



Llywodraeth Cymru
Welsh Government

Energy Targets for Wales Stakeholder Workshop – 17 July 2017

Summary Report

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Executive Summary

Welsh Government held a workshop on Energy Targets in July 2017 to inform the setting of energy targets. UK Energy Research Centre (UKERC) chaired the workshop, which included presentations from UKERC, UK Committee on Climate Change (UKCCC), Energy Technologies Institute (ETI) and the Energy Systems Catapult (ESC).

This report reflects the views and understanding of participants at the event and not that of Welsh Government.

Participants' perspectives from the interactive workshop were as follows:

- Wales has an opportunity to realise its contribution to the UK energy system if it is ambitious.
- Energy pathways modelling is needed to inform targets, and models should take account of financial and environmental costs.
- A fit for purpose grid is essential in delivering energy targets.
- As costs of renewables fall, system costs become increasingly important. Flexibility is a key determinant of cost, and an imperative as the proportion of renewables increases.
- There is significant potential for bio-energy in Wales.
- Decarbonising heat is important, but could be particularly challenging for Wales, due to geographical issues and lack of policy levers.
- Decarbonising heat is more expensive than decarbonising power or transport, and depends on having a low carbon electricity supply.
- Opportunities for Carbon Capture and Storage (CCS) are likely to be limited in Wales, and a significant distance away from large emitters.
- Producing decarbonised hydrogen in Wales could be challenging.
- Growth rate of electric vehicles (EVs) in Wales lags behind the UK and the charging infrastructure is poor.
- There are still many suitable sites to develop wind projects in Wales, but some consider the planning process and grid constraints are restricting growth.
- Community ownership or shared ownership with a community element is a solution, particularly for rural Wales.
- Community ownership is not at the scale we need to achieve targets, it is one part of the solution.
- A focus on cross-Local Authority working is needed. Local natural resources need to match to infrastructure and local demands.

During the workshop delegates were invited to select their preferred options from a range of suggested targets, and comment on the level of ambition and time frame for the top five targets. The top five targets were:

1. Energy efficiency/consumption target (19 votes)
2. Renewable electricity generation (percentage) (18 votes)
3. Ownership/local benefit target (15 votes)
4. Fossil fuel reduction target (13 votes)

5. Renewable heat target (12 votes)

A target framed in terms of *percentage* of renewable electricity generation was preferred over capacity. There was a clear majority for short term (to 2030) targets for renewable heat, percentage renewable electricity generation and ownership/local benefit. For energy efficiency/consumption and fossil fuel reduction near term (to 2020) to short term targets (to 2030) were preferred.

A significant majority voted for a very ambitious target for energy efficiency/consumption, fossil fuel and renewable electricity generation. Opinion was split on whether a renewable heat target should be 'ambitious' or 'very ambitious'. The majority of delegates felt the appropriate level for an ownership/local benefit target would be 'ambitious'.

Background

The Welsh Government hosted an Energy Targets workshop to inform energy policy and the setting of energy targets in Wales. Eighty delegates from a range of Wales based and UK wide organisations attended the workshop, held on Monday 17 July 2017 at Jury's Inn, Cardiff (see delegate list at Annex A).

This report reflects the views and understanding of participants at the event and not that of Welsh Government.

The Welsh Government worked with UK Committee on Climate Change (UKCCC), the UK Energy Research Centre (UKERC), Energy Technologies Institute (ETI) and the Energy Systems Catapult (ESC) to design and deliver the workshop. An agenda for the workshop is attached at Annex B. The workshop was chaired by Professor Jim Watson, Director of UKERC. Professor Watson and Professor Ron Loveland, Energy Adviser to Welsh Government, jointly welcomed delegates to the event.

The workshop was interactive and participants were asked to answer questions and feedback on the evidence base available to inform the setting of energy targets for Wales. A summary of the evidence identified to date was provided to delegates in advance of the event.

The event aimed to:

- Set the broad intent and policy context for renewable energy targets and pathways.
- Place the Welsh Government approach to renewable energy targets and pathways within the international, UK and national context.
- Share the current evidence base with stakeholders.
- Provide opportunity for stakeholders to contribute their evidence.
- Test the evidence base to identify gaps.
- Identify key challenges for Wales on deployment of renewables and decarbonisation of energy.

Methodology

The workshop was delivered using MeetingSphere, an interactive system for capturing and feeding back delegates' views in real time. Delegates were encouraged to submit comments and questions in response to each of the speakers using tablets. The key points delivered by the speakers were recorded on MeetingSphere as they were speaking.

The interface encouraged delegates to work together in groups and contribute to the engagement process. People could also see and respond to other delegates' comments as the event unfolded. During and after the event the speakers were encouraged to respond to the delegate's questions and

comments on MeetingSphere. They were also encouraged to participate in the votes.

During the day delegates were invited to select their preferred options from a range of suggested targets, and comment on the level of ambition and time frame for the top five targets. Delegates were asked to contribute their views on:

- Which areas we should set targets for.
- Over which time period(s) we should set targets.
- What level of ambition we should seek in setting targets.
- What gaps there are in the evidence base.
- How we should fill gaps in the evidence base.
- What the main challenges and opportunities might be for Wales in terms of delivering decarbonised energy.

Presentations

Presentation 1: Setting the policy context for Wales

Prys Davies, Head of Decarbonisation and Energy Division at the Welsh Government, set out the objectives for the day in his presentation. He also gave an indication of why government might want to set energy targets, and highlighted the energy related targets which other national and regional governments had set.

Mr Davies set out the process and timetable for which the Welsh Government will need to set carbon budgets. He described the Wales 2050 Calculator model which the Welsh Government has commissioned Cardiff University to create. He also presented data setting out the baseline for energy consumption and generation in Wales. Finally, he described what Wales wants from its energy system, and posed some questions for delegates to consider.

The Cornwall Energy Island was given as an example by Mr Davies of a project with real energy leadership and one delegate asked if we could do something similar in Wales.

The questions and comments posed by delegates during Mr Davies's presentation were grouped under the following themes:

- **Ambition of target** - A view was expressed that Wales should do more than its 'fair share'. Another delegate commented:

"Is 80% by 2050 enough? Should we be more ambitious to prevent catastrophic climate change?"

- **Meaningful targets.** The issue of whether low carbon is a better indicator than renewable energy was raised. It was felt Wales has an

opportunity to realise its contribution to the UK energy market if it is ambitious, but this might not necessarily need a Wales-specific policy.

- **Welsh Government policy levers.** The issue of how a target would link to other WG levers and powers was raised. There was encouragement to be positive, as Scotland does not have the levers of market mechanisms either but sets ambitious goals.
- **Type of target.** There was a comment suggesting targets should be about reducing consumption as well as increasing renewables. Delegates also suggested targets around shared ownership and the wider benefits around energy. It was also felt that targets for generation should allow for growth of the economy and energy use. There was also a suggestion there should be targets in relation to overall carbon emissions, heat and transport:

“The increasing overlap between energy and transport should not be ignored in setting targets. CO2 emissions as a whole should be considered.”

- **Modelling.** It was suggested that modelling different energy pathways would be needed to inform realistic targets, and these should perhaps take account of financial and environmental costs of different options. The Welsh Government does not have the sole legislative competence to reach a target, therefore modelling could take into account scenarios where additional powers were devolved.
- **Community energy.** It was pointed out there is now over 10MW of community energy in Wales, a significant increase since 2014. It was suggested community ownership is best done in partnership (rather than in competition) with commercial developers. The impact of business rate revaluations was also raised as a risk to community energy projects. The difficulty with defining what ‘community energy’ actually means was raised:

“How has Scotland defined ‘community energy’ for its 1GW target? Notoriously hard to pin down what ‘community energy’ actually means.”

Presentation 2: What type(s) of energy targets do we need?

Dr David Joffe, a Team Leader at the UK Committee on Climate Change, spoke about the role energy should have in delivering decarbonisation in Wales. He began by giving an overview of Wales’ emissions targets and the role of UKCCC in providing advice to Welsh Government to enable them to set these targets and the corresponding carbon budgets.

Dr Joffe emphasised that emissions targets will require action in Wales even where policy levers are not devolved. He described the modelling work on the

future energy mix Imperial College have done for UKCCC based on a Great Britain system of 100gCO₂/kW in 2030. He explained the UK model has been specifically adapted to provide results for Wales based on a number of energy mix scenarios. He expressed the opinion that targets for low carbon power could be framed in terms of renewable/low carbon generation or carbon intensity.

A key point raised by Dr Joffe was the impact large individual projects can have on achieving energy targets (e.g. tidal, nuclear). He also described the importance of decarbonising heat and the difficulty in doing so. As heat policy levers largely sit in Westminster it will be necessary for the Welsh and UK Governments to work together. He suggested, given heat decarbonisation is inherently place-specific, it makes sense for the Welsh Government to play an important role and a target is one way to do this.

The questions and comments posed by delegates during Dr Joffe's presentation were grouped under the following themes:

- **Gas.** Comments were posted with regards to allowing more 'clean' or 'green' gas to be injected into the gas grid. It was also suggested there should be better connection between renewable generation in rural areas and demand in urban areas using power to gas and hydrogen for electricity, heat & transport applications
- **Costs of energy.** The issue of falling subsidies and the need for new projects to be developed 'subsidy free' was highlighted. This received a response with regards to the 'subsidy' support nuclear is receiving from UK Government. It was suggested greater consideration should be given to the lifetime cost of energy generation. The relationship between UK and Welsh Governments was referred to:

"How do we get the UK and Welsh Governments working together?"

- **Types of target.** It was suggested targets should encompass all three aspects of the energy trilemma (affordability, security and sustainability). Other comments suggested having targets for air pollution and carbon capture. It was noted a carbon intensity target risks relying on nuclear and possibly fossil fuels with carbon capture and storage (CCS). It was also pointed out that we need projections of energy demand in Wales to inform setting of targets. One delegate commented Wales should produce as much low carbon energy as possible:

"Target for renewables should go beyond generating 100% of Wales's electricity and incentivise exporting to the rest of the UK as we have the resource."

- **Energy efficiency.** Avoiding the need for energy by improving building efficiency was a common theme. A number of comments referred to the

link between better performing homes (in terms of energy consumption), heat decarbonisation and fuel poverty. The importance of tackling the existing housing stock was highlighted:

“Targets of households in energy poverty must also be an imperative for the Welsh Government.”

- **Carbon emissions.** It was noted increased generation in Wales may lead to increased export of energy from Wales. An absolute emissions target should be complemented by a carbon intensity target, and we should also consider going carbon negative. Sector targets were suggested to encourage emission reductions. One delegate pointed out there had been little mention of transport and the importance of deploying electric vehicles to decarbonise the sector. Another delegate commented:

“Is decarbonisation ambitious enough - should we not be seeking to go carbon negative?”

- **Modelling.** It was pointed out one of the Imperial College scenarios assumed a slowdown in the growth of solar and wind, two of the cheapest forms of generation.
- **Heat.** Decarbonising heat is a geographical challenge. The question of whether Welsh consumers are more open to low carbon heating due to a greater mix of heating technologies historically was asked. There was a suggestion Wales should look at the Scottish heat target of 80% of domestic heat demand from low carbon sources by 2032. The feasibility of this target was challenged. The age of the housing stock in Wales was raised (older than rest of UK) and this would need to be factored into any heat target. There needs to be a focus on reusing heat (waste heat) and any target should be for low carbon heat not specifically renewable heat.
- **Benefits of renewables.** The comments grouped under this theme centred on delivering projects that create benefits which are retained in Wales. It was felt we need more ambition around Solar PV to maximise benefits for Wales:

“The potential for solar PV in Wales has always been underestimated but has proved to be the most popular micro-generation and has the potential to be very low cost - we need more ambition here.”

- **Large Industry.** The presence in Wales of a greater proportion of the UK’s heavy industry needs to be considered. It was noted commercial / industrial generators should be a key part of our ongoing heat strategy. A whole sector approach is needed.

- **The consumer.** There needs to be an incentive for the consumer to invest in renewable technologies. Need a balance of top down and bottom up approaches.
- **Power grid.** It was pointed out a fit for purpose grid is essential in delivering energy targets. In response, it was commented grid infrastructure is very expensive and takes time to plan and build. The possibility of getting consumers off grid was put forward, but the value and benefit of this was challenged. Network operators in Germany are splitting their businesses to better respond to the changing system.
- **Energy mix.** Should we focus on the technologies which give best bang for your buck? It was pointed out there is a lot of peaking power generation across Wales which is relatively low cost and used to support renewable generation during peak demand. This should be encouraged through policy. It was commented large projects have a large impact on the system as a whole:

“Treat the really large projects as UK in scope (they will be determined in Westminster) and set targets without them.”

Presentation 3: Over what timescale should we set targets?

Dr Rob Gross, a Reader in Energy Policy at Imperial College London, spoke about UKERC’s review of the costs and impacts of variable renewables. He began by explaining the role of UKERC and how they undertake systematic reviews on a range of topics. The particular review Dr Gross presented updates UKERC’s 2006 report on the costs and impacts of renewables and included a reminder of the 2006 findings.

Dr Gross presented an overview of the methodology, pointing out a lot more data is available compared to 2006 and assessing system impacts is becoming more complex. He continued with an analysis of the costs of renewables (£/MWh) at various penetration levels.

In conclusion he pointed out that as the costs of renewables fall, system costs will become increasingly important, and flexibility is a key determinant of cost. Policy, regulation and markets must incentivise and reward flexibility. For Wales specifically, network issues are the first bottleneck, which will lead to constraint costs. Ultimately the balance of plant, demand side and wider system will determine how high renewables can go as a percentage of supply.

The questions and comments posed by delegates during Dr Gross’s presentation were grouped under the following themes:

- **Carbon.** A comment was made requesting more detail on the carbon benefits of renewables and the costs of integrating intermittent generation into the system. In response, a comment was posted stating the primary focus should be on deployment cost (levelised cost of

energy) and the ability of renewables to offset emissions from more expensive and carbon intensive generation. It was pointed out emissions from coal in Wales in 2016/early 2017 may have been greater than would normally have been the case due to need to run down the coal stockpile ahead of engineering changes to meet regulatory requirements.

- **Gas grid & hydrogen.** Hydrogen could be a solution to inter-seasonal storage but there are issues with developing the infrastructure. A frequent comment was the potential of the gas grid to store energy:

“Electricity to gas and the entire natural gas network have a large potential to store and balance renewable energy. Batteries are currently the ‘fashionable’ solution, but is using the gas network not more sustainable and efficient?”

- **Energy system.** System balancing and meeting peak demand are key issues. Grid is at capacity across Wales, particularly mid-Wales. It was noted capital costs used to be the main concern about impacts on cost of energy. Now we need to think about the balance of the system more carefully. If we have a flexible system then costs can be minimised.
- **Modelling.** It was suggested we need to model what could be achievable as a maximum in terms of our resource before we set a target and reference was made to the RSPB Energy Vision document which factors in ecological sensitivity. A comment was posted on the importance of modelling and how it becomes more important as the share of renewables increases. It was suggested the UKCCC advice is over-ambitious for heat.
- **Renewable technologies.** A suggestion was put forward for the Welsh Government to introduce its own FIT or RHI scheme. The uncertainty around Pot 1 Contracts for Difference auctions is affecting onshore wind developments. It was also noted solar PV works best where high solar irradiance best matches peak demand. A number of comments were posted with regards to co-locating renewable technologies with storage:

“One thing to consider is future ‘hybrid’ projects coupling solar PV, onshore wind, storage and AD (anaerobic digestion) to flatten generation profiles and avoid intermittency effects for future projects.”

- **Storage.** The importance of energy storage to maximise the potential of renewable energy was highlighted. A comment was put forward about the cannibalisation effect and the need to stabilise markets – as deployment increases it pushes prices down and it becomes harder to create viable business models.

- **Planning and consenting.** It was noted previous mechanisms in Wales have been self limiting; TAN8 was given as an example. It was also suggested the ability to achieve targets depends on having the ability to determine energy schemes of all scales and type:

“Future planning policy needs to work in tandem with the targets.”

Presentation 4: How ambitious should targets be?

Andrew Haslett, Chief Engineer at the Energy Technologies Institute (ETI), gave a presentation on the ESME model and what it tells us about the potential energy pathway in Wales. He explained ESME is the Energy System Modelling Environment which has been developed by the ETI and allows a whole system analysis based on sector specific detail. He went on to describe how ETI is in the process of updating its UK ESME analysis for 2017 and has applied an early version of this to Wales.

Mr Haslett described the modelled UK emissions trajectory out to 2050, which detailed the contribution made by each sector. He provided an example of what the generation mix could look like in 2030 and gave an overview of how each of the main renewable energy technologies could contribute to the electricity mix. He provided a brief insight into transport and concluded the presentation with details on heat, and set out heating as a current priority. He added that heating in Wales is already different from the rest of the UK and therefore UK policies may have unanticipated effects.

The questions and comments posed by delegates during Mr Haslett’s presentation were grouped under the following themes:

- **Energy mix.** It was pointed out Wylfa Newydd is significantly larger than any of the other energy projects and none of the renewable technologies contribute significantly to peak demand. In response to this it was stated bio-energy can contribute to peak demand, other technologies are required to meet peak demand and heat pumps create peak demand. One delegate commented resource mapping is required to balance competing land interests. Another comment emphasised the significant scale of change required to achieve decarbonisation. Onshore wind and solar PV are already two of the lowest costs of energy generation and it was suggested they should deliver more energy in Wales.
- **Industry.** It was noted decarbonising industry is more important in Wales than the rest of the UK due to the higher industrial intensity and there is a need to support specific industrial decarbonisation projects in Wales to protect future economic growth. It was suggested the opportunity for Carbon Capture and Storage is limited due to the distance between the large emitters (S Wales) and the potential storage sites (N Wales).

“What happens to the industrial emissions is important, but difficult to address. (There are) Large emitters in Wales (e.g. steel) and they are a long way from CCS storage facilities. Might want to look at piping hydrogen into Wales.”

- **ESME Modelling.** It was noted ESME allows modelling under uncertainty and can look at what is likely to be economic (secure and affordable). It does not look at preferences, but a cost or risk premium can be built-in.
- **Transport.** A comment was posted with regard to the difficulty of decarbonising transport. It was pointed out the growth rate of electric vehicles (EVs) in Wales lags behind the UK and the charging infrastructure is poor. It was noted ESME gives no consideration to hydrogen vehicles in the medium term. ESME does include hydrogen transport but a large scale take up is dependent on infrastructure. A detailed cost comparison of an EV and petrol vehicle was provided and it was felt the public were not fully aware of the gulf in running costs. It was suggested the impact of EVs is underestimated:

“Everyone including OFGEM seems to be underestimating the impact of EVs.”

In reply:

“EVs can be either positive or negative, depending on how well charging is managed. More progress is required with charging management standards and systems in the UK.”

- **Building sector.** It was explained why decarbonising heat in buildings comes late in the model. It is more expensive than decarbonising power and transport:

“Decarbonisation of heat in buildings comes relatively late on in the model, which may be challenging in terms of the supply chain. Decarbonising heating is more expensive than power or transport and depends on having the right power supply in place. There is a relatively long period of slow build up followed by a more intense period of mass conversion.”

- **Milestone.** A number of comments made reference to the challenge of meeting a 2030 target (only 12 years away) and that it is an important interim point on the way to 2050. Some large infrastructure projects can take 10 years to design, consent, build and commission.
- **Solar PV.** Comments referred to where to locate additional PV, should it be roof or ground mounted? Is there enough roof space? The land area required, if deployment was dispersed, is trivial. It was suggested the load factor for PV will increase and this has been proven in the lab.

- **Onshore wind.** It was noted there are still many suitable sites in Wales to develop wind projects but grid constraints make it difficult. It was suggested a Contracts for Difference for onshore wind was needed from Westminster and it would need to be £45-50MWh, which is relatively cheap.

“A country's energy resource must play an integral role in its targets. Wales is blessed with a strong wind resource, projects are close to grid parity, therefore a challenging target should be set.”

- **Storage.** It was commented ESME did not take account of storage. In response it was confirmed ESME does take account of storage but there are very few planned projects are in Wales.
- **Bioenergy.** It was noted the UK emissions trajectory seems reliant on credits. It was clarified they were not credits purchased from overseas, rather the contribution of bioenergy absorbing carbon from the atmosphere. Woody biomass could have a significant contribution to decarbonisation in Wales but this will have a land use impact.
- **Tidal.** It was explained diversity (in terms of location) is important for tidal energy.

“Diversity is particularly important for tidal energy - need to spread generation across as wide a time period as possible.”

- **Peak demand.** The statement wind and solar provide no peak demand was challenged. It was confirmed wind generation is included in peak demand analysis, but as peak demand occurs often when it's dark, solar is not.
- **Heat.** There is a need to look at heat solutions which suit the type of properties in Wales, and rural needs vs urban needs.
- **Planning.** It was suggested the planning process in Wales has restricted the growth of wind and would local ownership resolve this. One delegate suggested the vast majority of people support wind and democratic systems are not adequately reflecting the views of the majority. Supporting wind and solar via appropriate planning policy was suggested:

“An approach for onshore wind & solar might be to support it through planning, consenting and grid connection rather than focusing on subsidy.”

- **Hydrogen.** It was commented Wales has the greatest number of hydrogen production facilities in UK, two existing pipeline networks and significant practical, academic and industrial experience. It was pointed out the issue is producing *decarbonised* hydrogen. Therefore it is

possible that Wales might in future be reliant on decarbonised hydrogen produced elsewhere in the UK:

“The most economic method (to produce decarbonised hydrogen) is steam methane reforming, which needs to be linked to CCS. South Wales (in particular) is severely constrained in terms of the available storage resource.”

Presentation 5: How ambitious should targets be?

Dr Natalie Lowery, a Senior Modelling Analyst at Energy Systems Catapult (ESC), spoke about the role of local area energy planning in delivering Welsh carbon reduction ambitions. She outlined the current status of local area planning, identified the challenges and described the EnergyPath Networks tool ESC have developed.

Dr Lowery gave an overview of the work she has been doing with Bridgend County Borough Council on local area energy planning and provided some of the early insights from the project.

The questions and comments posed by delegates during Dr Lowery’s presentation were grouped under the following themes:

- **Community energy.** A number of comments suggested community ownership or shared ownership with a community element was a solution for rural Wales. A number of responses suggested community ownership is not at the scale we need to achieve targets:

“Agree that community energy is part of the solution but doesn't seem likely that this will get you all the way.”

- **Local authorities.** It was suggested there should be a focus on cross-Local Authority working. There is a need to evaluate local natural resources and legacy infrastructures and match this to local demands. Urban will differ from rural and there is no silver bullet.
- **Energy scenarios.** It was emphasised Bridgend is a diverse authority with both urban and rural areas, so is a good representation of Wales as a whole. It was commented more emphasis should be put on the supply chain opportunities that setting of targets could offer to Welsh businesses:

“Benefits to Welsh supply business should be a consideration and the opportunity for new companies based on spin out technology from universities.”

- **Bridgend.** It was commented it makes sense to do more with heat. ESC has been working with Bridgend for 8 months. The model has looked at which heat solutions may be suitable.
- **District heating.** It was commented much of Wales is off the gas grid and alternative fuels for off gas grid properties depends on a number of factors. It was suggested the dense population and terraced lay out of properties in the Valleys provide a good opportunity for district heating. There is a project in the Llynfi Valley looking at using district heating sourced from mineworkings (*note: this is included in the scope of the work with Bridgend and ESC*). Another comment suggested district heating does not always deliver the expected level of carbon savings.
- **Planning.** Concern was voiced about planning committee members not voting for locally opposed projects. It is important local authorities have appropriate strategies and policies in place to support renewables as it often appears they have a cautious attitude to new technologies. It was suggested targets should be set for sub-regional areas of Wales:

“Welsh target should seek to allocate targets to sub-regional areas of Wales. It should be top down not bottom up. The last thing that should be done is develop targets based on historic consenting rates in Wales.”

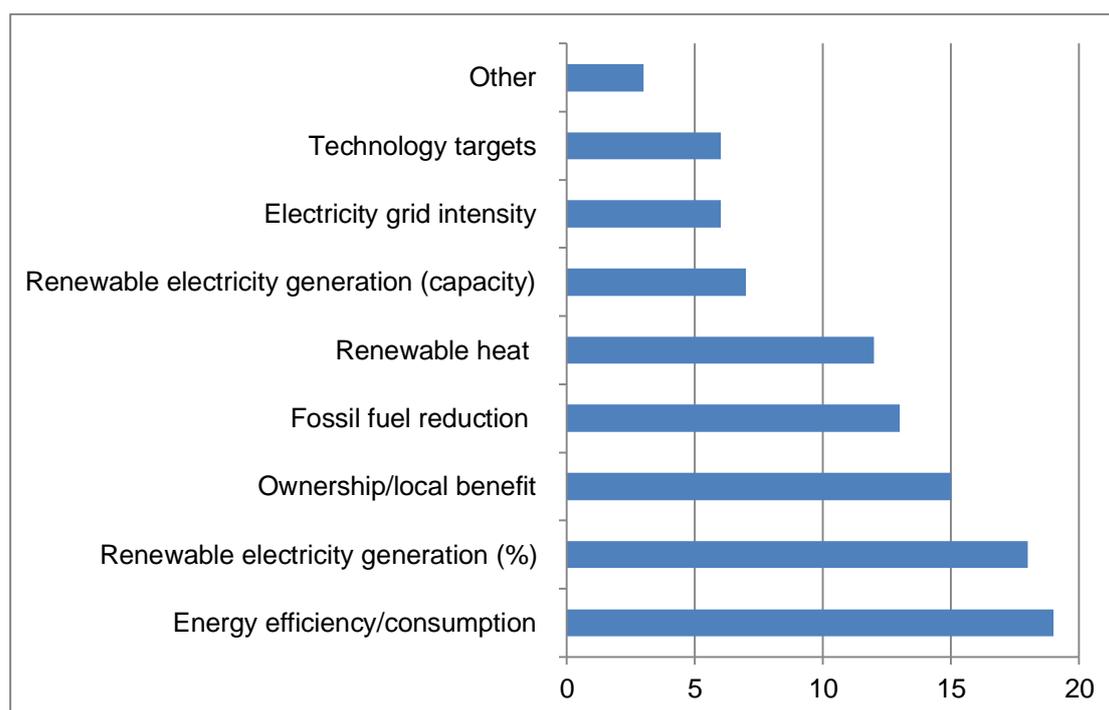
Questions

Question 1 - Which areas we should set targets for?

Delegates were asked to select up to five areas where they think targets should be set (from a list of 9). Against each type of target, delegates were invited to add a comment or describe the type of target they would like to see. If selecting 'other', delegates were asked to state what type of target they would like to see. Some delegates carried out this task individually; others worked in groups of 2-3.

The result of the vote was as follows:

- 1. Energy efficiency/consumption target (19 votes)**
- 2. Renewable electricity generation (percentage) (18 votes)**
- 3. Ownership/local benefit target (15 votes)**
- 4. Fossil fuel reduction target (13 votes)**
- 5. Renewable heat target (12 votes)**
6. Renewable electricity generation (capacity) (7 votes)
7. Electricity grid intensity (6 votes)
8. Technology target(s) (6 votes)
9. Other (3 votes)



In the 'other' category delegates put forward the following for suggestions for types of targets: low carbon rather than renewable, electrification of transport, jobs target, community engagement target, storage & hydrogen targets, an export target.

A summary of the comments posted against each type of target can be found in Annex C.

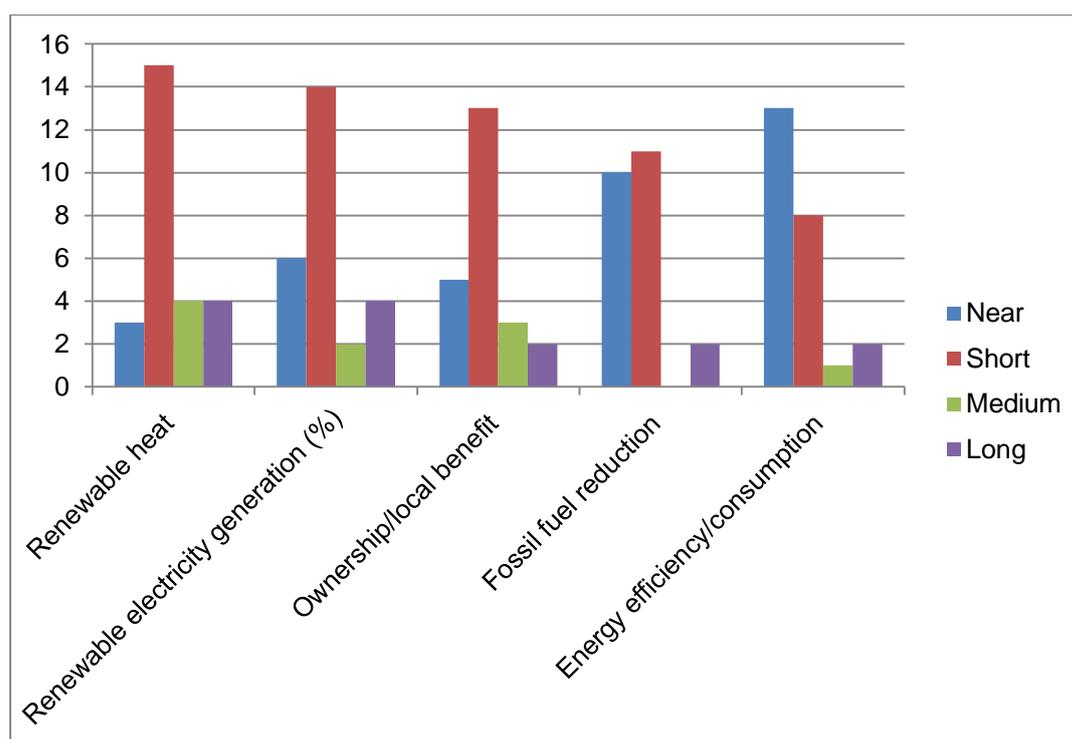
Question 2 – Over which time period should Wales set targets?

Participants were asked to select from a list of four timescales for the top five types of targets (as voted for in Question 1). The options were:

- Near term (to 2020)
- Short term (to 2030)
- Medium term (to 2040)
- Long term (to 2050)

The result of the vote is summarised below.

Type of Target	Near	Short	Medium	Long
Renewable heat target	3	15	4	4
Renewable electricity generation (percentage)	6	14	2	4
Ownership/local benefit target	5	13	3	2
Fossil fuel reduction target	10	11	0	2
Energy efficiency/consumption target	13	8	1	2



For renewable heat, percentage renewable electricity generation and ownership/local benefit there was a clear majority for a short term target (to 2030). For energy efficiency/consumption and fossil fuel reduction a near term (to 2020) to short term target (to 2030) was preferred.

A summary of the comments posted against each type of target can be found in Annex C.

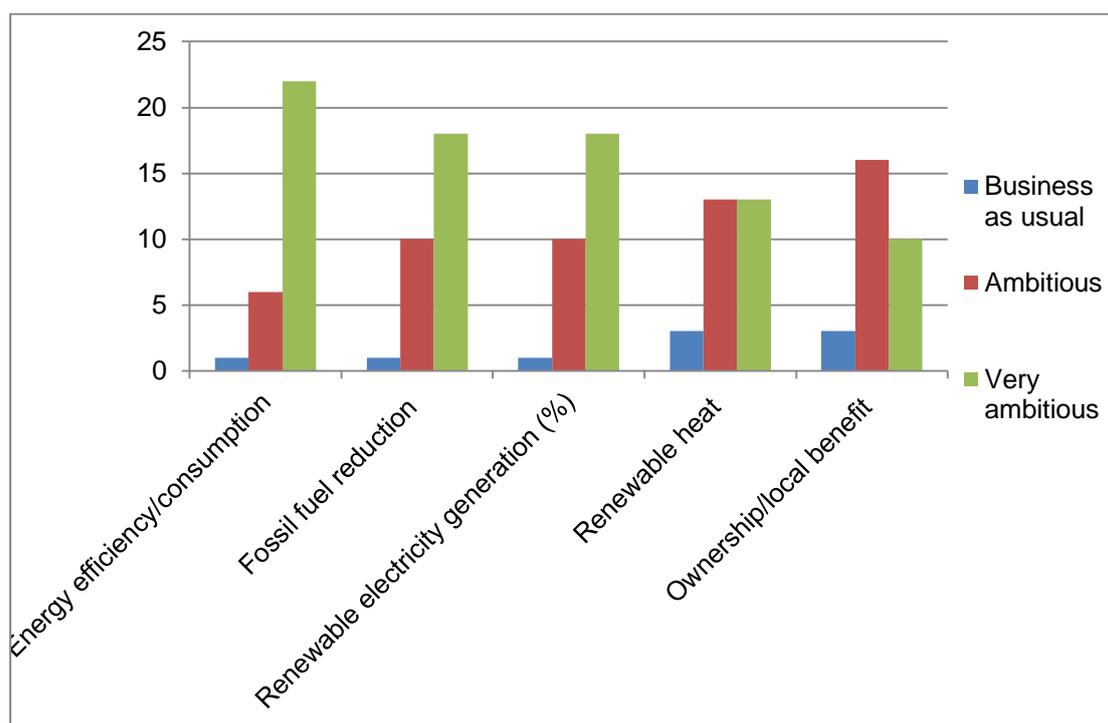
Question 3 – What level of ambition should we seek in setting targets?

Participants were asked to select a level of ambition for the top five types of targets (as voted for in Question 1). The options were:

- Business as usual
- Ambitious
- Very ambitious

The results of the vote are summarised below.

Type of Target	Business as usual	Ambitious	Very ambitious
Energy efficiency/consumption target	1	6	22
Fossil fuel reduction target	1	10	18
Renewable electricity generation (percentage)	1	10	18
Renewable heat target	3	13	13
Ownership/local benefit target	3	16	10



A significant majority voted for a very ambitious target for energy efficiency/consumption, fossil fuel and renewable electricity generation. For renewable heat an equal number of delegates thought this should be 'ambitious' and 'very ambitious' (13 each), perhaps reflecting the fact that decarbonisation of heat is potentially more challenging than decarbonising electricity. The majority of delegates felt the appropriate level for an ownership/local benefit target would be 'ambitious', again potentially reflecting

the challenges apparent in locally based organisations developing, funding, sharing ownership and benefiting from energy projects.

A summary of the comments posted against each type of target can be found in Annex C.

Group Discussions

The final session of the workshop involved group discussions. Delegates were asked to discuss the following three questions and provide their feedback using MeetingSphere:

1. What gaps do we still have in the evidence base and how should we fill these?
2. What are the challenges for Wales in delivering decarbonised energy?
3. What are the opportunities for Wales in delivering decarbonised energy?

The comments posted in response to each of these questions were grouped under a number of themes and are summarised below:

Evidence Gaps

- **Technologies.** There is a lack of evidence around technology adoption and a wider range of technologies need to be considered.
- **Consumer.** It was commented more information is needed on consumer behaviour and there is a knowledge gap amongst consumers around renewables. It was felt we do not know what the public will support.
- **Costs.** A number of comments referred to the need for accurate and reliable information on the costs of generation so meaningful comparisons can be made across technologies.
- **Data.** There is a need for a central data platform. In particular there is a lack of Wales specific transport data.
- **Housing.** Existing evidence on the housing stock in Wales is insufficient for targeting energy efficiency measures.
- **Investment & support.** It was asked how UK Government will support both industry and renewable energy. One comment suggested there is a lack of investment funds for disruptive technologies, whilst another delegate requested greater discussion on current support mechanisms.
- **Grid.** More information is required on the impact of micro-grids and a greater understanding of the impact of electric vehicle deployment on the grid is needed.
- **Carbon Storage.** A Wales based programme was suggested to ascertain the feasibility of carbon storage and sequestration is required.

Challenges

- **Public Sector & Local Authorities.** It was commented there is an expectation for public bodies to drive the renewables agenda whereas a bottom up approach could have a far bigger impact. There is a perception Local Authorities are often out of line with national policies and public sector procurement policy can be a barrier to delivering renewables.
- **Welsh Government.** WG need to provide more certainty to the sector, but a lack of devolved power around energy makes it difficult to implement effective policies.
- **Grid.** Grid capacity is a challenge and lack of capacity will impact on achieving targets.
- **Heat.** It was suggested meeting peak heat demand with renewables is difficult and gas (preferably green gas) will be important in the future. If there is to be widespread deployment of renewable technologies in domestic properties there is a need for a suitably skilled workforce to service the sector.
- **Decarbonisation.** Introducing a Wales carbon tax was suggested, as was the proposal that Wales could over deliver on decarbonisation against UK targets.
- **Planning.** The amount of Wales covered by environmental designations was identified as a challenge. It was suggested the consenting process for new projects needs streamlining and the timelines for obtaining planning permission are unclear. Need to strike the right balance between local issues and projects of national interest,
- **Consumers.** A number of delegates suggested a lack of consumer appetite for change, and a lack of understanding amongst consumers on energy issues. It was suggested there needs to be a focus on large domestic energy users.
- **Local benefits.** It was pointed out there is a challenge in retaining benefits, financial and otherwise, in Wales. Local solutions are needed that address urban and rural differences.
- **Data.** Making the right decisions with limited data is a challenge. There needs to be more information sharing across the public and private sector in Wales.
- **Modelling.** It was pointed out existing models tend to be based largely around cost, but achieving our targets must go beyond cost alone. We need a better understanding of the different rural and urban models.
- **Energy mix.** There is uncertainty around what Wales' future energy mix will look like (Wylfa, Aberthaw, Swansea Tidal Lagoon). We can set out the view of what we want Wales to achieve, to help influence UK policy.
- **Industry.** There is a challenge around engaging industry in the process.

Opportunities

- **Welsh Government.** There is an opportunity for WG to remove barriers to enable new generation (planning, procurement, bureaucracy). Also an opportunity for WG to develop more suitable support mechanisms for developments.
- **Energy efficiency.** A number of delegates commented on a need for more support for householders to implement energy efficiency measures. It was noted building regulations should be developed to meet long term energy efficiency requirements.
- **Local benefits.** It was suggested we need local targets for renewables, energy efficiency and carbon to drive local policy and enable balanced planning decisions. Other comments highlighted the benefits which local energy brings: economic, employment, quality of life.
- **Jobs/growth/investment.** It was pointed out Wales is very well placed to be a world leader in renewables due to its natural resources, which will provide significant investment opportunities, skills development and supply chain benefits. The wind industry is struggling in England and this could be an opportunity to attract more industry to Wales. One comment suggested reviewing procurement rules to promote local businesses.
- **Policy & legislation.** A number of delegates referred to the Wellbeing of Future Generations Act and to the Environment Act. One suggestion was we should adopt a Wales-first approach and another suggestion was Wales could become energy independent.
- **Public sector.** Wales has a huge public estate (buildings and land) and this presents opportunity for development.
- **Innovation.** One suggestion referred to coal bed methane and the opportunity for Wales to exploit it by converting it to hydrogen along with carbon capture. The significant industrial infrastructure and manufacturing economy of Wales provides an opportunity for the early implementation of new renewable technologies e.g. hydrogen. Another comment referred to Wales' small size and how this can be used to our advantage in bringing innovation to the market. There should be an increase in investment in Research & Development in Welsh higher education.

Annex A – Delegate List

Title	First name	Last name	Business name
Mr	Joe	Allen	Invicta Public Affairs
Miss	Chanelle	Anthony	Work Experience Student (RenewableUK)
Mr	Jon	Arroyo	Rhondda cynon Taff CBC
Mr	Marc	Asker	Forterra PLC
Mr	Graham	Ayling	Energy Saving Trust Foundation
Mrs	Kalpana	Balakrishnam	Natural Resources Wales
Mr	Fred	Best	Energy International Systems Ltd
Mrs	Amanda	Biss	Eginida
Mr	Shea	Buckland-Jones	Institute of Welsh Affairs
Mr	Ben	Burggraaf	Welsh Water
Mr	Kevin	Bygate	SPECIFIC
Mr	Mick	Campbell	Merthyr Tydfil County Borough Council
Ms	Alison	Cawley	Melin Homes
Mr	Richard	Clay	The Crown Estate
Dr	David	Clubb	RenewableUK Cymru
Mrs	Judith	Cook	Oren Associates
Mr	Mark	Cummings	Invicta Public Affairs
Mr	Kendal	Davies	Carmarthenshire County Council
Mr	Richard	Dibley	Falck Renewables
Professor	Iain	Donnison	Aberystwyth University
Mrs	Helen	Donovan	Welsh Government
Mr	Stephen	Elias	Finance Wales
Mrs	Helen	Fitzgerald	Wales & West Utilities
Mr	Jonathan	Fudge	Welsh Government
Mr	Anthony	Gale	Greenbackers Investment Capital Ltd
Mr	Adam	Hancock	Rentalspec Ltd
Mr	Gregory	Hill	Wales & West Utilities Ltd
Mr	Patrick	Holcroft	City & County of Swansea
Mr	Alan	Holden	British Geological Survey
Mr	Phil	Horton	Dulas Ltd
Mr	Stuart	Ingram	Welsh Government
Professor	Stuart	Irvine	Swansea University
Dr	Melissa	Johansson	Geode-Energy Ltd
Mr	Crispin	Jones	E.ON UK
Mr	Craig	Jones	EWT UK Ltd
Mrs	Luned	Jones	Llywodraeth Cymru
Ms	Catrin	Jones	Tidal Lagoon Power
Mr	Matthew	Jones	National Assembly for Wales

Professor	Ian	Knight	Cardiff University/K2n Ltd
Mrs	Eleanor	Knight	Welsh Government
Mr	Graeme	Lane	Ceredigion County Council
Mrs	Fflur	Lawton	Smart Energy GB
Ms	Rachel	Lewis-Davies	NFU
Ms	Shibo	Liu	Nationalgrid
Miss	Nia	Lloyd	RenewableUK Cymru
Prof	Ron	Loveland	Welsh Government
Mr	Hywel	Lloyd	IPPR
Mr	Ian	Mackinlay	Self
Mr	Jon	Maddy	University of South Wales
Professor	Judith	Marquand	Cardiff University
Mr	Peter	Morgan	Blaenau Gwent CBC
Mr	Simon	Morgan	REG Power Management Ltd
Mr	Glyn	Mountford	Refit Cymru
Ms	Kate	O'Sullivan	Cardiff University
Mr	Guto	Owen	Ynni Glan
Ms	Sarah	Penny	Cardiff County Council
Professor	Nick	Pidgeon	Cardiff University
Mr	Martyn	Popham	Cenin Group
Mr	David	Powell	Vale of Glamorgan Council
Mr	Tim	Probert	reNEWS
Mr	Robert	Proctor	Community Energy Wales
Mrs	Joanne	Ragdale	Good Energy
Mr	Andrew	Regan	Citizens Advice
Mr	Neville	Rookes	WPGA
Mr	Paul	Smith	Energy Saving Trust
Mr	Jeremy	Smith	innogy Renewables UK
Miss	Catrin	Sneade	Powys County Council
Miss	Susie	Stevenson	Miller Research
Mr	Rhodri	Thomas	Cynnal Cymru-Sustain Wales
Ms	Harriet	Thomas	Tidal Lagoon Power
Mr	Jonathan	Townend	Oren Associates
Mr	Teo	Van Der Kammen	Tocado international
Mr	Lee	Watt	Siemens Gamesa
Mr	Craig	Whitney	Rentalspec Ltd
Mr	Mike	Wilkinson	RSPB
Mr	Matthew	Williams	FSB Wales
Mrs	Ceri	Williams	Torfaen Council

Annex B - Agenda

10.30 Coffee and registration

11.00 Welcome and Introductions

Prof Jim Watson, Chair

Prof Ron Loveland, Energy Advisor, Welsh Government

11.05 Introduction to Meeting Sphere

Steve Bather, Facilitator

11.15 Setting the policy context for Wales

Prys Davies, Welsh Government

11.30 First session: What type(s) of energy targets do we need?

What role should energy have in delivering decarbonisation in Wales?

Dr David Joffe, UK Committee on Climate Change

12.00 Second session: Over what timescale should we set targets?

How high can we go with renewable energy? Costs and impacts – Dr Rob

Gross UK, Energy Research Centre

12:30 Lunch

13:15 Third Session: how ambitious should targets be?

What does the ESME model tell us about the potential energy pathway in Wales? Andrew Haslett, Energy Technologies Institute

The role of local area energy planning in delivering Welsh carbon reduction ambitions. Dr Natalie Lowery, Energy Systems Catapult

14:15 Break

14.30 Final session: Risks, challenges, opportunities and gaps

14.30 Facilitated table discussions:

- What gaps do we still have in the evidence base? How should we fill these?
- What do you think are the main risks, challenges and opportunities for Wales in terms of delivering decarbonised energy?

15.20 Feedback and reaction – key themes from group discussion, general questions and observations from the speakers

15.45 Next steps

15.55 Close

Annex C – A summary of the comments posted during the quantitative activities

Question 1 - Which areas we should set targets for?

1. Energy efficiency/consumption target (19 votes)
 - Energy efficiency targets are essential, should be a priority area for action and should be normalised to make them realistic.
 - Electric vehicles will increase electricity consumption.
2. Renewable electricity generation (percentage) (18 votes)
 - A number of responses suggested a 100% target for renewable electricity generation (assumed as 100% of demand is met by renewables).
 - It was commented a demand reduction target should be set alongside a generation target and also the importance of storage to allow better use of renewable generation.
 - One delegate commented a 100% target should only apply to specific sectors as some industry cannot use electricity only.
3. Ownership/local benefit target (15 votes)
 - One delegate asked the question ‘why should Wales host generation if it doesn’t provide significant net benefit (to Wales)?’
 - Local ownership will ensure the local community backs development.
4. Fossil fuel reduction target (13 votes)

No comments.

5. Renewable heat target (12 votes)
 - It was suggested more green gas injection should be encouraged to make use of the gas storage network to meet peak demand.
6. Renewable electricity generation (capacity) (7 votes)
 - One delegate asked what is stopping WG investing directly in renewable schemes to increase capacity.
 - It was suggested a target in this area should be GWh rather than installed capacity.
 - Another delegate suggested a target to phase out fossil fuel by a certain date.
 - It was pointed out that with Aberthaw going offline in 2025 the renewables % would increase anyway.
7. Electricity grid intensity (6 votes)

- Grid intensity is considered an important headline benchmark, but how do we decide what is realistic.
 - Are we assuming current technology (when considering grid intensity)?
8. Technology target(s) (6 votes)
- We should back technologies with a global reach.
 - Energy storage should be promoted and hydrogen technologies developed.
9. Other (3 votes)
- Delegates put forward the following for suggestions for types of targets: low carbon rather than renewable, electrification of transport, jobs target, community engagement target, storage & hydrogen targets, an export target.
 - One delegate asked how WG will support the development of innovative technologies given they take time and are expensive to develop and consent.
 - Reference was made to the Wellbeing for Future Generations Act and how do we maximise the benefits to Wales of the low carbon transition.
 - There is a risk WG will focus on small and local at the expense of the big wins.

Question 2 – Over which time period should Wales set targets?

1. Renewable heat target
- It was pointed out more work is required to achieve heat targets compared to electricity and targets should be for low carbon heat rather than renewable heat.
 - It was felt consumer behaviour needs to change and the right incentives need to be in place to achieve heat targets.
 - A huge infrastructure and technology change is needed to move away from fossil fuel heat.
2. Renewable electricity generation (percentage)
- It was suggested the timescale needs to harmonise with that of other strategies (transport, economic development, carbon budgets).
 - Too long term a target risks the issue being kicked into the long grass.
 - It was suggested there will never be a need to reduce generation and a coherent policy is needed to avoid 'short term' focus of government.
 - The sector needs certainty in order to invest.
3. Ownership/local benefit target

- A target of a proportion of projects with shared ownership was suggested and it needs urgent consideration or the opportunity will be gone.
 - Another delegate suggested we need to allow time for communities to mobilise.
 - Another opinion put forward was this is a political rather than a science based carbon reduction target.
4. Fossil fuel reduction target
- It is likely the market will dictate a near term target for fossil fuel reduction and without CCS it is a necessary target.
 - One suggestion was a fossil fuel reduction target should drive all change but unlikely to make significant impact until alternatives for gas are developed.
5. Energy efficiency/consumption target
- An energy efficiency target should tie in with a policy review of building regulations.
 - It was pointed out a lot of work has already been done in this area so let's get on with it, but it does take time to influence behavioural change and see impact.

Question 3 – What level of ambition should we seek in setting targets?

1. Renewable heat target
- Decarbonising heat is critical to reducing carbon emissions but challenging to deliver.
 - Radical changes should take place in this sector.
 - If we 'nail' heat we address a big issue.
 - Focus on efficiency and good design to minimise heat demand.
2. Renewable electricity generation (percentage)
- The distribution network needs to be upgraded and we must ensure we reduce demand.
 - It was commented we should be ambitious like Scotland as Wales is blessed with a strong renewable resource.
 - The public sector should lead by example in partnership with the private sector.
 - We should recognise the other opportunities of renewable energy projects (supply chain, skills, education).
3. Ownership/local benefit target

- Community energy will not power the whole nation but it is an important part of the mix.
 - It was suggested if schemes don't exist locally then communities should look for opportunities to participate in projects further afield.
 - It was pointed out ownership and local benefit are not the same thing and shouldn't be considered together.
 - It was also suggested capacity is growing in the community sector as too is confidence.
4. Fossil fuel reduction target
- This is essential for promoting policies and investment into low carbon technologies.
 - Fossil fuels should be phased out ASAP, but, need to consider fuel poverty and security of supply.
5. Energy efficiency/consumption target
- Focus should be on building performance rather than fuel consumption per se.
 - Need zero carbon new homes and serious work needs to be done on how we retrofit.
 - The link between energy efficiency and economic growth was highlighted – growing the economy whilst consuming less energy.