Embedded Generation
Summary

What is embedded generation?

Embedded generation is electricity generation which is connected to the Distribution network rather than to the high voltage National Grid. Embedded generation is typically smaller generation such as Combined Heat and Power (CHP) or renewable generation: small hydro, wind or solar power.

The development of embedded generation has an important part to play in meeting the Government’s long term environmental targets.

The issues

Today’s distribution networks operate passively delivering power from the transmission network, through the distribution network to the end customer. They have been built, and are operated and regulated, to work in this way.

Substantial embedded generation would require more active distribution networks which allow electricity to flow in two directions – to the electricity user for consumption in the home or business, and on to the network when the user is exporting excess generation capacity.

The way forward

Ofgem is currently looking at the issues facing embedded generation to ensure that its development is not hindered by the way in which networks are currently operated and regulated.

In looking at these issues, Ofgem’s overriding consideration is to ensure that any changes for the future do not put at risk electricity customers’ access to a secure, good quality electricity supply at a fair price.
How networks operate today

Currently the main aim of distribution network operators has been to build and maintain networks, which receive power from the high voltage transmission network and deliver it to customers. This has resulted in passive networks with little embedded generation.

Industrial customers who consume electricity

Thin line indicates flow from the network

Why is Ofgem looking at embedded generation?

- Ofgem is committed to ensuring a fair, competitive and transparent market for all generators.
- Embedded generation will play an important role in meeting the government’s renewables and CHP targets.

The way forward – consultation

In 2000, DTI, DETR (now DEFRA) and Ofgem set up the Embedded Generation Working Group (EGWG) to look at the issues and barriers facing the further developments of embedded generation in the GB market. The Group made a number of recommendations which Ofgem is taking forward.

The first step in this process is a consultation on price controls, incentives and connection charging relating to embedded generation. This looks to:
- propose short term measures to eliminate barriers to market entry for embedded generators, and
- identify the principles which Ofgem will apply to its work with embedded generation.
How the network could operate with embedded generation

This will result in distribution networks being able to export as well as import power and there will be a need for operators to more actively manage their networks and to address new technical requirements.

The more embedded generation there is, the more need there will be for operators actively to manage the power flows on their systems.

Industrial customers with CHP also generate some electricity which flows back onto the network

Embedded generators e.g. wind turbines

Domestic customers and small businesses with Domestic CHP can also generate electricity which flows back onto the network

An active network needed to account for customers generating as well as consuming electricity

What is embedded generation?

Embedded generation is electricity generation which is connected to a distribution network rather than the National Grid. The forms of generation which can be classed as embedded include: large combined heat and power plants (CHP), windfarms, mini hydro, solar power, and domestic (micro) CHP.

A distribution network is the low voltage network of wires and cables constructed to bring electricity to homes and businesses and operated by a distribution network operator (DNO), which, in this context, is a successor company to the former regional electricity companies.

Barriers to entry include:

Currently, anyone wanting to connect to a distribution network would have to pay ‘deep’ connection charges.

This is a one-off, up-front payment to allow generators to connect to the networks. It covers the cost of strengthening the network associated with the export of new generation up to the transmission network boundary.

As many renewable projects are located in remote areas, these costs can be prohibitive.

Demand customers, i.e. those who use electricity rather than produce it pay ‘shallow’ connection charges which involves paying for the equipment needed just to connect to the local part of network.

This consultation will address the issues involved in allowing embedded generators to face ‘shallow’ rather than ‘deep’ charges, and then charging them for the use of the system in the same way that load customers are charged.
## Work that has already taken place

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>November 1999</td>
<td>DTI, DETR (now DEFRA) and Ofgem set up the Embedded Generation Working Group (EGWG) to look at the issues and barriers facing the further development of embedded generation in the GB electricity market</td>
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<tr>
<td>January 2001</td>
<td>Embedded Generation Working Group published their draft report on the implications which an increase in embedded generation would have on access to the electricity networks</td>
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<tr>
<td>6 April 2001</td>
<td>Ofgem published response to EGWG recommendation proposals</td>
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<tr>
<td>May 2001</td>
<td>Embedded Generation Working Group published supplementary document</td>
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<tr>
<td>27 September 2001</td>
<td>Ofgem published first consultation paper on issues surrounding embedded generation</td>
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## Future work

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<th>Date</th>
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<tr>
<td>16 November 2001</td>
<td>Target date for responses to the first consultation</td>
</tr>
<tr>
<td>December 2001</td>
<td>Decision document</td>
</tr>
<tr>
<td>April 2002</td>
<td>Supplement new interim changes, if agreed</td>
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<tr>
<td>April 2005</td>
<td>New distribution price control</td>
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The joint DTI/Ofgem Co-ordination Committee is now being established. Membership is to be announced later this year.

**For more information about Ofgem’s work regarding embedded generation you can contact:**

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