

CONSULTATION RESPONSE NIHE

APPENDIX A

<i>NAME OF RESPONDENT</i>	Northern Ireland Housing Executive
<i>CONTACT DETAILS</i>	Energy Services Unit, 2nd Floor, 2 Adelaide Street Belfast BT2 8PB Tel 02890240588
<i>TYPE OF COMPANY</i>	Housing and Energy Conservation Authority
<i>INTEREST IN DSM</i>	Affordable energy services for low income consumers

SECTION 2

QUESTION 1: Do you agree with our characterisation of the four types of benefits that demand side management can provide?

ANSWER: The descriptions of the benefits of Demand Side Management do not include being able to make beneficial use of local surpluses of wind energy which will occur at times. The scale of wind energy supply needed to meet renewable energy targets will result in many periods when the available wind energy is more than the total conventional demand on the island, and due to the variability of wind within years and between years it will not be economic to construct west to east interconnectors to Britain to export all of this. New useful loads need to be introduced quickly to meet the timetables for wind energy development. It will be easier to use, say, existing immersion heaters already installed in almost every home to displace high carbon home heating fuels, rather than to attempt to fund and install vast numbers of heat pumps, microCHP units, or electric vehicle charging points over relatively few years. Home heating fuels are the same fuels used in fossil generation, so displacing their inefficient use in heating homes is an effective way to cut carbon emissions.

QUESTION 2: Are there other cost savings which you believe demand side management can deliver?

ANSWER: DSM can postpone the need for investment in regional grid capacity by using the outputs of smaller wind turbines locally via the lower voltage network to displace the use of heating fuels and reduce home heating costs. i.e. Avoiding overloading the regional grid in times of high windspeeds. When windspeeds rise by 44% the power output can treble at short notice, especially with smaller turbines. Using wind energy can reduce the costs of home heating oil, which are likely to rise, especially for the West where incomes are lower.

QUESTION 3: Are there additional studies and reports (to those listed in **Error! Reference source not found.**) which you are aware of and believe we should review?

ANSWER: None to hand.

QUESTION 4: What other insights do you have from your experience of demand side management adopted internationally?

ANSWER: In Japan large numbers of off-peak electric storage heaters were being installed, resulting in a large and unwelcome demand for generation at the start of the off-peak charging period. Glen Dimplex developed a system to delay starting the charging so that the home would nevertheless be warm and the heaters charged at the end of the cheap rate period. This made the heaters more affordable to run as the house was not overheated at night. An island off Canada has used storage heaters with wind.

In the late 1980s and early 1990s a locally manufactured 'Wet' Economy 7 heating system used hot water stored in large steel tanks to heat homes for a time. Better control systems and heat pumps are now available to ensure that these systems can perform better, especially with better insulated homes, or when larger tanks are used.

QUESTION 5: Are you aware of other quantitative findings from international experience which you believe are important for us to capture and consider?

ANSWER: Other countries with high wind penetrations have large hydro electric resources (Norway, New Zealand) or regional interconnectors (Denmark), so their experience will be less relevant to the large local wind resource.

QUESTION 6: Do you agree with our identified drivers of future value for demand side response/management? Are there any additional drivers we should consider?

ANSWER: No. As renewable energy targets are reached and surpassed the amount of wind energy available will very often be greater than local peak demand, so there is a high value in quickly developing new applications for this extra energy. e.g. As a substitute for heating oil use.

SECTION 3

QUESTION 7: Are there any other aspects of current demand side activity in Ireland which should be captured?

ANSWER: Automatic systems are being used that switch loads on or off depending on wholesale electricity prices. Prices are already beginning to dip with wind availability.

QUESTION 8: Do you agree with our high level assessment of the potential for demand side management in Ireland by 2020?

ANSWER: It does not seem to have captured the need to balance a very large but variable source of clean energy, the funding of west-east interconnectors, and the development of new local uses for electrical energy that is not available constantly within year or predictably each year.

SECTION 4

QUESTION 9: Do you agree with our definition of each individual demand side measure?

ANSWER: Thermal energy storage is not specified, despite the installed base already being very large.

Your estimates of thermal storage for the domestic sector do not include the very large thermal storage capacity that exists in the hot water cylinders and radiator circuits of most homes, and in the fabric of all homes.

Thermal storage also increases the flexibility of CHP generators of all sizes, so that electricity can be generated when its value is highest, even if this is at a different time from when most heat is required.

QUESTION 10: Is our description of the current policy baseline for each demand side measure accurate and complete. If there are omissions please point them out.

ANSWER: Within Home and Office Automation off-peak storage heating is not referred to. This was an earlier policy response to the use of coal and nuclear plants as baseload where the most economic output was constant, not variable as with wind. Both coal and nuclear energy had good energy security.

There is a correlation between windspeed and heating demand, which is familiar to gas suppliers.

Other types of new demands that can have a role in DSM include:

Home Heating Fuel Substitution.

With minor wiring changes most systems can already transfer some heat from a hot water tank heated by an immersion heater to radiators, by pumping the heating circuit while holding the boiler off with a relay switch.

Mechanical Ventilation Heat Reclaim units: These have a similar efficiency to heat pumps, and can be turned off for a short period without a major impact on consumers, as it takes air pollutants a time to accumulate. They also become more efficient if turned down, due to duct and fan loss characteristics. They are easiest to install in bungalows that are commoner in western areas.

Community Heating schemes can be linked to heat pumps or to Combined Heat and Power engines, and tend to have massive heat storage capacity that can be economically supplemented with separate large tanks.

QUESTION 11: Do you agree with our categorisation of different types of “market issue” and typical remedies for each?

ANSWER: Heating Fuels are in the 'non traded' sector in relation to carbon emissions, so people are unaware they may be paying more for their electricity to reduce carbon emissions that might be reduced more economically by

changes to domestic heating systems. e.g. Changing from Coal to Oil or from Economy 7 to Gas heating typically halves emissions for a home.

Electricity tariffs are built up from basic generation costs with different cost components that make it expensive to use electricity for home heating, even if more of this is coming from wind. e.g. At night, or if it were possible to generate extra electricity with cheap gas purchased on 'Spot' markets.

QUESTION 12: Do you agree with our identified barriers and enablers for each of the specific demand side measures we have identified?

ANSWER: Although the type of Smart Metering to be implemented is not settled, omitting direct remote load switching from this could prevent a lot of Demand Side Management activities. Omitting the capacity for multi-fuel or heat metering would also affect the economics of community heating and combined heat and power systems that can contribute to DSM. i.e. It is worth listing aspects of the Smart Metering specification that may impact on the volume of feasible DSM.

QUESTION 13: Do you agree with our identified market issues for each specific demand side measure and our proposed remedies to address these?

ANSWER: When the current system of cost allocations for electricity tariffs was developed, there was no prospect of a zero carbon energy source substituting for imported fossil heating fuels. The current system prevents wind produced electricity being an occasional substitute for heating fuels, due to the constant high retail price of electricity, even though the grid is not usually congested at these times. i.e. The use of wind energy in this application is not giving rise to a need for extra grid investment, and can be doing the opposite:

By creating a new revenue stream for 'spare' or the most intermittent wind energy, it can increase the 'constancy' of the major part of wind output, making it more valuable in mainstream markets and making it more feasible to fund export interconnectors and local grid reinforcement.

We agree that making wholesale price differentials more visible to the market would allow consumers to make more informed choices, but realistically this should allow loads to be switched remotely depending on price. E.g. As people will rarely be awake to take advantage of collapses in prices at night.

QUESTION 14: What are your views on the likelihood and effectiveness of the identified policy options addressing the specified market issue and delivering the desired change?

ANSWER: The scale of change required is very large and the pace of change very fast. The best prospect of translating policy into installation programmes with an adequate DSM capacity will be where programmes use proven technologies and re-use existing installations. E.g. The benefits of Demand Response can be obtained for the large installed base of hot water cylinders and electric storage heaters with modest technology before large numbers of electric vehicles are deployed. E.g. Using wind energy at night, or using the extra electricity produced as generators 'ramp up' to full capacity in the mornings, to displace the use of heating oil.

The benefits of controlling demands to match the availability of economic low carbon generation depend on the amount of demand that can be shifted in time. This is simplest for larger wattage heating related appliances such

as immersion heaters and storage heaters, which often already have separate circuits taken back to meter cupboards, making it easier to install new automatic switching for them.

Adding the DSM capability to this installed base also provides an opportunity to improve the controls on these systems. E.g. Providing weather compensation and 'back' charging optimisation for electric storage heating, and adding weather compensation or hot water temperature controls to existing oil systems.

QUESTION 15: Are there any unintended undesirable consequences that any of the options might create elsewhere?

ANSWER: Reducing the volume of electricity sold by energy efficiency greatly would increase the retail price of electricity as the costs of funding grid upgrades for renewables will be spread over fewer electricity units.

SECTION 5

QUESTION 16: Do you agree with our identified specific demand side measures and our assessment of the different types of benefits each demand side measure provides?

ANSWER: Within the timescales envisaged for renewable energy development on the island, dealing with intermittency is likely to be more urgent than dealing with energy efficiency, which may even intensify the difficulties in accommodating wind. i.e. If total consumption is reduced, the proportion of variable wind increases.

As you note, actual savings may be less than expected, and behavioural change may not result in large shifts in demand. Automatic systems have a better track record. i.e. Off peak electric heating tariffs.

QUESTION 17: Are there any additional demand side measures that we should individually identify and assess? If so, what type of benefit(s) is it felt they provide?

ANSWER: There are less time dependent loads which could be met by intermittent energy e.g.: Stone crushing, crop drying, lighting for horticulture, large scale refrigeration and cooling, swimming pool heating.

There are also some domestic electrical loads that tend to occur in peak periods that might be removed by fuel switching. E.g. Using mains or bottled gas for cooking or focal point fires rather than electric fires.

QUESTION 18: Have we identified all of the relevant criteria for assessing the individual and comparative merits of the demand side measures?

ANSWER:

QUESTION 19: What are your views about our approach to high level assessment of different demand side options?

ANSWER: It looks very comprehensive

QUESTION 20: Do you agree with our assessment of each demand side measure against each of the identified factors?

ANSWER: Assuming that electric space and water heating is included in Home and office automation, its capacity to support DSM with rapid Renewable Energy deployment is underestimated, especially if energy from wind is used to displace the use of heating fuels directly on an optional basis. i.e. If the wind does not arrive, the heating is provided with the existing oil/coal/gas system. E.g. It would be relatively simple to make immersion heaters respond to a dip or rise in grid frequency, achieving a response that is very much larger than that of a modern low energy fridge.

Thermal storage should be listed separately from (electricity) storage, as it can be much larger in the medium term.

QUESTION 21: Do you agree with our overall assessment of the relative merits of the different demand side options?

ANSWER: The technical potential of the variety of options listed may be large in total, but can be very difficult to obtain within a ten year period, and may not adequately address the issue of the availability of large 'lumps' of wind generation at times of low demand.

Because heating and hot water installations in homes use similar technology, and can absorb large electrical inputs, they can be more suitable for a time constrained programme of DSM capable installations. They may also make the transition to sustainable energy provision more acceptable when a benefit can be experienced directly.

The job creation potential may also be higher than medium as existing trades & technologies can be used for high numbers of installations, which can also be improved subsequently as more wind comes on stream/ oil prices rise.

QUESTION 22: Do you have any comments on our high level assessment of the benefits of different demand side measures?

ANSWER: It is difficult to tell if the assessment is well related to the scale of load shifting required for wind use.

QUESTION 23: Do you agree with our assessment of the relative priorities of different demand side options in developing a 2020 Demand Side Vision?

ANSWER: To avoid wind curtailment and maintain revenues for wind generation, markets for 'interruptable' wind energy, such as heating fuel substitution, are likely to have to be developed, as well as increasing load shifting by various means. Although usually a good thing, it is not clear that energy efficiency should be ranked higher than say (the missing) 'Thermal Storage' for Demand Side Management capability.

'Frequency Responsive Relays' are rated as neutral for growth in RE Supply (wind), but can be strongly supportive when used with existing thermal storage systems such as electric storage heaters and immersion heaters. However other forms of 'Smart Grid' control may add more value. E.g. Controlling loads on the lower voltage network can allow it to transfer locally produced wind energy for heating applications without stressing the regional grid.

QUESTION 24: What alternative views do you have on relative (merits and) priorities?

ANSWER: Given the short timescales in reaching targets of 40% renewable energy supply by 2020, existing technologies, standards, and larger wattage heating installations should be used in DSM programmes to ensure early delivery of load shifting and beneficial use of excess wind generation.

This will not prevent more technically advanced options being developed later, and the widespread presence of automatic DSM equipment is likely to spur the economic development of other energy storage technologies.

QUESTION 25: Do you agree with our proposed high level 2020 Demand Side Vision as described above?

ANSWER: It is difficult to tell if the priorities are well related to their potential for bulk load shifting.

We agree that price alone may be insufficient to use resources efficiently, and that system operators should have the capability to switch some loads. E.g. To maintain essential lighting and communications for homes.

QUESTION 26: What alternative vision would you put forward?

ANSWER: It can be appropriate to 'futures' retail prices so that they include periods of low prices now, before increasing wind penetrations provide these on wholesale markets, so that peoples' behaviour can adapt over a longer period.

QUESTION 27: Do you agree with our proposed policy pathways for implementation of the identified different policy options for realising our proposed 2020 Demand Side Vision?

ANSWER: Integrating Smart Metering with automatic demand control, and metering and prepayment for heat and other fuels, can have a massive role in supporting DSM. E.g. By communicating the status of thermal stores.

QUESTION 28: What alternative policy pathways would you propose based on your previous comments and responses?

ANSWER: The implementation of Smart Metering should include metering and prepayment for other fuels and for heat. This will maximise the potential for automatic substitution of excess wind energy for other fuels and support the economic development of combined heat and power systems of all sizes. i.e. The price of heating oil should be known to assess when it is more economic to start an air source heat pump. The price of electricity and heat should be known to optimise the use of combined heat and power systems or community heating systems using biomass or large heat pumps. The status of heat stores in homes could be transmitted back to system operators so that the capacity to absorb wind or other low cost generation is known.

SECTION 7

QUESTION 29: Do you have any additional view or comments you feel are important/useful for us in (a) establishing a Demand Side Vision for 2020; (b) identifying associated policy development and (c) determining policy pathways?

ANSWER: Thermal storage systems use locally available technologies and skills, but are unlikely to be patentable. The best hope for their development is the early availability of electricity tariffs with periods of low prices.

QUESTION 30: Are there any final comments industry stakeholders wish to make about this consultation and the proposed next steps in the consultation process?

ANSWER: Thanks for the opportunity to comment and for the useful consultation meeting.