Submission by:

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2. Installation Process for Micro Generation

2.1. Technical Considerations

[5] For the avoidance of doubt ESB Networks is the owner and operator of Ireland's electricity distribution network and as such can also be referred to as the Distribution System Operator, or DSO. However, the term "DSO" is reserved in this paper to refer to any distribution network operator operating in Ireland or any other jurisdiction.

The Commission recognises that, over time, there could be a large volume of micro generators installed in domestic houses and small businesses. If these are exporting onto the network they could cause voltage rise problems particularly at times of low demand. For this reason, it is important that the installation of these units should be monitored so that appropriate controls can be put in place if necessary. The administration and cost of tracking these units could be onerous both for the end user and ESB Networks (ESBN)[5].

From a system perspective there are two scenarios for the installation of micro generation units which need to be considered. These are once off installations where a customer installs a unit on a single premise and planned multiple installations, such as new housing schemes, where micro generation is installed in a high proportion of premises. The latter also applies to existing housing schemes where, for example, a successful advertising and promotional campaign has resulted in a high take up by householders.

It is recognised that a high take up of micro generation in one area could adversely impact the capacity of the existing low voltage substation that supplies an estate or scheme. Therefore, ESBN proposes, in the interests of prudence, to initially set a limit of 40% of the total installed micro generation capacity on the existing low voltage substation. If accepted, it could of course, be revised upwards or downwards as experience of micro generation grows. In any event, the 40% figure is unlikely to be reached for a number of years.

ESBN is embarking on an internal project to look into the effects of voltage rises across the network both for micro generation and for larger generation units in the 10-20 kW range. As penetration of micro generation increases ESBN will monitor the impact on local networks. The limit of allowed total installed capacity relative to the substation may be revised following these studies.

Request for Comment

The Commission seeks comments on ESBN proposal to set initial penetration limits of 40% of the total installed micro generation capacity on the existing low voltage substation.

The 40% limit should not be a limitation for some time provided that the issue of “ghost” embedded generators are dealt with by the ESBN process. I discuss this further in the relevant section. The issue of voltage rises, i.e. significant input from the embedded generation as per this process is likely to be negligible as the generation equipment ratings will be small by network standards and the primary use of the energy produced will not be for export. In fact there are many devices available to ensure export is always maintained at zero. It is likely that these devices will be deployed if no payment/offset system is facilitated. There will also be an issue as to what generation source the 40% is made up of, as for example voltage rises at night when the network was lightly loaded would be typical for wind generation but solar PV would be off-line. Solar operates during the day when loads are higher so maybe Solar PV would be positively discriminated against as it is in other network areas ? Wind and Solar also have a capacity factor so the 40% would be better placed by ensuring there was a consideration of this capacity factor rather than equipment plate rating.

I am assuming that the 40% capacity factor for micro-generation input on the substation excludes any other renewables such as CHP, etc and that they would be not form any element of the 40% value.

[6] CENELEC – European Committee for Electotechnical Standardization (www.cenelec.org)

[7] Please refer to Section 4 – "Technical Aspects of Micro Generation"

2.2. Notifying the Network Operator

At present there is no formal application process for micro generation connecting to the network in Ireland. The aim of this consultation process is to formalise this process in line with the draft CENELEC[6] standard[7]. The Commission considers that the installation process should be efficient, easily understood and fit for purpose. The process should not place an unnecessary burden on either the micro generator or ESBN.

The CENELEC standard as currently drafted proposes two approaches. Under the first process it is proposed that the installer must make the DSO aware of the micro generator installation at or before the time of commissioning and, in addition, must provide the DSO with certain information regarding the installation within 30 days of the micro generator unit being commissioned. This can be referred to as an "inform and fit" approach and is applicable in countries where inform and fit is allowed *without* the prior consent of the DSO.

The draft standard states that in all other countries prior consent of the DSO is necessary. This can be referred to as an "inform, *consent* and fit" approach. Here, the installer must make the DSO aware of the micro generator installation before installation occurs and must submit to the DSO the notification form contained in Appendix 1 and the **Type Certification Test Results Sheet (TCTRS)** contained in Appendix 2 of this paper at this stage in the process. The DSO will inform the customer if it does not approve of the installation as proposed.

ESBN propose that the latter approach be implemented in Ireland, i.e. "inform, consent and fit". From a network design perspective it is important to know the level of penetration of connected micro generation. This will help to identify potential voltage rise within particular low voltage (LV) groups, which could potentially drive local reinforcement works. In addition, the inform, consent and fit approach reduces the likelihood of non-compliant units being connected which could have safety implications. The following section sets out the inform, consent and fit approach that ESBN propose to adopt in Ireland in more detail. The Commission considers that this approach is prudent.

Request for Comment

The "inform, consent and fit" approach is the best approach for speedy access and controlling non-compliant equipment from being connected to the grid subject to a number of other weaknesses in that process being addressed, this is discussed later.

[8] For new applications to the network the intention to install a micro generation unit will be registered on the application form. Please refer to the application processes for a new domestic network connection or a new business network connection at http://www.esb.ie/esbnetworks/home/index.jsp

2.3. Inform, Consent and Fit

ESBN propose that an inform, consent and fit approach be implemented in Ireland for micro generation. The details of ESBN's proposals in this regard are set out in this section.

2.3.1. Informing ESBN of Installation

It is proposed that every new micro generator interface type and model shall satisfy the following:

- results of tests to verify the operation of all elements of interface protection;
- the interface protection settings on board the unit shall be as detailed in the final agreed standard;
- the methodology of these tests shall be carried out as outlined in the final agreed standard, and;
- these tests shall be carried out by or under the supervision of a recognised test laboratory.

Under the inform, consent and fit approach as proposed by ESBN the customer will be required to inform ESBN of its intention to install a particular micro generation unit (make and model). ESBN has proposed that the customer will be required to submit a completed notification form and a completed TCTRS for each installation at this stage in the process[8]. If the micro generation unit being installed does not meet the technical requirements as laid out by the draft standard then ESBN proposes to reject the application.

The Commission considers that ESBN's proposals as above would be onerous on customers and would be cumbersome for ESBN to manage. The Commission favours a register of approved types of micro generation and proposes that a list should be maintained and should be made available to the public. The Commission considers that ESBN would be the appropriate body to maintain this register. If the micro generator that the customer wishes to install is approved then the customer need only inform ESBN of the type and model of the generation unit that it wishes to install and some basic details as required in the notification form. If the micro generation unit is not on the approved list the customer must also provide the TCTRS. If the TCTRS shows that the unit is compliant with the standard then the unit will be approved and will be included it on the register of approved types.

Request for Comment

I agree with ESBN's approach to the inform, consent & fit approach except for the adoption of a register as it creates a loop=hole for non-compliant equipment.

It is important that the test certificate IS submitted in ALL cases. This TCTRS certificate is available with all compliant equipment so places no additional requirement on the supplier. In addition, no test centre is currently testing to G10 (ESBN Interface settings) requirements, so a foreign network TCTRS is normally supplied to ESBN but this has no guarantee that the equipment has the required ESBN Interface settings required under Annex A of the EN50438 standard.

This means that we need to have a 2 step technical approval, this is a simple step, and will not be a burden on legitimate manufacturers and suppliers.

I would propose the notification would consist of the filled out notification form, a TCTRS to G83-1 (UK) [or which ever other EU network codes that ESBN will accept] and a certificate of conformity from the manufacturer/supplier that the equipment is programmed with the correct interface settings for the ESBN network as per EN50438 and the serial number of the compliant utility interface inverter attached to that certificate.

In addition, I would be ANSOLUTELY against an approved list of type approved utility connected systems; as in the UK and other country's in Europe who have implemented this ahead of Ireland, this is being widely abused. Currently in the UK, there are suppliers of non-compliant utility connected equipment which is coming from the Far East which has no testing certificate for any network. Certain dubious suppliers are picking a "approved listed unit" from the approved list and using it to make a legitimate application. This is called "cloning" in the industry and it is where a legitimate application is made but a non-compliant piece of equipment in installed. It is important that all equipment making a request/notification to connect simply supplies the required TCTRS and the G10 Interface settings certificate of conformity WITH the serial number of the utility inversion equipment in each case. This certificate of conformity should come from the manufacturer/supplier and will guarantee compliance of the equipment and place legal responsibility on the supplier if any issues are found. It's a simple but robust process. In our case, each system already comes with this paperwork as it is all required under EU product standards legislation already so the DSO should ask for it.

This will ensure that only equipment that is in compliance with ESBN requirements under EN 50438 will/can be installed on the network. We are aware because of this "approved list" weakness in at least 3 EU country's that widespread non compliance is happening and we know in the UK and in the Netherlands, legitimate company's (these are company's who started out being fully compliant) are being forced to tell customers that there is no requirement to adhere to any network code as the illegitimate sellers of untested and unapproved equipment don't have this requirement and are undermining the market place. It's a consumer market and an untested, uncertified non CE marked piece of equipment (probably without any product liability insurance) is going to be a lot cheaper and a lot of consumers will be hoodwinked by fast talking sales men, if there is a weakness in the process.

Also, we currently supply the same Utility Inverter that we use on the ESBN network to several other networks so it would be the same type approved unit on an approved list even though we then programme it with settings for several country's depending on its export location.

Also, due to VAT differences, we can sell the same grid connected system into Northern Ireland for 16% less than the Republic of Ireland, if an approved list was used, then somebody could purchase our systems from the NI with UK settings and simply install it in Rep of Ireland as it will be entitled to be on an approved list, but shouldn't be entitled. The two step process above would eradicate this. It will also protect the manufacturer/supplier from legal liability issues; i.e. if ESBN approve a type of utility inverter and it was imported back from another network area and was connected legally and a problem occurred, it could place the legitimate manufacturer/supplier in a legal limbo.

An approved list would cause the breakdown of compliance to G10 requirements and would simply lead to it being ignored after short period of time.

The application process should also be undertaken ONLY by the manufacturer/supplier (not the consumer) of the equipment as:

a) Only they can provide the technical details of the equipment.

b) The consumer would be more inclined to make a bogus/incorrect application.

c) The consumer could make applications which don't go forward with any installation and this would be registered on the network under the 40% limitation.

d) Many applications could be advanced by developers for a perceived marketing advantage.

Note: Since we started marketing utility connected systems, we have experienced the following examples of issues:

1) A 200 house property developer has asked us to make 200 applications for a housing development which he would then market in his brochure to help sell his property. (green enabled). Clearly most of these if not all would never happen but would still be listed as connected.

2) Another developer who had purchased 5 grid connect turbines on the internet asked us to install and was not interested in any licence, etc.

3) At an international meeting recently, one EU manufacturer in business 30 years stated that they now ignore their country's grid code process as cloning is widespread and they will go out of business if they don't do the same. They stated they notify the network of 2 installations a month to allay suspicions.

A verification process is also fundamentally required and I discuss a simple step which will allow ESBN (and any future DSO operators inheriting these installations) to do simple phone call checks to validate compliant installations long into the future.

The simple situation is that if the legitimate industry is not protected by the system, the cowboy operators will get a foothold and break the system down.

The use of a registered list will simply create a loop-hole to allow illegitimate equipment make legitimate applications by “cloning”.

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2.3.2. Consenting to Micro Generator Installation

In accordance with the principles of efficiency and ease of use outlined above, the Commission considers that the consenting process should be automatic in so far as possible. The consenting to micro generation by ESBN will differ depending on whether or not the application is for a single unit or for multiple units, and on the impact of the proposed installation(s) on the system.

At the outset, please note that, as detailed in Section 2.1, ESBN proposes that where an application for installation of micro generation would result in ESBN's proposed threshold of 40% of the total installed micro generation capacity on the relevant existing low voltage substation being exceeded, such an application would be rejected. In this case, the applicant will be advised on the reason for the rejection. Applicants may appeal to the Commission in cases of refusal.

In cases where the proposed capacity exceeds 50kVA ESBN has stated that an analysis of the local network will be required. This will effect only applications for multiple units in an estate or area as by definition they cannot be single applications. Applicants may, in these cases, request ESBN to carryout a network analysis and ESBN may be in a position to quote the applicant for any reinforcement work necessary. Such applicants must wait for confirmation from ESBN that they may commence installation. This is the current practice with connections of this size.

For applications for micro generation units less than 50kVA the consent process will operate as follows:

- The customer will inform ESBN of their intention to install the micro generator by submitting the appropriate notification form in Appendix 1. For a new connection, the notification form and TCTRS (if appropriate) should be included along with the normal application for connection.
- If ESBN believes that the installation should not proceed because of any technical or location specific reason(s) then the ESBN will inform the customer within 20 working days of receipt of the notification complete with all required information.
- If the micro generator is not on the approved list a TCTRS for the micro generator should also accompany the application. If ESBN determines that further clarification or information is required then ESBN shall contact the customer and request any outstanding information or clarification
- ESBN will determine from the TCTRS whether or not the micro generation type meets the standard and if so it will include it in the approved type list.
- If the unit is not on the approved type list or, if having examined the TCTRS, ESBN decide not to put the unit on the approved type list,

ESBN will advise the customer and will direct that the installation should not proceed.

Table 3.1 Matrix of Documents Required For Micro Generator Installation

Where a customer submits an application to ESBN for multiple units of micro generation not exceeding 50kVA[9], which is on the approved type list, in accordance with the approved application process they may install the unit after 20 business days unless they have received a letter to the contrary from ESBN.

Finally, please note that for all applications for micro generators which are not on the approved type list, the applicant must await confirmation from ESBN that they may commence installation.

2.3.3. Enforcement and Practical Implications

ESBN's proposals to implement an "inform, consent and fit" approach for the installation of micro generation in Ireland and the Commission's view regarding this approach are outlined above.

[10] "National Rules for Electrical Installations" - These rules implement the relevant technical content of the Harmonization Documents issued by CENELEC. These Rules specify the requirements for the design and erection of electrical installations so as to provide safe and proper functioning for the intended use.

[11] This involves cutting the electricity supply to the premises.

The Commission is aware that there are practical difficulties in enforcing this principle. Nevertheless, there are safety and operational issues that need to be addressed and therefore it is imperative that ESBN is informed via a clearly defined process of the intention to install micro generation.

In the first instance the Commission believes that all parties in the chain have a role to play with regard to informing the end user of their requirement to inform ESBN. Manufactures, suppliers and installers should all play their part in this process. The exact mechanism for creating this awareness amongst customers is difficult to establish given that the market for micro generators is relatively new and what types of micro generators will be installed and how they will be sold to customers is not yet fully known. The Commission has been discussing this issue of compliance with ESBN. It is considered that where an authorised installer is involved in the installation they will be registered with an authorised body approved by the Commission and will comply with ETCI regulations. ESBN has opened discussions with ETCI on the requirements for micro generation and the inclusion of the regulations into the wiring rules[10].

It should be noted that customers are obliged through their connection agreement to comply with ESBN rules for connection. Therefore, ultimately, if an unapproved micro generator is installed and not removed on request, ESBN may de-energise[11] the customer. Even where the type is approved the customer is still obliged to inform and if they do not comply they may be de-energised. Thus, whilst there is a mechanism for enforcing compliance it does not solve the problem of how a customer is made aware of their responsibilities in this regard.

The Commission is aware that vendors are selling micro generators in Ireland through various channels. If these are not type approved the customers to which they have been sold may be de-energised, as discussed above. Therefore it is in the interest of the vendors to obtain the type approval prior to sale and inform the purchaser of the units. Hence there is an implicit obligation on vendors to provide the type certificate to their customers with an explicit instruction that this has to be completed and returned to ESBN. Manufacturers will be guided by the standard as to the necessary specifications for units to operate in Ireland. The "inform, consent and fit" is a requirement under this standard and therefore in turn have an implicit obligation to inform their customers.

The Commission understands that micro generator units are now being sold through retail outlets. The principle that the type certificate should accompany each unit still holds in these circumstances. As the penetration of micro generation increases it may be necessary for ESBN to engage in a publicity campaign informing customers of their obligations.

The Commission is discussing enforcement and compliance issues with ESBN and will continue to monitor the market and the penetration of units. Based on the Commission preliminary findings and discussions with industry new procedures and rules to ensure compliance with the regulations may be put in place.

[12] http://www.esb.ie/esbnetworks/downloads/Application_Fees_for_Embedded_Generators.pdf

[13] This fee applies to generators where there is no shallow works required i.e. there is an existing connection.

Request for Comment

Enforcement is fundamental to the system working properly. I would recommend that the manufacturer/supplier supplies two equipment plate stickers outlining the equipment spec and serial number. One of these stickers would be placed onto the back of the notification form sent to ESBN initially and one would be placed on the inside of the electrical meter cabinet on site of the installation.

This would allow an ESBN at any stage in the future to contact the supplier and validate the disc and the authenticity of the installation. If the supplier no longer existed, then ESBN still retained a duplicate which was placed onto the notification.

No illegal installation would have this sticker and a simple inspection of the meter box would be enough to confirm possible suspicions of illegal installations.

As meter readers already access this meter box on a regular basis, compliance would be high and defectors easily identified when meters are being read.

By restricting the notification process to manufacturer/suppliers, the consumer would be informed by the supplier of their duties as regards network codes, etc. A list of suppliers who can supply legitimate equipment might be a start for the consumer rather than listing type approved equipment.

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2.3.4. Safety Requirements

As with any electrical installation the requirement is that micro generation units are installed in accordance with the appropriate standards. This is as the same problems potentially exist with such units as with any other electrical installations.

ESBN has its internal safety rules and procedures which are intended to cater for the safety of any persons working on or in close proximity to the network. These rules need to be robust to deal with the occasional situation where unapproved, unadvised and unprotected “rogue” generators are connected to the system. Instances of such connections have occurred in the past. As the procedures have to be robust enough to handle these situations, then they should also be adequate to handle the more controlled environment of technically certified microgeneration.

ETCI Wiring Regulations cover safety issues where they arise on the customer’s side of the meter. With respect to safety, the Commission will be working with the ESBN and ETCI to address any safety requirements for the installation of micro generators.

With regards installers, I would recommend the regulator moves to getting this into an ETCI situation with manufacturers/suppliers training as soon as possible and in the meantime, it could start with manufacturers/suppliers trained installers only.

Utility connected systems comprise commonly of wind and solar photovoltaic generation systems which operate at voltages of between 250 Volts and 600 Volts before they even enter the Utility connected inverters so this is a serious voltage level and safety issue and will never by DIY. The commission is RIGHT to move forward with and ECTI strategy on this.

It should also be noted that on the renewable energy forums, courses are being run and information [anonymously] is being given on how to "simply" make your own utility inverters.

For clarity, when Solar PV panels are connected on the roof of a property, they are configured typically up to 600 volts DC cabled down to the utility connected inverters. An off-grid system would operate at 12v – 48v typically and this high voltage level should be recognised in Utility connected systems as a safety concern.

2.3.5. Application Fees

ESBN will incur some expense in processing and monitoring micro generation units on the network. It is reasonable therefore, arguably, that a fee should accompany each application for connection of a micro generator. The introduction of an application charge (even if small) should ensure that all applications are genuine and that time is not wasted on speculative applications. It would also help ESBN to maintain accurate records of where units are installed on the network. However, this might be a disincentive to customer wishing to install units and processing fees may be cumbersome for ESBN.

Currently the application fee that applies to generators is covered by the schedule of charges approved by the Commission in 2005[12]. For a generator less than 4MW the application fee is €7,880[13]. However at that time little or no account was taken of micro generators connecting to the network. It is considered that any charges should be proportionate to the amount of processing required. The Commission proposes the following charges should apply to micro generator applications for connection to the network. The Commission proposes that the application fee would be submitted with each completed application form.

[14] "Revised Process for the Authorisation and Licensing of Generating Stations" , CER/06/195, October 4 2006

Application Type	Charge
Single Connections less than 50kVA	€20 INC VAT.
Multiple Connections less than 50kVA	€10 per connection point up to a maximum of €500
Multiple Connections greater than 50kVA	By Quotation

Response:

The costs should be inclusive of VAT as the costs are being presented to the consumer.

Table 4.2 Proposed Application Fee for Micro Generator Installation

2.3.6. Licensing and Levy Order

All electricity generators in Ireland are required by law to have an authorisation to construct and a licence to generate electricity. The Commission is currently consulting regarding the authorisation and licensing by Order of generators below a defined threshold. The proposals set out revised process which will apply to micro generators if implemented. Please refer to this consultation for further detail[14].

The work of the Commission is funded through a Levy Order where participants engaged in electricity generation, transmission, distribution and supply pay a levy each year on the basis on the number of the electricity units of their business. All generators exporting to the network pay this levy. The Commission considers that micro generation is concerned primarily with production of electricity for use by the customer. In most cases little or no export may take place. Should the levy be applied, the cost of collection of monies from micro generators in respect of units exported could well exceed the monies received. Therefore it is proposed that micro generators should be exempt from paying the levy order.

Request for Comment

The Commission seeks comments on the principle and level of the proposed application fees and the exemption from payments in respect of the Levy Order for micro generators.

3. Metering and Commercial Arrangements

3.1. Introduction

Micro generators are intended for installation in domestic houses and small businesses and replace some of the imported electricity with own generation. This results in a benefit to the customer that has installed the micro generator to the extent that payment of the full retail tariff is avoided for units generated by the micro generator. However, a customer's demand for electricity varies throughout the day and the output of the micro generator may also vary. Therefore, at times the micro generator may be generating in excess of what the customer is consuming. Here, the micro generator may wish to export that which is surplus to requirements and obtain payment for the exports. The question arises as to how the micro generation customer is to obtain payment for any exported electricity and how this is measured.

The Commission has set out a number of options below in regard to metering and payment options and is seeking views on the most appropriate method. Each of the payment mechanisms must be supported by the relevant metering arrangements and these are outlined for each option presented.

The Commission considers that any measures implemented as a result of this consultation process will endure post the introduction of the Single Electricity Market (SEM) of Ireland and Northern Ireland which will come into effect in 2007.

3.2. Criteria for Evaluation

In reviewing the reward options the Commission will consider the responses received and the following evaluation criteria:

- any arrangements implemented should be simple, transparent and easily understood by customers;
- any arrangements implemented should not impose disproportionate administrative costs on the micro generator, ESBN or suppliers;
- any arrangements implemented should be cost effective;
- any arrangements should be compatible with the SEM;
- consistency with the Commission's Statutory duties, and
- micro generators should receive a fair reward via a cost effective mechanism.

3.3. Payment Options

Micro generators are by their nature very small generation units. The primary benefit to customers is that micro generation replaces imported energy and thereby reduces customers' electricity bills. At times the on-site generation may be greater than the customer demand and electricity may be exported (or

spilled) onto the network. The customer may wish to get payment for these units and the question arises as to who should pay the customer. The options are the wholesale market, the supplier, or ESBN. The alternative is that no payments are made for exported units. The issues associated with each of the options are discussed below.

[15] http://www.allislandproject.org/2006/AIP-SEM-74-06.pdf

3.3.1. Sales to the Wholesale Market

The SEM will come into operation in 2007. Consultations are on-going regarding participation of small generators in the SEM wholesale market[15]. The Commission considers that participation in the wholesale market may not be cost effective for micro generators and therefore the focus of this consultation is on payment and metering options for non participants.

3.3.2. Supplier Purchases Spill

A pragmatic way to compensate micro generators for spilled energy is to get the electricity supplier to buy back the spilled energy. The advantage here is that there is a ready purchaser and the customer can be 'compensated' relatively easily by adjusting their electricity bill. However, suppliers may be unlikely to favour this as they will incur costs associated with the monitoring of the spilled energy and additional billing costs. Furthermore, these micro generation customers will be consuming less than the average customer so the supplier will potentially face additional costs for less reward. The option of selling spill to a supplier other than the customer's own supplier may not be cost effective, and therefore unattractive to the supplier, given the small amounts of spill anticipated and the costs associated with collecting the data and payment.

3.3.3. ESBN Purchase Spill

Spilled electricity may benefit the distribution system by reducing local losses. It could be argued, therefore, that ESBN should pay for any such benefits but paying customers directly for the spilled amount may not be very cost effective given metering, data collection and payment costs. It is sometimes suggested that a reduced Distribution Use of System (DUoS) standing charge could be introduced for micro generation customers. However any such reduction would have to be specific to the technology type (i.e. vary depending on wind turbine, micro CHP, etc) and there would be considerable complexity in establishing an appropriate remuneration level. Furthermore, the above assumes that all micro generation units installed will stay installed and stay working. If this were not the case some customers would be paying lower standing charges but there would be no system benefit. Inevitably, this free rider situation will arise over time.

More importantly, it should be noted that some DUoS charges are recovered through units consumed and not just standing charges. Micro generators will use fewer units than the average domestic customer but the wires to their premises and the operating costs associated with these will be the same. Therefore, ESBN will under recover their revenues for micro generation customers and the short fall will have to be taken up by all other customers and DUoS charges will rise. If there is a benefit to ESBN from spilled units this

may compensate for revenue losses and could serve to mitigate price rises for other customers.

3.3.4. Non Payment for Spill

The point above argues that non payment for spill may be justifiable to counteract subsidies by other DUoS customers. Another reason why non-payment may be appropriate is the cost of metering and settling the amounts payable. Since the exported quantities are anticipated to be low the costs may outweigh any payment benefits.

If micro generators are to be paid on the quantities spilled then a meter which records exports will be needed. An alternative to this is net metering which subtracts the exports from the consumed quantity. To be equitable, export meters should take account of the time spilled and any price paid should reflect the price of electricity at the time of spilling. The question is whether there is any metering and settlement system which is cost effective. The issues with the various metering options are discussed below.

3.4. Metering Options

The following are the metering options considered by the Commission and the payment possibilities are discussed under each option.

- Standard Domestic Metering
- Net Metering
- Non Interval Import/Export Meter in conjunction with Profiles
- Interval Meter with Import/Export Channel
- Smart Meters

3.4.1. Standard Domestic Meter

The simplest and cheapest option for micro generation is to use the standard meter. Thus, there will be no cost for installation and no additional data collection costs. However, these meters come with a backstop which prevents the meter from running backwards. Therefore, they do not record the energy flowing onto the network. In this case, the benefit to the customer of installing micro generation arises due to the replacement of imported electricity with electricity generated on site. The extent of the benefit will depend on the degree to which the micro generation unit meets the customer demand. This could be significant depending on the size of the unit and the consumption profile of the customer.

The advantage of this approach is that there is no change to metering or data collection and therefore no additional costs arise. Under this option, there is no facility for the micro generators to get paid for the spilled electricity and ESBN would get the benefit of the spilled units. Regarding the latter, please note the issues highlighted in section 3.3.3 above.

3.4.2. Net Metering

Net metering involves the removal of the backstop in the standard domestic meter so that the meter will run backwards when electricity is being exported. Thus, the number of exported units will be netted off the consumption.

This option has the advantage of only requiring one meter, but it would still need to be an additional new meter as current meters in Ireland are not designed to run backwards. This does not suggest that meters capable of

running backwards are installed. However the suggestion is that separate recording of import and export be recorded with this being netted off in the billing system.

With net metering it is not possible to split the import and the export or the times when these occur. Therefore, it is not possible to have different charges for import and export or for different time periods. It is possible that the unit is

exporting during low price periods and the importing during high price periods. Thus the micro generators may be over compensated for the exported units.

A further issue with net metering is that the meter register can have a lower number than the last time the meter was read if exports exceed imports. This could impose costs on meter reading and billing systems that are designed to highlight apparent discrepancies such as this. It also could make theft detection more difficult.

With net metering the customers reward for spilled energy would be automatic and no third party would need to be contracted. ESBN would benefit from the spilled energy. Regarding the latter, please note the issues highlighted in section 3.3.3 above.

The Commission deems the disadvantages of this approach as highlighted above to be significant enough to preclude net metering being considered as an option for micro generation.

3.4.3. Non-Interval Import/Export Meter with Profiles

The installation of a non interval import / export meter in place of standard, domestic meters can facilitate payments for exports either:

- by a supplier based on profiled output
- directly from the market based on profiled output

This metering arrangement allows for accurate assessment of volumes of electricity imported and exported, but not for the times when these volumes were imported or exported. In this situation the standard meter would be replaced by an import/export meter. This would record separately the energy imported and the energy exported by the customer. In this way different commercial and market prices could be applied to the import and export quantities.

With this option profiles would be required to estimate the time when energy was being imported and exported. A profile takes the total gross import energy, and converts it into a series of half-hourly values which can be related to the half-hourly price of energy in the wholesale market. Reliable profiles would need to be developed for the different types of customers, e.g. rural domestic, urban domestic, 24 hr and night saver, and would have to be based on the technology type of the micro generation, e.g. wind, PV, or micro CHP. The difficulty and cost of developing profiles for the various micro generation technology types must be considered here. Note also that the cost for developing and maintaining profiles would have to be borne by all consumers. Cross subsidisation across categories and between customers with and without micro generators may arise under this approach due to the application of profiles. Finally, the cost of settlement and reconciling actual meter reads could reduce the cost effectiveness of this option.

3.4.4. Interval Meter with Import / Export Channel

The installation of an interval meter in place of standard, domestic meters can facilitate payment for exports either:

- by a supplier based on half hourly output
- directly from the market based on half hourly output

[16] "Smart Metering, Demand Side Management and energy Efficiency" (Working Title)

This metering arrangement records all import and export electricity flows for each quarter hour period. It therefore allows for accurate assessment of volumes and also the times of these volumes.

This option facilitates accurate payment for all the energy exported onto the network. It provides an incentive to export at times of high energy prices assuming these high prices are reflected in the price the micro generator receives for its output. The micro generators would be paid at the market price, or some agreed price, for each quarter hour for the exported electricity.

It is considered that the extension of the current interval metering and settlement systems would be an expensive option in terms of metering, billing, back office and settlement costs. There would also be some central metering systems costs to handle the extra number of interval meters that being polled. These costs would be shared across all electricity customers.

3.4.5. Smart Meters

There have been considerable developments in metering technology over the last number of years largely driven by the opening of the electricity market. Electronic meters provide increased functionality compared with the electro-mechanical meters which are standard for domestic and small business customers in Ireland. Prices for these meters have dropped significantly and they are now becoming a real option for smaller customers. 'Smart meters' have as standard import and export channels and time of use metering.

The Commission is examining the use of smart meters for all customers and will shortly issue a consultation document on the issue[16]. The Commission is of the view that the introduction of smart meters in the future may be the best way to facilitate payment for exported electricity. In the event that smart meters are rolled out to domestic and small business customers in the near future, it may be prudent not to introduce any alternative metering options for micro generation at this time.

3.5. Commission's View

The Commission considers that net metering should not be introduced for micro generation for the reasons outlined. While interval metering provides the best technical solution for exported units it is an expensive option and is not considered to be cost effective for the small amount of units which may be exported. While non interval metering is less costly, profiles will be required and the costs of developing and maintaining up to date profiles could be onerous. Additionally costs of settlement and reconciliation of metered data could potentially outweigh any benefits accruing to the customer.

In light of the above the Commission is drawn to the view that explicit compensation for exported units may not be advisable at this juncture. This

would mean that the standard domestic meter could be used and the customer would not incur meter replacement or settlement costs. As already stated the customer will benefit from the replacement of imported electricity units with electricity generated by on site micro generation. The Commission considers that, in the future, smart metering may provide a cost effective method of measuring and settlement for exported units from small scale generation. In the meantime, customers may spill any excess units onto the network. Any benefit

to ESBN in terms of reduced losses can be used to off set losses in DUoS revenue from customers with micro generation.

Request for comment

My view is that we should adopt a strategy which is being used in other parts of Europe to account for REGO's. Since 27 October, 2003 under the RES-E directive – Article 5, Ireland has had a requirement to account for REGO's on all renewable electricity. In the EU, while they wait for new cost effective micro metering technologies to develop, they simply use a second meter connection with the standard meter in reverse and attach the utility connected equipment to this meter connection only.

This has been used as strategy to satisfy the directives requirements.

As Ireland will now have a significant issue on REGO's, it would be recommended that we follow suit and implement an off-set programme as in other EU states as an initial step to meet our EU legal requirements.

In simple terms, the householder has their current "consumption meter" and the network installs a second "production meter", where the micro-generation is attached and export is calculated on the export meter and REGO's can be accounted for also satisfying the directive.

There are no technical impediments to measuring export units with standard equipment and processes.

A price is then calculated for the export units, which varies from a fraction of the retail unit cost to a multiple of the unit cost. i.e. in Spain, you will get 575% of the regulated tariff for Solar PV. Please see all other EU areas tariffs attached.

It should be noted that Solar PV is heavily supported due to its daytime energy input and wind and solar PV differences should be considered as having different requirements in certain regulation areas.

In applying the export value created, it could be done annually and applied to the consumption account as a credit in the same way as pensioners are given an annual credit on the accounts.

In total summary:

I think the process should consist of the following:

Notification to the DSO by the manufacturer/supplier only.
TCTRS supplied in all cases.
Cert of conformity to G10 by the Irish legal entity making the connection.
Equipment sticker applied to inside of the meter box on installation.

I will outline the issues occurring in other markets using the process with the approved list scenario as in the consultation:

Scenario 1: Customer makes his/her own utility inverter and wishes to connect to the grid. They simply look up the approved list and assume the identity of a piece of type approved equipment (cloning) and make an application to the DSO. The DSO approves and the non-compliant equipment has been authorised by the DSO. If the DSO comes to inspect in the future, the equipment could be 20 meters in the air and no inspection possible.

With my recommended process [with no type approved list], the customer would have no TCTRS or cert of compliance so would be unable to get authorised by the DSO. If the customer simply installed the equipment anyway, a meter reader or DSO representative would simply call and inspect the meter box for the equipment plate sticker and this would be missing. The DSO could then move to take steps to have the non compliant equipment removed. A very simple robust process.

Scenario 2: Customer buys a non-compliant utility connected wind turbine on the internet which has no testing certificate. Again, they simply look up the approved list and assume the identity of a piece of type approved equipment (cloning) and make an application to the DSO. The DSO approves and the non-compliant equipment has been authorised by the DSO. If the DSO comes to inspect in the future, the equipment could be 20 meters in the air and no inspection possible.

With my recommended process [with no type approved list], the customer would have no TCTRS or cert of compliance so would be unable to get authorised by the DSO. If the customer simply installed the equipment anyway, a meter reader or DSO representative would simply call and inspect the meter box for the equipment plate sticker and this would be missing. The DSO could then move to take steps to have the non compliant equipment removed. A very simple robust process.

Scenario 3: Customer imports a second hand utility inverter from Spain which is also on the "type approved list". He/she makes an application to the DSO which is authorised. This equipment however does not comply with G10 requirements as it has been programmed for the Spanish network. This would go un-noticed using the process of type approved listings and would get a legal connection.

It is important to note that due to VAT rates and larger markets, there will be a natural attempt to import inverters if a "type approval" listing is used; which will not be programmed with G10 settings. My process recommendation would protect the DSO form this happening.

Using my recommended process:

Scenario 4: Supplier makes an application on behalf of a customer for a grid connected Solar PV system. Supplier submits the notification with equipment plate sticker attached. They also submit the TCTRS and the G10 compliance cert to certify the programmed settings. This is now authorised by

the DSO. During installation, the installer places the equipment plate sticker inside the meter cabinet.

In this case, a representative of the DSO simply inspects the meter cabinet, rings the supplier and validates the equipment plate sticker as a genuine installation at any time. This means that even forged equipment plate stickers can be validated by ESBN or the supplier records.

This process is more robust and already there are a lot of horror stories on the other networks who started this over the last few years. It is our advantage to build a robust process on their mistakes.