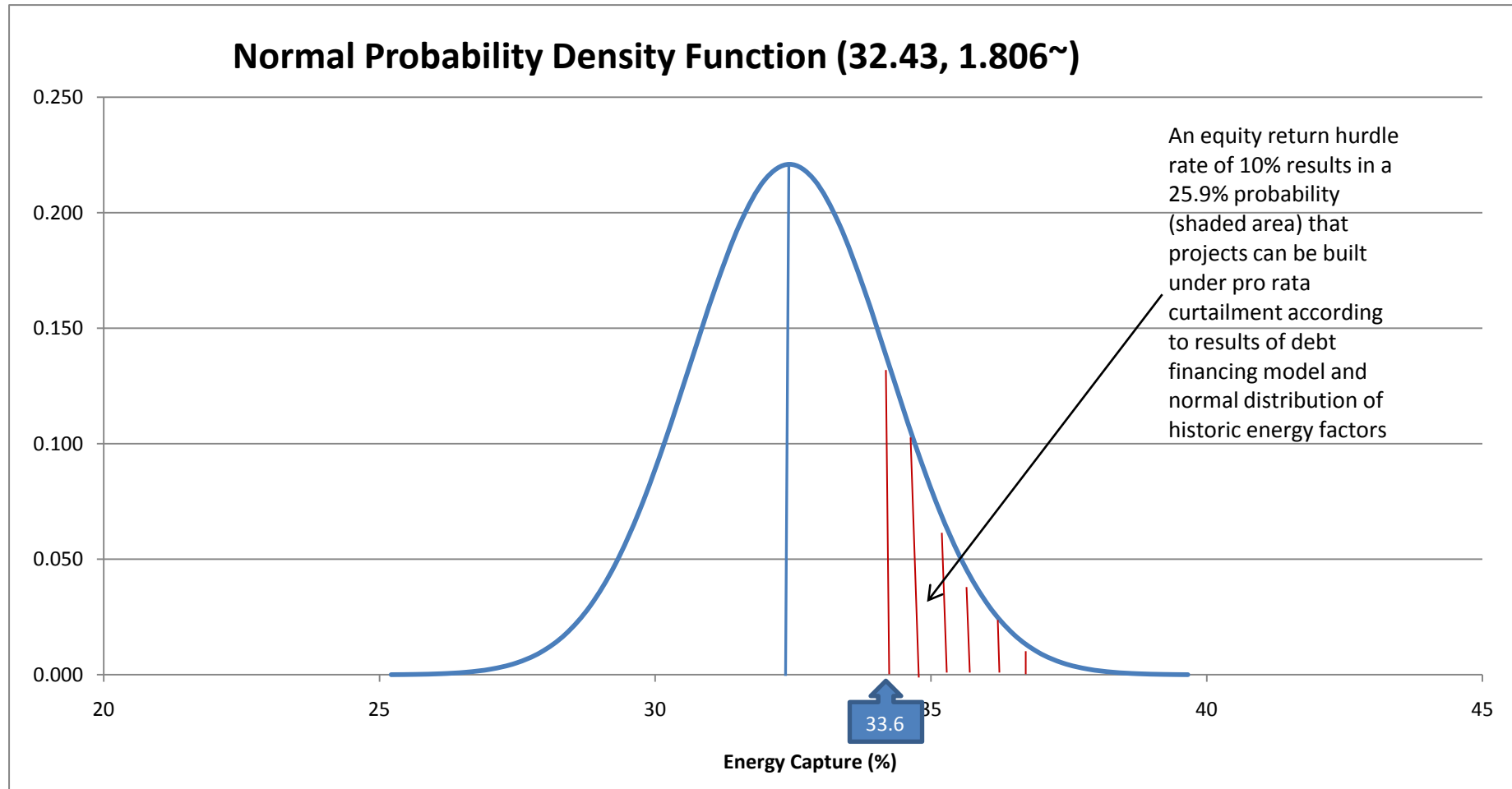
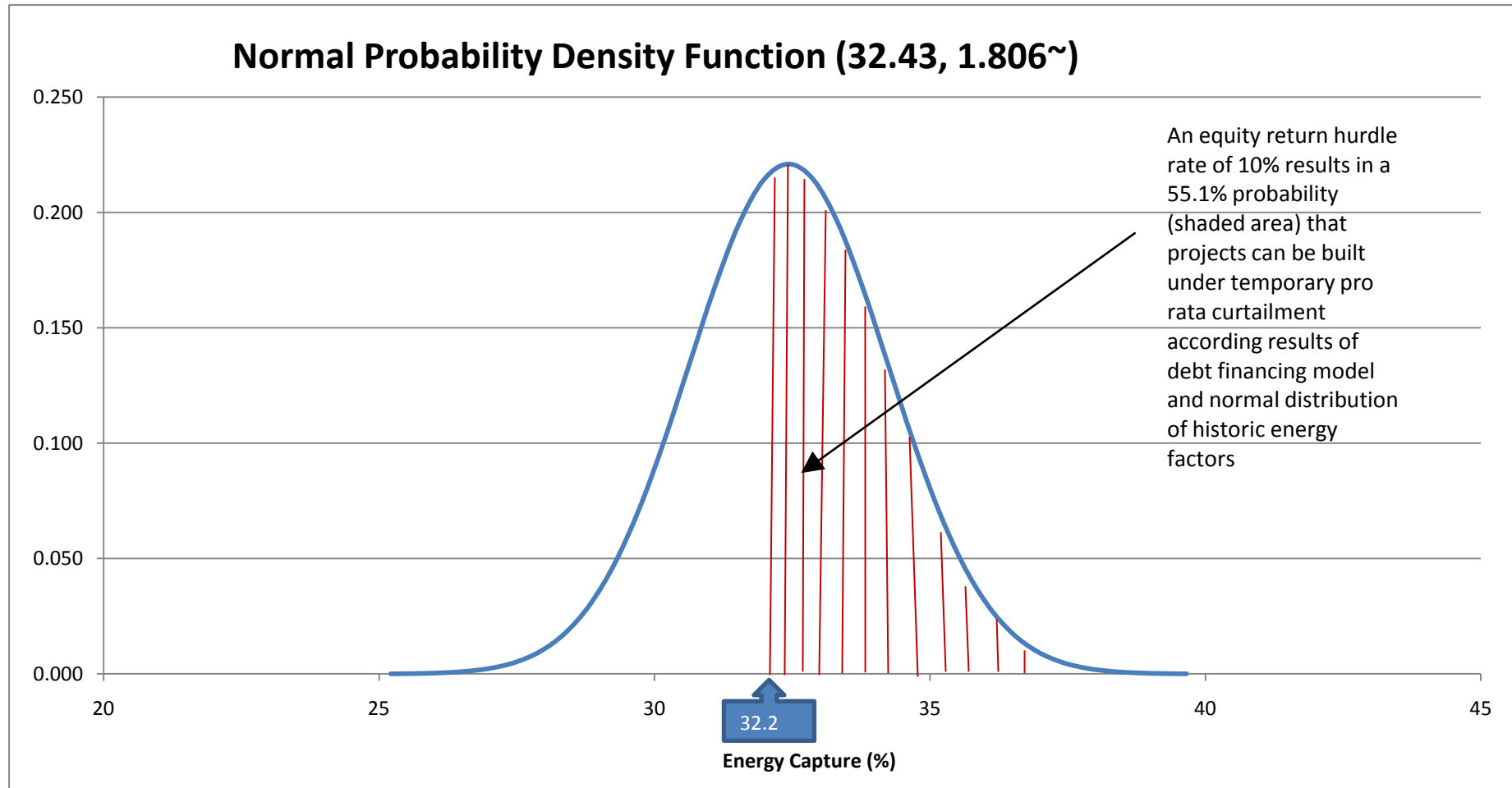
Figure 9: Impact of pro rata curtailment according to normal distribution of historic energy factors

Figure 10: Impact of temporary pro rata curtailment according to normal distribution of historic energy factors

4. Evaluation of Options

The SEM Committee have set five criteria with which to assess the four options presented in the consultation paper. The five criteria are;

- Impact on the Customer and Dispatch Balancing Costs (DBC)
- Facilitation of Ireland and Northern Ireland 2020 Renewable Targets
- Efficiency of Entry Signal
- Stable Investment Environment
- Consistency of Treatment for Constraints and Curtailment.

As there has already been some discussion of these criteria in our response above we now briefly consider the four options against SEMC's stated criteria.

Option 1 – Grandfathering

Following on from the discussion of the previous SEM Committee decision (SEM-11-105) in Section 2, the basis for the previous SEM Committee decision to grandfather curtailment is largely reiterated in this consultation paper. Energia remains supportive of this approach, and we firmly endorse a number of points made in the consultation paper in support of a grandfathering approach.

- **Impact on the customer and DBC** – All other things being equal, *“it is likely that the grandfathering of curtailment will be cheaper for the all island customer,... [T]he grandfathering approach is consistent with the SEMC's objective of customer protection”*. As outlined above Energia understands that this is likely to be confirmed by Eirgrid.
- **Facilitation of renewable targets** – *“Grandfathering of transmission access rights on the basis of firmness may lead to a more reliable and efficient achievement of the Ireland and Northern Ireland 2020 renewable targets, than alternative approaches.”* Energia believes that sufficient firm access will be delivered for the achievement of the 2020 targets, and that there is headroom available provided that connection agreement longstop dates are enforced. In addition there are further policy levers that Regulators and Departments have that could be deployed to address any shortfall in firm access quantities at a later date, should that become necessary. Energia is of the view that firm access is an imperfect but reasonable proxy for the system's ability to accommodate further wind generation and minimise any associated curtailment.
- **Efficiency of entry signal** – *“From an economic theory perspective, grandfathering of curtailment should provide a signal to the marginal renewable plant in future years of whether it is financially viable to connect to the system...[I]n essence grandfathering allocates the risks and costs of curtailment onto the ‘marginal’ wind generator”*. Energia believes that this is an important economic principle that will reduce the likelihood of excess

curtailment, will promote financing efficiency and provide a clear timeline for project build.

- **Stable investment environment** – *“Grandfathering therefore provides enough certainty to ensure investment by a ‘critical mass’ of generators.”* Energia fully endorses this view. Our financing analysis shows that significantly higher numbers of projects will be economically viable under a grandfathering approach than under a pro rata or temporary pro rata approach.
- **Consistency of treatment for constraints and curtailment** – *“[t]o adopt a different approach to curtailment than that which is used for constraints, without the certainty of differentiation in all instances, may lead to a non-transparent and potentially incorrect solution / allocation in certain instances.”* Energia believes that this principle is important in a constraint group area, where application of grandfathering for constraints and for curtailment is essential to maximise the financeability of projects in these areas. Pro rata for curtailment would be detrimental.

As already summarised in this response, it has been the SEM Committee’s stated view that the grandfathering of curtailment, relative to other options considered (pro-rata); **benefits customers, is the most efficient and cost effective approach, provides an efficient entry signal, improves bankability, improves investor confidence, provides consistency of decision making and certainty,** and will **facilitate achievement of renewable targets.**

In response to SEM-11-063 Energia submitted that, *“[A]pplying the grandfathering principle to both constraints and curtailment using firmness and date order as a proxy is furthermore justified on the basis that the frequency and severity of these events is clearly made worse by wind generators connecting to the system when the system cannot accommodate them.”*

The evidence presented herein demonstrates that the grandfathering of curtailment will maximise financing efficiency for marginal projects, is most likely to facilitate achievement of the 2020 targets, and is most likely to minimise cost to customers. We are strongly of the view that this approach best fits the criteria set out by SEMC.

Option 2 – Pro-Rata

- **Stable investment environment** - Would a pro-rata treatment of curtailment would provide a stable investment environment? The answer to this, based on the evidence presented herein, is emphatically no. A pro-rata treatment of curtailment would, at a minimum, substantially alter banks appetite for involvement in the market; the risk profile of the market; the terms of finance offered to investors; and, the basis of the equity investors’ returns. The inefficiency introduced into the financing of required investments would increase costs for customers, restrict investment in wind and prevent achievement of 2020 renewable targets.

- **Stable investment environment** - Furthermore, taking the investment in network infrastructure as exogenous, such an approach would risk stranding this investment. The removal of an efficient entry signal introduced by a pro-rata treatment of curtailment may compound this issue. In this event the customer will pay a high price for constrained and ultimately insufficient progress towards targets, delivered through inefficient financing arrangements.
- **Consistency of treatment for constraints and curtailment** - The consistent treatment of constraints and curtailment in a non-discriminatory manner can only be achieved where these two events can be categorically separated. Although these are two separate events, the similar treatment of them by the market is appropriate in the context of constraint groups, and a pro rata approach would contradict this.
- **Impact on the customer and DBC** – As outlined above Energia understands that Eirgrid are likely to confirm that pro rata would be a higher cost to customers. Whilst this may be a marginal difference on a direct cost basis, Energia argues that financing inefficiencies arising from pro rata will also ultimately lead to higher costs to customers.
- **Facilitation of renewable targets** - For the reasons outlined above, supported by evidence in this response, Energia is of the view that a pro rata approach will undermine the financeability of projects and therefore fail to promote the €4.5bn of investment necessary to achieve the 2020 targets.

Option 3 – Temporary Pro-Rata

Option 3 is a slight alteration on Option 2. It is Energia's considered view that on the substantive matters addressed herein, there is no material difference in the financing outcome for Option 3 as compared with Option 2. Our conclusions are not materially different to Option 2, and are repeated here for clarity.

- **Stable investment environment** - Would a temporary pro-rata treatment of curtailment provide a stable investment environment? The answer to this, based on the evidence presented herein, is emphatically no. A temporary pro-rata treatment of curtailment would, at a minimum, substantially alter banks appetite for involvement in the market; the risk profile of the market; the terms of finance offered to investors; and, the basis of the equity investors' returns. The inefficiency introduced into the financing of required investments would, increase costs for customers, restrict investment in wind and prevent achievement of 2020 renewable targets.
- **Stable investment environment** - Furthermore, taking the investment in network infrastructure as exogenous, such an approach would risk stranding this investment. The removal of an efficient entry signal introduced by a temporary pro-rata treatment of curtailment may compound this issue and

risks creating a market driven by subsidy as opposed to supported by it. In this event the customer will pay a high price for constrained and ultimately insufficient progress towards targets, delivered through inefficient financing arrangements.

- **Consistency of treatment for constraints and curtailment** - The consistent treatment of constraints and curtailment, in a non-discriminatory manner, can only be achieved where these two events can be categorically separated. Although these are two separate events, the similar treatment of them by the market is appropriate in the context of constraint groups, and a temporary pro rata approach would contradict this.
- **Impact on the customer and DBC** – As outlined above Energia understands that Eirgrid are likely to confirm that pro rata would be a higher cost to customers. Whilst this may be a marginal difference on a direct cost basis. Energia argues that financing inefficiencies arising from temporary pro rata will also ultimately lead to higher costs to customers.
- **Facilitation of renewable targets** - For the reasons outlined above Energia is of the view that a temporary pro rata approach will undermine the financeability of projects and therefore fail to promote the €4.5bn of investment necessary to achieve the 2020 targets.

With respect to the different options for the form of Option 3, it is important to note that no material difference in the financing impact is seen between setting a capacity or date limit to the ending of temporary pro-rata. In fact, the adoption of a date (1 January 2018) would be seen as highly questionable by market participants and would introduce a new and unnecessary regulatory risk with respect to likely lobbying of the RAs should progress towards the renewable targets prove to be slower than expected, thereby undermining the financing credibility of this approach.

Irrespective of the approach under Option 3, based on the new evidence presented herein, Energia considers that the temporary pro-rata treatment of curtailment will inherently slow the rate and level of investment in wind capacity due to unfavourable financial conditions for both banks and investors.

Option 4 – Pro-Rata with Generators Taking the Risk

Option 4 is a variant of option 2, under which curtailment is not compensated. This is a materially worse position for a debt provider or investor to contemplate, and we do not think this is financeable at all. In addition we note that it is not possible to distinguish between constraints and curtailment accurately in all cases, and this is especially critical where there is a financial difference in their treatment.

We do not believe this is a feasible solution,

5. Key Conclusions

Around **€4.5bn** of additional investment will be required in windfarm projects in order to finance the additional 3,000MW needed to reach the 2020 renewable targets. This cannot be supported by company balance sheets and will not be achieved without project financing.

The key impact of the decision on the allocation of curtailment will be on the financeability or otherwise of windfarm investments and project financing.

Energia has demonstrated unequivocally that the most efficient basis for project financing and investment viability is through the grandfathering of curtailment on a firm access basis as set out in Option 1, as amended for temporary gate 2 connected windfarms.

Temporary Pro rata (Option 3) has been shown to be not materially different to Option 2 (Pro rata) in respect of its impact on financeability, and does not represent a viable way forward, and is not a middle ground position.