

Green Recovery Dialogues

Nick Kelly, Strathclyde University - Transcript

See the video at <https://youtu.be/GdM3-WlzSDI>

[Sound of the wind]

Hello everybody, my name is Nick Kelly. I'm a reader in the Department of Mechanical and Aerospace Engineering and I also co-direct a group called the Energy Systems Research.

So our area of expertise is in the demand side, particularly the built environment and I'm going to be talking today about the transformation of existing homes and spaces into more energy-efficient entities.

View of a river with hills beyond. Across the river is a tall chimney, and on this side are the lights of an industrial site.

So we're here, high above Falkirk in Callendar Park because this is a really good vantage point to see the transformations that are occurring in our energy system particularly on the supply side. So there we can see on the horizon what used to be Scotland's largest emitter of greenhouse gases Longannet Power Station which is now closed down and, if I swing around a little bit, there's its successor which is Grangemouth which is producing fuels for transportation. But in one camera shot, if I pan right round, there we can see the successor technology to Longannet. So Scottish Power Longannet's owners have now transferred all of their generation assets to wind power so effectively they're producing almost all of that energy from clean energy sources. So what we're going to do now is we're going to go down out of this wind and look at the other side of the equation which is the demand side, particularly the housing sector.

View of a tower blocks with trees around them.

So here we are at lower level looking at the other side of the equation which is the housing sector; that accounts for about 30% of total demand. So here we can see some social housing down here at Callendar Park in Falkirk and you can see we've actually made a lot of progress in terms of making these buildings more energy-efficient. So they're all externally insulated and you can just about see over there...

Camera pans to a smaller building hidden behind a wall.

We have an energy centre as well. So in terms of social housing we've gone a long way to improving the energy efficiency of these buildings. We'll see in a moment this isn't necessarily the problem area because generally you tend to have one landlord so making fairly radical actions with regards to energy efficiency improvements is more straightforward. Where the problem really begins to escalate is where we have private housing

View of a street with modern three-storey blocks of flats.

So we've moved along the road a little bit to an area that's more problematic for energy efficiency. So that's the private sector. Here we can see flats and these will be a mixture of owner occupiers and also rented accommodation and here the problem of improving energy efficiency becomes more difficult because we don't have a single owner, so it becomes more difficult to make the communal changes that are necessary to really radically improve energy efficiency. So again, we can see most

of the low hanging fruit; most of the easy changes have already been made so most of these flats, in fact all of them, have double glazing and they'll all be reasonably well insulated. So if we want to improve energy efficiency and reduce emissions further we need to think about radical improvements in insulation such as external insulation and also maybe changing our fuel type from gas - as most of these houses will have gas boilers - to something that's much lower carbon such as a heat pump, or at least promises to be lower carbon in the future as electricity decarbonises.

View of a small housing with modern detached houses

So here we are now in a typical residential street and, again, we see a lot of the easy gains that can be made in terms of reducing energy consumption have already been made. So all of these houses are double glazed. They'll all have loft insulation. We can see some solar thermal collectors up there. And we can also, at the far end of the street, see some solar panels. So the problem is that going beyond this involves significant capital outlay. So we need to radically improve insulation levels and potentially radically increase the amount of microgeneration associated with these buildings as well, if we're to move towards that zero carbon future by the middle part of this century.

SLIDE 1:

- **Transformation of the electricity sector needs to be reflected in the built environment**
- **Many 'easy' energy efficiency improvements have already been done**
- **Radical interventions required to get to 2050 targets - fuels switching to electricity/hydrogen/heat networks, deep retrofit (eg (passive house standards, microgeneration with storage for clean heat and power, vehicle-dwelling-integration, smart homes,**
- **maintain COVID-19 behavioural shifts ie working from home, less travel, localism etc**
- **many of the technologies we need to achieve these are already here.**

So back indoors and out of the wind, we've seen that the transformation that's been evident in the electricity sector over the last 10 years really needs to be reflected in the built environment as we move towards net zero by 2050. However many of the 'easy' energy efficiency improvements that need to be implemented have already been done. So these are the low cost ones, such as changing lights to LEDs, going for loft insulation, cavity wall insulation, and double glazing. Anything that needs to be done in future is much more expensive and potentially much more involved. So examples of the types of radical interventions that we need to implement in housing and buildings to get to 2050 targets includes: fuel switching away from gas and towards electricity, hydrogen or heat networks; really deep retrofitting of energy efficiency measures eg moving towards passive house standards; far more microgeneration along with storage in dwellings - so that means storing clean heat and power without dumping it onto the grid; perhaps vehicle-to-dwelling integration as vehicles will become an increasingly important part of dwelling power demand if we go towards electric vehicles; smart management of homes, particularly management of their energy demands so that they don't pose too much of a strain on energy networks. And, potentially maintaining some of those behavioural shifts that have been upon over the last few months due to COVID-19 that are actually beneficial to the environment so that includes working from home, traveling less and doing things locally. So the good news is that many of the technologies that we need to achieve this are already here however there are considerable issues.

SLIDE 2: Some key issues And opportunities

Do we have time?

- **Eg transforming 300,000+ households in Glasgow - radically improving 30 households per day every single day for the next 30**
- **requires large skilled workforce, rapid, semi-automated processes, survey design, manufacture installation, and monitoring**

Do we have the resources?

- **for the private housing sector, how do we fund this sustainably without saddling householders with large debts?**

Do we have the people?

We need to plan how we obtain a workforce large enough and with the skills required to bring about rapid radical transformation of the energy performance of our building stock.

Can we afford not to do this?

Transforming Glasgow's buildings for a net zero future can and must address many other chronic issues that plague the city so that includes cold damp housing, fuel poverty, ill health and underemployment.

So in this final slide are some thoughts that will hopefully stimulate conversation at today's event. So, firstly, do we actually have time to implement this radical transformation in our built environment? For example, transforming the energy performance of over 300,000 households in Glasgow involves radically improving 30 households per day every single day for the next 30 years. So that would require a huge skilled workforce, and rapid and semi-automated processes to undertake surveying, designing, manufacturing, installing and monitoring the energy efficient equipment that we need to bring about the changes in our buildings. Do we have the resources? For example for the private housing sector, how do we fund these very radical energy efficiency interventions without saddling householders with huge amounts of debt and bankrupting them? Do we actually have the people that we need? So we need to start to think now how we go about training and obtaining a workforce big enough and with the skills that are needed to bring about such a rapid radical transformation of the energy performance of our building stock. And then, I guess the final question we need to ask ourselves, is can we afford not to do this? So transforming Glasgow's buildings and their energy performance can and must address many other chronic issues that plague the city so that includes cold damp housing, fuel poverty, ill health and underemployment. However, to do this is a gigantic challenge and requires a lot of imaginative and original thinking in order to do it. Thank you.