



**SUBMISSION IN RESPONSE TO CER CONSULTATION PAPER OF
10.10.06
ON ARRANGEMENTS FOR MICRO GENERATION (CER/06/190)**

Submitted by: **Sustainable Energy Ireland**

1. PREAMBLE

SEI welcomes the consultation on arrangements for Micro Generation. This SEI response covers 4 areas:

- An overview of the requirement for new arrangements;
- The definition of the size limit for micro generation;
- Responses to the specific requests for comment in the consultation document;
- Recommendations for further analysis.

2. CONTEXT

The European Directive Directive 2001/77/EC places obligations on member states to implement measures facilitating the generation of electricity from renewable sources. Under this directive, Ireland has made a commitment to a target of meeting 13.2% of its electricity demand or 4.78TWh/annum from renewable sources by 2010.

On June 19th 2006 Minister Noel Dempsey announced a new 2010 renewable electricity target of 15% of electricity demand requiring 5.43TWh from renewable sources annually.

On October 1st 2006 the Department of Communications, Marine and Natural Resources published the Green Paper "Towards a Sustainable Energy Future for Ireland" Key statements within this document on energy policy in relation to renewable electricity and CHP are as follows:

"Ireland has rich potential in renewable sources of energy. The Government is committed to exploiting this potential and encouraging a significant growth in renewable energy in the period to 2020. A new 2010 target of 15% of electricity consumption to be met by renewable energy has been set by Government, with a further target of 30% penetration by 2020, assuming no insuperable technical difficulties. [The incentivisation of a broad range of renewable technologies is discussed further in Section 2.3.10]" The green paper further states *"Renewables will contribute to fuel diversity and security of supply targets. The Renewable Energy Feed-In Tariff (REFIT) scheme will represent the most important incentive mechanism for the construction of new renewable generation. The REFIT scheme critically underpins the ambitious targets for renewable penetration by incentivising a broad range of renewable technologies, including hydro and biomass technologies."* and *"The Government, through its agencies, is ensuring actions are taken to secure the potential of small-scale renewable sources. The CER is also examining the issue from a regulatory perspective and appropriate solutions will be developed. SEI is undertaking certain analysis in relation to metering and*

reward systems that adequately and equitably treat both generators and system operators. SEI will undertake:

- An analysis of the ability of renewable and small-scale CHP electricity generation to secure adequate payment for their exports;*
- A review of connection standards and the connection process for smaller generators; and*
- An analysis of the implications of the single electricity market for small-scale electricity generation with recommendations on how micro generation can best be facilitated."*

2.1 NATIONAL LEGISLATION

Specific national legislation relating to measures which would facilitate microgeneration include:

Section 3 (iii) (c) of part 2 of SI 60 of 2005 which requires that "The Commission shall, in relation to electricity, monitor: (f) the terms, conditions and tariffs for connecting new producers of electricity to guarantee that these are objective, transparent and non-discriminatory, in particular taking full account of the costs and benefits of the various renewable energy sources technologies, distributed generation and combined heat and power." This requirement came in to force in European Law for renewable energy in 2003 under Article 7.2 of Directive 2001/77/EC.

Part 4, Section 10(d) of SI 60 of 2005 which requires that: "In planning the development of the distribution system, the distribution system operator shall have regard to the fact that energy efficiency/demand-side management measures, and distributed generation might supplant the need to upgrade or replace parts of the distribution system. " ; and the insertion of a paragraph (7) which states that: "In discharging its functions under these Regulations, the distribution system operator shall take into account the objective, in so far as is practicable, of minimising the overall costs of the generation, transmission, distribution and supply of electricity to final customers".

2. REQUIREMENT FOR NEW ARRANGEMENTS FOR MICRO GENERATION

Electricity sector liberalization within the EU and in other jurisdictions has facilitated the entry of new generators that do not conform to the centralized large-scale model of electricity generation which is associated with the former vertically integrated utilities with regional monopoly. Such generators use an increasingly diverse range of generation technologies many of which are environmentally friendly due either to their high efficiency or to the use of renewable sources of energy. There has been rapid technological development of such non-conventional electricity generating technologies across a range of scales including the micro-scale. Such micro-generators are suitable for use to serve directly the on site electricity needs

of consumers down as small a single residence or small business premises. According to their cost-effectiveness and user appeal, certain of these technologies may see rapid market uptake in the coming years. In particular those microgenerators that are suitable for connection to the electricity network will be most suitable for widespread use. European legislation gives cognizance to this and the benefits of such generators in requiring member states to put in place appropriate arrangements and administrative procedures for network connection of all scales of electricity generation.

The consultation document rightly recognizes that use of micro generation in Ireland is likely to expand substantially in the coming decades in common with many other countries. International and national legislation, policies and programmes are being introduced to encourage its development in recognition of the potential for economic and environmental benefits.

In setting up new arrangements for Ireland it is essential that as a minimum, barriers to deployment are removed and wherever possible those arrangements facilitate increased deployment. There is also an argument for not only making the arrangements transparent and equitable but in tipping the balance in favour of encouraging the adoption of micro generation.

Government led trials of micro CHP are already being established in Ireland and it is probable that trials of other forms of micro generation will be established in the near future. There are also commercial initiatives getting underway. Interim arrangements which will facilitate this early small scale deployment are required whilst the necessary investigations are undertaken to inform arrangements for the medium term when widespread uptake may take place.

Any new arrangements will obviously have to work alongside the SEM from 2007, be compatible with any arrangements in Northern Ireland and enable micro generators to avail of existing or future support schemes.

3. DEFINITION OF THE SIZE LIMIT FOR MICRO GENERATION

The upper size limit for micro generation needs to be agreed. The consultation document alludes to a number of different figures as the size of micro CHP including:

- “ESBN is embarking on an internal project to look into the effects of voltage rises across the network for both micro generation and for larger generation units in the 10-20 kW range” (Sec 2.1)
- “For applications for Micro generation units less than 50kVA) (Sec 2.3.2);
- CENELEC Standard EN 50438 - Micro generation is defined by the standard as equipment rated up to and including:
 - 25A at low voltage (single phase)

- 16A at low voltage (three phase)".

Micro co-generation is defined within the EC Directive on the Promotion of Cogeneration based on Useful Heat Demand in the Internal Energy Market (2004/8/EC) as a unit with a maximum capacity below 50kWe.

The CENELEC standard covers only the smaller end of the size range for micro generation.

The EC Directive definition of up to 50 kWe should be adopted to define the upper size limit of micro generation and comprehensive arrangements should be put in place to cover that range.

4. RESPONSES TO SPECIFIC REQUESTS FOR COMMENT

4.1 *ESBN's proposal to set initial penetration limits of 40% of the total installed micro generation capacity on the existing low voltage substation. (Sec 2.1)*

This proposal places an arbitrary limit on the penetration of micro generation. The 40% figure is neither explained, nor are there any cross-references given to its derivation by ESB or other sources.

In 2003 SEI commissioned a study titled "The Costs and Benefits of Embedded Generation in Ireland"¹. The study reviewed the potential costs and benefits to the electricity distribution network associated with the connection of microgeneration. This study included a specific review of the costs and benefits of microgeneration. Representative microgeneration connection scenarios were modelled and the network effects of reasonable penetrations of microgeneration were, in general, found to be benign. In the UK, the Mott MacDonald study, which may be the most comprehensive published substantive piece of engineering research into the effect of widespread take-up of micro generation² concluded that a significantly higher penetration of domestic scale micro generation would be unlikely to cause any significant impact. We are not aware of any publicly available evidence to the contrary that suggests large scale installation of micro generation units is likely to cause any serious network consequences that cannot be "planned in" as part of the normal course of network refurbishment and development. There are always going to be exceptions, for example in cases of "clustered" installations on weaker parts of the network. The Mott MacDonald study referred to above acknowledges this, but concludes that the cost of addressing these is insignificant when

¹ PB Power, "The Costs and Benefits of Embedded Generation in Ireland" SEI, 2003

² Mott Macdonald, M. "System Integration of Additional Micro-generation" DTI, September 2004

compared to the network-related benefits large scale uptake of that micro generation will have.

It is unlikely that a 40% penetration will be achieved in the short term except in exceptional circumstances such as perhaps where a specific demonstration or trial is under way which will require individual attention. There is therefore no need, at this juncture, to impose a limit which could become longstanding and constitute a new market barrier. A better alternative would be to initiate a study to reveal whether any limit was required and if so at what level and impose that at a future date when it might be required.

4.2 The Commission's view that the approach adopted for the installation of micro generation units should ensure timely information is provided to ESBN minimising the risk that noncompliant units will be installed and aiding management of the networks in a climate of increasing micro generation. The Commission requests comments on the "inform, consent and fit" approach from interested parties. (Sec2.2)

ESBN's proposed approach to the implementation of the inform, consent and fit approach in Ireland. In addition, comments are requested regarding the Commission's alternative approach as outlined above and, in particular, whether a register of approved micro generation units should be maintained and if so who is the appropriate body to do this. (Sec 2.31)

The proposed consenting and fit processes outlined above. Comments are also sought on the area of enforcement and practical considerations in relation to informing interested parties of the need to inform ESBN of the intended installation of micro generation. (Sec 2.3.3)

SEI agrees that with the Commission that the approach adopted for installation of micro generation should ensure timely information is provided to ESBN, that risks of non-compliant installations should be minimized, and that provision of suitable information will aid management of the networks.

For the majority of micro generation installations an "inform and fit" approach coupled with a register of compliant plants should be adequate. This process should not become an additional market barrier for micro generation. Delaying prospective micro generators by up to a month is unnecessary, and contrary to established practice in several European Member States.

For some larger applications or non compliant plants, it is justifiable that the DSO should have the opportunity to examine the impact that the connection of generation would have on its local network. If on receipt of notification ESBN needed to intervene there could be a period within which an intervention could be made without the need for consent to be obtained for all compliant plants.

The smallest systems, in particular (e.g. of less than 16A per phase), and typically those in the household sector, are similar in their impact upon the network to many electrical domestic appliances or tools, and the proposed approach, in particular the requirement for consent, places an unnecessary requirement upon owners of such installations.

Some micro generation products are positioned to compete directly with conventional gas boilers, a market where the vast majority of sales are driven by the failure of a consumer's existing heating system. For example under these proposals a household looking to replace their failed boiler would face a choice of buying a conventional boiler and having it installed in a very short period of time, or buying a CHP boiler and having to wait up to a month before installation is possible. This would represent a serious market impediment given that consumers will not tolerate the absence of heat or hot water for long periods.

There are established practices in other EU Member States that are based on the recognition that household scale micro generation is little different from a network impact perspective to mass market consumer appliances. This is the premise of CEN Workshop agreement that formed the basis of prEN50438, and the centrepiece of the discussions referred to currently taking place in CENELEC Committee TC8x on the development of prEN50438. It is also the philosophy behind Engineering Recommendation G83/1 in the UK³, and indeed UK legislation⁴.

SEI considers that the approach of the UK Government and DSOs is well suited to the needs of the emerging micro generation industry and DSOs alike as the penetration of micro generation units increases to mass market volumes. As an illustration, and an appropriate model for CER to adopt, the UK approach for small systems is based on:

- Type approval of micro generation equipment to meet industry standards;
- Installation by accredited installers;
- A "fit and inform" or "inform and fit" approach, without the need for specific consent.

The most critical aspect of the connection process for household scale generators is that consent is not required from the DSO provided all the above criteria are met.

³ Engineering Recommendation G83/1 "Recommendation for the Connection of Small-Scale Embedded Generators (Up to 16 A Per Phase) In Parallel with Public Low-Voltage Distribution Networks" Energy Networks Association, September 2003

⁴ The Electricity Safety, Quality and Continuity Regulations 2002 – UK Statutory Instrument Number 2665 -HMSO ISBN 0-11-042920-6

Household micro generation units are regulated in the same way as other electrical products and gas appliances. That is to say minimum safety requirements should be laid down in EU and Irish law. More detailed technical guidance and specification can then be added and updated as and when necessary. For example, the UK already has guidance in place for the installation of heat producing appliances under current Building Regulations⁵ and the Electro-Technical Council of Ireland produce guidelines which all electrical installations should comply with⁶.

The Office of the Director of Consumer Affairs (ODCA) is responsible for protecting consumers and ensuring that products comply with the relevant consumer protection legislation in Ireland. SEI suggests that they would be best placed to ensure that the micro generation firms comply with the relevant legislation and regulations governing the industry. Close cooperation with the ODCA and self regulation are successful methods in which industry has ensured that consumers are protected against rogue manufacturers and installation firms. SEI believes a similar regime should apply to micro generation in Ireland.

Irrespective of the organisation that monitors compliance, it will be important to ensure that the regulations, standards and requirements for certification that are put in place are comprehensive and support optimal development of a microgeneration sector. It is important that such measures maintain a balance between protecting electricity consumers and facilitating them in choosing to install microgeneration. SEI would advocate discussion of the required arrangements in a forum in which the key affected groups are represented.

4.3 *The principle and level of the proposed application fees and the exemption from payments in respect of the Levy Order for micro generators. (Sec 2.3.6)*

If an “inform and fit” approach were to be adopted for micro generation up to 50 kW the amount of administration would be reduced and the need for a fee would be considerably reduced to the point where perhaps no fee would be appropriate. The DSO would still be able to keep a record of the notifications so that, in keeping with other demand and generation data, this is built into network analysis models for operational and planning purposes.

SEI agrees with the Commission’s assessment that the monies that would be collected from individual micro generators in relation to the Levy Order would be negligible and likely to be less than the transaction costs

⁵ Technical Guidance Document J (Heat Producing Appliances) to the Building Regulations, 1997

⁶ National Rules for Electrical Installations (ET101) (2nd Edition, 1991)

associated with their collection. SEI therefore agrees that micro generators should be exempt from paying the levy order.

4.4 Payment options for exported energy and metering options outlined above and any other proposals on payments.

In 2004, a steering group was formed to direct an SEI study on metering options for small-scale generation in Ireland⁷. Representatives from the DCMNR, ESB Networks, ESB Customer Supply, Eirgrid, and, from Northern Ireland, the DETI, OfReg and NIE, participated in this steering group. In 2005 the consultants, ILEX Energy, produced their final report which identified the primary metering mechanisms applicable to small scale generation. The appropriateness each metering option to types and scales of small generator was assessed on the basis of cost effectiveness. The findings of this report might provide material for a more in-depth analysis on the approach to metering for microgeneration.

SEI's preferred approach in principle would be to work towards an arrangement where:

- An equitable payment were made for units exported;
- Imported and exported electricity were separately recorded for payment purposes and facilitating measurement for use with existing (REFIT) or new market support systems that might be introduced to accelerate introduction of micro generation.

This approach would be consistent with provisions in the EU Directives on RE (2001/77/EC) and the Promotion of Cogeneration based on Useful Heat Demand in the Internal Energy Market (2004/8/EC) requiring the provision of Guarantee of Origin Certificates. It would also be consistent with the Commission's preference for any support to be via market support mechanisms⁸. It would also meet the intentions of the EC Directive on Energy End-Use Efficiency and Energy Services to encourage "smart meters" and more informative billing in the short term and require smart meters on replacement unless technically impossible.

This approach may need to be progressed through two stages given the small levels of initial market penetration, the availability of smart meters and knowledge and cost of generating suitable tariffs. The first stage might be to

⁷ ILEX Energy, "Metering Options for Small-Scale Renewable and CHP Electricity Generation in Ireland" SEI, 2005.

⁸ CER Ref 24157, Letter from Regina Finn to Lorcan Kennedy, DCMNR, 30/9/2005 RE: All-Island Market – Renewable Electricity – 'A 2020 Vision', Preliminary Consultation Document July 2005. "The Commission is of the view that merchant build is the preferred route but where support is required, this should be market based in order to attain value to the final consumer."

require two register meters so that import and export can be recorded separately and the use of a simple single level payment per unit exported as has been used in several countries as an interim measure. The second later stage would be to introduce smart meters as they become available at more competitive rates and an appropriate equitable tariff designed as a result of studies of the disposition of costs and benefits. SEI has already published initial studies on Metering Options for Small-scale Renewable and CHP Electricity Generation and Costs and Benefit of Embedded Generation carried out in collaboration with the Commission and the ESB.

The SEI study "The Costs and Benefits of Embedded Generation in Ireland" includes a dedicated section on microgeneration. The study reviewed the potential costs and benefits to the electricity distribution network associated with the connection of microgeneration with regard to:

- Utilisation of network assets
- System losses
- Voltage regulation
- Voltage unbalance
- Power flow
- Fault levels
- Voltage step changes
- Generation location

Representative microgeneration connection scenarios were modelled in the study and results for the above criteria were presented. The study detailed conclusions on the treatment of costs and made recommendations relating to the calculation and apportioning the costs and benefits.

A 2006 amendment to national legislation detailed in section 2 above requires the Commission to monitor "terms , conditions and tariffs for connecting new producers of electricity to guarantee that these are objective, transparent and non-discriminatory, in particular taking full account of the costs and benefits of the various renewable energy sources technologies, distributed generation and combined heat and power." SEI would contend that the consultation document provides no evidence of a cost-benefit analysis supporting the action proposed in sections 3.3 and 3.4 having been carried out and therefore that these proposals must be discounted in the absence of such analysis. In particular the contention that the respective costs and benefits of spilled microgenerator exports and reduced recovery of DuoS charges may balance each other out takes no account of the potential positive network impacts of microgeneration including reduced losses.

Any proposed arrangements must consider the impact that micro-generation has on distribution network costs and ensure that Distribution Use of System (DUoS) charges reflect any benefits that microgeneration

brings. A local network which benefits from a variety of sources for its energy, including the use of individual micro generation units, may be expected to contribute to funding this new source. SEI would advocate that an analysis under the criteria identified above be carried out using typical network installation scenarios to establish a charging regime for microgeneration. If the ESN were to use reduced DUoS standing charges to reward those that provided energy to the local network, a slight rise in the standard DUoS standing charge may be acceptable. Again the incentive to provide more accurate meters would be provided to ensure reduced standing charges were justified.

There are a number of other relevant issues at a more detailed level outlined below.

Payment for exported energy is an important part of the appeal of micro generation units. The consultation appears to assume that export levels are likely to be a small proportion of the overall generation, and certainly small in relation to the customer's demand. Whilst this may be true for some installations and some micro generation technologies, there are several others under development for which exported power would constitute a much more significant proportion of the overall energy balance. Moreover, as high electrical efficiency fuel cells continue to attract significant international effort and capital, the likelihood that heat / power ratios will decrease means that future micro generation products may feature significantly higher levels of exported power than those closer to market today.

The current cost of installing a micro generation unit means customers are predominantly enticed by future savings in energy bills, but also the potential to sell back excess energy produced by their units. The most pragmatic means of recording exported energy is to install twin register import / export meters in the short term. The cost of their installation need not be prohibitive for two reasons:

- Whilst it may be true that simple import / export meters are today a little more expensive than single register import only meters, their mass installation would rapidly bring costs down.
- Metering is unlikely, now, or into the future, to be a significant proportion of the overall cost of installation. Industry estimates put the total cost (hardware and installation) of mass produced two way meters at the equivalent of around €75. This is a relatively small proportion of the overall cost of a micro generation installation.

The cost in upgrading the metering infrastructure could be spread as to become negligible, particularly if done on an incremental basis. If as part of the natural cycle of meter replacements, the *de facto* metering standard was raised so that all new meters were required to have import and export capability, the industry would quickly adapt and accommodate this

requirement, and meter hardware costs would fall. This has already happened, for example in Italy where, under a major meter replacement programme, the Italian utility ENEL has been replacing existing meters with ones that have two way capability at a rate that peaked at 15,000 meter changes per day. In the medium term the move will be to smart meters.

It is important that, as the detailed rules are developed for the introduction of competition in Ireland, that those consumers who install micro generators are able to obtain reward for exported power right from the outset. The trading rules being developed for the wholesale and retail markets need to take proper account from the outset of the needs of small generators, including householders to avoid the situation, for example in the UK, where the trading rules create prohibitive transaction costs for customers and suppliers wishing to obtain trading value from exporting micro generation.

In the UK, for example, this problem is so acute, that the UK government has passed primary legislation⁹ to allow it to force suppliers to pay customers for exported power should they fail to voluntarily within a year.

The focus of industry work on this subject in the UK is therefore to examine carefully the legitimacy of the costs that household generators are required to pay under the current trading regime, and seek to eliminate all those that are inappropriate. This threat of government intervention has proven effective in motivating suppliers to look very carefully at possible changes to the trading rules to minimise transaction costs for very small generators. This not only rewards the micro generator for reducing the carbon footprint of that supplier, but also adds an incentive for the Supplier to ensure more accurate metering system is introduced.

5. REQUIREMENT FOR FURTHER ANALYSIS

Application of micro generation being a new development in Ireland there is insufficient information on experience of the characteristics of the plant and the response of the electricity supply network to be able to define fully developed guidelines and processes in all of the required areas immediately. A programme of field trials and parallel studies of specific areas of incomplete understanding is required. Field trials are getting underway as is initial commercial exploitation. Necessary studies should be commissioned in the near future, in some cases following up earlier studies by key stakeholders. In particular studies are required of:

⁹ The Climate Change and Sustainable Energy Act 2006 gives the UK government the power to amend Distribution and Supply licences to force utilities to pay customers for exported power. The UK government has said it will use this power if necessary, but would prefer for the industry to come up with its own scheme to offer customers a satisfactory level of export reward. The government has made it clear that if the industry fails to do so within a year, it will step in and exercise these powers.

- Existing micro-generation plant standards and the extent of compliance of existing plants and plants at an advanced stage of development with those standards;
- The impact of increasing capacity of plants on the distribution system in terms of load flows, protection and isolation arrangements, voltage regulation , fault level, and operational costs ;
- The benefits and costs of embedded generation in terms of energy savings, emission savings, electricity system loss reductions and network investment and operating costs;
- Appropriate metering arrangements for initial market penetration and larger-scale penetration in the medium term;
- Appropriate arrangements for the equitable allocation of costs between the micro- generator and network operator/supplier including payment for exported electricity in for both the initial market penetration and larger -scale penetration in the medium term;
- Administrative procedures associated with connecting, operating and monitoring microgeneration.

This work if carried through by a steering group of the stakeholders could provide the basis for future arrangements. SEI would be willing to arrange and fund such studies or contribute to the funding. Indeed, SEI has been mandated to carry out such studies in the recent Government Green Paper.

6. SUMMARY OF RECOMMENDATIONS

A summary of SEI's recommendations regarding the proposed arrangements for microgeneration is as follows:

1. The proposed arrangements must be compatible with the SEM and with arrangements in Northern Ireland;
2. The proposed arrangements, and in particular the metering arrangements, must be compatible with current and future market based renewable energy support mechanisms;
3. The EC Directive 2004/8/EC definition of up to 50 kWe should be adopted to define the upper size limit of micro generation;
4. The study on local network penetration limits for microgeneration should be carried out. The imposition of a 40% local limit should be deferred until it is justified in study results or indefinitely;
5. The administrative processes associated with microgenerator connection should comprise: a) Type approval of micro generation equipment to meet industry standards; b) Installation by accredited installers; c) A "fit and inform" or "inform and fit" approach, without the need for specific consent;

6. Metering and payment options should incorporate; a) an equitable payment for units exported; b) separate recording of imported and exported electricity for payment purposes and facilitating measurement for use with existing (REFIT) or new market support systems.
7. Network tariffs which give consideration of the costs and benefits of embedded generation should be arrived at for microgeneration.
8. Further studies and field trials are required to support the development and implementation of arrangements for microgeneration.
9. A steering group should be formed to facilitate expeditious implementation of the above recommendations and to direct any necessary research.