

# Fuel Poverty, Community

## Energy

[Philip Squire]

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# Executive Summary

This report summarises a visit to Germany and the UK in late 2018 by Philip Squire, Chief Executive at Sustainability Trust in Wellington. The study tour was undertaken to learn from organisations working on the challenge of fuel poverty and housing quality. Other areas of focus included energy supply, especially the development of citizen-owned community energy projects. The prime reason for the study trip was to determine what initiatives, regulations, and good ideas could be transferred back to New Zealand and developed by Sustainability Trust and partners. Especially pertinent to the latter stages of the trip was the implications for housing quality and fuel poverty with of the change of government in New Zealand. More supportive policies and regulation of the residential rental sector provided some focus on specific regulations that could be enabled in NZ.

A brief summary of the major learnings include:

## Housing Quality

- Our current building code is set very low. Requirements for homes to meet a minimum energy performance could and should be set much higher. Note that in Germany, even 10-15 year old houses perform significantly better in terms of energy consumption than NZ new builds.

## Fuel Poverty

- Heating fuel costs in NZ are similar or slightly lower than Europe. BUT food costs are much higher (as much as twice the cost!). A food price review is in order!
- Establishing a national standardised grading for homes, such as Energy Performance Certificates (EPC), would allow NZ to regulate household energy efficiency much more efficiently. In particular EPC's would provide means to eliminate poorly performing homes from the rental market.

- Winter fuel payments, while having some benefit actually increase carbon emissions. Better targeting and energy efficiency interventions that reduce heating costs may be better use of funds.

#### Community Energy

- German and UK community energy schemes are usually strongly place-based (e.g. villages) and responding to a perceived environmental/social need.
- Co-ops that require community investment and support are the most successful model for community energy schemes.
- Several communities in Germany have bought back their local electricity network or are planning to.

#### Energy Efficiency Programmes and Projects

- Very similar household energy efficiency programmes being delivered in UK and Germany that we have in NZ. Support from local councils, focused on advice then action.
- Higher level of training and accreditation for energy efficiency advisors/practitioners than in NZ. National register for practitioners registered to provide EPC's and other tools.

#### Sustainability (Waste, Transport)

- Cycle lanes, cycle ways, and volume of cyclists lead to a culture where cycling is accepted and valued. Polite and attentive drivers in evidence in Freiburg.
- Efficient public transport and light rail evident in most major cities in Europe.
- Minimal ticket checking in Germany – a kind of trust/honour system.
- Germans are recycling kings – green waste, paper, plastic, metals, glass (x3) all in different bins. Rubbish bins are about ¼ the size of recycling bins and collections once/fortnight.

- Container deposit schemes in Germany work. No cans, bottles (glass or plastic) in the environment as all have cash value. In some cases, deposit return is more than cost of drink.

#### Cultural Differences

- Germany's social services generally run by national, state or local government. Catholic and Evangelical church also deliver many free professional services. Community organisations that flourish in UK and NZ, generally not present in Germany due to both funding and perceived need.

## Introduction

My current role is Chief Executive at Sustainability Trust in Wellington. We are a not-for-profit organisation working on practical projects that increase urban sustainability in the Wellington region. We have a focus on energy efficiency and waste minimisation at the household and community level but also cover other sustainability topics as well. It's fair to say we're a passionate, visionary, and very practical group who have grown from a couple of part-timers in 2004 to over 35 staff with a lovely EcoCentre in central Wellington and a \$4M annual budget. I also serve as chair of Community Energy Network (CEN), a national network of charities and social enterprises working on energy efficiency and fuel poverty.

A large part of our work at Sustainability Trust is providing warm dry homes to Wellington residents with a special emphasis on low-income households. As someone concerned about social justice and being an "energy geek" this work is an area of special interest and formed the basis for my fellowship to Europe. I was also interested in the wider area of community energy – for its renewable/low-carbon benefits but perhaps more for its contribution to the democratisation of energy generation and social equity outcomes. Understanding how the NZ situation and the European situation compare and contrast would hopefully provide myself, the Trust and our community energy partners (such as CEN) with solutions to support vulnerable households and address our own community-led community energy initiatives.

The conditions that lead to families living in cold, damp homes are complex. They include both practical issues such as housing quality, but are deeply influenced by higher level factors such as government policy and how organisations work together to address this issue. My fellowship afforded me the opportunity to meet and discuss with people and organisations working on a wide range of projects from small community organisations taking on multinational energy corporates to not-for-profit energy retailers to lobbying and research organisations influencing government policy. All these organisations were focused on providing citizens with the energy

they needed to live healthy dignified lives. As National Energy Action (NEA) puts it “A Fairer Energy Future for All” is what we are after.

Before I jump into the story of my trip, I think it’s useful to introduce the phrase/term that ties all this work together – and that is “Fuel Poverty”. Fuel poverty (also known as energy affordability or energy poverty) captures the conditions that lead to so many households shivering in winter. In NZ, this term is not used widely, but it is an extremely useful coining of the main issues that lead to cold damp homes. Fuel poverty work thus addresses three main areas:

- Housing quality, equipment, and householder behaviours
- High costs of energy
- Low incomes

Fuel poverty is rife in New Zealand with many households struggling to heat their homes during the winter months. Significant increases in hospital admissions and deaths are linked to decreasing temperatures with many families making decisions between heating and eating (notwithstanding the fact that food is at least twice as expensive in NZ versus the Europe!)

And one other point I should make is that the awarding of the fellowship sparked a temporary life change for myself and my family which culminated with us living in Freiburg, Germany for six months. My original plan to spend up to six weeks in Germany and UK by myself expanded to a major expedition for all six of us. After a lot of consultation with my Board and staff, I was granted a period of sabbatical to be able to mix professional development, research and part-time work. On my wife’s side, she was also able to gain a six-month leave of absence from her work at Ministry of Education. And the kids, after some convincing decided that a six month switch to a German school was on the whole – doable.

And why Freiburg? Freiburg is one of Europe’s premier green cities and provided a location to engage with a local experts and experience that efficient “just do it” attitude that is so German. It was also the base for three years of one of my Kiwi energy efficiency colleagues who provided a

number of contacts. Freiburg has solar panels on nearly every roof (as part of the Energiewende – energy transition), bike lanes and public transport everywhere and the ability to recycle just about anything demonstrated that the “green low-carbon life” is possible - it just takes some organisation.

Using Freiburg as a base I was able to visit organisations and people in the UK and Germany, while also retaining oversight of Sustainability Trust from my home office in our little house near the woods. The children (four girls aged from 7 to 12) attended the local schools and experienced German culture and traditions and became rather fluent in the language. And my wife, who is German was able to converse freely and visit with her parents and family who lived in a small town three hours north of Freiburg.

Having the opportunity to spread out my visits over a longer period of four months (September – December), rather than a whirlwind tour has meant the learnings have gone much deeper. The actual realities of day-to-day living and culture which supports it were experienced intimately. Initiatives that work on one culture may not work in another due to many factors and settling in a place – albeit temporarily gives an insight into what is likely to be transferable and what is not.

Much gratitude to the Winston Churchill Memorial Trust, Sustainability Trust staff and Board, and my family for my frequent absences!

## **A bit about sustainability, fuel poverty, and lived experience**

Sustainability, in the environmental sense, is at its heart an ethos that seeks to retain or improve the lifestyles of human beings, while also recognising that we are connected to all other non-human life systems (including rocks, rivers, mountains, air etc). It is impossible in reality to disconnect one environmental indicator from another. Whenever we influence one area, such as increasing the amount of renewable energy in our electricity supply, there can be cost implications that may fall on the most vulnerable. So sustainability really describes a future that works for everyone, not just one part of society or the wider environment. There ain't no free lunch is another way to put it.



My particular angle during my fellowship, was to learn about the challenges and successes of our European cousins in addressing the issue of fuel poverty and energy affordability. And then to determine what was cultural (i.e. wasn't transferable to New Zealand) and what was transferable.

The inability to be able to heat your home to a healthy standard in a wealthy nation such as New Zealand has huge emotional, health, employment, and other societal and personal costs. How is it that we've arrived at a place where the most basic requirements for a happy existence, i.e. shelter and warmth are not available for the most vulnerable? And how do we go about setting this right?

As I mentioned earlier, the opportunity to spend an extended period of time in Europe gave me a chance to observe life as lived by the people in Germany and the UK. It's one thing to drop in, but quite another to actually live and experience life on the similar terms to the residents. In studying issues such as fuel poverty, community energy, and sustainability, being able to participate in the community gave me an insight into why things worked like they did.

Perhaps the most striking example was that for the first time in my life I lived in a modern house that was heavily insulated, had thermal mass and stayed warm through the winter months with little heating. The fact that Germans and Europeans in general value and legislate for this kind of living experience speaks volumes for cultural expectations and that we in NZ can also achieve something as simple as good quality housing. While it will take some work to achieve a cultural shift, if we value a warm, dry home with low running costs then we will achieve it. All it takes is for people to realise it is possible and for good people to act – i.e. make a lot of noise and deliver practical examples.

## **Reasons for heading to Europe - Questions to answer**

The questions I originally had in mind to answer, when I applied for the fellowship altered somewhat as the journey to Europe came closer. The main reason for the change, perhaps was the political landscape in New Zealand, and the likelihood of a continuation of a centre-right government post the October 2017 general election.

The past nine years had yielded some gains in programmes such as insulating low-income homes, but indications were that financial support for vulnerable households and any move towards seriously addressing climate change were not on the cards. With the strong likelihood of spending another 3 years in “opposition” i.e. working to support the environment and low-income households with little government support my focus shifted to fuel poverty as a central theme. Working at the coal face means our team get to experience first-hand the effect of poor policy development and application!

Another question was the difference between German and UK social and community organisations. The UK, in my experience is very similar to NZ in that there are many almost identical organisations such as Sustainability Trust who fill the role between government and community. Whereas, it was hard to find similar entities in Germany. Noting that Germany had some of the most advanced social, environmental, and housing standards, what was the role of the NFP/NGO sector?

The main questions then became:

- What are the existing standards of housing in Germany and UK?
- What are the legislated and expected (cultural) standards?
- What policies are in place to achieve these standards?
- What programmes are currently running to support warm, dry homes at an affordable cost?
- What new policies, programmes, and frameworks are being enacted or planned?
- How transferrable are these policies and programmes to New Zealand?
- What is the structure of groups working in fuel poverty, community energy and sustainability? How were they formed and what continues to drive them?
- What cultural difference between Germany and the UK/NZ results in there being very few social enterprise/community organisations working on fuel poverty?

- What kind of projects and advocacy work should Sustainability Trust and CEN in New Zealand deliver to assist in elimination of fuel poverty.

I can honestly say, that I felt like a kid in a candy store. Being in mainland Europe and based in Freiburg, was incredibly exhilarating. With so many options to explore and hundreds of potential projects, organisations, councils and individuals to visit – narrowing down to those with most to teach took some work. An advantage of being on the ground in Germany, also meant that I could use the initial contacts I put together in NZ to add other relevant organisations and take others of the list that would perhaps be less valuable.

## **In and around Germany and the UK – finding the answers**

The value of the fellowship is primarily to allow recipients to engage up close and personal with people working in a similar area overseas. Conversations and sharing of time, coffee, food, beer, ideas, and passions has no substitute. Once you sit down with someone, conversations can go off onto tangents and other possibilities for future projects can emerge. Not having too fixed an agenda, I found, was the best strategy, and allowing my hosts to wax lyrical yielded many unexpected insights.

I arranged a number of meetings and site visits with people and organisations in Germany and the UK over a period of four months. This involved two separate visits to the UK from Germany, visits in and around Freiburg, and one trip to Berlin. The itinerary included organisations that seemed to present the best value for learning about a particular research area – specifically fuel poverty, community energy, energy efficiency programmes, and environmental education.

The meetings included a 2-day conference in Nottingham on fuel poverty, 3-day stay at an environmental education centre in Wales, a community energy facility near Freiburg, and meeting with a community group planning to buy back the Berlin energy network. Numerous other meetings

with organisations and individuals in the UK and Germany were arranged to allow me to investigate the key questions listed above.

Also, after the unexpected election result, which saw a Labour-Greens-NZ First government my focus turned to some practical actions that could be rolled out in the light of new centre-left policies. This included gathering information on Energy Performance Certificates (EPC) that are mandatory for residential houses in Europe. These EPC's could provide a robust rating basis to quantify performance of residential homes required under the Healthy Homes Guarantee Act passed in December 2018.

## **Tours, coffee, conversations – The learning**

I have included in the Appendix a notation of observations, learnings and insights that occurred during my meetings and visits. These are listed under the itinerary headings to link the learnings with the place/person I met with or visited. They form a bulleted list of inspiration points rather than being an exhaustive capturing of the entire meeting and points discussed. Having a clear purpose for these visits and application of knowledge to my work with Sustainability Trust, Community Energy Network and other colleagues and stakeholders helped keep the observations succinct and pertinent.

While I recommend reading the bulleted lists in the Appendix, I've provided a summary of the main useful learnings below. By "useful" I mean those that I think are relevant to our local situation and could inform projects and policies in a 1-5 year time frame.

### **Housing Quality**

- Our current building code is set very low. Requirements for homes to meet a minimum energy performance could and should be set much higher. Note that in Germany, even 10-15 year old houses perform significantly better in terms of energy consumption than NZ new builds.

- Carbon emissions (mitigation and quantification) are key drivers for improving energy efficiency of new housing stock. As NZ has comparatively low emissions/unit of domestic heating, carbon drivers are not as strong.
- It is possible to live in a warm, dry home with low energy costs. Double glazing, draught proofing, passive ventilation, efficient heating, thermal mass etc provide a stable temp, warm house during winter. And a cool house during summer.

### **Fuel Poverty**

- Heating fuel costs in NZ are similar or slightly lower than Europe. BUT food costs are much higher (as much as twice the cost!). We need to address food poverty in NZ and instigate a food price review so low-income households have enough money left over to be able to heat their homes adequately.
- Establishing a national standardised grading for homes (such as EPC's) would allow NZ to regulate household energy efficiency much more efficiently. In particular EPC's would provide means to eliminate poorly performing homes from the rental market.
- EPC's would also provide government with the means to signal to landlords what their properties need to achieve to be able to be rented in the future. Note: in the UK any rental property with a grade lower than an "E" (needs more than 160kWh/m<sup>2</sup>/annum to meet WHO temperature standards) cannot be rented. Also the standard will increase over the next 12 years which gives landlords time to improve their rental stock.
- Subsidies to assist low-income households are still one of the main levers for getting energy efficiency measures into homes.
- Energy retailers under a mandated commitment provide the majority of funding for low income households – a possibility for NZ.

- Winter fuel payments, while having some benefit actually increase carbon emissions. Better targeting and energy efficiency interventions that reduce heating costs may be better use of funds.

### **Community Energy**

- German and UK community energy schemes are usually strongly place-based (e.g. villages) and responding to a perceived environmental/social need. In Germany early community energy schemes were in response to going renewable after Chernobyl disaster. Green credentials are also important for small and large cities/villages.
- Co-ops that require community investment and support are the most successful model for community energy schemes.
- Several communities in Germany have bought back their local electricity network or are planning to. Key drivers are control over pricing, supply and investment in renewables; retention of profits in the community. Outside ownership (as in the case of Wellington Electricity and Berlin network) naturally means decisions are made from a purely business and regulatory standpoint. Local community ownership such as Vector or Orion at least means this critical infrastructure is accountable to local stakeholders with profits reinvested locally.
- Feed-in tariffs have supported community energy programmes. Economics for future schemes are not as robust as tariffs roll back.

### **Energy Efficiency Programmes and Projects**

- Very similar household energy efficiency programmes being delivered in UK and Germany that we have in NZ. Support from local councils, focused on advice then action.
- Higher level of training and accreditation for energy efficiency advisors/practitioners than in NZ. National register for practitioners registered to provide EPC's and other tools.

## Waste & Transport

- Cycle lanes, cycle ways, and volume of cyclists lead to a culture where cycling is accepted and valued. Polite and attentive drivers in evidence in Freiburg – drivers likely ride bikes as well and are on alert for children, elderly and less confident cyclists.
- Helmets are optional, however 99% of children ride with helmets (1% without helmets were our kids reveling in the freedom). Most commuters wear helmets, however round town cyclists generally do not. NZ is an outlier in the compulsory helmet stakes – legislating for helmets would confuse most Europeans as it would reduce attractiveness of cycling. Indeed as head injuries are more common in car crashes, mandating for compulsory helmets for car passengers would make sense.
- Efficient public transport and light rail evident in most major cities in Europe. Integrated ticketing makes transfers easy. We lived easily without a car for six months. Freiburg, a city the size of Wellington had a very efficient, quick train, tram, and bus system.
- Minimal ticket checking in Germany – a kind of trust/honour system. But major embarrassment if found without a ticket – it seems to work for the German psyche.
- Germans are recycling kings – green waste, paper, plastic, metals, glass (x3) all in different bins. Rubbish bins are about ¼ the size of recycling bins and collections once/fortnight.
- Options to recycle packaging at supermarkets – i.e. take off cardboard or any excessive packaging and leave at supermarket. No free plastic bags at supermarkets – everyone brings their own.
- Conversely some items have excessive packaging – mainly fruits and vegetables.
- Container deposit schemes in Germany work. No cans, bottles (glass or plastic) in the environment as all have cash value. In some cases, deposit return is more than cost of drink.

## **Cultural Differences**

- Germany's social services generally run by national, state or local government. Catholic and Evangelical church also deliver many free professional services. Community organisations that flourish in UK and NZ, generally not present in Germany due to both funding and perceived need. Groups that do exist tend to be either larger NGO's or single-issue organisations established for a particular project. Likely reasons include the socialist ethos, established churches, supportive taxes that are invested in social services, and general cultural expectation that government should take care of social and environmental challenges. As one colleague in Emmendingen said, "In Germany we practice a "soft" capitalism, whereas the UK, USA, and others practice a "hard" capitalism."

## **Back to New Zealand – Applying and sharing the learnings**

The insights I gathered in Germany and the UK both have a short and long term application. On the short term side, with perhaps the most major piece of legislation in a lifetime being passed by the new government on healthy housing, we have some international evidence and practice to inform new policies. NZ's Healthy Homes Guarantee Act is currently out for consultation to develop the regulations that will govern insulation, heating, ventilation, draughts, damp, and drainage in rental properties. European standards are in some areas many years ahead of NZ, so representations to government by Sustainability Trust and Community Energy Network are being informed by my recent tour.

Of perhaps most pertinence is the European directive for all homes to have a standardised EPC produced at the time of rental or sale. The EPC, using an A-G rating system provides a standardised measure of the energy efficiency of the home and the annual running costs. Interestingly in the UK, no property can be rented unless it has an E or better rating. We will be advocating strongly for a similar system to be brought in for New Zealand under the Healthy Homes Guarantee Act.



On the medium to long-term my experience is informing Sustainability Trust's strategic and annual planning. These documents direct both the projects we will deliver over the next twelve months and also set the direction for the organisation over 3-5 years. And as our organisation is a leading member of local, regional, and national networks we have the opportunity to influence and inform work in healthy housing, community energy, and sustainability initiatives across the country. For example, we are planning on expanding our work (adding staff and project areas) in healthy housing research and policy as well as specific carbon mitigation projects. From visiting a number of organisations in the UK, my opinion is that our community-centred organisations have a much bigger part to play than we currently are.

As an organisation with deep networks and a fairly vocal contributor to community and policy level discussions, I have taken numerous opportunities to share my experiences more directly. This includes both formal talks at the Trust and external workshops and fora over since I have been back in the country. The Trust also has a wide social media presence and I have written a number of blogs on housing programmes and legislation drawing on my European experience ([insulation](#); [healthy homes](#)). I will continue to write and speak about my experiences over the coming years and continue to reference support from the Winston Churchill Memorial Trust.

## Conclusions

The overall experience has been extremely rewarding from both a professional and personal perspective. Getting my head out of the day-to-day in Wellington and encountering new ways of working has changed the way I view our work. I would also say that it has given me a measure of satisfaction and confidence that at my own organisation and within our networks that we are doing some cutting edge work here at the bottom of the world. But also that "older" countries have been working to get their housing and community energy programmes in order for longer than we have, and there is much that is transferrable.

I am extremely grateful to the Winston Churchill Memorial Trust for providing the funding and impetus for the odyssey. And without the support of the Board and staff at Sustainability Trust as well as my family the whole jigsaw wouldn't have been able to be put together. I am also very grateful to the organisations and people who freely gave me their time– it certainly helps to know that there are friends and colleagues working on the same challenges across the world and willing to share their experience.

## Appendix: Itinerary and Notes

| Date               | Notes   |
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| 6-7 September 2018 | <p><b>Centre for Alternative Technology (CAT) – Mchynlleth, Wales</b></p>   |
|                    | <p><b>John Urry – CAT pioneer and graphic designer</b></p> <ul style="list-style-type: none"> <li>• John gave me a top-bottom tour of CAT – from the beginnings up the present day. John joined CAT in the early 80’s, and is still on staff as a graphic designer.</li> <li>• CAT is located on the border of Snowdonia National Park in north Wales near the town of Mchynlleth</li> <li>• CAT started with a keen group of environmentally-minded folks in late 70’s looking to promote alternative energy, permaculture, and trial a new form of community living.</li> <li>• Found an old slate quarry and started with a peppercorn rental from the owner</li> <li>• Built up a range of educational programmes and workshops over the years.</li> <li>• Is now a large property, with walks, accommodation, café, lecture theatres, demonstration buildings, lake, tram, gardens, composting facilities and much more.</li> <li>• Reasonably flat structure for many years, with different people taking it in turns to be “Mother” or CEO for the month.</li> <li>• Wages were in 3-tiers, and all rather low. Many volunteers who lived on/off site.</li> <li>• Structured as a charity – however in early days Board was more of a rubber-stamp and staff ran the organisation.</li> <li>• Built the access tram – first major engineering feat. Proved that CAT could do some serious work.</li> <li>• Added Education Centres, shop and many other buildings.</li> <li>• Most recent major project was the WISE Center (Wales Institute for Sustainable Education). Challenges with the build and cost overruns. Bank required CAT to restructure and bring in managerial expertise and more vertical structure. Quite a bit of downsizing and job losses. Some dissatisfaction in staff as the culture changed with more differentiation in salaries and less of a family atmosphere. However, John felt this was part of the growing pains and needed if the organisation was to remain relevant</li> </ul> |

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|  | <p>and successful.</p> <ul style="list-style-type: none"> <li>• Visitor numbers peaked at 80,000/year in the 90's but dropped off when holiday makers changed to seeking the sun rather than the valleys of Wales and the price of plane fairs dropped. Currently at about 50,000/year.</li> <li>• As the emerging technologies have become mainstream, the focus is now firmly on education (hence the WISE Centre). This includes research and dissemination of the results through research papers, presentations, seminars etc.</li> <li>• Also picked up some graduate school degrees when these were tendered by University of East London. Students come to CAT to study practical elements of the degrees. Again some friction when professors (who had been at UEL) came to CAT and were paid well above the standard CAT wages.</li> <li>• Funding to support the operation is provided by visitor fees, student fees, grants, shop, weddings, café, membership, volunteer labour, and donations.</li> <li>• A very warm, community feel to the place with strong connections to the local communities.</li> </ul> |
|  | <p><b>Kara Moses</b></p> <ul style="list-style-type: none"> <li>• Kara is a new staff member at CAT focussing on re-wilding courses and community empowerment.</li> <li>• CAT views community engagement on environmental issues as a key part in encouraging positive change.</li> <li>• Current interest is in preventing fracking in rural communities – several successful campaigns have been delivered that have led to operations being delayed or shut down.</li> <li>• They can provide support and advice to groups wanting to run effective community empowerment campaigns.</li> <li>• Rewilding workshops focus on reorienting our minds to the natural world – with the outcome being that the divide between people/nature is relaxed as we appreciate that the distance (and thus tendency to manipulate and degrade) is all about how we orient our minds away from nature.</li> </ul>  |
|  | <p><b>Deidre Raffan</b></p> <ul style="list-style-type: none"> <li>• Deidre is an educator and has been with CAT for over 15 years</li> <li>• Currently 2.5 educators who work with visitors, schools, community groups, teachers, universities etc.</li> <li>• Education is mainly delivered onsite. Some groups stay in the Ecocabins which have their own educational feedback tools such as energy meters, PV panels, water heating displays etc.</li> <li>• The displays, working models, buildings, trails etc that make up CAT are educational tools used for casual visitors and organised groups. Interpretive signage is high quality and frequent throughout the grounds and in the model homes.</li> <li>• The Zero Carbon Britain trail leads visitors to 20 points around the campus with demonstration and interpretation for each waypoint – e.g. solar hot water demonstration and interpretation. The ZCB trail is an effective means to link the various</li> </ul>   |

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|  | <p>environmental messages with a core concept – climate change.</p> <ul style="list-style-type: none"> <li>• Deidre and her team have developed and adapted numerous resources for visitors. These are available online and through the store as well.</li> <li>• Values card game – The Common Cause. Useful for setting scene for environmental action.</li> <li>• Broad range of workshops supported from coppicing, carving, small houses, straw bale, PV etc. Groups have worked on various projects that are around the grounds –e.g. greenhouse build,</li> </ul>  |
|  | <p><b>Paul Allen</b></p> <ul style="list-style-type: none"> <li>• Paul is a long-time CAT staff member (joined in 1988) and is External Relations Officer as well as Zero Carbon Britain Coordinator.</li> <li>• Paul leads the ZCB research team and is active in teaching, research, and dissemination of project findings. ZCB is an ongoing research, education and action project. The latest report is called <i>Zero Carbon Britain – Making it Happen</i>, which offers a toolbox of ideas that can help inspire, form and enable change to happen.</li> <li>• ZCB is a vision for a positive future. Paul emphasised that the change needed was quite radical – in the extent that it was not just re-engineering our current fossil-fuelled technologies but re-imagining our relationship to each other and the earth.</li> <li>• Visioning such as “Postcards from the future” where participants were encouraged to send a postcard from 2050 to themselves describing how the world looked and what they were doing. A positive vision - not a fantasy utopia but how things would really look if we were to go net zero carbon. Too much Armageddon won’t move hearts and minds said Paul.</li> <li>• Cities such as Zero Carbon Liverpool have taken this up on a city basis</li> <li>• Carefully consider the additionality – i.e. co-benefits of each technology. Greater connection, health, etc</li> <li>• The most challenging areas are food production and meat-eating</li> <li>• Watch Carnage on Youtube – by Simon Amstel. A mockumentary on meat eating</li> <li>• C40 Cities – climate leadership group. A useful resource for regional/local action</li> <li>• The arts are incredibly important in moving our perceptions and assumptions c.f. <i>The Extraordinary Story of Human Beings, Energy, and Happiness</i> – a multimedia presentation created by Paul Allen, recasts our relationship with energy.</li> <li>• <i>Secrets of Silicon Valley</i> – a recent BBC documentary questions the relationship to tech. A reminder that our relationship to energy and control can lead to disastrous consequences</li> <li>• The use of other forms of media to get the message across, e.g. graphic novels have more cache than technical literature and reach other audiences.</li> <li>• Local organisations such as TGV Hydro are part of the zero-carbon electricity solution</li> <li>• Nordic Folkecenter in north Denmark is a similar organisation to CAT – but focussed on energy. Worth a visit if possible.</li> <li>• Green Open Home Network – inspiring ideas for folks considering upgrading their homes</li> <li>• 100 Good Ideas – on CAT’s website. Excellent links and examples of practical solutions</li> </ul> |

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| Insights | <ul style="list-style-type: none"> <li>• Can we use WCC's Low Carbon Capital plan to outline the pieces of pie that need to contribute to Zero Carbon Wellington. What's the plan for each piece? Which piece is ST's? What are the targets and timelines to achieve this? What are the projects?</li> <li>• A carbon budget/trading for Wellington – set a cap and trade within a specified market.</li> <li>• ZCW trail around Wellington – could include Forresters, Brooklyn Turbine, NIWA, cable car, Te Papa, Zoo, MEVO, community gardens, CommonSense etc. A means to link initiatives with WCC Low Carbon City Plan</li> <li>• Excellent resources from CAT for education. Available for download or sale.</li> <li>• Arts projects and other means to influence/inspire. Consider alternative methods and maintain and create hope for the future.</li> </ul>   |
| 8 Sept   | <b>National Energy Foundation – Milton Keynes</b>   |
|          | <p><b>Sandra Hayes</b></p> <ul style="list-style-type: none"> <li>• Sandra is the Household and Communities Principle overseeing a team of advisors and technical staff working in the residential sector.</li> <li>• I gave a 30 minute presentation to staff on the NZ healthy housing situation.</li> <li>• NEF runs a range of programmes to improve energy use in buildings. These include: <ul style="list-style-type: none"> <li>○ Delivering practical projects – using experience and technical expertise.</li> <li>○ Inspiring action – providing building owners and occupiers with the encouragement, advice and real-life examples to achieve better performing buildings.</li> <li>○ Advancing knowledge - supporting collaboration to drive forward the frontiers of knowledge, innovation and practice.</li> <li>○ Identifying and addressing market failures using evidence, analysis and ideas</li> </ul> </li> <li>• NEF employ a range of professional and technical staff who work in both residential and commercial applications. Projects range from carbon accounting, energy advice, supporting local councils with energy efficiency projects</li> <li>• NEF used to be part of the Energy Saving Trust (EST) advice line project. CEN modelled our Energy Advice Centre project off this programme.</li> <li>• NEF either sources funding for programmes (similar to say Warm Fuzzies) but doesn't operate projects such as Curtain Bank or provide practical insulation/heating services such as Smart Homes.</li> <li>• They coordinate funding and project manage/administrate programmes and can provide an administrative function to relieve councils of the burden of running a programme.</li> <li>• Clients can contact NEF who will provide advice and referral to contractors participating in ECO (Energy company obligation) funded programmes.</li> <li>• Better Housing – Better Health project – take referrals from GP's - then provide advice, assessments and referrals to funded</li> </ul> |

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|                     | <p>programmes (cf Warm Fuzzies).</p> <ul style="list-style-type: none"> <li>• Excellent summaries of their work is available on the website – especially the Impact Report</li> </ul>  |
| <b>Insights</b>     | <ul style="list-style-type: none"> <li>• NEF perhaps operates one level up from Sustainability Trust in that it either project manages and delivers programmes for clients (such as sourcing clients for a local authority Green Deal programme) or does high level building energy assessments or carbon accounting for commercial clients.</li> <li>• There does appear to be a space for ST to move into a more technical/administrative area, but perhaps the population differences would not make it as financially viable. Currently we do offer (or more correctly respond to enquiries) project management for similar programmes such as MHIPI, SoS. We could more widely promote these as services that we offer?</li> </ul>  |
| <b>11 September</b> | <b>Fuel Poverty Symposium: Lead by Dr Harriet Thomson – Manchester University</b>  |
|                     | <ul style="list-style-type: none"> <li>• This one day meeting was an opportunity for a range of “early-term” researchers to present results of their studies into housing efficiency, fuel use, financial constraints etc.</li> <li>• A wide range of people from various organisations, universities and government departments including Hungary, Italy, UK, Spain, France, Germany, Austria, Croatia, Romania,</li> <li>• Salient points: <ul style="list-style-type: none"> <li>○ Fuel poverty definition is complex – not agreed across Europe</li> <li>○ Different groups of people within the “fuel poor” e.g. it’s not just energy inefficient housing – also a function of income and energy use</li> <li>○ Example from China district energy scheme – energy cheap but people still cold due to a number of factors including access to heating devices, illiteracy etc.</li> <li>○ Administration loads on some subsidy fuel poverty programmes very high – not worth it for grants under \$2000</li> <li>○ Energy policies actually make some houses more fuel poor – e.g. time of use or low-user tariffs. Must be careful in design as usually the poor don’t have a voice but can suffer from poor design.</li> </ul> </li> <li>• Robin Hood Energy <ul style="list-style-type: none"> <li>○ Not for profit energy retailer established by Nottingham city council: <ul style="list-style-type: none"> <li>▪ Gail Scholes CEO <a href="mailto:gail.scholes@robinhoodenergy.co.uk">gail.scholes@robinhoodenergy.co.uk</a></li> <li>▪ Jade Kirk Customer/Mktg Manager: <a href="mailto:jade.kirk@robinhoodenergy.co.uk">jade.kirk@robinhoodenergy.co.uk</a></li> <li>▪ Introduced competition into the market</li> <li>▪ Nottingham market now one of the most competitive</li> <li>▪ Other councils now following suit – Leeds/Doncaster/Manchester/Islington</li> <li>▪ Developed directly from Council desire for a retailer to assist low-income clients</li> <li>▪ Will visit later in November for more indepth discussion</li> </ul> </li> </ul> </li> <li>• National Energy Action: Research projects are a priority to form a compelling base for partners seeking to validate and/or secure funding</li> <li>• Citizens Advice have an energy advice team! They serve a national function for providing local advice.</li> </ul> |

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|                        | <ul style="list-style-type: none"> <li>• Higher energy costs for tenants than homeowners in Hungary – poorer houses, less energy efficient heating</li> <li>• Spain: up to 37% difference between highest and lowest energy tariffs!</li> <li>• Social housing landlords can be market leaders – not private landlords. E.g. Nottingham CC owns the assets so can make the changes they need quickly as their outcome is social investment</li> </ul>  |
| <b>12-13 September</b> | <b>National Energy Action: Fuel Poverty Conference - Nottingham</b>  |
|                        | <ul style="list-style-type: none"> <li>• 2-day conference in Nottingham on a range of fuel poverty topics – focussed on UK initiatives</li> <li>• Speakers from local and central govt., research, practitioners, regulators, NGO’s,</li> </ul> <p>Notes:</p> <ul style="list-style-type: none"> <li>• Fuel Poverty – a framing that includes energy efficiency, cost of energy, and supply. A very useful categorisation of the major challenges. A better framework than “healthy homes” for NZ?</li> <li>• UK is excited about roll-out of smart meters and potential for assisting low-income households measure and reduce costs of energy. Not sure we have the same level of excitement in NZ as we’ve mostly completed our rollout. Possibly the role of an NFP retailer to really research and extend the benefits to their core market.</li> <li>• E-On, one of the big 6 energy companies sponsored the conference. Getting alongside a big retailer not such a risk for NEA and conference attendees.</li> <li>• Energy Performance Certificates (EPC) – difference in energy costs between a C and F can be up to 1000P/year</li> <li>• EPC’s are perhaps an excellent way to rate homes – the commitment is to move all F’s to at least a C by 2030. Nothing below a C can be a rental after 2030. 2M homes to go.</li> <li>• Low-hanging fruit has been picked in many areas. Finding eligible clients is very challenging</li> <li>• 85% of homes heated by gas from mains network. UK challenge is “how do we decarbonise heat”? Challenge to convert all homes to electric. Heat pumps are new tech with low penetration. UK calls them renewable energy!</li> <li>• Affordable Warmth – another good term</li> <li>• NEA: <ul style="list-style-type: none"> <li>○ Pushes the government on policy through research and policy development</li> <li>○ Trains the sector – City and Guilds courses etc.</li> <li>○ 156 members</li> </ul> </li> <li>• Winter fuel payments likely to increase carbon emissions. Would prefer investment in energy efficiency to reduce actual spend while increasing warmth.</li> <li>• ECO (Energy Company Obligation) which is commitments from the big 6 retailers, is the main financial tool for supporting energy efficiency programmes.</li> <li>• It’s getting harder and harder to locate eligible clients –to 1 in 20 applicants were eligible. 44-60% of programme costs in ECO are in locating clients and admin/reporting rather than install/equipment costs.</li> </ul> |



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|           | <ul style="list-style-type: none"> <li>• Employers sometimes engaged in EE interventions. Employer pays upfront and then takes out of salary over a year.</li> <li>• 75% of fuel poor are in the private sector (i.e. not social housing)</li> <li>• OfGem (UK regulator) – vulnerable more likely to experience detriment of energy policy</li> <li>• Citizens Advice – statutory consumer energy advocate!</li> <li>• Smaller retailers tend to avoid vulnerable clients</li> <li>• 1.4B pounds NHS costs for housing related health costs</li> <li>• East Sussex Energy Partnership – meets 4 times/year – similar to our regional Wellington group.</li> <li>• NICE guidelines are succinct health quality standard – adopt in NZ <ul style="list-style-type: none"> <li>○ <a href="https://www.nice.org.uk/guidance/qs117/chapter/List-of-quality-statements">https://www.nice.org.uk/guidance/qs117/chapter/List-of-quality-statements</a></li> </ul> </li> <li>• Creating warm homes brings people out of poverty – Rob Howard – excellent presentation on issues such as trust between members of society. In general NZ scores poorly across a range of poverty lead indicators such as social equity, trust etc.</li> <li>• Off-gas homes have much higher FP</li> <li>• Reiteration that locating vulnerable homes is challenging</li> <li>• Paris targets are a major commitment – no waffling. Not a question of if but of how do we meet them. Relationship with FP a hot topic</li> <li>• All energy retailers have a focus on vulnerable clients – only 150 disconnections across the country last year! <ul style="list-style-type: none"> <li>○ Quarterly invoicing leads to much pricing shock.</li> <li>○ High proportion of households on smooth pay – which means some adjustment at year-end</li> <li>○ Smart meters intended to fix this so no estimates</li> <li>○ Non-payers have many options – most go to prepay with their debt against the meter</li> <li>○ So self-disconnection obviously higher (need more stats on this) – stats from Citizens Advice <a href="https://www.citizensadvice.org.uk/about-us/how-citizens-advice-works/media/press-releases/1-62-million-prepayment-energy-consumers-cuts-off-each-year/">https://www.citizensadvice.org.uk/about-us/how-citizens-advice-works/media/press-releases/1-62-million-prepayment-energy-consumers-cuts-off-each-year/</a></li> </ul> </li> <li>• Energy tariffs a real talking point. Most households are on fixed rate tariffs. When they come off and don't reset they go on to a higher variable tariff. Up to 35% are on these higher tariffs. A real question of how the tariffs are structured and regulation of suppliers to ensure clients are on the best available pricing structure – and/or lower variable pricing. Very different in NZ where there's not such a big difference between plans and standard pricing. Most people not on plans.</li> <li>• All presentations available from NEA</li> </ul> |
| Learnings | <ul style="list-style-type: none"> <li>• FP – a useful framework for NZ</li> <li>• NFP retailer – would also use smart meter data for clients – e.g. storage heaters, off peak rates etc.</li> <li>• Identification of needy households <ul style="list-style-type: none"> <li>○ Focus some serious staff time and \$\$ to targeting the right folks</li> </ul> </li> <li>• Define FP for NZ</li> </ul>   |

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|                          | <ul style="list-style-type: none"> <li>○ # of homes in FP</li> <li>○ Rating of homes – (EPC rating, WoF, etc)</li> <li>○ Long-term plan e.g. 2030 target to get all homes to a C</li> <li>● CEN FP conference <ul style="list-style-type: none"> <li>○ EECA, MBIE, MoH, MSD etc</li> <li>○ Suppliers of kit/insulation</li> <li>○ Practitioners</li> <li>○ Retailers – vulnerable client coordinators</li> <li>○ EA – approach to vulnerability</li> </ul> </li> <li>● Customer service – the highest priority for many organisations/retailers etc – focus for ST needed.</li> <li>● A national team with some real talent and clout needed. Looking at the quality and profile of people at NEA and other organisations, our NFP sector is not quite there.</li> <li>● NZ NFP retailer: <ul style="list-style-type: none"> <li>○ Could eligibility be restricted to CSC/WINZ entitlements – 5 year recheck?</li> <li>○ Take all smooth pay and prepay customers of other retailers</li> </ul> </li> <li>● Conduct an EPC trial?</li> <li>● Project to identify FP homes – an indepth study of various data sets to determine fuel costs, rental, quality of housing etc.</li> <li>● Should ST commission reports etc with our surplus. Mirror state of nation/recommendation etc – like NEA.</li> <li>● Create clear strategy and task list for national/regional group e.g. <ul style="list-style-type: none"> <li>○ EPC/WoF</li> <li>○ NFP retailer</li> <li>○ HIR enforcement</li> <li>○ MoH guidelines (cf NICE)</li> </ul> </li> <li>● Heating with plug-in electric is deemed inadequate. Hence the roll out of gas connections. Hits both affordability and whole house heating in one go. We need a clear message in NZ that only certain types of heating are OK – e.g. HP, wood, flued gas.</li> </ul> |
| <p><b>10 October</b></p> | <p><b>Gundelfingen City Council – (nr Freiburg)</b></p> <p><b>Brice Mertz</b></p>  |

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|                   | <ul style="list-style-type: none"> <li>• Met with Brice Mertz, who runs the EnergieKarawane for Gundelfingen Council and other cities around the region. He’s a freelancer with a background in campaign delivery, mainly environmental/energy.</li> <li>• EK is funded regionally within various states across the country</li> <li>• Originally was a national pilot 2011-15 funded by Min of Env. Affairs. Outcomes were to reduce carbon emissions and improve energy efficiency.</li> <li>• A total of 60 campaigns across 55 communities.</li> <li>• After 2015, national government decided not to continue to fund it, so a local organisation FESA (an NFP) took over the operation and IP, and has marketed it to various councils in the region (i.e. getting Council buy-in to fund and support it). Brice then manages the delivery of EK in a number of communities in the region.</li> <li>• The marketing is done on a targeted locality approach. Specific areas of a city are targeted and letters sent to all privately owned properties (to landlords and homeowners). Access to landlords addresses has been negotiated via the cities.</li> <li>• Letter assumes an opt-out approach. E.g. tell us if you don’t want to participate. Achieves a 25% buy-in rate. Followed by phone calls by the consultants.</li> <li>• For FY2016 Q4 had 409 households with a 110 opting to take up an assessment.</li> <li>• For 80% of households this is their first contact with energy efficiency consult.</li> <li>• Assessments similar to HESP, but more targeted at providing information and starting points/signposting. Picks up major areas such as heating, moisture, renewables, insulation etc. Some info left with homeowners. Reporting is tick box and quite brief – really aimed at starting homeowner to think about upgrading.</li> <li>• This can be followed by a more indepth study for E1600. 50% of this funded nationally and 25% by the city so total cost of E400. This is an 80-page report and standardised across the country.</li> <li>• Various subsidies available for upgrading energy systems. Some national some local. Consultants form the lead in the renovation process organising the contractors and applying for subsidies etc.</li> <li>• Assessors are chosen from a nationwide list of Energie Effizienz Experts. A list held by DENA (national energy agency). Assessors must be trained and registered.</li> <li>• Gundelfingen and Freiburg have 50% CO2 reduction targets by 2050, and all renewable energy by 2030.</li> <li>• Germany national energy usage 1/3 Transport; 1/3 Residential; 1/3 Industry</li> <li>• Other contacts provided include: <ul style="list-style-type: none"> <li>○ FESA (manage EK in the area)</li> <li>○ Henning Liebeck – energy consultant for EK</li> <li>○ Armin Bobsien – Energiehaus Emindingen</li> <li>○ Carsten Rothballer - ICLEI</li> </ul> </li> </ul> |
| <b>19 October</b> | <b>ICLEI – Freiburg</b>  |

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|                          | <p><b>Carsten Rothballer</b></p> <ul style="list-style-type: none"> <li>• Met with Carsten Rothballer; Coordinator – Sustainable Resources, Climate and Community</li> <li>• ICLEI – Local Governments for Sustainability is the leading global network of more than 1,500 cities, towns and regions committed to building a sustainable future</li> <li>• Funded by membership fees from local councils – European Secretariat is based on Freiburg and supported by Freiburg City with accommodation.</li> <li>• 50 staff in Freiburg – European Secretariat.</li> <li>• Fees are GDP related</li> <li>• Provides support for a range of sustainability initiatives including carbon accounting, project plans, green fleet, information sharing.</li> <li>• A reasonable amount of indepth technical support is provided for members including procurement advice.</li> <li>• Main outcome is to support councils with climate adaptation and mitigation activities at a local level. Especially for developing Sustainable Energy Action Plans and the like.</li> <li>• Carsten provided a range of written information and links to work they are conducting.</li> </ul> |
| <p><b>9 November</b></p> | <p><b>EnergieHaus Emmendingen - Emmendingen</b></p> <p><b>Henning Liebeck</b></p> <ul style="list-style-type: none"> <li>• Met with Henning Liebeck who is an assessor in the EnergieKarawane (EK) programme and an energy consultant at a small consultancy in Emmendingen.</li> <li>• He outlined the detail of EK – included: <ul style="list-style-type: none"> <li>○ Providing reasonably detailed information and signposting on insulation/heating/renewables</li> <li>○ Support for taking forward measures</li> <li>○ Does not do the work themselves so no conflict of interest</li> </ul> </li> <li>• Important to show people examples of new technology especially since quite expensive</li> <li>• Subsidies available for higher standard interventions</li> </ul>   |

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|                           | <ul style="list-style-type: none"> <li>• 15% of heat must be renewable in all new builds and renovations – viz. heatpumps, solar, wood burning etc.</li> <li>• Emphasise timing of investment with other construction – so doesn't have to be NOW!</li> <li>• Air tightness an issue. Reminds people they need to have a plan for air changes if new windows/wall insulation is installed.</li> <li>• Generally extraction in kitchens and bathrooms, though some kitchen is just fat removal.</li> <li>• Opening windows – similar behavioural advice as in NZ – e.g. 15 mins/day etc.</li> <li>• HR system by Inverter <a href="http://www.intventer.eu">www.intventer.eu</a>, is worth a look. A cross-flow unit that stores heat in ceramic elements and reverses every 75 seconds. Brilliant</li> <li>• Costs of energy: <ul style="list-style-type: none"> <li>○ 25c/kWh electricity</li> <li>○ 7c/kWh gas</li> <li>○ 5c/kWh pellets</li> </ul> </li> <li>• Discussed philosophy for local energy generation. Main agreements were that local ownership encourages democratic and transparent decision making.</li> <li>• If we can stay in the Black Zero (that is make just enough to pay wages and cover costs) and create social good then we are meeting our objectives. Contrast the ownership of Wellington Lines offshore – where decisions can never be made with the local best objectives in mind.</li> <li>• Other links/contacts (Henning to provide more later) <ul style="list-style-type: none"> <li>○ Ecotrinova – run Saturday Forums in FB 10-12midday on energy topics</li> <li>○ Energieagentur – Energy Centre Freiburg</li> <li>○ Solar info center at FB airport</li> <li>○ ISE Freiburg – solar institute</li> <li>○ Okoinstitut</li> <li>○ GreenMotion Film Festival</li> <li>○ EWS Schonau – original lines/renewables local ownership</li> </ul> </li> <li>• Henning also took part in the recent coal mine protest in Cologne. Great to see some practical activism.</li> </ul> |
| <p><b>24 November</b></p> | <p><b>Solarbuerger Genossenschaft (Freiburg)</b></p> <p><b>Herbert Krikle</b></p>  |

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|                           | <ul style="list-style-type: none"> <li>● Herbert is an electrical engineer who designed a community solar project on the local school and also does sessions with students on solar energy. He is a member and technical advisor to Solar Buerger Genossenschaft (Solar Citizen Coop).</li> <li>● The roof is rented from the school by the Coop. Funds were raised from parents and supporters. Income from the elec generation is paid back to the community owners with excess funds provided to the school.</li> <li>● The Coop scopes for solar and CHP (combined heat and power) to assist the energiwende (energy transition). It is a member of Burgerwerke , a Coop that purchases the output from energy coops and sells green energy to any private or business clients.</li> <li>● Herbert observes that solar is not as “cutting edge” for kids as they are more interested in new tech – solar is a little old now so not as sexy.</li> <li>● Economics for solar is now very tight as subsidies have been reduced considerably for private households – Herbert has his own PV array (5kW), and solar hot water. The PV exports to the grid and as the system was installed about 10 years ago he gets around 50c/kWh for any amounts exported!</li> <li>●</li> </ul>   |
| <p><b>27 November</b></p> | <p><b>Centre for Sustainable Energy – Bristol, UK</b></p>  |
|                           | <p><b>Ian Preston – Project Leader: Advice</b></p> <ul style="list-style-type: none"> <li>● CSE has a total of around 44 staff, with 18 in the Advice team</li> <li>● Advice is purely around a fuel poverty focus although CSE through its policy and community work covers a wider spectrum</li> <li>● They have trained retailers to work with vulnerable customers, such as how to recognise subtle clues in phone manner (e.g. kids in the background, out of breath etc) as to clients’ status</li> <li>● Priority services register is used for both retailers and the lines companies to theoretically monitor vulnerable clients – a shared register to alert companies if there is a power cut etc.#</li> <li>● CSE is perhaps unique in that has direct contact with LI clients but also delivers policy and evaluation – not just policy wonks.</li> <li>● Get referrals from Western Power (lines company), Ovo, and direct marketing. These are referred and a fee charged by CSE £23/call</li> <li>● DNO (district network operators) are required under the licence-to-operate to have social obligations. Western Power is top of the league table for DNO’s and wins an incentive £1M to assist clients.</li> <li>● Will refer clients to insulators who have ECO subsidies – take a referral fee</li> </ul> |

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|             | <ul style="list-style-type: none"> <li>• Also other referral fees for e.g. solar/battery companies £350/successful referral</li> <li>• Advice and Community work is limited to their geographical area.</li> </ul>   |
|             | <p><b>Simon Roberts – Chief Executive</b></p> <ul style="list-style-type: none"> <li>• A long history in energy and at CSE from the early days</li> <li>• Have developed from a focus on advice to policy/research</li> <li>• In 2006 took on a head of research – used internal funds – to enable them to bid for work.</li> <li>• Also run quite complex pieces of work – e.g. National Household Model – a detailed programme to evaluate housing quality for local bodies and government</li> <li>• Generally will partner with organisations rather than compete for proposals</li> <li>• Estimate is that if all heating load was to go on elec, would be a 500% increase in load on lines – not designed for that so removing gas from equation will require some serious changes to efficiency or upgrades to lines</li> <li>• Board recruitment – 11 members. Run open recruitments. Board a good mix, but lack someone connected to funders.</li> <li>• Operate a strategic investment fund for funding internal projects. But have to pass a test to be internally funded – e.g. were not able to externally funded. This allows the project to be built until it’s fundable from external sources.</li> <li>• Wrote a paper regarding the social obligations of Network companies – possibly a good resource for us with regards to our own hands-off network operators such as Wellington Electricity.</li> </ul> |
| 28 November | <p><b>Bristol Energy – Bristol, UK</b></p> <p><b>Laura Penny – Policy and Strategy Manager</b></p>   |

**James Robertson – Head of Marketing**

**Vikki Rogers – Media and Public Relations Manager**

- Bristol Energy is a NFP energy retailer that was set up and owned by Bristol City Council
- In 2012 BCC received ELENA funding from EU and committed to forming its own retailer based on the Hamburg Municipal Energy Company
- There was cross-party support from councillors and matched the 2015 award for European Green Capital
- It has been operating for four years and has a staff of 180 – provides both gas and electricity.
- Original goals were based on social/economic/environmental benefits to Bristol including:
  - Retaining profits in Bristol
  - Offering fair, transparent tariffs to Bristol and other residents across the country
  - Moving the industry to fairer pricing
  - Offering services to the fuel poor
  - Building a portfolio of renewable suppliers over the longer term
- Journey to formation of the organisation involved investigating a number of alternatives including:
  - White labelling (using another retailers platform)
  - Licensed lite
  - Partnerships with other retailers
  - These were all discounted as not being able to achieve the main objectives
- Business Plan was developed with assistance of Cornwall Insight and reviewed by PwC/KPMG
- Are working with the Council to access the residents of the city. There are some privacy concerns that limit this at the moment but the intention is to be able to offer services to city housing residents.
- Original vision was to have one energy organisation to supply and generate energy for Bristol
- 25000 homes are in FP currently in Bristol
- An annual Plan is developed by BE and signed off by Council
- Council Brand assists BE, as people tend to trust Council
- Tested the name Bristol Energy – works as Bristol is seen as a bit of revolutionary, and also sells the city
- 17% of clients are in Bristol, the remainder live outside
- Best tariffs are reserved for Bristol residents
- Have a FP tariff called WarmHomes Plus- work with CSE and GP's to combine the tariff with other services like home visits.
- Differentiator for potential clients is the reinvestment into the community – a good brand proposition
- Public ownership is back in vogue – similar to the rise in energy coops.



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|             | <ul style="list-style-type: none"> <li>• London is starting up a similar initiative, as well as Birmingham</li> <li>• Community connection is important. BE supports the arts, sport, homelessness; not just talking about energy gets the message out.</li> <li>• Have physical shopfront in Bristol – unique but puts a human face</li> <li>• Council loans used for startup – expect profitability after four years of operation</li> <li>• Currently 65000 households</li> <li>• Smart meters coming in and changing the environment – by 2020 all households will need a smart meter</li> <li>• Once a supplier goes over 250000 clients, a new set of regulations starts to govern - extra commitments and regs.</li> <li>• Big problems in UK are with rates gouging. Fixed plans are used to acquire customers but when the plan expires customer rolls onto floating rate which is much higher than the plan. Customers are usually disengaged so end up paying much higher pricing.. Govt will be regulating by setting max pricing. BE ensures fair pricing in this area.</li> <li>• Currently 40 PPA’s with renewable energy generators including farmers, National Trust, Businesses</li> <li>• 4% of energy in the grid is currently renewable</li> <li>• Some renewable gas from Bristol waste plant</li> <li>• 2% of clients are on a green tariff.</li> </ul> |
| 29 November | <p><b>National Energy Action</b></p> <ul style="list-style-type: none"> <li>• NEA is a national charity working to end fuel poverty in England, Wales and Northern Island. They have a staff of around 70</li> <li>• They run the annual national FP conference and are very active in policy development, advocacy and training</li> <li>• NEA also owns WarmZones which is a national installer of energy efficiency measures and delivers a number of NEA’s contracted fuel poverty projects</li> </ul> <p><b>Michael Hamer – Technical Development Manager</b></p> <ul style="list-style-type: none"> <li>• Michael heads the technical team and is charged with development and testing of new technologies and methods of delivery to</li> </ul>   |

FP households

- He is currently involved in running a project to investigate the impact of FP on a range of new technologies.
- This programme – Technical Innovation Fund, was funded from a £26M fine imposed on Npower (a UK energy retailer) for inaccurate billing and not responding to client complaints. The fine was directed to be used by a charity and NEA was awarded the funding and required to come up with a plan to spend it for vulnerable clients.
- Income maximisation for households (checking families were on the right benefits) was a major part of the overall programme. Approx 6M in extra benefits secured as a result of checks.
- A tender was put out for companies to respond with projects that would test new tech. 44 programmes were funded, with a total of 5.1M to meet capital and installation costs. A total of 2.5M was secured in matched funding.
- SAP/EPC used as a measure to indicate improvement in quality of homes. SAP owned by BRE – to get a new a technology onto SAP is very expensive, so some tech innovations won't show a SAP benefit.
- Installed: (low cost) smart heating controls, draught proofing, heat recovery ventilation; High cost – heating improvements, battery storage, communal heating, fabric improvement, robot spraying of underfloor foam insulation.
- Big wins in installing insulation and heatpumps into mobile homes.
- Examples of innovation including installing air-source heatpumps into off-gas homes. This shows the general trend to gas heating vs. standard electric, i.e. if you are off the gas grid, you are likely to paying high costs to heat electrically. Culturally different in NZ where we have high penetration of heatpumps and wood burning.
- Funding was used in places where it was hard to utilise ECO funding (e.g. mobile homes)
- The study was to provide insights into new technologies rather than detailed academic study
- Hybrid HP a winner. Controller was used to determine if HP or gas was used to heat water. i.e. what is the cheapest source at any given time.
- Impact reports are available on NEA website
- Specific areas of interest
  - Controls and smart controls show benefit
  - Infra-red heaters were not well received. Energy tariffs need checking to determine if new tech doesn't actually increase energy bills – i.e. day/night rates if customer previously had a night storage heater.
  - Solid walls are damp prone. Instances of moisture penetration due to driving rain, rising damp,
  - Double wall injection – had some problems. Polyurethane is needed for areas with driving rain, but as is 10x as expensive, contractors tend to continue to offer fibre product. Condition of the cavity determines which material is suitable.

**Chris Ellis – Training and Assessment Manager**

- NEA has developed a number of nationally recognised (City and Guilds) courses and are ISO9001 certified. Some courses also carry CPD credits.
- Staff and some consultants are used to perfect and keep the standards current
- Some organisations may require their staff to be put through the Energy Awareness course. Others (e.g. charities) may make it voluntary – but there is demand for the service.
- Most popular course is the Level 3 Award in Energy Awareness. This is a 3-day course with a written exam. Comprises 2 written papers, simulations and practical. A 70% pass is required for awarding the cert. Overall numbers passing is 92%
- Anyone can sit the final exam as it is a City and Guilds course, and some organisations have marketed training to pass the exam. However the pass rate for these folks is quite low.
- Are developing e-learning options as the cost and getting 3 days off work is challenging for many organisations. Similar to our experience in NZ
- DNO's and GDN (gas and elec network companies) now need to have trained their people to recognise vulnerability issues. They must have the ability to recognise vulnerable clients and place them on the "Priority Services Register". This is so they can alert and or assist in the event of a power cut, and also can't disconnect them.
- University of Aberystwyth has done some work on how to deliver energy advice that is really going to work – i.e. how to actually get behaviour change – Something we at ST and CEN should look into. We should train our assessors and advisors for effective behaviour change.
- Also advice/training packages for HNZ/WCC tenants etc – specialised courses

### **Jenny Saunders – Chief Executive**

- Jenny has been CE at NEA since 2007, and is moving on shortly to another role
- Staff has had reasonably high level of turnover due to project ups and downs. Currently at 80 with the L26M funding from the Npower fines. Also 40 staff in WarmZones.
- They do take on new graduates and train them up.
- NEA's work is directed by current need rather than setting an agenda.
- Advisory Board was established after the first 10 years to assist with political negotiations. They found useful politicians who could form relationships (e.g. ex Ministers) and gain entry/acceptance at higher levels.
- Main work is to drive down the percentage of income that is spent on energy
- Average energy bill is L1200/year with an average income for Fuel Poor of L10K

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|             | <ul style="list-style-type: none"> <li>• Won't be able to rent out a property after 2018 if not at E or above on the EPC scale.</li> <li>• The use of EPC in NZ should be investigated in light of the HHGA and means for assessing a whole of house measure</li> </ul>  |
| 29 November | <p><b>WarmWorks Scotland Ltd</b></p> <p><b>David Green – Chairman</b></p> <ul style="list-style-type: none"> <li>• David was a founder of NEA and has worked for a period in Australia as Chief Executive of the Clean Energy Council</li> <li>• David is now chair of Warmworks Scotland which is a fuel poverty reduction programme delivering retrofits and advice to households.</li> <li>• The programme is funded entirely by the Scottish government</li> <li>• Available to private rental/owner-occupied</li> <li>• L10M investment</li> <li>• High level of inequity between highlands/lowlands</li> <li>• 5500/year assisted – 4500 broken boilers fixed</li> <li>• Wide range of benefit eligibility</li> <li>• <u>NZ needs to expand our eligibility criteria to include a wider benefit range!!</u></li> </ul> |
| 29 November | <p><b>WarmZones Ltd</b></p> <p><b>William Gillies – Managing Director</b></p> <ul style="list-style-type: none"> <li>• WarmZones is owned by NEA</li> <li>• Started as a demo project for NEA. Found that most vulnerable homes didn't apply for assistance, so founded an area approach. This meant door knocking on each home</li> <li>• 5 pilot schemes initially – working systematically through an area</li> <li>• NEA was persuaded to take WZ on board to help NEA deliver its mission</li> <li>• Formed as a CIC – basically commercial but passing profits back to NEA <ul style="list-style-type: none"> <li>○ Chair – NEA Trustee</li> </ul> </li> </ul>   |

- NEA 3 non-exec directors
- 4 independent non-exec directors
- 3 exec directors
- Must have a majority of non exec directors
- Operating agreement/Business Plan approved by NEA
- Established a Warm Zones Fund with a disciplined reinvestment strategy – i.e. surpluses are utilised for FP projects
- NEA/WZ some culture clashes but resolved by working together
- Some concerns from NEA about passing work onto WZ as they would like to be seen as being impartial.
- However, will deliver joint projects such as one by McMillain Cancer Care – funding vulnerable patients
- Value over other commercial providers include: Audits; Benefit Advice, exacting standards with contractors, this means that generally a contractor's best teams are put onto WZ work
- 4 regional hubs
- ECO suppliers would prefer a regional/national supplier to help to have scale
- Co-op Energy contract (need to check this out) synergies
- Runs a tender programme to select organisations who can provide the carbon and heat/insulation savings for the funds available. These include carbon savings from electricity and gas
- Includes how much the contractor can raise the EPC level.
- WZ goes out and finds these schemes.
- WZ contracts with energy providers EDF/nPower/Coop Energy to deliver ECO measures
- ECO makes a contribution to measures but need cofunding from other sources
- Calculate how much an ECO measure will save in terms of carbon over a lifetime.
- Will work with local authorities to target vulnerable households – cofunding with Eco
- Social housing is an easy partner to deliver ECO and usually provide cofunding
- Referral agencies include faith groups/community groups/talks in communities etc.
- DNO/GND's have a requirement to sign up vulnerable clients on the Priority Services Register as part of their licence obligations
- Benefit advisors have increased benefits by L4 to L5K/client/year! Advisors are not independently regulated but need to be well trained to assist and apply for funding on behalf of clients. A certain amount of handholding is required and ongoing assistance.
- Some funding comes through the WarmHomes discount. WH discount is a mandated discount on bills at L1M/company. This is reported to OfGem
- QC of subcontractors is quite rigorous. Pre during, and post.
- H&S – produce a quarterly bulletin for contractors
- New tech includes small biomass heating in terraced housing. Hopper fed containerised solutions. Wood pellets from local suppliers and delivery jobs.

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| 7 December | <p><b>Buerger Energie Sankt Peter</b></p> <p><b>Markus Bohnert</b></p> <ul style="list-style-type: none"> <li>• I met with Markus Bohnert – engineer responsible for running the Bio-energy CHP plant in Sankt Peter</li> <li>• Markus showed me around the wood-chip/pellet fired heat and power plant, as well as a snowy tour of the wind turbines, solar and hydro installations.</li> <li>• In the village and surrounds Sankt Peter generates 300% of the power that it uses.</li> <li>• SP is a member of Buergerwerke which is a collaboration of 70 citizen energy coops. Buergerwerk purchases power generated by a number of coops and sells that green power to citizens.</li> <li>• Markus commented that it is challenging to get citizens to switch electricity suppliers</li> <li>• The SP coop is solely responsible for the CHP plant. The wind, solar, and hydro stations are in private citizen or business hands.</li> <li>• The SP coop CHP plant provides hot water via a district heating system to many homes, businesses and the monastery in SP. Hot water at 90 deg is fed around a ring main in the town. Customers (who must be a member of the coop) take heat from the pipes via heat exchanger to heat their hot water for domestic and heating purposes.</li> <li>• The CHP system uses a buffer tanks, automatic controls for heating and feedstock to match the hot water demand. During peak times, typically in mornings in winter, a backup diesel plant is used.</li> <li>• The CHP plant also supplies electricity into the local grid from a generator run of gasified wood.</li> <li>• The main aims of coop are: <ul style="list-style-type: none"> <li>○ Climate neutral, sustainable energy industry</li> <li>○ Re-regionalization of energy supply</li> <li>○ No energy imports = no cash outflow for oil and gas</li> <li>○ Stabilization of energy prices</li> <li>○ Upgrading regional value creation</li> <li>○ Conservation and strengthening of rural areas, strengthening of agriculture and forestry</li> </ul> </li> </ul> |

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|             | <ul style="list-style-type: none"> <li>○ Citizen participation <ul style="list-style-type: none"> <li>= investment from the region,</li> <li>= income remains in the region</li> </ul> </li> <li>○ Financial support of social and cultural projects in St. Peter</li> </ul> <ul style="list-style-type: none"> <li>● Woodchips and pellets are purchased from local forest owners and businesses</li> <li>● The project used mostly local labour and expertise in the construction and laying of the pipelines</li> <li>● Installation of the plant required local consultation over concerns of fog production, emissions, and noise. The issues were mostly resolved with scrubbers, sound insulation.</li> <li>● For new connections or clients wanting to upgrade their heating system, it's an average of 70% less expensive to hook up to the network than to install a standalone system. E10K vs. E30K. Annual cost is 15-25% cheaper than using oil for heating.</li> <li>● 9500 MWh/year in hot water production; 2500kW CHP/2500kW diesel backup</li> <li>● Coop chosen as a it is a well understood and regulated structure in Germany. 1-3 votes depending on size of organisation though financial returns based on the level of investment.</li> <li>● Coops have business plans checked by the regulator. If coop goes insolvent only membership fees lost.</li> <li>● 260 current members, AGM to elect board; members must be connected to network, however some investing members such as forest owners and woodchip producers</li> <li>● In a village it was felt that a Coop structure would provide transparency and democratic ownership and engagement.</li> <li>● The system provides some good PR for SP and a flow of international visitors. Also homes that are connected to the network have a better resale value as they use a renewable heating source.</li> <li>● Future plans to network the whole village.</li> <li>● Markus commented that in the early days there was a lot of voluntary labour put into the running of the coop. As the founders of the system grow older, newer folks are not the same as the early adopters so wages will need to be paid – An interesting parallel to life in any community/social/environmental startup.</li> </ul> |
| 12 December | <b>Berlin: InVENTer – ventilation company</b>   |

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|             | <p><b>Silvio Vater – Export Sales Manager</b></p> <ul style="list-style-type: none"> <li>• I met with Silvio in Berlin (near their central office/plant in Jena).</li> <li>• Inventor produces a range of decentralised ventilation systems that could have an application in o-o and rental properties especially if ventilation and moisture control are mandated under the new HHGA</li> <li>• The system explained by Silvio comprises paired fans that are wall mounted – thus avoiding using attic air. The heat recovery fans contain a ceramic core that retains up to 90% of the heat. Fans reverse their direction every 70 seconds with one extracting one pulling air in.</li> <li>• Based on our work in NZ, fans such as these which are cheaper to install could be solutions for properties that are mouldy or damp and/or very airtight.</li> <li>• The beauty of the units is that the filters can be easily removed and cleaned (not located in a dark attic space) and are cheaper to run and install.</li> <li>• In Germany, new builds must have a ventilation concept design to be eligible for subsidies. Potential new laws in 2019 may make this mandatory as moisture problems are becoming more apparent as airtightness increases.</li> <li>• Landlords can have permanent on for 24 h/day.</li> <li>• A pair of fans covers around 20m2.</li> <li>• Heat recovery vs. opening windows and losing heat gives a better payback.</li> <li>• Sometimes the ventilation systems provide a backup/baseline even when folks still open their windows</li> <li>• Filtered air also a bonus – outside pollen and dust; plus if living beside a noisy road may not want to open windows.</li> </ul> |
| 12 December | <p><b>Buerger Energie Berlin</b></p> <p><b>Luise Neumann-Cosel – Chief Executive</b></p> <ul style="list-style-type: none"> <li>• BEB is a citizen coop formed to buy back the electricity network in Berlin from the current operators Vatenfall.</li> <li>• I attended their AGM in Berlin where the board was elected, past years activities discussed and new projects were introduced.</li> <li>• I also met with Luise Cosel (Chief Executive) the following morning for more detail.</li> <li>• VAtenfall is a large generator retailer with significant coal generation facilities.</li> <li>• BEB wants to buy back the grid for three main reasons: <ul style="list-style-type: none"> <li>○ Support renewable generation</li> <li>○ Return profits to the city</li> <li>○ Support energy efficiency.</li> </ul> </li> </ul>  |



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|                 | <ul style="list-style-type: none"> <li>• In 2013 a citizen-forced referendum just failed to gather the number of votes (by 10,000) to require the city to offer the grid to citizens. This would have</li> <li>• The Berlin grid concession is opened for tender every 20 years. BEB successfully pulled together a tender and is currently awaiting the result.</li> <li>• Vatenfall are challenging the legality of the tender and have sued the city thus holding process up in court for 2-5 years. In the meantime are still running the grid and retaining profits.</li> <li>• Net income is around \$100M/annum for Vatenfall – similar to Wellington Electricity.</li> </ul>  |
| <b>Insights</b> | <ul style="list-style-type: none"> <li>• What would it take to develop a similar initiative for Wellington? i.e. buy back the grid.</li> <li>• What would be the costs/benefits from a community-owned lines company?</li> <li>• Who would we need to get on board? How much would we need to raise? Is there appetite in Wellington for such a venture?</li> </ul>   |
| 13 December     | <p><b>Adelphi Associates - Berlin</b></p> <p><b>Andreas Schneller – Project Manager</b></p> <ul style="list-style-type: none"> <li>• Adelphi is an independent think tank and public policy consultancy on climate, environment and development.</li> <li>• I met Andreas in Nottingham and followed up in Berlin with a discussion on his work in public policy as it relates to Germany’s energy transition and impact on low-income households</li> <li>• Maximum of 11% of refurbishment investment in a rental property can be added to the rental cost – implies payback over a ten year period. But the 11% is of the total cost – net of any subsidies and regular maintenance costs</li> <li>• Laws in Germany must be written to encourage investment by landlords because of the split-incentive – similar to NZ but we could take note of the emphasis on the carrot rather than all stick.</li> <li>• 80% of households in Berlin are rentals.</li> <li>• Subsidies are provided for landlords but on a time-limited basis. Use it or lose it!</li> <li>• Energy Performance Certificates now contain another page where landlords must write down recommendations provided by the energy assessor – as in UK, EPC’s are mandatory.</li> </ul> |
| 18 December     | <p><b>Henning Liebek – Energy Consultant, Freiburg</b></p>  |

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|             | <ul style="list-style-type: none"> <li>• Met with Henning again to drill down into application of Energy Performance Certificates in Germany based on potential for using in NZ’s Healthy Homes Guarantee Act.</li> <li>• Main points: <ul style="list-style-type: none"> <li>○ All new rentals and home sales require an EPC to be on file (10 year life or updates for renovations)</li> <li>○ EPC takes 3-4 hours to complete (assessment and reporting)</li> <li>○ Gives a grading based on kWh/m2 for heating and lighting (A-F)</li> <li>○ Thus also gives a carbon, and cost to heat/light/hotwater a dwelling</li> <li>○ Also provides energy consumption based on 3 previous years as a comparison (demonstrates to new occupants how building systems have been used over past years).</li> <li>○ Gives recommendations for upgrades to a next level.</li> <li>○ Provides landlords with total costs to gain compliance</li> <li>○ A reasonable level of skill is required to produce an accurate EPC (similar to ALF or Accurate)</li> <li>○ Only qualified assessors can produce these documents</li> </ul> </li> <li>• My view is that introducing an EPC to NZ rental properties would give us a quantifiable measure of required energy usage and cost to heat a home to WHO standards. Fuel poverty risks would be immediately apparent.</li> <li>• Landlords who could not provide a home above a set level (say C) would not be allowed to rent the property.</li> <li>• Subsidies could be tied to measures to improve the home.</li> <li>• Could also sit beside the WoF, with a range of other measures non-negotiable – i.e. safety/mould etc.</li> </ul> |
| 19 December | <p><b>Emmendingen City Council</b></p> <p><b>Armin Bobsien</b></p> <ul style="list-style-type: none"> <li>• Met with Armin Bobsien – Climate Officer</li> <li>• Armin runs the Energiekarawane home assessment programme in Emmendingen. As well as other climate programmes</li> <li>• He said that larger cities had officers in similar positions to his, but this was not mandated.</li> <li>• Cities did not have a mandate to have climate programmes but many had opted to address council and city wide emissions.</li> <li>• Pointed out that Emmendingen had bought back its lines company and also generated and retailed (Stadtwerk Emmindingen)</li> <li>• He also had some interesting observations on a broader scale: <ul style="list-style-type: none"> <li>○ Churches and government tended to fill the gap typically filled by social enterprises in NZ/UK</li> <li>○ Some of this attributed to socialist society and not as rampant capitalism in Germany (thus a reduced inequality)</li> <li>○ 48 Degrees Sud one SE that is similar to NZ/UK models</li> </ul> </li> </ul>  |

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|          | <ul style="list-style-type: none"> <li>• EU directive is 30kWh/m2 for new buildings by 2021</li> <li>• Emmendingen target is 95% reduction below 1990 levels by 2030</li> <li>• Armin uses the 50%-80%-90% target to track down to required goals: <ul style="list-style-type: none"> <li>○ 50%: energy efficiency – i.e. a 50% reduction in energy use/building</li> <li>○ 80%: 80% of energy consumed in the city will be renewable</li> <li>○ 90%: overall CO2 emissions will be 90% lower than 1990</li> </ul> </li> <li>• This lends much weight to EPC for NZ so we can reduce the energy consumption/home to 50% less than current (will require a lot of political will and cash) <ul style="list-style-type: none"> <li>○ Would need a detailed assessment</li> <li>○ Subsidies tied to improvements</li> <li>○ Needs a draught assessment – blower door test</li> <li>○ Walls very important – insulate as the major source of heat loss after ceiling/underfloors done.</li> <li>○ New build standards are critical!! Passive houses – setting up the future for reducing energy consumption</li> </ul> </li> <li>• Our challenge in NZ is how to account for heating one room versus whole-house heating in Germany</li> <li>• Measure HHGA regs vers health costs NEED a standard trade-off metric i.e. what are we willing to forego in public health costs if we don't upgrade our rental housing stock to an EPC of C.</li> <li>• Invest in science/application of behaviour change <ul style="list-style-type: none"> <li>○ CBSM approach – invest in this</li> <li>○ Well Homes – put a CBSM hat on; identify the barriers and address these with solutions (robust approach)</li> </ul> </li> <li>• Uses 4 pillars in Emmendingen programmes: <ul style="list-style-type: none"> <li>○ Public messaging</li> <li>○ Dialogue</li> <li>○ Subsidies and Information</li> <li>○ Model projects/model homes</li> </ul> </li> </ul> |
| Insights | <ul style="list-style-type: none"> <li>• Many Germans feel that the Energiewend cannot be left to government and industry</li> <li>• This gives rise to citizen groups such as Buerger Energie Berlin and Sankt Peter, as well as many other energy coops and projects</li> <li>• Germans take climate change seriously and challenge the status quo by setting up and running significant projects.</li> </ul>  |

## Photos – a small sample



Center for Alternative Technology – Wales



Center for Alternative Technology – Wales



**City-owned wind generators above Friburg**



**Recycling at local supermarket for excess packaging**



**Solar panels on student accommodation**



**Parking congestion in downtown Freiburg**





**Freiburg trams – fast and regular and cheap**



**More solar panels on high rise building in Freiburg**



**Bikes are treated as equals – lanes and priority signage**



**Solar array on the local landfill – Freiburg**





**Wood chips for district heating scheme supplied by local foresters**



**Sankt Peter Energy Village – On-farm wind generators**

**Sankt Peter Energy Village**