11 January 2013

GB Stakeholder Comments on four areas identified in the ACER Review of the RFG Network Code.

Further to JESG Action 100, and JESG Agenda Item 5 attached are the six sets of comments received from GB Stakeholders prior to the 8 January deadline, on the four areas identified in the ACER Review of the RFG Network Code.

These issues will be discussed at the 15 January 2013 JESG Meeting.

Comments were received from:

1. BDR Thermea
2. Combined Heat & Power Association
3. ESB International
4. Heating & Hotwater Industry Council
5. Microgen Engine Corporation
6. Micropower Council

Comments on Network Code for Requirements for Grid Connection applicable to all Generators (RfG)

1. Background

BDR Thermea, known as Baxi in the UK, is Europe's leading supplier of micro combined heat and power (mCHP) solutions, with a total of over 30,000 mCHP units installed across Europe. BDR Thermea has over 20 years of experience in mCHP and now offers solutions based on a range of technologies including the Stirling, internal combustion engines and fuel cell.

The UK market leading mCHP is the Baxi Ecogen which uses the Stirling engine. Manufactured in Preston, the Baxi Ecogen is a small scale combined heat and power unit that can be installed in homes instead of conventional boilers. It saves around 1 tonne of carbon emissions per household compared to a UK Band A boiler and 2.7 tonnes compared to a Band G boiler annually.

It is the first commercially available UK mCHP product and the first Microgeneration Certification Scheme (MCS) approved mCHP. BDR Thermea has invested millions of pounds in product development, manufacturing tooling and market collateral to promote the product. Thus far the Baxi Ecogen is responsible for the vast majority of MCS registered mCHP installations in the UK.

2. The impact of the proposed Network Code

The Baxi Ecogen complies with current regulation in UK and Europe. For over 10 years mCHP has been governed by standards for grid connection, such as EN50438 and G83 in the UK, which allowed small generators to disconnect when the grid was outside the statutory frequency limits of 49.5 to 50.5Hz. These regulations were carefully considered when designing mCHP technology and significant time and money was spent on optimising efficiency and carbon savings and complying with regulations.

However, the proposed ENTSO-E code requires a frequency range of 47 Hz to 52 Hz which synchronised generators like the Baxi Ecogen cannot achieve. Engine redesign would take many years. Fitting a bespoke inverter would enable the unit to comply with the new code but add significant cost to the product which is already more expensive than a boiler. It would also significantly reduce the efficiency of the product, therefore eliminating much of the carbon savings it brings and making the product neither economically nor environmentally viable.

This new proposal requiring all small generators to operate over an enlarged frequency range comes before mCHP penetration levels have reached a point where developers can recover their initial costs let alone fund redesign. Importantly it also comes at a time when mCHP penetration levels are so low grid stability will not be impacted by this technology.

Whilst the Stirling engine is laying the foundations for the UK mCHP market it will only be a small proportion of mCHP future deployment. A group of UK mCHP developers and manufacturers have published a report setting an objective for the uptake of 1 million mCHP units in the UK by 2020. It is expected that only 18,576 of these 1 million mCHP units will be using Stirling Engine non-inverter technology. If the forecast of the mCHP industry is met, non-inverter grid connected Stirling engine mCHP will account for only 1.86% of the volume of UK installed CHP. These will be around 1kWe and account for less than 20 MW in 2020.

Whilst BDR Thermea appreciate that the work of ENTSO-E aims to provide reliable and stable electrical power to all consumers of electrical energy throughout Europe, we firmly believe that imposing the proposed frequency range of 47 Hz to 52 Hz requirement on Stirling engine mCHP is neither necessary nor helpful in achieving this aim. Since other mCHP technologies do comply with the frequency ranges in the code proposed by ENTSO, allowing this particular technology to continue to operate to the existing frequency requirements would have no significant impact on the grid and would not in any way compromise the objectives of ENTSO-E.

3. Proposals for a Significance Test

With the support of COGEN Europe BDR is proposing a change to the significance test, this proposal is outlined below.

- The significance test should be constructed in such a way to allow emerging technologies that cannot meet the proposed ENTSO-E RFG requirement due to the fact that they were governed by previous regulations time to establish a certain market penetration prior to having to meet the new requirements.

- This allows assessment to see if the technology will even reach a significant cross border generation level.

- Basing the assessment on market penetration is beneficial in two ways; firstly it allows already developed technologies time to develop efficient design solutions to meet the requirements and to generate income to pay for these new developments.

- A significance test based on penetration and cost benefit analysis for Type A modules that cannot easily meet the proposed code due to major design constraint making it fundamentally impossible without incurring vast costs and time and these technologies that are either close to market or in their infancy in the market at the time of CODE changes can be given time to see if they will reach sales volumes that could even cause grid aggravation. If so then a period is allowed for efficient and cost effective solutions to be found.

- A significant Type A generator is one whose total installed technology capacity in a synchronous area as reported by the DSO's (EED directive requirement) and monitored by the Regulator (fit and inform requirement as exists) exceeds the 0.1% of maximum system load. A manufacturer introducing a technology which does not fully comply with the Network Codes should identify the technology according to major type or new. Given that there are a range of technologies within the Type A generator category, each with its own and different characteristics with respect to the network code requirements, there is a degree of randomized response to failure due to this multiplicity of technologies. There is no implicit accumulation of the behaviours which suggest that the total accumulated capacity of all non-significant generators needs also to be limited. This said technologies with identical behaviours should be treated cumulatively.

- It is proposed that any distributed embedded mCHP technology with less than 300MW combined cumulative capacity in a synchronous zone should have minimal grid impact and is therefore not

deemed "significant." If 300 MW of capacity all shut down at once only a 0.1hz frequency effect would be the result.

- Each synchronous zone level to be reviewed individually based on the synchronous zone CBA.
- Each OEM to report penetration levels each quarter to each synchronous zone who in turn provide this data to ENTSO-E. Actual grid connections could be controlled and confirmed as per G83 by form filling at install to the DNO.
- Once the market penetration levels are exceeded by a technology then all new units being sold have to meet the ENTSO-E requirements.

Precedents already in place

- The UK in G83/2 have allotted a threshold of 50 MW for Linear Stirling generators .
- From BDR's market volume predictions mentioned previously, there would be an opportunity in which to find a cost effective and efficient solution up until approximately 2023.
- Germany has also recognised the unique situation of this technology and has added an exemption in VDE-AR-N4105

4. Why a Significance Test and not a Derogation?

The impact of the Network Code has been recognised and acknowledged by ACER. Referring to new technologies at small scale ACER stated, "These technologies may become important for the transition to a low carbon energy sector; however at present the Network Code risks stifling innovation by imposing onerous requirements before they are justified and potentially preventing new technologies from entering the market in time to contribute to the 2020 target".

ACER in its evaluation of the code specifically requested improvements to the "Significance test to identify significant Grid Users". ACER stated that this could be addressed by "targeted amendments to the Network Code".

The significance test is advantageous to everyone as it is then, as per ACER'S recommendation, hard wired into the ENTSO-E regulation from the start and is not open to interpretation and multiple complex national derogations which may jeopardise achievement of the overall objective of grid stability and clarity.

The significance test will make clear to manufacturers what the requirements are and when changes would need to be in place based on market penetration rather than burdening them with large cost at this stage while the technology is still in its infancy and developing or risking DNO/DSO deciding their fate. (Manufacturers are not allowed to apply for derogation[1])

The significance test approach deals with the issue now rather than moving it to individual DNO's/DSO's to solve the regulations issue; thus bringing certainty, clarity and stability.

The significance test can be centrally policed in terms of market penetration so no confusion on actual market penetration and it can be monitored so that estimated limits can be tracked and the technology growth known.

If this is left to a derogation then control and monitoring may be more difficult and there is a risk too many units could be installed as each country would need to inform ENTSO-E of its derogation numbers etc. and there is a danger of exceeding the spinning reserve allocation.

Derogations are more likely to be time limited rather than market penetration due to all the extra complexities of the derogation process and the decisions having to be taken locally. A time limited derogation is not sensible as any potential grid issues are about volumes rather than elapsed time and manufacturers will recoup their design costs and be in a position to re-design not as time passes, but as volumes increase. The significance test is not time dependant but concentrates on what is actually important i.e. grid aggravation due to market penetration levels.

A derogation would add bureaucracy, extra cost and time as it would require the derogation process to be clearly defined, the authorisation route to be determined and approved by DDNO/DSO's as well as ENTSO-E & ACER prior to being able to determine if it would be a suitable alternatives to the significance test.

A Network Code change, as well as being the route recommended by ACER, is likely to be the lowest cost for implementation compared to derogation.

A derogation would not restore investor confidence; in fact it would severely dent it as the process would be uncertain, complex and difficult to administer, creating exactly the conditions which undermine the confidence of investors.

7 January 2012

[1]

Technologies that cannot meet the proposed code at this time based on a CBA and not a major design restriction should be allowed to use a derogation procedure. Therefore a derogation procedure which allows manufacturers to apply for derogation for Type A modules is both logical and desirable for already significant but early stage technologies will find they have a disproportionate barrier compared to larger generators in applying for and achieving derogation at the time of network code changes.

Combined Heat & Power
Association
6th Floor
10 Dean Farrar Street
London SW1H 0DX

Tel +44(0)20 3031 8740
Fax +44(0)20 7222 4253

info@chpa.co.uk
www.chpa.co.uk

Barbara Vest
Independent Chair of JESG

8 January 2013

chpa
Bringing Energy Together

Combined Heat & Power
Sustainable Energy Services
District Heating & Cooling

Barbara Vest

CHPA comments on the ENTSO-E RFG Network Code and the effect on certain Stirling Engine products

CHPA is one of the associations that represent the microCHP industry in the UK, and our members include several of the household names in the home heating business, including BBR Thermea (Baxi). CHPA is also a member of Cogen Europe, which acts as CHPA representative on EU and other European matters.

This letter contains our comments on the implications to particular microCHP technologies of the ENTSO-E RFG Network Code which ENTSO-E is currently revising. Our understanding is that UK organisations' comments are being compiled on this matter by you as Independent Chair of JESG.

It is the view of CHPA that European Network Code Proposals as set out threatens the viability of the microCHP industry in the UK. Virtually all the microCHP units currently installed in UK homes are Stirling Engine units produced by BBR Thermea (Baxi). These provide a successful and practical method for householders to reduce their energy bills and cut carbon emissions. The current product would require substantial modification to comply with the frequency ranges and disconnection requirements of the proposed EU Network Code. There has been significant investment in the development and manufacture of these units, but it is our understanding that this product will have to be withdrawn from the market if the Code comes into force unchanged. **If this happens as a consequence of the ENTSO-E RFG Network Code it will inflict permanent damage on the UK supply chain, reduce investor confidence and hamper market growth of microCHP in general.**

CHPA understands that there are a number of constructive proposals being put forward in an effort to alleviate this pressing matter from BDR Thermea and COGEN Europe.

In a related and relevant action, on 30 September 2012 UK Energy Minister Greg Barker stated that the GB Distribution Code Review Panel (DCRP) have undertaken to introduce a dispensation for Stirling engines under the new GB connection standard G83/2. G83 requirements are similar to those proposed by the European code and will ultimately be superseded by Europe.

According to the Minister, the DCRP awarded the dispensation on the basis that Stirling engines currently represent a small share of the overall capacity on the electricity system. A Guidance Note in the GB Distribution Code will set out that Stirling engines will not be expected to comply with the frequency requirements of G83/2 until overall installed capacity reaches 50MWe.

CHPA considers that the actions of the UK Government on this matter provide a relevant precedent for action at a European level.

Should you require any further information on CHPA's position, please contact me.

Yours sincerely

Ian Manders

Deputy Director

Wakeley, Paul

From: Felicity Bush [felicity.bush@esbi.ie]
Sent: 08 January 2013 16:16
To: .box.europeancodes.electricity; Barbara Vest (Barbara.vest@energy-uk.org.uk)
Cc: Michael Dodd
Subject: RfG comments
Follow Up Flag: Follow up
Flag Status: Red
Attachments: ATT00001.txt

Hello,

The below brief points correspond solely to the ACER opinion; I would add that although we of course appreciate that it is only these four areas which are now open to discussion, we believe improvements could be made throughout.

- Significance test for small scale units
  - Agree with ACER's point here, and believe that the standards route would be more appropriate for the smallest scale generation.
  - However would add that "significance" has a further issue of definition both in RfG and in terms of consistency throughout the Network Codes; the Operational Planning and Scheduling uses the term "Relevant Power Generating Module", with relevance to be determined by impact on cross-border operational security. It is unclear how this is different to the definition of Significance, and how these will be applied alongside one another. As RfG will go into Comitology first it is important that this is resolved
- Insufficient justification for deviation from existing FRT practice
  - We believe that heed should be taken of the FG requirement of a *robust* CBA prior to changes to *any* parameters (not solely FRT), whilst appreciating the enormity of the task. With this in mind, deviations from normal practice should be adjusted to be subject to CBA rather than codified in the first instance
- National scrutiny of the Network Code's requirements to be implemented at the national level
  - Agree with the ACER opinion; NRA oversight and approval should be the default for all areas of the Code. There should be no instances of TSO parameter adjustment or decision that are not transparent and open to consultation given the potential impacts on Market Participants of this code
- Recovery of costs incurred by TSOs and DSOs
  - Agree with the ACER opinion

Best,

Fliss

Felicity Bush | Regulatory Analyst | ESB International | 3rd Floor, Regent's Place, 338 Euston Road, London, NW1 3BT, UK | T: +44 (0) 20 7544 8632 / +44 (0) 7824 512900 | www.esbi.ie

Heating & Hotwater Industry Council

Comments on Network Code for Requirements for Grid Connection applicable to all Generators (RfG)

1. Background

HHIC are submitting this response alongside BDR Thermea, known as Baxi in the UK.

The Heating & Hotwater Industry Council (HHIC) is a trade association that represents the UK domestic heating industry. Members include all sectors of supply chain including manufactures, merchants, installers and service providers. HHIC membership covers most types of domestic heating products and systems including traditional central heating systems and most low carbon and renewable heating technologies.

2. The impact of the proposed Network Code

The Baxi Ecogen complies with current regulation in UK and Europe. For over 10 years mCHP has been governed by standards for grid connection, such as EN50438 and G83 in the UK, which allowed small generators to disconnect when the grid was outside the statutory frequency limits of 49.5 to 50.5Hz. These regulations were carefully considered when designing mCHP technology and significant time and money was spent on optimising efficiency and carbon savings and complying with regulations.

However, the proposed ENTSO-E code requires a frequency range of 47 Hz to 52 Hz which synchronised generators like the Baxi Ecogen cannot achieve. Engine redesign would take many years. Fitting a bespoke inverter would enable the unit to comply with the new code but add significant cost to the product which is already more expensive than a boiler. It would also significantly reduce the efficiency of the product, therefore eliminating much of the carbon savings it brings and making the product neither economically nor environmentally viable.

This new proposal requiring all small generators to operate over an enlarged frequency range comes before mCHP penetration levels have reached a point where developers can recover their initial costs let alone fund redesign. Importantly it also comes at a time when mCHP penetration levels are so low grid stability will not be impacted by this technology.

Whilst HHIC appreciate that the work of ENTSO-E aims to provide reliable and stable electrical power to all consumers of electrical energy throughout Europe, we firmly believe that imposing the proposed frequency range of 47 Hz to 52 Hz requirement on Stirling engine mCHP is neither necessary nor helpful in achieving this aim. Since other mCHP technologies do comply with the frequency ranges in the code proposed by ENTSO, allowing this particular technology to continue to operate to the existing frequency requirements would have no significant impact on the grid and would not in any way compromise the objectives of ENTSO-E.

3. Proposals for a Significance Test

With the support of COGEN Europe, HHIC is, alongside BDR Thermea, proposing a change to the significance test, this proposal is outlined below.

- The significance test should be constructed in such a way to allow emerging technologies that cannot meet the proposed ENTSO-E RFG requirement due to the fact that they were governed by previous regulations time to establish a certain market penetration prior to having to meet the new requirements.

- This allows assessment to see if the technology will even reach a significant cross border generation level.

- Basing the assessment on market penetration is beneficial in two ways; firstly it allows already developed technologies time to develop efficient design solutions to meet the requirements and to generate income to pay for these new developments .

- A significance test based on penetration and cost benefit analysis for Type A modules that cannot easily meet the proposed code due to major design constraint making it fundamentally impossible without incurring vast costs and time and these technologies that are either close to market or in their infancy in the market at the time of CODE changes can be given time to see if they will reach sales volumes that could even cause grid aggravation. If so then a period is allowed for efficient and cost effective solutions to be found.

- A significant Type A generator is one whose total installed technology capacity in a synchronous area as reported by the DSO's (EED directive requirement) and monitored by the Regulator (fit and inform requirement as exists) exceeds the 0.1% of maximum system load. A manufacturer introducing a technology which does not fully comply with the Network Codes should identify the technology according to major type or new. Given that there are a range of technologies within the Type A generator category, each with its own and different characteristics with respect to the network code requirements, there is a degree of randomized response to failure due to this multiplicity of technologies. There is no implicit accumulation of the behaviours which suggest that the total accumulated capacity of all non-significant generators needs also to be limited. This said technologies with identical behaviours should be treated cumulatively.

- It is proposed that any distributed embedded mCHP technology with less than 300MW combined cumulative capacity in a synchronous zone should have minimal grid impact and is therefore not deemed "significant." If 300 MW of capacity all shut down at once only a 0.1hz frequency effect would be the result.

- Each synchronous zone level to be reviewed individually based on the synchronous zone CBA.

- Each OEM to report penetration levels each quarter to each synchronous zone who in turn provide this data to ENTSO-E. Actual grid connections could be controlled and confirmed as per G83 by form filling at install to the DNO.

- Once the market penetration levels are exceeded by a technology then all new units being sold have to meet the ENTSO-E requirements.

Precedents already in place

- The UK in G83/2 have allotted a threshold of 50 MW for Linear Stirling generators .

- From BDR's market volume predictions mentioned previously, there would be an opportunity in which to find a cost effective and efficient solution up until approximately 2023.
- Germany has also recognised the unique situation of this technology and has added an exemption in VDE-AR-N4105

4. Why a Significance Test and not a Derogation?

The impact of the Network Code has been recognised and acknowledged by ACER. Referring to new technologies at small scale ACER stated, "These technologies may become important for the transition to a low carbon energy sector; however at present the Network Code risks stifling innovation by imposing onerous requirements before they are justified and potentially preventing new technologies from entering the market in time to contribute to the 2020 target".

ACER in its evaluation of the code specifically requested improvements to the "Significance test to identify significant Grid Users". ACER stated that this could be addressed by "targeted amendments to the Network Code".

The significance test is advantageous to everyone as it is then, as per ACER'S recommendation, hard wired into the ENTSO-E regulation from the start and is not open to interpretation and multiple complex national derogations which may jeopardise achievement of the overall objective of grid stability and clarity.

The significance test will make clear to manufacturers what the requirements are and when changes would need to be in place based on market penetration rather than burdening them with large cost at this stage while the technology is still in its infancy and developing or risking DNO/DSO deciding their fate. (Manufacturers are not allowed to apply for derogation[1])

The significance test approach deals with the issue now rather than moving it to individual DNO's/DSO's to solve the regulations issue; thus bringing certainty, clarity and stability.

The significance test can be centrally policed in terms of market penetration so no confusion on actual market penetration and it can be monitored so that estimated limits can be tracked and the technology growth known.

If this is left to a derogation then control and monitoring may be more difficult and there is a risk too many units could be installed as each country would need to inform ENTSO-E of its derogation numbers etc. and there is a danger of exceeding the spinning reserve allocation.

Derogations are more likely to be time limited rather than market penetration due to all the extra complexities of the derogation process and the decisions having to be taken locally. A time limited derogation is not sensible as any potential grid issues are about volumes rather than elapsed time and manufacturers will recoup their design costs and be in a position to re-design not as time passes, but as volumes increase. The significance test is not time dependant but concentrates on what is actually important i.e. grid aggravation due to market penetration levels.

A derogation would add bureaucracy, extra cost and time as it would require the derogation process to be clearly defined, the authorisation route to be determined and approved by DDNO/DSO's as well as ENTSO-E & ACER prior to being able to determine if it would be a suitable alternatives to the significance test.

A Network Code change, as well as being the route recommended by ACER, is likely to be the lowest cost for implementation compared to derogation.

A derogation would not restore investor confidence; in fact it would severely dent it as the process would be uncertain, complex and difficult to administer, creating exactly the conditions which undermine the confidence of investors.

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Technologies that cannot meet the proposed code at this time based on a CBA and not a major design restriction should be allowed to use a derogation procedure. Therefore a derogation procedure which allows manufacturers to apply for derogation for Type A modules is both logical and desirable for already significant but early stage technologies will find they have a disproportionate barrier compared to larger generators in applying for and achieving derogation at the time of network code changes.

Microgen Engine Corporation

Comments on Network Code for Requirements for Grid Connection applicable to all Generators (RfG)

Background

Microgen Engine Corporation Limited (MEC), based in various locations (UK, NL and China) employing approx. 250 people, test, develop and manufacture the Stirling engine generator used in products such as the Baxi(UK) Ecogen, Remeha(NL) Evita, Viessmann(GER) Vitotwin and KD Navien(Korean) appliance.

These products are all micro combined heat and power (mCHP) units that can be installed in homes instead of conventional boilers. They save around 1 tonne of carbon emissions per household compared to a UK Band A boiler and 2.7 tonnes compared to a Band G boiler annually.

MEC has invested 15 years and many millions of pounds in the development of the Stirling engine used in these units.

The Impact of the Proposed Network Code

All of these mCHP appliances comply with current regulation in UK and Europe. For over 10 years mCHP has been governed by standards for grid connection, such as EN50438 and G83 in the UK, which allowed small generators to disconnect when the grid was outside the statutory frequency limits of 49.5 to 50.5Hz. These regulations were carefully considered when designing mCHP technology and significant time and money was spent on optimising efficiency and carbon savings and complying with regulations. These regulations led us to the choice of the Stirling engine as the ideal generator due to its clean energy, high efficiency, ability to be directly grid coupled making it 99.8% efficient for connection, low noise and high reliability with no servicing.

However, the proposed ENTSO-E code requires a frequency range of 47 Hz to 52 Hz which synchronous directly coupled linear generators used in the mCHP appliances cannot achieve due to their mechanical design.

Stirling Engine redesign would take many years. Since the generator is directly grid coupled it can NOT use an off the shelf inverter. A bespoke inverter would take years to develop and would add significant cost to the product, which is already significantly much more expensive than a boiler. It would also significantly reduce the efficiency and electrical output of the product, therefore eliminating much of the carbon savings it brings and making the product neither economically nor environmentally viable. If we consider just the customer payback time alone, assuming that we had a bespoke inverter solution; the price increase would be approximately 500 Euros and would take 2 additional years of electricity generation to recover these costs. The product already takes 7 to 8 years in the UK to pay for the differential between a mCHP device and a normal boiler. This would increase the payback time to >10 years; considering the product is already a distress purchase item, this would seriously damage the commercial viability especially when considering the boiler life is only 10 years.

The new proposal requiring all small generators to operate over an enlarged frequency range comes before mCHP penetration levels have reached a point where developers/investors can recover their initial costs, let alone fund redesign. Importantly, it also comes at a time when mCHP penetration levels are so low grid stability will not be impacted by this technology.

Whilst MEC appreciate that the work of ENTSO-E aims to provide reliable and stable electrical power to all consumers of electrical energy throughout Europe, we firmly believe that imposing the proposed frequency range of 47 Hz to 52 Hz requirement on Stirling engine mCHP is neither necessary nor helpful in achieving this aim until market penetration levels become large enough to become significant cross border generators.

Why a Significance Test is required

The impact of the Network Code has been recognised and acknowledged by ACER. Referring to new technologies at small scale ACER stated, "These technologies may become important for the transition to a low carbon energy sector; however, at present the Network Code risks stifling innovation by imposing onerous requirements before they are justified and potentially preventing new technologies from entering the market in time to contribute to the 2020 target".

ACER, in its evaluation of the code, specifically requested improvements to the "Significance test to identify significant Grid Users". ACER stated that this could be addressed by "targeted amendments to the Network Code".

The significance test approach is advantageous to everyone as it is then, as per ACER'S recommendation, hard wired into the ENTSO-E regulation from the start and is not open to interpretation and multiple complex national derogations which may jeopardise achievement of the overall objective of grid stability and clarity.

The significance test will make clear to manufacturers what the requirements are and when changes would need to be in place based on market penetration rather than burdening them with large cost at this stage while the technology is still in its infancy.

Since the derogation process as it currently stands does not allow manufacturers to apply for a derogation, a significance test will provide clarity and remove the risk of the manufacturer's fate being decided by a DNO. In addition the significance test approach deals with the issue now rather than moving it to individual DNO's/DSO's to solve which would result in uncertainty and increased risk.

The significance test can be centrally policed in terms of market penetration so there is no confusion on actual market penetration levels and it can be monitored so that estimated limits can be tracked and the technology growth known.

If this issue was left to a derogation then control and monitoring would be more difficult and there is a risk too many units could be installed as each country would need to inform ENTSO-E of its derogation numbers etc. There is also is a danger of exceeding the spinning reserve allocation.

Due to complexities of the derogation process and the decisions having to be taken locally, derogations are more likely to be time limited rather than based on market penetration. A time limited derogation is not sensible as potential grid issues are about volumes or generating capacity, rather than elapsed time and manufacturers will recoup their design costs and be in a position to re-design not as time passes, but as volumes increase. The significance test is not time dependent but concentrates on what is actually important i.e. grid aggravation due to market penetration levels.

A derogation would add bureaucracy, extra cost and time as it would require the derogation process to be clearly defined, the authorisation route to be determined and approved by DNO/TSO's as well as ENTSO-E and ACER prior to being able to determine if it would be a suitable alternative to the significance test.

A Network Code change, as well as being the route recommended by ACER, is likely to be the lowest cost for implementation compared to derogation.

A derogation would not restore investor confidence; in fact it would severely dent it as the process would be uncertain, complex and difficult to administer, creating exactly the conditions which undermine the confidence of investors.

Proposals for a Significance Test

The significance test should be constructed in such a way to allow emerging technologies that cannot meet the proposed ENTSO-E RFG requirement due to the fact that they were governed by previous regulations time to establish a certain market penetration prior to having to meet the new requirements. This allows an assessment to see if the technology will even reach a significant cross border generation level.

Basing the test on market penetration is beneficial in two ways; firstly it allows already developed technologies time to develop efficient design solutions to meet the requirements and secondly it allows them to generate income to pay for these new developments.

In order to protect already developing technologies which may also fail to meet this draft requirement, a certain allowance should be made backed up with a costs benefit analysis. If the technology provider can show significant cost has been incurred to date and that the design is less than 1 year away from market launch, then they should also be eligible for the significance test. Any technology that falls outside of this window that cannot also prove considerable spend shall be in compliance with the regulation at the point of commercial launch.

A significant Type A generator is one whose total installed technology generating capacity in a synchronous area as reported by the DSO's (Energy Efficiency Directive requirement) and monitored by the Regulator (fit and inform requirement as exists) exceeds the 0.1% of maximum system load. A manufacturer introducing a technology which does not fully comply with the Network Codes should identify the technology according to major type or new.

Given that there are a range of technologies within the Type A generator category, each with its own and different characteristics with respect to the network code requirements, there is a degree of randomised response to failure due to this multiplicity of technologies. There is no implicit accumulation of the behaviours which suggest that the total accumulated capacity of all non-significant generators needs also to be limited. This said technologies with identical behaviours should be treated cumulatively.

It is proposed that any distributed embedded mCHP technology with less than 300MW combined cumulative capacity in the European synchronous zone should have minimal grid impact and is therefore not deemed "significant." If 300 MW of capacity all shut down at once only a 0.1hz frequency effect would be the result.

Each synchronous zone level should be reviewed individually based on the synchronous zone cost benefit analysis.

Each OEM will be required to report penetration levels each quarter to each synchronous zone who in turn provide this data to ENTSO-E. Actual grid connections could be controlled and confirmed as per UKs G83 form filling at install to the DNO. Once the market penetration levels are exceeded by a technology then all new units being sold will have to meet the ENTSO-E requirements.

Precedents already in place

- The UK in G83/2 has allotted a threshold of 50 MW for Linear Stirling generators.
- From BDR's market volume predictions mentioned previously, there would be an opportunity in which to find a cost effective and efficient solution up until approximately 2023.
- Germany has also recognised the unique situation of this technology and has added an exemption in VDE-AR-N4105.

Comments on Requirements for Generators Network Code

About the Micropower Council:

The Micropower Council is a cross-industry body whose membership comprises of electricity and gas companies, manufacturers, installers, trade associations, professional bodies, non-governmental organisations and charities in the microgeneration sector. We provide the microgeneration industry's main focal point for Government, regulators, Parliament, opinion formers and the general public on regulation and public policy issues affecting the production by consumers of their own sustainable heat and power.

Impact of the Proposed Network Code:

- Microgeneration technologies have been designed to comply with both EU and UK regulation (G83/1), notably to operate between 49.5 and 50.5 Hz. The new proposal requiring all small generators to operate over an enlarged frequency range (47 to 52 Hz) means that non-inverter grid tied generators, like the Baxi Ecogen which uses a Stirling engine, would not be able to operate[1].
- There is concern that the development of emerging technologies would be held back if they were required to meet the proposed ENTSO-E RFG requirement due to the fact that they were governed by and designed to comply with previous regulations.
- The changes would come before penetration levels have reached a point where developers can recover their initial costs let alone fund redesign. Furthermore, from a cost/benefit perspective, the penetration levels of emerging technologies are so low grid stability will not in any case be impacted.
- The code proposal particularly affects the case of Stirling engine mCHP, since this unlike other mCHP technologies connects directly to the grid without an inverter. The materiality of Stirling engine mCHP to grid stability is minimal given that, whilst a forerunner in the EU market mCHP market, it will only be a small proportion of future deployment. In the UK for example, if industry expectations are met, the 1kWe installations will account for less than 20MW in 2020.
- Deployment of Stirling engine mCHP is important to stimulating the market – engine redesign would take many years, add additional cost and risk wider market development and consequential carbon savings. A bespoke inverter could be developed as a compliance option, yet this would reduce operating efficiency and add further cost to Stirling engine products, also reducing carbon savings and rendering them commercially unviable.

[1] Most small domestic generators – solar PV, wind, fuel cells, ORC etc already require inverter technology to connect to the grid. They do not directly connect to the grid to produce synchronous power.

Significance Test Proposal:

In its opinion, published on 13 October 2012, ACER referring to new technologies at small scale stated "These technologies may become important for the transition to a low carbon energy sector; however at present the Network Code risks stifling innovation by imposing onerous requirements before they are justified and potentially preventing new technologies from entering the market in time to contribute to the 2020 target". ACER has requested improvements be made to the "Significance test to identify significant Grid Users".

The Micropower Council supports this approach and the proposal, outlined below, which has been developed by OEMs in consultation with UK and European Trade Associations.

- A significance test based on penetration and a cost benefit analysis (CBA)will provide a period of change for efficient and cost effective solutions to be found where future growth of technologies are calculated to impact on grid stability. Technologies with identical behaviours should be treated cumulatively.
- Any distributed embedded mCHP technology that exceeds the 0.1% of maximum system load for example in Europe this would be calculated as approx 300MW combined cumulative capacity in a synchronous zone would have minimal grid impact and therefore should not be deemed 'significant'. If 300 MW of capacity was shut down simultaneously, the frequency effect would only be 0.1 hz. In any case, each synchronous zone level should be reviewed individually based on a CBA on the synchronous zone.
- Given that there are a range of technologies within the Type A generator category, each with its own and different characteristics with respect to the network code requirements, there is a degree of randomized response to failure due to this multiplicity of technologies. There is no implicit accumulation of the behaviours which suggest that the total accumulated capacity of all non-significant generators needs also to be limited. This said, technologies with identical behaviours should be treated cumulatively.
- This approach would require OEMs to report penetration levels each quarter to each synchronous zone that in turn would provide the data to ENTSO-E. Actual grid connections could be controlled and confirmed as per G83 by form filling at installation to the DNO.
- With this proposal, once the market penetration levels are exceeded by a technology, then all new units being sold would have to meet the ENTSO-E requirements. In the interim, income received would enable developments to be funded in line with the new connection standards.

Reasons for Significance Test Preference:

- The Micropower Council strongly supports the proposal for a significance test as this would support investor confidence, minimise costs and ensure grid stability and clarity, all of which are key determinants in the decision to opt for either the significance test or derogation approach.
- The significance test holds a number of benefits over derogation:
  - The test would be incorporated into the ENTSO-E regulation from the start and provide a greater degree of market certainty through more efficient tracking of market penetration for purpose of tracking technology growth and estimating limits.

- Given that any potential grid issues are about volumes rather than elapsed time, manufacturers could then recoup their design costs and be in a position to re-design not as time passes, but as volumes increase.
- The significance test will make clear to manufacturers what the new requirements would be and when changes would need to be in place based on market penetration. This removes the burden of large costs at a stage when technologies are close to market or still in their infancy at the time of CODE changes. The test would also reduce the risk of third parties (DNO/DSOs) implementing their own solutions.
- A Network Code change, as well as being the route recommended by ACER, is likely to be the lowest cost for implementation when compared to derogation.

- Investor confidence is best supported by clarity and certainty in market arrangements. This is best served by the significance test as opposed to derogations which tend to be time limited, more complex and costly as well as potential variations existing between Member States.