STBA / Cadw Workshop at Caerphilly Castle

23/10/2019

Housing Retrofit vs Grid Decarbonisation

Outcomes of the event

Key Question

The key question is what changes we should make to our building stock, in the light of the fact that all buildings could soon be supplied by a largely decarbonised electricity grid and would thus meet the far-reaching main target required of them?

Perspective

To answer this question it is necessary to understand the context:

- Early commitments to sustainability were broad. The focus on the decarbonisation agenda is more recent.
- The very ambitious targets for the building stock are driven by the decarbonisation agenda. More realistic targets for reductions in demand are still required to deliver the required reductions in fuel poverty.
- All change has an impact and a cost. It is necessary to compare the costs and impacts of retrofit with the costs and impacts of providing sufficient renewable energy to decarbonise the electricity grids
- The gas grid is also being decarbonised to a degree.
- The electricity grid faces increased demand if we move over to more electric vehicles, or swap gas heating for electric heat pumps.
- Low carbon LPG is also under development - important for off-gas-grid.

Selected points made by speakers

- Wales is committed to its decarbonisation and fuel poverty targets (HB)
- Even the most advanced architects of deep retrofit are recognising the embodied impacts of work at the margins and accepting slightly lower performance in use to avoid high impacts for little effect. (HP)
- Embodied energy /carbon is a factor in retrofit, so there must be an emphasis on the use of low embodied materials (HP)
- The "fabric first" approach to retrofit may need to be reviewed (PD)[1]
- The "fabric first" approach to retrofit should be maintained (PR)
- Grid decarbonisation may require huge investment in onshore wind (OL)
- We already expect to achieve 77% reduction in grid carbon intensity by 2035 if interconnectors are largely low carbon (PD)

[1] Based on the research from Cardiff University, there appears to be an emphasis away from fabric first towards grid decarbonization and associated changes in heating services in order to achieve carbon targets

- Hybrid gas boilers/ASHPs may be an interim solution as the electricity grid gradually decarbonises.
- Materials impacts of deep retrofit may outweigh savings (AL)
- The decision on the eventual approach depends on what you are trying to achieve - a wide set of aims is essential (NG)
- Wales approach is to create an 'optimised retrofit' that delivers individualized holistic solutions based on some standardized palette of measures (HB, PM, PR)
- Integrating improvements with maintenance can reduce 'payback' times dramatically, especially with the older stock. (PD)

Break-out session analysis

The workshop split into groups and examined the question in the light of the 7 goals of the Wellbeing of Future Generations Act.

Green items indicate benefits
Red items indicate disbenefits
No highlight indicates an issue to be addressed

Goal	Impacts of Grid Decarbonisation	Impact of Deep Housing Retrofit
Global responsibility	1. Less carbon 2. Up front costs for infrastructure 3. New tech -> research required 4. Systemic values change required	1. Examine whole life carbon costs 2. Other impacts of materials 3. Achievable targets needed 4. Note comfort taking 5. Makes decarbonising grid easier 6. Systemic values change required
Prosperity	1. Addiction to oil 2. Impact on GDP? 3. Unintended consequences? 4. Employment potential if using locally produced technology 5. Potential to export skills in low carbon generation	1. Job creation, upskilling 2. Financial costs of deep retrofit 3. Local income generation 4. Lower bills 5. VAT issue on renovation 6. Increased property values 7. Opportunities in insulation manuf 8. Small builders excluded
Resilience	1. Mix of technologies -> less risk 2. Smart connections in rural Wales 3. Importance of hydro and tidal 4. Seasonal storage inc hydro. Homes can add flexibility?? 5. Battery storage has major costs 6. Impact of changing habits	1. Understand limitations 2. Retrofit reduces pressure on grid 3. Renovation prolongs property life 4. Less voids and dereliction 5. Planning system does not serve existing homes & businesses 6. Lack of contractors to PAS2030
Health	1. Improved air quality 2. Relatively low impact? 3. Impact on landscape and noise pollution (wellbeing) 4. Transport - EVs and lower air pollution	1. Improved thermal comfort (grid decarb doesn't reduce draughts etc) 2. Reduce overheating 3. Improved air quality required 4. Importance of behaviour change 5. Health impacts of materials 6. Health risks of poor retrofit
Equality	1. Potential to improve local control over energy supplies 2. Could worsen fuel poverty 3. Employment from installations	1. Cost may outweigh existing value 2. Funding for maintenance & repair 3. Need to address fuel poverty 4. Note competing priorities in EPCs
Community	1. Community ownership model 2. Energy buying clubs 3. District heating opportunities 4. Disruption from local grid reinforcement	1. Regeneration impacts 2. Educate and involve community 3. Improve appearance of run-down estates
Culture	1. Impact on landscapes 2. Tourism impact? 3. Need to decide what is valued for future generations	1. Impact on historic environment 2. Risks in traditional buildings 3. Need to decide what is valued for future generations 4. Rear elevations less precious

Final plenary session comments

- Clearly we need to continue to do both - reduce the energy demand of buildings, and to decarbonise the grid.
- New buildings can be designed to use less energy than currently required by the regulations. This will avoid the need to retrofit these. Link planning to performance standards via Section 106 agreements.
- Targets for both new and existing buildings framed in terms of kWh/m^2 would be more appropriate than EPC targets.
- It is essential to retain the plurality of benefits from retrofit in any centrally designed retrofit programmes.
- A culture of maintenance needs to be encouraged, in part to recognise the embodied energy in existing buildings.
- User behaviour is an important constituent of demand reduction.
- Need to consider any unintended consequences of Grid Decarbonisation.

Conclusions

- We need to continue to do both. Reducing demand from buildings reduces the amount of new renewable plant we need to build.
- The cost (and environmental impact) of retrofit rises when aiming to achieve deeper retrofit, as more expensive and disruptive measures are introduced.
- Retrofit must allow for future improvements so 'optimised retrofit' must follow a Medium Term Improvement Plan similar to PAS2035
- The cost and impact of additional renewables (eg offshore wind turbines) is relatively level, for each additional MW of power production. However, the electricity distribution grid may need to be reinforced if demand rises.
- Based on the two previous conclusions, there comes a point when it is cheaper to decarbonise the grid rather than to retrofit. This can be illustrated graphically (purely notionally):