

# Sparking a change: Illuminating the path to an all-electric home

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## Supplemental Materials



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## Part A – Authorship

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## **Part B – Preamble, Staff and Expert Interview**

Thank you for meeting with us today. I am \_\_\_\_\_. Assisting me is \_\_\_\_\_. We are a team of Worcester Polytechnic Institute students working with the Moreland Energy Foundation to generate educational materials regarding transitioning homeowners to an all-electric home. The purpose of this interview is to obtain additional background information specific to the Moreland community regarding homeowner behavior, technical aspects of transitioning power sources, environmental specific issue as well as economic issues.

You are not obligated to answer any question we ask, and if you do not want to answer a question please indicate this to us. You also have the right to review the information from the interview prior to publication of the report.

## Part C – MEFL Staff Member Specific Scripts

### Gavin Ashley

#### *Establishing understanding of the Community*

1. When considering sustainability in general, what do you think are the most important factors for homeowners and why?
  - Whether it meets their functional needs
  - How much it cost compared to how much they can save
  - Whether it's easy to get done
2. What do you believe are the major benefits of transitioning to an all-electric home?
  - Major benefit is the electricity network will increase its renewable portion over time and if more people use electricity instead of gas it'll help the environment
3. Which local governments have you worked with?
  - About 20
4. While working with many local governments, have you found that most are willing/want to work to become more sustainable?
  - Yeah, they are all trying but some others are trying harder
  - Think there are a couple of influences: the makeup of their council (which a reflection of what people vote for), affluence to it (in some communities, people are trying to get by and others are more educated and try to focus their council on environmental things)
  - Councils are democratic

#### *Technical, Environmental, Economic, and Behavioral Issues*

1. How would you gauge community interest this transition to an all-electric home?
  - Community is can but they need financial mechanisms and need to understand what they can and should do with regard to becoming more sustainable
  - Information might not be the biggest barrier – people see info and then move on and forget it
  - The ability to link with an immediate solution based on their own circumstance is a major barrier
2. How can homeowners access cheaper energy efficient, electrical appliances? Are there incentive programs, besides the ones that Positive Charge offers, in place to help them?

- Very little government incentives
  - At times when the government obtains money for projects they can roll out different government programs where products are given out for a lower rate or free where MEFL can create a campaign around
3. Have developers in the area begun to install efficient, electric appliances instead of gas in their new developments?
    - Yea, we do some of that work in consulting and they are move towards it
    - Work with apartment building developers – going all electric in apartments
    - Problem with the electric stuff in apartments is the hot water because electric heat pumps are tough to put on balconies
    - There is a funny market going on with induction cooking, they don't trust it but they should. Cooking with gas is still seen as the best thing, it has cultural conotation

### *The Deliverable*

1. What medium for presenting information do you believe has been the most effective in the past? Why?
  - Might be the wrong person to ask, doesn't do a lot of community outreach stuff
  - Gut feel is any way you can start a direct interaction with trust is the best way to get people, put a value on a first connection, lowest cost with the highest interest
  - Community engagement talk that Elly gave on the intranet
2. Has working with local governments improved the effectiveness of the message that MEFL has to offer for homeowners?
  - I think in the main they are but there are some nuances, some people don't like their council and also some nuances around whether councils are always in a position of trust
  - If you are a member of community groups, you are likely to believe them but it's a good place for information to be passed
3. If you were to distribute a singular page of information to educate people on a brand-new sustainability topic, what 3 key points would you want addressed?
  - It's in the customization, our project needs to be customized for specific people, it'll depend on people's circumstances to determine what people should do

- "We understand everyone is different, we can help you with a range of solution to fit your circumstance and the benefit is being more comfortable, more healthier and saving money"
- Decision make framework is what people need right now to learn what is important for them to do, everyone is going to have their different circumstances so there will need to be different paths for them all to get there, people are starting from different points of view

### *Closing*

1. Have you transitioned to an all-electric home? Why or why not?
  - No, he has solar hot water with a gas booster and it doesn't use gas over the summer but uses a little in the winter and the stove is gas but everything else is electric
  - Thinking of making the full transition? What he will do is he would replace hot water heater with heat pump when it needs to be replaced, when he does this it would make sense to switch the gas hot plate for electric to become all electric
2. Can we follow up with any clarification or further questions?
  - Yes, sure

### All-Electric House definition:

- It includes solar panels, definition would be you've made an investment in thermal performance (insulation and windows – double glazing) got rid of electric storage or gas hot water in favor of heat pumps, got rid of gas stove in favor of induction, got rid of gas ducted space heating in favor of split systems and once you've done those you've sized the solar to take care of the rest of your consumption

### Removing appliances

- Councils waste departments would be the best place to learn more about that

### Determining the best way to do the transition

- Avoid doing heating a cooling stuff before doing thermal performance stuff and all the other stuff is based on end of life
- If you have one gas appliance left and you can get rid of that then you can get rid of an entire utility and its supply charge and you would end up with 1 energy bill
  - Just changing that last appliance will be a no brainer
- Solar panels go the timeline at any place, as long as people understand them to not be the end game

- Understand what system to go based on what kind of energy you will be using with electric appliances – help people understand what system will be necessary when they actually install everything with the efficiency and electric power
- Solar PV is the part of the journey but don't think it's the only thing you can do and we can help you make sense of which options are best for you personally
- If they only have 2-3 thousand dollars they should do solar cause the other things will have longer payback times
- Is payback time stuff a good idea?
  - It's risky to put it on their cause every situation is different but you can put a disclaimer on it
  - People will need a degree of confidence that it'll be beneficial and that they will be able to afford it
  - Sees benefits in not doing it and benefits in doing it

#### Projects Worked On

- Project database on the intranet, search according to key words

### Jason Cox

#### *Developing Good Programs*

1. Your role with MEFL is program coordinator, correct? What has your role in MEFL lead you to accomplish over the past few years?
  - Working with the department of health and human services. They work in social housing and health. Reimagining social housing -> normally the worse housing imaginable (Poorly maintained high rises, overpopulated).
  - Post occupancy study for Carlton: Carlton had very poor housing, full of junkies, refugees, mentally ill. Multi-generational problems. Tore them down and put up low rise homes, better quality, more security, smaller footprint, mix of social and private housing. Social outcomes AND energy savings are improved
  - Creation of a better standard and design for housing
    - Improve people's lives and the environment
  - Queensland Refugee housing. Bit of work up front. Being sure entitlements and concessions are given. They don't have to worry about being in debt to the electric companies

- [Question detoured at this point:] All electric house. 3 have been built. Australian building standard: Low standards for building. Last ten years, electric 4x more expensive. Look at how often air changes over in a house. Some houses 25x an hour, current building is around 4. Better financial and health outcomes. Solar powers air conditioning ->costs nothing. Gas is going through the roof
    - People have not really been influenced by no gas to the property
    - Small investment up front for solar stops asking for more money later on for electric bills
  - Constant temperatures in homes help for health. Highs and lows will affect many people. Electric heating allows for consistency. Environmental changes are good for physical health. Not spending money on environment, but instead improving peoples' health
  - Urban heat island effect: Moreland has areas of much higher temperature due to concentration of concrete and lack of green areas. Faulkner. Houses build next to each other with almost no yards. Temperature was 3 degree Celsius hotter. Social housing worse than public housing
2. We caught wind you had a hand in the Greentown program, right? We researched into the program while back in the states, and served as one of our key speaking points on consumer behavior change. Could you tell us a little more about the program's approach towards introducing sustainable practices within the community?
- Strong multicultural presence in Moreland. Lots of Italians and Greeks. Islamic, Egyptian and African
    - Doing the work but it was not relevant because advertising in English, everything based in english and not reaching that group
    - Recruited bilingual assessors to be able to do assessments in mother language and culturally sensitive way. Resulted in discovering in Islamic households, kitchen is highest water user because they use running water. Did with Arab speaking community in Moreland, Turkish, African, Indigenous elsewhere
    - How to integrate the CALD community? Put together videos dubbed with voice over from many language groups. Received a lot of positive response. People contacted MEFL for info working with communities
  - a. Do you believe the approach Greentown took for consumer outreach was the most effective option? Could it scale to other demographics as well, or do believe the

success of Greentown was due to the fact these communities are, by culture, tightly knit?

- Trust is a major issue. Don't trust people like we used to. Elderly community gets many phone calls from landlines so they don't trust anyone. CALD communities don't understand the information and are skeptical. Best way to reach out is through a trusted source: community group. Trusted organization, peer group. If community leader gives association credibility it is very effective. People mistakenly believed MEFL people were from council which created a lack of trust
3. What goes into consideration when creating a new program?
    - Send out letter from the council, this has council backing (PC). Going out to the community groups for working with ZCE. With CALD, normally has to go through the community leaders. Currently working to do solar bulk buy in Arabic/Turkish
    - Don't represent self, but go out with community leader
  4. How do you ensure the program being designed will accomplish its end goal?
  5. What are some of the strategies used when developing programs?
    - What's in it for the person you're working with. Have to show a genuine interest to what they consider important. Have to make money with everything done, but won't get it if person isn't helped
    - How is the community improving as a whole? Projects must have ability to scale up. Example: Working with businesses was achieving nothing. On a whim, bought a bunch of fridge timers and offered them free businesses. Installed free (saved 200 per fridge per year at cost of 15 per timer). Then went to VIC chamber of commerce, here is results, they scaled up across Victoria and led to 1000 places getting it with high economic and greenhouse savings. Similar program with coffee machine timers to shut them off overnight.
      - Timeframes, is it worth the outcome? Don't just work for the money, but money is still necessary
  6. What physical deliverables do you look for in a program?
    - Not a lot of KPIs originally, we need to be able to show results to get funding. Started measurement on what is done. How do we measure what the all-electric home will accomplish? Depending on projects depending on what is measured.
      - Home evaluations -> this many people talked to. Then use percentage of people who actually follow through to calculate greenhouse gas reduction

- Solar bulk buy -> how much energy will panels create? How much money will people save? How much emissions will this stop?
- a. How does this differ to what a homeowner would see?
  - Homeowners don't care about environmental impacts
    - They want more comfortability or energy savings. Business programs? Talk about money. Talk about what your speaking of "when their eyes light up."
  - Urban solar saving program -> Darabin (Shelbyville)
    - Trying to model MEFL. Council would buy solar panels on to pension rate households and would pay back on no interest loan through property taxes, would save 750 per year and would cost 450 per year (300 per year savings)
    - Financial and reassurance aspects to the program
- b. How does this differ from what a city councilman would want to see?
  - City councilors are interested in Environmental outcomes. Councils are held up by red tape that MEFL is not. Ex: fridge timer problem. Delivery and delivery time is important. They want picture to put on the poster to say we are doing (good) work in the community. MEFL is working ground for councils because they can do things much more quickly. Ex: Community barbeque in Carlton took a few weeks, council took three weeks to just get risk management paper back from supervisor for similar program.
- 7. Overall, what components does a successful program consist of at MEFL? Why?
- 8. Where do you think the community may be most hesitant towards becoming all electric? (The potential renovations to their home, the costs it may present, the change in lifestyle they may have, other)
  - People don't want to change, they want to do things the way they have always done them, it makes sense to them, why change something that's already working
  - Previously existing infrastructure. He's planning to go all electric, but opportunity hasn't arisen. Redoing kitchen, will remove gas. Slow process because its planning as necessary. Most people don't plan ahead enough and then want the most convenient solution when something breaks.
  - No existing cost penalty for gas but there will be in a few years' time
  - Things pushing the change -> Rise of solar and batteries. Cost of running gas line to house. Will potentially be an exponential change as gas prices increase.
  - People don't understand difference between old electric and induction systems



9. What myths need to be debunked?

- Electric vs. Induction cooking
  - If they had master chef use induction cooking instead of gas this would push huge change due to popularity
- Electric Heating/hot water
  - Not long ago "more expensive, less efficient"
  - With increase in efficiency and rise in gas prices this is no longer the case
  - Changing a message that has been around for a while
  - Difficult message to get out
- Fluoro lights should be left on all day because they take so much power to turn on. False.

*The Deliverable*

1. What medium for presenting the all-electric home to homeowners do you believe would be the most effective? Why?
2. If you were to distribute a singular page of information to educate people on becoming all-electric – or any other form of sustainability, what 3 key points would you want addressed?

*Closing*

1. Have you transitioned to an all-electric home? Why or why not?
2. Can we follow up with any clarification or further questions?
3. Can you give us the names of any community leaders (Especially community leaders) or contractors that we can contact to interview?
  - Jason will put together a list for us

## **Helen Eveleigh and Elly Pattison**

*Establishing understanding of the Community*

1. Can you tell us a little bit more about your roles at MEFL?
  - Helen – Zero carbon program for Moreland, reduce emissions by 22% by 2020. Works with Councils and Community groups.
  - Elly – Project Support across the four teams to get whatever they need done. Elly does a lot of research on community engagement, specifically with social media.
2. Could you briefly explain what the Zero Carbon Evolution has been working on recently?
  - Helen – Working on a new campaign for doing at community festivals, like the eco doll

house to help speak with others in the community. The other things include working on a project for engaging businesses to help normalize action on climate change, a community green space. Working with Positive charge for solar and drought proofing.

3. Do you believe all homeowners should care about their emission contribution? Why?

Elly – Yes definitely. It's everyone responsibility to do their fair share. It makes economic sense to be efficient.

Helen – Everyone should be playing their part, they should care how much energy they spend or waste.

4. When considering sustainability, what are the most important factors for homeowners and why?

Helen – Cost. How long it will last, durability. What will need to be fixed, repaired? The comfort from insulation or heating compared to the extra cost for the bill. Keeping it cool in the summer without high energy bills.

5. Talk about the community councils and community group workings

Helen – one of the reasons to work with councils and community groups is for the additional level of trust. With positive charge there can be a ton of campaigns, but when a letter goes out it's a huge spike. More so with homeowners than businesses. Working with schools has been slightly effective too because they get benefits as well. When it comes from someone they know it's most effective too. Face to face is also good but time consuming.

6. Could you tell us a little more about your social media and MEFL?

Elly – Started the facebook page a few months ago. Then a paid advert for a month. Not sure how many likes is good, though.

Helen – made some videos, two short 60 second videos to put on the website and council websites to tell a little more of a story. Got about 5,000 views. There wasn't any increase in contact from solar requests, however. Not everyone listened with sound on or watched to the end too. What's really been effective is working with other groups, and having them share from there.

Helen – Social media for us is still very new, once we have built up a backing to get more of those likes there will hopefully be more of an impact.

7. What do you believe are the major benefits of transitioning to an all-electric home?

#### *Technical, Environmental, Economic, and Behavioral Issues*

1. How do you feel Zero Carbon Evolution fits into the plan for an all-electric home in the future?

Helen – A lot of ways. Some people don't think it's worth solar, but then we can open up a longer term conversation to ask "well do you want to be on gas in the future?". It's not immediate, it's a lot about planning out the decision points and making them known.

2. How do you help homeowners make those decision points?

Elly – Most of the time people have thought about solar already, and then they get the letter

from council and they are sort of pulled over the fence. Gives them that extra bit of confidence.

Helen – There are people who are coming onboard about the feed in tariffs, whether they are going to lose all this money. There is a conversation about how to better use it. There are a lot of people whom say solar doesn't work for me, but getting people to take that long thought about their house in the next 10-20 years is about the long haul game.

3. What is an all-electric home?

Helen – “One without gas!”

Elly – And it includes solar panels

Helen – but it doesn't have to include it. Eventually the grid will be all green to.

4. How do you convince / plant the seed into homeowners whom aren't on the fence?

Elly – It's mostly been helping coax people off the fence. It's very hard to convince many other homeowners whom are very set in their ways.

Helen – The idea is to get the early adopters and build the base off those whom are already considering it. It's that social scale, eventually all will join if many start.

5. Where do you think the community may be most hesitant towards adopting the changes the Zero Carbon Evolution team suggests? (The potential renovations to their home, the costs it may present, the change in lifestyle they may have, other)

Helen - Sometimes there are barriers like renters, older folks don't know how long they'll live for, there's a lot of development around here and many believe their home will just be knocked down anyways for new apartments – especially Coberg downwards where densification is going on.

Elly – Competing priorities within a household as well. Other financial issues as well. It's not urgent necessarily.

Helen – State government should be paying for us more for the energy we generate. They're sort of waiting for someone to make it cheap or free or more profitable.

Elly – some of that may be true. Because the government doesn't take a very good stand on it, what does that say to the people? IF the government doesn't endorse it, it takes away from the credibility.

Helen – For those working all day, it also doesn't seem to work well for them. When they retire...

6. Government Incentive

Elly - Small scale certificates, you earn the number based on the number generated. Ie 2KW system gets 12 certificates (not actual, just example). And then you can trade those for a value, or it's taken off the amount for the solar installation.

Helen – the feed in tariff is there took, it's about to get raised but it's still a quarter of what you pay so it's not much worth it. When it was first introduced it was 60 cents, so people may be waiting for it to jump again but it never will.

Helen – The certificates do add up and do reduce a significant percentage, something like more than 10% of the price. That will eventually disappear much like the tariff did.

7. Payback period

Elly – Based on your usage. If you are home during the day, it's quicker. It's about 7 years for an average sized one 3-5kw system. It's included on the estimate.

8. Variance

Helen - Across Victoria it will be more or less the same. It's more of a house by house basis. Bigger houses in the suburbs, which means bigger solar, but still more or less the same climate wise of course.

Elly - The feed in tariff and the certificates are set by the state. The messages in your final product will more or less be the same

Helen - it's not targeted differently for positive charge.

9. What have you seen work locally to effectively change consumer behavior?

10. Does the Zero Carbon Evolution team help homeowners in anyway obtain cheaper, energy efficient products that use or output less carbon emissions? Are there incentive programs, besides the ones that Positive Charge offers, in place to help them?

11. What can homeowners do with their old products should they want to install new more energy efficient ones? Are there avenues they can take to regain some value from them? How can they dispose of them in an environmentally friendly way?

Helen – Retailers may take them, I don't know. There is a thing with lightbulbs, where if someone installs lights and takes away the old ones, you get a discounted price. There are a few other things that definitely.

### *The Deliverable*

1. If you were to distribute a singular page of information to educate people on a brand new sustainability topic, what 3 key points would you want addressed?

Elly – reinforcing that homeowners are making a difference, playing their part. But don't feel guilty about not doing everything. Little bits and bobs help build the path.

Helen – Being clear about what you are asking them to do is important to. Having levels of information is a good thing. Telling people where they can find more information helps, reel them in and then give them extra details. So refine it such that there are tiers where it's a higher up level and then shows granulated amounts of information as you drill into it.

2. What medium for presenting information has worked well for the Zero Carbon Evolution team? Why?

### *Closing*

1. Have you transitioned to an all-electric home? Why or why not?

Elly – My house sucks in terms of energy. Renting too.

Helen – I rent. My gas appliances were new. I can't ask for them to change really.

2. How do you impact renters/landlords?

Helen - To impact renter/landlords, there really needs to be something they need to replace. Electric induction would need to provide the pans as well.

Elly – There is probably some education to renters as well, to show them they have this power to ask for the green choice. It may not have an impact on the landlord's request, but renters don't really make the choice. The hardest thing is getting over that upfront cost, because the landlords pay the upfront cost but the renters save money on the bills.

Helen – you could say if they see the demand in interest is a good thing. But around here there is often a queue. There is no regulation on the rented properties, so if they are falling apart they can be falling apart... There's not a drive to give the best quality of house essentially. So the goal is to take action on those who can take action, renters are too powerless. Housing providers also have regulations.

3. Can we follow up with any clarification or further questions?

4. Can you give us the names of any community leaders or contractors that we can contact to interview?

Helen - Jason has the contacts to the levi community.

Elly - The people at the Brunswick community church were really nice and helpful as well.

Helen – This Sunday fork and a fester is this Sunday. Lots of people at lots of different stores, could have face to face chats with people. There's not a big flow through of people, so you'll be able to walk around the stores and talk to them.

Elly - There's also the chance to walk around and administer a 5-minute survey, just handing them out.

Helen – Jason also has another thing going on to ask to hand it around. Could also share to Facebook, and they can then share it with CERES over their network.

## Rachel Maddocks

### *Establishing understanding of the Community*

1. When considering sustainability, what are the most important factors for homeowners and why?

- Energy efficiency ratings (popularity has increased creating a standard minimum)
- Next steps are draught proofing (retrofitting or even heavy drapes (old fashioned coming back), double glazing windows
- Water usage

- I don't use enough electricity to get paid back by feed in tariffs -> can be fixed by getting correct system size
- Feed in tariff pay 28-31 cents, will buy at 2-5 cents/kWh -> from instability, pulled rebates, killed industry

2. Why do you believe all homeowners should care about their emission contribution?

- Too many people, impacting planet more than we should
  - Loss of green space
  - Loss of touch with nature
- Natural progression from acceptance of global climate change
- Exhausting finite resources
- Australia doesn't really care about climate change (culture)
- Lower socioeconomic, not enough resources to care, struggling to survive
- Community based solar, community is important
- Community more important than environment
- Government is important, lack of policy stability leads to insecurities in sustainable market, businesses shy away
- Scare tactics with prices
- Carbon tax -> going to make electricity bills go up -> not the actual case, it's because of maintenance of poles and wires and updates to infrastructure
- Recycling is very big here

3. What do you believe are the major benefits of transitioning to an all-electric home?

- Understand knowledge of impact and energy use
  - Being able to promote the idea of a self-sustaining house
  - Being careful not to go completely off the grid at the cost of the lower class & industry
  - Technology on the grid needs to be evaluated, not been looked at for 50+ years
- Recent council elections 2-4 greens people may be elected into the Moreland Council*
- The council's vote for the mayor, not the people*

*Technical, Environmental, Economic, and Behavioral Issues*

1. Define "all-electric home":

- All appliances are powered by electricity

- Nuclear ->cautious as a culture (Sort of a scare culture)
    - View of disasters (Chernobyl & Japan) - no public appetite
2. Are solar panels part of this campaign or are they an add-on resource?
    - Part of it, but secondary, trying to avoid gas and coal
  3. How would you gauge community interest in transitioning to the all-electric home?
 

Very.... Somewhat... Neutral... Infrequent... Not at all

    - This is around information
    - Understanding opportunity, given information this could increase--> what we are trying to do
    - Many different classes, lower, middle, upper, generation range, (greeks and italians in coburg primarily), generations have stayed put
  4. Where do you think the community may be most hesitant towards changing out their appliances? (The potential renovations to their home, the costs it may present, the change in lifestyle they may have, other)
    - Upfront cost
    - Not lifestyle
  5. How can homeowners access cheaper energy efficient, electrical appliances? Are there incentive programs, besides the ones that Positive Charge offers, in place to help them?
    - Unsure, don't think so, only star rating at a consumer level,
    - Free LED lighting
  6. What is already known about the technical aspects of this transition? Are there any steps already identified that homeowners would need to do before installing new appliances? (I.e. electrical upgrades, solar panel capacity, etc).
    - Nope
  7. What can homeowners do with their old appliances should they want to install electric ones? Are there avenues they can take to regain some value from them? How can they dispose of them in an environmentally friendly way?
    - Urban issue because it's not very frequent
    - Councils offer a free curbside service (get certain number per year depending on suburb) -> as low as one per year
      - No car batteries, maybe not paint, gives certain days per year, outside of this time there can be fines

- Not clear about what gets recycled, some might go to landfill
- Anything not dangerous or explosive

### *The Deliverable*

1. What medium for presenting information do you believe has been the most effective in the past? Why?
  - Balance between level of detail required by homeowners and the campaign for council
  - Give campaign kit to a council for a price that has the info
  - One flyer per step, (small booklets) -> works well with house model
  - Case studies and testimonials
  - Videos work well
  - App to select municipality and have interactive, personal experience
  - Visuals help to explain technical parts
  - Review the final product
2. If you were to distribute a singular page of information to educate people on a thte transition, what 3 key points would you want addressed?
  - Why people should transition (how will you benefit) -> with comfort
  - How they can do it -> make it simple to understand and not seem like a huge task (break it down
  - Positive language
3. What does the final product look like in your mind?

### *Closing*

1. Have you transitioned to an all-electric home? Why or why not?
  - No, they use very little electricity, doesn't understand technicalities, no insulation
  - "Time" is a factor
  - Limits energy usage
    - Uses very little lights. Minimizes air conditioning and heating
2. Can we follow up with any clarification or further questions?
  - Yes
3. Can you give us the names of any community leaders or contractors that we can contact to interview?



- Italian Clubs, Croatian Clubs, Serbian Clubs (Lucy has these contacts)

## Greg Snelders

### *Establishing understanding of the Community*

1. When considering sustainability, what are the most important factors for homeowners and why?
  - Double edge, if they are focused on sustainability they are aware of the environmental benefits. But mostly they are aware of the impacts on their bill. So overall, economic and comfort – improving on their overall condition. Historically our climate isn't so severe, so our houses have done pretty well. That's why we don't really need to draft proof our houses like crazy, and we have a cheap supply of power. That's why the building stock is pretty poor in a sustainability sense – it's not been a driver. Essentially, most people would do it for a direct benefit to themselves (thermal comfort, cost).
  - Are there building codes?
  - We do, there are a 6-star minimum performance required. These have been relatively new in last 20-30 years. Ceiling insulation, etc. People can typically afford to run their appliance though...
2. Why do you believe all homeowners should care about their emission contribution?
  - Most homeowners would probably be prompted by a financial return, not many will do it for the sake of the environment. For our perspective, all the forecasting about climate change will eventually be costly either due to a more hostile environment that will adapt or hopefully mitigate it before we get there. So for us, we take a moral high ground. There's the wealthy vs non-wealthy, 1<sup>st</sup> world vs 3<sup>rd</sup> world, health condition exacerbated...
3. What do you believe are the major benefits of transitioning to an all-electric home?
  - For Victorian context w/ Brown Coal, the transition away from heavily polluting sources. If it's all electric, from day 1 you can buy 100% green power. Gas inherently (while as less emissions intensive and more affordable supply, more and more with what we term "unconventional sources of gas" there is strong argument around if all emissions are captured from that and it's still a fossil fuel, so we'll never meet our targets if we use gas). Technology has also advanced, in the past we couldn't talk about electric air conditioning but today we can. Solar has only really taken off since 2009 in AUS, this is when the federal gov't put in good rebates/market got better. Go

to greenenergycouncil, energy efficiency council, or Solar PV to see the graphs where it suddenly takes off. Particularly the heat pump, ambient heat, cooking is what we care about, but the big chunky ones are the water and air heating.

- So solar panels will kind of a secondary towards the all-electric house?
- People act irrationally, there's some whom already have it and it wouldn't hurt to get more people onboard. It just resonates that Germany has 40% penetration of solar how come we don't have the abundance they do. Solar is still on the rise but not as steep as it was when it used to have better rebates.

### *Technical, Environmental, Economic, and Behavioral Issues*

#### 1. How would you gauge community interest in transitioning to the all-electric home?

Very.... Somewhat... Neutral... Infrequent... Not at all

- Gut feel for the moment is that: I don't think people would know, I don't think MEFL as an org hasn't been talking about this as forceful as we should be, and maybe that's because we aren't confident in what it looks like for everyone's situation (better understanding of the cost/savings implications and how solar can contribute to that potentially).
- Is anyone is restricted in doing it? Solar contribution if your roof ain't good enough. There will be sections of Vic where people won't have gas – but everyone will have electric. What about renters? As a renter they just fall into that usually problem that they are somewhat powerless, but the building homeowner can do it at the upfront cost but with the residence benefit – so there is a balancing issue. Will be difficult in short to medium term.
- So, if no one has restrictions in terms of electric access, why haven't people done this?
  - For us, it's not on our website to directly said this is the bee's knees. We're just not being strong advocates about it. We've never clearly defined this, like an infographic explaining what is this (and then you click on the heat pump / hot water and get more info...)
  - So, no physical barrier, but the cost and the information.

#### 2. Where do you think, the community may be most hesitant towards changing out their appliances? (The potential renovations to their home, the costs it may present, the change in lifestyle they may have, other)

3. How can homeowners access cheaper energy efficient, electrical appliances? Are there incentive programs, besides the ones that Positive Charge offers, in place to help them?
  - Nothing substantial enough to drive the change. At the moment, there is the Victorian energy saver initiative, which is a white certificate program where certain actions abate to certain carbon abatement which is traded into the marketplace. But around hot water there is almost no rebates, and heating/cooling... nothing setup to drive the change.
4. What is already known about the technical aspects of this transition? Are there any steps already identified that homeowners would need to do before installing new appliances? (I.e. electrical upgrades, solar panel capacity, etc.).
  - We got a good feel for it, but we've probably not nailed it down. At the broad: those three appliances (Heating water / air / cooking). There are gas dryer/washer but those are more industrial and would be an exception to the rule – so really those three things are where you start to be all-electric.
5. What can homeowners do with their old appliances should they want to install electric ones? Are there avenues they can take to regain some value from them? How can they dispose of them in an environmentally friendly way?
  - Moreland specific will need to look at the council offerings, the brotherhood of st Lawrence do take somethings, but don't know the exact answer. Essentially we aren't saying rip out what you have on the spot, it's more about educating for a replacement decision when things are falling apart or unhappy with, other motives. It's just a matter of not forcing the change now, but when they change comes about, do it this way rather than that way.

### *The Deliverable*

1. What medium for presenting information do you believe has been the most effective in the past? Why?
  - So, that infographic, is that what you imagine?
  - The energy freedom has a 9-step program (in a big book): you do the efficiency, supplement it with renewables, and then you've done all that you can.
  - I like the idea of an infographic that shows a home where users can dip in and out of what they have and what they don't. One that shows high level information and then you can delve into it more with specific graphics (click into). For us, it's a journey.

Don't think you need to invest 20-30K today, but we need to support them with information where they are 5 years into a washer, don't replace it but if it's 10+ years maybe consider replacing it. Typically, we wait until it breaks and it's a crisis, you don't have time for research or any of that – it's crisis mode. But maybe we should be informing people ahead of time so there isn't that crisis or when it does happen they know what to buy instead of buying what they already have.

- Gas ducted is typical, where the unit sits outside and you have a network of duct that blows the hot air around. Could be vents on floor or ceiling. Very common, most people grew up with it and get it. But what do you do for electric? Do you get a small unit for every room (~2K per unit)? What's cost effective for those not on the top of the food chain? If you do a centralized unit, you do lose the efficiency. But how much? Get a heading of that. What's the best way to figure that out? What's the best way to heat / cool the home (bathroom, living room, kitchen, everything!) with these units?
- But if it's seen as something you are going to replace anyway, like the hot water, and the cost are about the same then there's most probably won't have an issue. But with gas cooking for example, it's in the language to say "cooking with gas" as a positive thing. It's literally in the lingo. A good selling point though is that it's a matter of glass for cleaning, which would be huge for the people who cook in the home. With a gas or another electric version, you got to take the thing apart beforehand. But with gas you get that visual feedback of how strong it is, because I can see it. Yes, people will need to replace pots with induction (choice does reviews on induction cookers) but they will most likely want to. There are even intermediate accessories that are like pads, in which you put that on the stove and the pot on the pad, which gets around the pot issue. So, it's an excuse for new pots, what they have can work, and there are accessories out there to make what they have that doesn't work, work. Most people do this during a reno anyways, a few hundred bucks on top isn't much when you are already spending a lot of bucks.
- The energy rating website is another good space to look at, it listed out more about the air conditioners etc. Every product that gets a rating is on there. Bigger units have less efficiency.
- "Are we still cooking with gas?" by the ATA report.
- James Bramwell is good with telling you about program design, how they approached it and what not to do. He helped set up the BZE, they did all the research,

they just don't have the ability to push it. It just so happens that we are inverted, but they don't want to give up their research for free so we kind of have to duplicate their works.

2. If you were to distribute a singular page of information to educate people on a brand-new sustainability topic, what 3 key points would you want addressed?

- For the infographics, I would want the complete snapshot for the initial landing. I like the Energy Freedom Infographic example that shows a bit more. (Page 7 of their book). Talks about improving the building shell, and then the specific appliances, and later on solar etc. But solar is a response to the public wanting that, even if the logic is that if you are efficient you'll need a smaller PV and you'll save even more money. But people see it on the roof and it's the first thing they think of.
- If this is the All-electric house, then we need to be able to send people to the distributors they need to take action on each aspect of it.
  - a. Where does the weather proofing come in?
- Ordinarily that should be the first focus. But if you feel the hot water heater is 14 years old and it's going, then that is the first priority. We'd do the same steps as the energy freedom book talks about, but the world isn't linear and we'd do it in the way we need to adapt. The point is to try and derive some logic of order from doing things in a non-linear way.
- The shell has the biggest impact on comfort and effectiveness. You won't see it in a bill necessarily, so it's harder because of perception, but that's where I'd start. But this is also a program where we want people to act. Having lighting done right away is easy, relatively cheap, and homeowners get to put a check on the box right away. It would be good to have a suggested path given a certain circumstance. But we don't double glaze first, for example, because it's not something people may have already done and it's not necessarily the cheapest or easiest to do. Give people an orientation of what to do. Just don't get rigid on it.
- Most people won't have air conditioners, some have evaporative where it blows air through water and you have to open the door, but it doesn't do much in terms of temperature drop. It just pushes air through the house / door. All will have heaters.
- The challenge is how do we not rip their work right off.

### *Closing*

1. Have you transitioned to an all-electric home? Why or why not?

- No, partly because I made investment choices before I was in this space. This is around 2008. I had electric resistance hot water unit, got solar put in. It's just a matter of finances and timing. If you don't do something in the first two months of owning a home, you stop seeing issues and just live with it... In summary: timing, having to act quick, etc. I wouldn't think to jump to induction until the other two are sorted. Heat pump ~4K to install.
  - Solar water has water flow through north facing panel on the roof and that alone warms it. It's not generating electricity. Your Home 5th edition online by federal gov't. Typically, there is a booster around for when it's too cold, which would be gas most likely (but there are electric versions). Instantaneous means demand as it is generated, but can't handle volume or large inefficiencies in piping. In general, good for water saving but not for large family.
  - Steve Turnock works a couple days here, he worked on a project with (forgot who) where he literally installed heat pumps w/ 2 grand rebates for low income.
2. Can we follow up with any clarification or further questions?
  3. Can you give us the names of any community leaders or contractors that we can contact to interview?
    - No specific answer but as an org there are people who can get us the ans.
    - To talk government policy, the old CEO Paul (Kate or Alison can help make contact) can help point you out.
    - There was a cost benefit project from a couple years ago that talks about the cost benefits of installing different efficiencies into a home.
  4. Where can we get cost information?
    - Barring web search and seeing what comes back, the old drive in the safe may have some information related to a project Greg did that includes costs. Sustainability
    - Victoria has a good diagram / pages on the base overview on hot water technologies but they may not have capital costs. They may have running costs.
  5. Good questions for survey:
    - Some councils need to deal with noise issues around heat pumps. People can hear compressors kick on and off.

Other barriers: Some houses will have 1.2m clearance on the side near the boundary. So, most houses have a blind side where their hot water tank would be anyways. You want to protect compressors from full sun, but you'll want to put it somewhere that can minimize the noise. Some places will only be able to put stuff in the back due to heritage laws (visual appeal). There is that physical limitation: water tank, compressors, etc. – where

can they go, especially if you only have so much space in the backyard? So, easier for larger areas, not so much for smaller areas. May not be most appropriate for those areas, there are still large areas of Moreland where this can be done. And there are ways to get around this, it's just a matter of motive.

## Tim Wong

### *Establishing understanding of the Community*

1. When considering sustainability, what are the most important factors for homeowners and why?
  - Economics: drives decisions, is there a benefit?
  - Comfort: inside of a home, if you're a high-income learner then comfort is a high priority
  - Convenience: appliances or devices, do you have to get involved in learning the process?
  - Felt very few people are worried about the environment and the sustainability factor
2. Why do you believe all homeowners should care about their emission contribution?
  - In between (on the fence)
  - Yes, people might not see the indirect consequences but it'll come back and bite them
    - These people will require price incentive
  - Carbon Pricing: charging a levy per quantity of carbon emitted ("carbon tax") **ask Gavin**
    - Was in Australia in the past
3. How do you define the "all-electric home"?
  - Having no devices or appliances that use any source of energy other than electricity
  - The appliances = users of energy
4. What do you believe are the major benefits of transitioning to an all-electric home?
  - Potential economic benefits: cut off the gas, don't pay the daily "supply" charge
  - Simplification of appliances and maintenance
  - Better quality from some appliances that run-on electricity
  - Health benefits: Carbon monoxide is released from burning of gas, which can filter into the room
  - Economic: gas per unit of energy is cheaper but gas prices are trending upwards (possible cross of electric and gas prices in near future)

### *Technical, Environmental, Economic, and Behavioral Issues*

1. Where do you think, homeowners may be most hesitant towards becoming all-electric? (Appliances, power generation, knowledge hurdles...)
  - a. Have there been major hurdles?
    - Yes.
      - People need to be convinced that it is worth their struggle
      - Cost/time vs. benefits that they will see
      - Some want to see the side benefits (helping environment, cleaning less polluted household)
2. What can be done to address the costs of becoming all-electric? (Cheaper appliances, incentives?) What kind of turnaround time could a homeowner expect?
  - Government gives subsidies for solar PV – these will help

- Over 10-15 years how much kilowatt hours will you produce and you get small scale technology certificate
  - Based on zone they have predetermined the amount of STCs you will be given based on your energy output and when they sell it to you it's cheaper based on the number of STCs you are be given
  - Hot water pumps
    - Depends on the amount of water you are using-the more you used the more you save
    - Payback time is capital cost / annual savings
      - around 4-5 years
    - Heat pumps are expensive (\$5000-\$8000)
    - Savings depend on amount of hot water used
    - 1kwh = 3.6MJ/energy all converted into heat
    - Coefficient of performance = 3-4.5
    - 1kwh to run at heat pump = 3.6x4.5 MJ/energy you would be using 4.5 less energy to heat something with a heat pump
  - Solar PV
    - Feed in tariff – paid for the extra amount of energy
    - You are paid 5-7 cents per kilowatt hour that you produce into the grid – has changed dramatically since the early days when the feed in tariff was around 60 cents.
    - To import electricity from the grid is about 20-30 cents per KWH depending on your provider, which makes many feel they are ripped off. They provide the grid with the same amount as they consume, but for some reason the amount they consume costs more than the amount they produce!
    - Depends when you are using the electricity so you don't have to import it – no benefits really to pushing it back into the grid due to this cost difference. It's best to store it in a battery for later or to have a system that produces the exact amount you use.
    - Battery: Should the feed-in tariffs scale with peak demand, this would allow you to store energy generated and dump it into the grid at high demand times – but this isn't the case. There is a high cost to batteries, so as of now the real purpose of these are for power when the electricity goes out or you are not generating (like at night or especially bad days).
3. How familiar are you with the all-electric transition process? Could you describe some of the steps a homeowner would need to take to become all-electric?
- Roughly, haven't done the calculations
  - Some people like the responsiveness of gas, also like the flexibility of gas
  - People would probably look at the cost, is it broken, worn out, is there a need for an appliance to be changed
  - Homeowners would need to determine if the appliances are stand alone or built in and make sure if it is built in that it fits or else the home will need modifications
  - If they have gas they need to isolate and switch off – this is not very difficult
  - No data about electrical upgrades within the home, but theoretically most electrical appliances are built to run off a wall socket. However, with certain appliances like a multi-burner electric cooktop, the wall socket only provides 240V and 10A, which is



2400W. A single burner could be that, so technically a homeowner may need breaker upgrades and wiring changes to support a higher amperage to produce the number of watts they need to power a multi-burner cooktop (Volts is locked in since that is related to potential difference in the electrical grid itself).

- Choice Magazine – MEFL has a subscription – can provide some additional resources on choosing the correct appliances for the all-electric home.
4. How can homeowners remove their existing gas appliances and sources, perhaps recuperating some of their losses?
- Gumtree: second hand selling akin to craigslist. This applies only if they have a still functioning appliance.
  - Otherwise the landfill will take it or potentially recycling programs in the city – but odds are you will need to pay someone to take it away since you won't have the means to haul this anywhere. Yet another cost.

### *The Deliverable*

1. What medium for presenting this type of information to homeowners do you believe will be the most effective? Why?
  - **Social media** (Facebook): high noise, set a target demographic and have ads pop up as they are browsing
    - good for targeting specific demographics but its high noise
  - **Website**: have the website but don't rely on it
    - Have to convince the customer first and get values across to them and make them buy into ideas
    - Either way, this will most likely be a given with any project so those interested have a landing page.
  - **In person** – This is the most effective way but also the most expensive
    - Powerful cause its two way
    - Having chat at EXPOs
  - **Referrals?** – word of mouth or references from government or celebrity
    - Positive publicity is beneficial
  - **TV** maybe
    - Broad audience, not targeted at all
  - **Understand target audience by segmenting**
    - Demographic
    - Location
    - Age
    - Income
    - Societal attitudes
- Only pick 1 or 2 segments
- Target the segments that can actually do it, have the income
2. What are the key points you believe homeowners should know about being “all-electric”?
  - Health and welfare benefits
  - Cost benefits
  - Helping the environment (people might not buy this but you have to mention it.) (3<sup>rd</sup>)
  - Determine the consumer pains – and figure out how to solve them

Solar Panels kW to kWh. What's the difference?

- Power measured in watts
- $1 \text{ W} = 1 \text{ J/s}$
- Running a 1W appliance for 1 hour you get 3600 J energy or 1Wh (watt hour)
- kWh = energy consumed
- kW = rate of energy

## Part D – Expert Specific Interview Scripts

### James Bramwell

#### *Establishing understanding of the Community*

[Information shared before questions were asked:]

- Most people have the reverse cycle air but they don't use it properly.
- People who have solar don't export it out because there is so little benefit.
- When doing the assessments of homes James would look how much gas they are using.
- Homes that rely heavily on gas it could be upwards of \$30,000 and a long period of time to actually convert to all-electric.
- Evaporative coolers – aren't good during heat waves and cause a lot of drafts.
- Gas bills in Melbourne in the winter are very high.
- Campaign would be targeted at homeowners who are environmentally minded and are going to live in their house for about 10 years and already have solar but got it with a low feed in tariff so they are primed for using more of that energy at home.
  - Cause more people change appliances when they break or when they renovate, but informing them about the options for when they are looking to change.
  - New buildings.
  - Replace with electric alternative when things break.
- Comparison to commute to work: pay more to live closer.

1. Can you briefly tell us a little about your experience in the sustainability field?
  - Mechanical engineering degree – thesis in Green star (energy efficiency rating)
  - 2008 worked in energy efficiency audits and recommendations
  - Gas vs electric wasn't really settled and LED weren't really a thing
  - 2010 Green loan assessor – assessments
  - Beyond zero emissions (5 years) - produced report
  - Energy Freedom Project – 9 steps
2. You previously worked with the Energy Freedom organization to develop “The Energy-Freedom Home” handbook, correct?
  - a. Our understanding, and from glancing over it, the research and information was there but it never really sunk into the community – what do you believe caused this?
  - b. How would you circumvent this in future attempts?
3. The handbook details “9 Steps to wipe out energy bills” – do you believe those 9 steps must be done in that order? What if a homeowner wanted or needed to replace some of their appliances before sealing their home, for example, is that necessarily worse for them or the environment?
  - There is currently a lot on lighting and solar but there isn't a lot of information about the 7 other steps in between.
  - Worked to help homeowners pledge energy freedom within 10 years but they didn't follow up with the people they reached out to.

- Industry kept them from changing people's minds because mechanics would come by and tell them not to get the most expensive but environmentally friendly version of their appliances
  - You have to start at the basics with the people – reverse cycle air conditioners that are less than 5 years old then they more efficient than the best gas alternative
  - Gas appliances are compared to gas appliances but electric is compared to electric and they are far more efficient
  - Check ATA for report on how to do transition
  - Having your own solar makes things that run-on electricity cheaper and makes it more appealing. Changing appliances to electric would be the minimum thing to do – it'll cost more upfront but it is much cheaper to run. People miss the fuel cost when comparing a couple of different types of appliances
    - a. Are there inherent steps homeowners can jump to, for saving upfront costs or to address at another time, potentially?
4. What do you believe to be the motivating factor behind behavior change with homeowners?
    - Paying more upfront to save in the future
    - Teachable moments – heat wave or wild fire it becomes a teachable moment for people
      - When people are renovating (before renovating, think about these things...)
      - Just bought a house but wondering what to do now.
    - Identify the teachable moments points.
    - Replace your gas stovetop because you're paying the pay in fee for gas.
    - "There is nothing that gas does that electricity can't do or do better."
  5. We've been told one of the biggest sells on the all-electric home is "comfort". We've read into the process a little bit and it sounds almost like the comfort comes from draught proofing more so than the utilization of electric appliances. Is there more to it?
  6. What do you think specifically stops homeowners from taking this transition on, especially if it brings such things as enhanced comfort, reduced bills, and a lesser footprint on the environment?
  7. If you were to ballpark it, how much does the entire transition cost?
    - a. I've estimated approximately \$5,600 for some mid-grade appliances and the essentials of DIY draught proofing. Is it truly that low?
      - Doesn't know the price of a ducted unit
    - b. How could homeowners make the transition as economically efficient as possible?
  8. What are city councils looking for when converting their homeowners? What do they want, why?
  9. Do you see any reasons to, or reasons not to, transition to an all-electric home?

### *Concluding*

1. May we follow-up should we need any further clarification?

## **Katherine Cocks**

Sustainability Outreach Officer – Stonington Council

### *Establishing understanding of the Community*

1. How would you describe the demographics of your community?

Quite a diverse in all affects, it's quite a long municipality. At one end, it's very urbanized, it's bordered punt road (Yarra) apartments and denser living. At the other end of

the municipality, it is less urbanized and many properties are detached on larger blocks. In between that it also contains some of Melbourne's finest mansions to large blocks of public housing. Around 30% of the community was born overseas and the top five nations of origin are England, India, China, New Zealand and Greece. The top five non-English languages are Greek, Mandarin, Cantonese, Italian and Hindi.

Over 36% rentals in the area so a lot of transitional residents. Generally high rents and high property prices all throughout with some public housing. A very educated community, not necessarily that driven by sustainability as compared some other municipalities, but are very educated.

2. How does information travel within your community? (E.g. word of mouth, bulletins, newspapers/newsletters, internet, etc.)

By the council, information goes out in a quarterly published to all residents via a magazine (quite effective). They have a website. They have good social networks from Facebook and Twitter (varies by department). Good online newsletters w/ a good subscription amount. Media releases. In the newspaper, there is a monthly full page on the council.

3. What do you think is the easiest way to communicate with members of your community?

### *Sustainability within the Community*

1. How does the community feel about sustainability, is it a priority to them or are there more pressing issues?

It is important but not necessarily their main priority. Other priorities include retail, hospitality, economy, maintaining heritage, property and streetscape appearances etc. We have some key shopping areas including strip shopping and Chadstone Shopping Centre. It is always challenging to market sustainability to the community, although those involved are very receptive.

2. What are some examples of sustainability efforts in your community? Are people involved?

Offering in home energy assessments and solar bulk buy from Positive Charge. They've run a few energy workshops over the years that aren't always that well attended. However our in-home energy assessments have been popular with 150 undertaken over the years and something like 50% took action as a result. The solar program is not current being that well utilized, but the promotion has been limited. However, we will hopefully soon be doing a targeted campaign to help push it.

- a) Why the assessments over workshops success?

Possibly because the information is tailored to their property and energy improvements can be very specific to each property. For workshops, topics such as gardening etc, things people are happy to learn about more about at night or on the weekend.

3. What were the results/outcomes of the efforts in your community? Solar bulk buy? Home energy assessment? Have you seen any progress from the home energy assessments?
4. What do you think could help encourage members of your community to change their sustainable behavior? (More information, more programs...)

Doing case studies so they can kind of see what they are talking about might not impact their quality of life or visual appearance of their home. Giving them something to relate to would help. Tailoring information as specific as possible would help. Letting them know it doesn't reduce their quality of life...

Do most people not like the look of solar?

Yeah, likely. Also, not knowing what the planning requirements are. We are holding a workshop to explain the planning requirements. It's also about price and confusion about who to buy it from or to understand the industry. We have tailored our bulk buy towards getting independent advice to help counteract this.

5. Our team has defined the all-electric home as a home using only electricity for energy, good insulation, reverse cycle air conditioners, an induction cooktop, and a heat pump for hot water. What type of information would your community want when it comes to transition to an all-electric home? (E.g. Cost, carbon footprint, installation, timeline, etc.)

For each of those items it depends. A fact sheet explaining why it is better. People may have prior information, like split systems non-comparable to gas heaters. The latest info on each of those items, why they are super-efficient, where they can go to compare more information about the types available. That's why PC is great, it lets us redirect people to them to get their information.

### *Closing*

1. Are there any community groups that you believe would be worthwhile for us to reach out to?

One community group relating to climate. SCAN. They are climate specific.

There are the friends of gardener's creek. She will forward their details to us.

2. Would you be able to assist us in finding homeowners in your community whom would like to be interviewed about their thoughts on sustainability?

One resident who's doing a case study for solar bulk buy, but has just done the solar panels on the roof w/ a home energy assessment. Spoke to PC at an event, has a larger system

than she needs in hope of eventually installing a battery. They have a case study on her, but must wait on council approval. She will ask her if we can contact her.

3. Can we follow up with any clarification or further questions?

No problem.

## Tim Forcey

### *Establishing understanding of the Community*

1. When considering sustainability, what are the most important factors for homeowners and why?
  - Average homeowner (when making decisions) will just do what they've done before
    - Status quo, what a friend recommends
    - Sustainability will not be a factor
    - Familiarity is the most important
2. Why do you believe all homeowners should care about their emission contribution?
  - The planet is falling apart
  - There are win-wins -> advantages for homeowner with sustainability
    - Info isn't out there
  - Most cost effective way to heat homes is reverse cycle AC (AT)
    - People don't understand because they are used to gas across the country
    - Lack of information
  - Has worked as a home energy consultant and there is too much info available with many types of information and options
  - Different priorities based on priorities based on their homes
3. What do you believe are the major benefits of transitioning to an all-electric home?

### *Technical, Environmental, Economic, and Behavioral Issues*

1. How would you gauge community interest in transitioning to the all-electric home?
  - Difficult to get attention of 70%
  - 10% are very interested
  - 10% would actively be against it (just for fun)
2. Where do you think the community may be most hesitant towards changing out their appliances? (The potential renovations to their home, the costs it may present, the change in lifestyle they may have, other)
  - In home energy consultation
    - Has done 400
    - Person to person specific, individuality
    - Best decision order (decision tree)
    - Public lectures and publishing are less effective
    - Facebook groups/social media
    - A lot of misinformation
      - Even on reliable websites because information becomes obsolete and not updates

- Keeping info up to date
  - Partnering with other likeminded organizations is valuable
    - Similar organizations having slightly different information is difficult
    - Time stamp so that people know how old information is and can filter through it as they see fit
    - Simple information as opposed to general
    - Projects that can be sustained for 5-10 years
3. How can homeowners access cheaper energy efficient, electrical appliances? Are there incentive programs in place to help them? \*have heard of energy certificates\*
    - For heat pumps and solar panels there are renewable energy certificates
    - Can consider bulk buys of reverse cycle AC
  4. What is already known about the technical aspects of this transition? Are there any steps already identified that homeowners would need to do before installing new appliances? (I.e. electrical upgrades, solar panel capacity, etc).
    - Some people will have a reverse cycle AC they don't know heats
      - Need to find heat button
    - Making smart decisions when having to buy new appliances
    - Hot water is tricky
    - Needs preplanning because people usually get a hot water heater when it fails
    - Induction cooktop
    - Get to making and storing their own electricity
  5. Do you know of any resources for homeowners to get rid of their old appliances should they want to install electric ones? Are there avenues they can take to regain some value from them? How can they dispose of them in an environmentally friendly way?

#### *The Deliverable*

1. What medium for presenting information do you believe has been the most effective in the past? Why?
  - Techniques for Reaching Homeowners
    - Facebook/social media
    - Survey and community groups
    - Post questions on the Facebook group
2. If you were to distribute a singular page of information to educate people on this transition, what 3 key points would you want addressed?
  - Can vary geographically based on climate zones
    - Tailored info
  - For Victoria:
    - Consider reverse cycle AC is cheapest and most efficient
    - Same for heat pumps/hot water
    - Move to all-electric home
      - Allows freedom for solar panels or other sustainable methods
      - Forgetting about gas makes the message more simple



- Solar panels are secondary to an all-electric home
  - Can buy green energy on a larger scale
    - Well reputed companies

*Cost of Installation* <-these are important, he speaks a lot to finding ways to save money

1. What could the range of cost be for a homeowner looking to make a full transition?
  - Up to \$30,000 for the total transition
    - See the budget and get the best thing
    - People don't understand the difference between electric resistance heaters or an induction cooktop
2. Would it be cheaper for a homeowner to replace their appliances in a certain order?
3. In what ways could a homeowner potentially save money with the installation?
4. Are there additional costs associated with connecting a home's solar panels to these devices for power?
5. In general, how does the cost of gas compare to electric? Are people aware of the trends in prices? Have info from podcast, any further comments?

#### *Opinions*

1. How do electric appliances compare to other energy sources (e.g gas) in performance, reliability, and safety?
  - Heat pumps are unknown in mainland Australia
    - Is actually a reverse cycle AC
    - Perception of reverse cycle air conditioners as poor for heating
    - People used to hold out because air conditioners are poorly efficient
    - But now the reverse cycle can heat and cool
    - Victorians can save 250,000,000 per year with using reverse cycle AC to heat
      - Cheaper to operate than gas heating
    - Insulation before buying a reverse cycle AC
2. Do you see any reasons to, or reasons not to, transition to an all-electric home?

#### *Understanding the installation*

1. For a homeowner interested in transitioning to an all-electric, what infrastructure upgrades could they anticipate needing, if any?
2. Over what period of time could a homeowner expect this transition to an all-electric home to take? Is it something they could stretch over a longer period of time?
3. Are there any restrictions the city has in place that the homeowner would need to be aware of when replacing these appliance, such as permits, safety concerns, or mandated upgrades?

#### *Closing*

1. Have you transitioned to an all-electric home? Why or why not?
2. Can we follow up with any clarification or further questions?

## My efficient electric home

- Get 4 stars or better
  - Each star is a 10-15% increase in efficiency
- People see no difference between a wall plug in electric heater and a reverse cycle AC used for heating
- Can combine gas with a reverse cycle AC
- Gas can be up to 66 cents per kilowatt hour
- Age of appliances 1 star has a coefficient performance ranking of 2.0 vs a 7 star which could be 5.8
  - Uses way more ambient heat, uses less electricity, less loss
- Victoria, has just decided to go away from fracking
- Gas prices
  - Australia is highly exporting
  - Changed from a buyer's market to a seller's market
  - Climate is difficult
    - With warm because you lose the heat sell
    - With colder and colder climates efficiency is lost
    - In Australia, heating is maybe 100 days per year, but definitely need AC anyway
    - Don't go deep into the numbers, going into ROI is bad, too complex for average consumer
    - Community is important
  - Efficiency of a gas system cannot make it cheaper for everyone
  - Having case studies is important, different case studies allows for people to find commonalities with their own homes

## Barriers other than communication

- Cost and income
  - Probably a lot that can be done before cost barrier
- Personal preferences
  - Some people just want gas for no real reason
  - Using RCAC took take basic load, use a supplement
- Hasn't done water heater because he needs new sewer line, wife wants new bathroom
- Buy offsets or do other green things

## Aesthetics can be important

- Gas used to be determined to be more efficient
- ATA concerns themselves more than policy
- Could get benefits, unless a gas pipe goes down your street
- Governments have been supporting solar hot water (with solar panels)

## Ross Harding

1. In a previous interview with the Visions and Pathways Organization (Stephen McGrail) you mentioned, in context of diversity in renewables, that “solar is the king.” How do you believe solar adoption among homeowners can be increased, specifically given their financial **concerns**?
  - Community energy project; lots of panels to power a community rather than each home having panels individually- however, logistically complex
  - What's preventing them? --> logistics rather than finances, "as soon as you can blame it on someone else, you will."
  - 40% of S. Australian homes have solar
  - Big companies are slowing down this process
  - Recently, payback time is approx. 5 years= relative quick
  - Exponential costs -- pay people to put in solar to cut costs
2. In your City of Yarra project, you stated that residential energy consumption could be reduced from 27% to just 9% with the adoption of energy efficiency. How do you believe homeowners can implement these efficiencies best? What kind of program do you envision helping homeowners become educated on the products and process they must undertake to retrofit their homes?
  - Adverse to change. LED and solar have become the norm
  - Ban within local planning: new builds- take away the option from people and force them to change
  - Negative: heat water during peak hours and store to use later; with this you might run out of hot water at night and need a gas booster... gas also provides instantaneous hot water
  - Heat pumps have cheaper operating costs- \$0.06-0.08- while gas boiler is \$0.08-0.10 (per kW hr)
  - \*\*\*Make it cultural- correlate feelings and knowledge- want them to walk away and remember
  - "The very existence of humanity depends on it" (sustainability)
  - Need variation--> be BADASS with marketing. Target the middle 80% of bell curve population. Make it palatable and digestible for all. Anything you do, should be rewarded. "New environmentalism" stereotypes have changed (from hippie) and continue to change
3. There is a quote you stated several times throughout the Yarra project video, “Be Realistic, Demand the impossible”. To whom are you asking to demand the impossible?
  - a. Is it the residents of these cities to demand change in this government?
  - b. The sustainability organizations to demand more of their community?
  - c. To what are they truly demanding?

- Empower people... make them believe that they can change the future. People influence politics
  - "Make information digestible for a 5-year-old"
  - Get people on board... make it a community movement
  - Develop a vision: # houses in Moreland, with & without all-electric, how do we change?  
Weekly/monthly/yearly targets?
4. A lot of organizations stress concerns over climate change and carbon emissions, but you assert those are only 1 output of using finite resources. You assert it's about becoming infinite. Do you believe the public will grasp this message, especially after climate change has been the heated topic of debate for decades?
  5. In your Trillion Fund, Off. the. Grid music festival video, the caterers had said something about the party that stood out to me: "It's making it cool to be conscience about the environment." Is making it cool a key factor when "finding infinity"? Do you believe every demographic would see behavior change if they believed it was cool?

## Fred Harrison

CEO of Ritchie's Supa IGA

1. Do you take any action in your stores to reduce your carbon footprint?
  - Transitioning to LED lighting throughout stores
    - Will be complete by January 30
  - Most stores use electric heating
  - Use of blinds for insulation
  - Start of using solar in some stores
    - Has not proven to be very cost-effective
  - Retro-fitting light blinds for old systems
  - Converting to CO<sub>2</sub> refrigerant use, done as the systems fail
    - Will be done in 7 years
  - Heat reclaiming to supplement store heating and hot water
2. Is there anything that could encourage you to change your sustainability practices? (Ex. Government incentives, community programs, etc.)
  - There used to be discounts available from the government, but this is not the case any longer
    - If there were opportunities now this process would likely be fast tracked
    - Difficult to do fast because the company works on 1.5% margins
3. Would you be interested in installing solar panels on any of your stores or warehouses? Why or why not?
  - Solar panels are very marginal from a cost standpoint
  - Doors on open dairy and meat coolers has been much more cost effective
    - Huge power bill savings

- On the order of 25% savings
4. Why do you choose the types of advertising material that you do? (Ex. Newspaper ads, internet, social media, etc.) Do you use different marketing strategies to reach different demographics?
- Company spends 0.8% of sales on marketing
    - In addition to a 1% from the overall IGA
  - Hand bills are best for sales
  - Have employed social media
    - In limited batches
  - Lovefood.com.au
    - Company chef's "favorite food recipes
    - 120,000 people signed up in 18 months
  - Radio advertisements are good for awareness of things like store openings
    - Bad for prices
  - IGA does a lot of TV adverts
  - Adverts in the Herald Sun
    - 2, ½ page adverts almost daily
  - They are on the top end for spending on advertising
  - They do not sponsor sports teams , but will have boards at stadiums
5. What are three things that need to be included in an effective outreach material, to persuade people to change their behavior?
- Save money
    - Everyone wants to save money
    - Emphasize long term savings
    - It is not a "one-off" savings scenario
    - Potential for many years, if not a lifetime, of savings
  - Catchphrase
    - Ritchies -> where the community benefits
    - Reinforcement
    - Has to be short
    - 1 sentence
    - Have to stick with it
    - The more you write the less people actually read
  - People love rebates
    - Community benefits
    - Donating to charity is a great way to do this
    - Not a gamechanger
      - But will win in the scenario of head to head pricing
    - They use a running total of donations to the community
      - They have a total of 80 stores
  - Testimonials have to come from things that are already actively happening or have happened
    - Highlighting reasons that people did the things they did
    - Why people should choose PC
    - "community wins big in Australia"

## Richard Keech

### Advantages:

- Light roof color, solar aspect (facing correct way), close too public trams, clothes line in garage to prevent effects of rain, garden space

### Disadvantages:

- Windows on north side... supposed to get light in the winter and not in the summer.... opposite happens, almost no insulation, drafty, air/heating used ducting-lots of energy loss

2006: baseline year- 80 GJ

- Peak usage was mid-year, use lots more power in these months

2007: insulation, 1.3 kW PV array, -28% gross consumption

- Advantage of federal government rebate & feed in tariffs which was approx. \$0.60 when he bought his solar panels
- Each panel about \$1200
- Insulation added over the top of fiberglass insulation (his type was all recycled insulation) and underneath the roofing as well

2008: sub-floor insulation, induction cooker, new fridge; 55 GJ; -30% below baseline

2009: hot water, draft proofing 42 GJ; -44%

- Evacuated tubes on roof and quantum heat pump
- If he were to do it again he would install a heat pump instead of solar heat pump because ROI is not as much
  - Heat pump is 80-85% less energy while the combo is 90-95% less
- Lifetime cost is higher
- Draft- collapsing blades for exhaust fans
- Want ventilation, but want it under your control
- Doors & windows: gaps on top where you cannot see- plug these gaps collectively

2010: double glazing, standby management; 37 GJ; -52%

- Does not change character of house
- Not perfectly sealed, so condensation can collect inside it, but magnetic strips makes them easy to clean
- Using magnetic alternative to double glazing and easier to install and cheaper, about 1/5 of cost of actual double glazing
- Safer because the glass stronger and does not break as easily
- Impinging on window area a little bit because of magnets... not a big deal for normal windows, but if you have smaller, decorative windows, may be a drawback.
- Company is called EcoMatters
- Use power strips with switches to turn appliances and electronics off when they are not in use

2011: LED lights, new TV, new (added) PV; 38 GJ; -52%

- Solar: 2.5 kW on car port, 1.1 kW on garage
- 5 kW limit for rebate (feeding tariff of \$0.60+)
- 9 LED lightbulbs=2 halogen, save 85% electricity usage
- Down lights problems – not light efficient, ventilation, insulation
  - Replace with new LED, electrician to replace socket, then "appliance" plugs in

2012: new air conditioner (NO GAS); 23 GJ; -71%

- Electric usage has increased, but gas is eliminated
- Split system heating and cooling
- Multi split- connects one outside to many units inside
- Per MJ, gas is cheaper, but most of heat energy delivered by split system is taken from the air, so operating cost is way lower
- Each person can heat their room to their own comfort
- "smart sensors" only heat when people are in the room

2013: walls insulated; 20 GJ; -75%

- Insulated walls by cutting holes in outside of the house, filling them with a foam and patching the holes back up
- Loose fill fibers, water based foam, then cure
- Installed in one day, all around the house
- "Until you've plugged all the holes, it's still a leaky bucket"
- This was "plugging the last leak"
- Take care of all heat loss pathways

Noise reduction with wall insulation and glazing?

- There was never really had a problem in the first place with noises with neighbors

Comfort:

- Amount that room cools overnight when heater is not on was reduced significantly after wall insulation was added

Other Information:

- Mean radiant temp & air temp is where people feel thermal comfort
- People think air movement is too much with heating but it does not have to work as hard to keep comfort, not blowing as much
- He has seen \$35,000 savings since making the changes
- Making money each month because of such good feed in tariffs with his solar panels
- Payback for Richards case was about 14 years
- \$ per kW install capacity/300 = lifetime cost per kW hour
- Different tariff rates "time of use tariff" for peak hours--> do not pass on fluctuations to consumer
- There are smart meters "Zigby" which work wirelessly to talk directly to meter

He is very against coming off the grid completely

- Houses should generate at least as much as they consume

- Grid is storage system and sharing system
- Creates a market for surplus energy generated
- Helps when you are not sufficient yourself
- If people come off the grid, the cost of the grid is divided between fewer and fewer, so cost will increase, giving people more incentive to come off the grid themselves, not good for the economy
- Off-grid: need a petrol generator, different battery storage for on and off

## Donna Luckman

1. The ATA previously worked with WPI on a report regarding the viability of electricity over gas. What were some of the longer lasting outcomes of that report? Do you believe it still holds true today?

Could talk to the project manager at another time to learn about what happened. About 2-3 years they did the report "Should we be cooking with gas?". Did economic modeling looking at people switching from gas to electric, understanding if people would get the savings + the carbon reduction. Looked at Reverse Cycles, heat pumps, induction cooktops. Did a whole lot of modeling over most of the states in AUS. It was quite compelling that you should start transitioning.

The WPI students did some of the pamphlets you found downstairs. In the last 12 months, funding made those into brochures.

2. Do you think solar panels are a fundamental to all-electric?

We just got funding for an analysis involving solar panels. For us when we talk sustainability in the home we always try to look at that bigger picture. What are their aims in the next 20 years? We try to make an energy plan for them, starting with energy efficiency. We get people calling up asking to put solar panels in, but we end up telling them to consider upgrading their appliances or insulation, and then this is the type of solar system you should get. Solar is always part of it, but we try to get a bigger picture of what people need as well.

There's not one fast rule for getting in contact with all community members. Members are at different levels, so we try to produce various levels like those fact sheets. That gives them the general understanding, but it doesn't directly relate to them. That's where we provide one on one advice, where we can give them tailored information based on a solar simulator. We can run them through the simulator and show them cost and carbon savings. There is a mixture of all those things. You have to start with information and gov't talks, but when it comes to decision time you need something like Positive Charge or our service to help people.

3. Are the fact sheet effective to get people onboard?

It's a little early to test that. But when we go to home shows and talk to people about going from gas, it's especially foreign. It's a mindset thing to start changing, attitude is that gas will be cheaper. It's just starting to have that conversation with people at the moment.

4. The ATA also published a short PDF / PowerPoint on reverse cycle air conditioners, aimed at being passed around for educational purposes. How effective has this proven? Do you believe there are stronger ways to spread the information?
5. How do you communicate with gov't to get to homeowners?



Local gov't plays an important role, since they are closest to the consumers. At the ATA, we work with gov't in several ways. We'll provide them with advice at their staff meetings, what's going on with batteries or solar or what people are switching to. Education of staff. We also run an event - speed date with an energy expert. It gets people really interested, they'll get 15-20 experts in solar or energy efficiency or landscape or... People will pre-book and they'll get a 20-minute consult with these people and they'll come in with their house plans or energy bills and it fulfills their need for specific tailored info. Runs that with local councils. It's that deep engagement so it leads to further action afterwards.

We also do a lot of work with gov't on tinder? assessments. They get ATA to run the tinder assessment to determine the company to go with (works with Positive Charge on this). Does this for many councils.

6. How has the ATA spread information in the past to residents? What has proven to be the most effective in your eyes?
7. Is taking a home completely off the grid the end goal, or do you believe the end result should make homes produce more than they consume?

Depends where it is. If you are in the metro area already on the grid, you tell people to stay on the grid, even with battery storage. It will be cheaper for you and you can put more back into the grid. IF you are producing extra solar for example, you aren't letting it go everywhere, so there is more potential staying on. So, we encourage people to stay electric but get off the gas grid.

As people get off the gas grid, do you think that has an effect on the pricing of gas vs electric?

In what sense?

We believe if people come off the grid, the cost will divide.

I'll have to have you ask Damien on that. But we believe gas will go up with exports on the market going on now. WE don't want to make it so that people can't afford to get off of gas. That's why we encourage people to stay on the electric grid so that people can still afford electricity (not everyone can afford to leave the grid!). We have a lot of people whom like to play with new technology. We have a lot whom like to join as a protest. We also have a lot whom live in a fringe / remote area where it makes sense to go off the grid, but those are larger more expensive systems.

So even if people are on the grid in metro, can they have battery storage?

Absolutely.

How does that affect people's decision to stay on or off?

It's changing so much; we're doing modeling so much. 3 months old data is now out of date as of two weeks ago with tesla's new batteries. So, it's still in flux. We just had that blackout a few months ago, and of course the politicians turned it anti-renewables, but this is the perfect time to start pushing new tech like batteries to handle new distribution systems. Some people didn't even know the blackout because of their batteries. That's the power of battery storage, that's what we should be promoting rather than getting stuck in this anti-renewable.

Do you believe the politicians are anti-renewables?

It depends on what party they are in. In their heart, they do know they need to transition, but it's powerful lobbying that makes them go the other way. Current PM used to be very pro renewables but now that he's in power he's really backtracking.

8. What barriers are keeping people from becoming sustainable?

Financial is always one. Time and resources, ensuring they know what path to go down and developing an action plan. I think those are the main two reasons. Our members are much more on the higher end of the scale of sustainability. They've done the low-cost things, and are now looking at the big guns like batteries.

The other thing is the current housing stock is really bad, like 2 stars. For us it's about making homes more efficient. Things like double glazing, which is probably standard in the states, but our houses are very leaky -- especially in the winter you'll notice. for us wit's about making existing houses more efficient.

9. Talking about the pathway to all-electric, do you think having one general path or many, more tailed paths is the better approach to the program?

I think at the moment, if you talk to Damien, there are average 3-4 things everyone should do. It tweaks and varies by household but it's still quite similar. Insulation. Hot water options. Solar for generation. Fuel switching. It's just how much of which you do for each. There's not just one answer. People need different contact at the different stages they are at. They need that general information to get them moving along, but they need home specific home info to take action.

We also run a program that gives people a taste of how it feels inside that home, and to ask questions about their homes.

10. How do we stress comfort?

We don't really mention the environment on some days. we really push comfort. you could be really comfortable in your home, especially with our two star homes. talking about the more extreme events we will have, there are health benefits as well we talk about to ensure people are safe and healthy during these events.

Can also send the link through about the NSW comfort. We've had internal debates about cost savings, which makes it a very economic decision. Comfort works really well to break away from cost and make it a heart and mind decision. But it's the first thing people talk about, how much it's going to cost me and what kind of solar panel will be. We always tell people it's about what you pay for, and this is your energy savings.

I'll also send through the survey on sustainable house day. Over 32% of people already done action on it after going to the event! Over 50% identified what they wanted to do. Over 80% had spoken to friends and family about what they learned on that day. So, it comes back to your question -- it's not just fact sheet, but also one on one.

11. Do you believe word of mouth is a good tool?

Absolutely. You always ask others about electricians and plumbers, this is nothing new.

Do you believe others push each other into being sustainable?

No, they'll talk more about being comfortable really!

12. Do you believe policy is in a place that supports the all-electric home? What changes would you like to see made?

I haven't looked into that in much detail. Some are more progressive than others. Some might just have a singular man on it. Some have targets and long term plans.

13. How did you approach brochure design?

Tim got some photos, everyone added some. Graphic designer downstairs does it. Ask Damien about it!

14. General Comments:

Sustainable house day is speaking with homeowners, not salespeople. Which is much more powerful. And we always tell them to talk about what you would do different and spreading the learnings to each other rather than what they just did.

Hydronic underfloor heat pump heating hasn't really worked they've found in their member's home. It removes a lot of hot water from their system, so they suggest having two: one for water, one for hydronic heating.

- Reach out to Damien.
- For another example house coming off gas, Andrew from the staff has done gas to electric. He used to have ducted electric heating and has closed that up as well. Another good example to talk about those whom have retrofitted.

## Dr. Henry Wu

Do you have any questions before we start?

1. Can you tell me a little bit about your sustainability experiences and views?
  - He manages audits in sustainability; participates in clean energy talks and receives newsletters from PC & others

- Personal preference: maintain fossil fuels to benefit workers but improve quality of emission & reduction
  - Power plant in rural Victoria: relocated residents and workers - maintain the perseverance of culture
  - How to improve the current state of fossil fuels: think of the long-term consequences of the plant closings
  - Many residents are concerned with the pollution of the power plants, although there is no visual pollution
2. Do you have any feedback on our survey? Are there any questions you would like to further elaborate on?
- Local govt is not necessarily where people get their info.... he gets his from PC newsletters, online, email, TV- about products, symposiums, talks
  - Will it benefit all houses? People have different situations- different circumstances
    - His personal gas usage is limited - not a big bill so gas pricing does not affect him as much
  - Don't rely heavily on govt subsidies
    - EX. Price of insulation is high... starts at X price... no govt subsidies
  - People consider the quality of products (PC not us)
  - Idea for future: each energy provider promotes their own way of obtaining clean energy... "I have a great price for energy, and it's clean"... consumers will be guilt-free when purchasing electricity from these companies
3. What is your view of transitioning homes to all-electric?
- If high quality products & will last, good idea.
  - Need to make it clear the production of energy will be maintained even when weather is not cooperating (for wind and solar for ex)
  - Promote the people who have done it... TV and email
  - Make the awareness visual
  - Government incentives to consumers are v. important to people and the initiative of the people will depend on which incentives are available
4. With your background in visual communication engineering, could you give us some advice on the types of visuals we should consider in our outreach material?
- Data mining - how to visualize pollution
    - Scientific effect & outcomes
  - Bring data, research, and models together to predict different pathways that can be possible outcomes
  - People rely on data to make decisions
  - Outreach is not limited to clean energy
    - Development of local and global economy
    - People want to know that the renovations will not hurt their house
  - Design, maintain and balance the social, economic and environmental aspects of the "system" of a home
  - Tableau- data mining company
5. Can we follow up if we have any further questions?
- Yes

## **Part E – Preamble, Homeowner Survey**

Thank you for participating in our quick 5 minute survey. This survey was created by student researchers from Worcester Polytechnic Institute near Boston, United States, working with Positive Charge. The goal of this survey is to help establish interest homeowners may have in transitioning their homes to all-electric power and what information is already known to them. Data gathered from this survey will be used to tailor educational materials on sustainable practices in the Moreland and Inner Melbourne communities.

- All results will be kept confidential and unattributed in any way.
- No personally identifying information will be released and results will be used in general terms.
- Participation in this survey is voluntary
- You may end your participation at any time
- Not every question needs to be answered in this survey

## Part F – Complete Homeowner Survey

### Homeowner Interest in Transitioning to All-Electric

#### *Demographic Information*

1. Do you own a home? ( Yes / No )
2. Your age: 18-29 30-49 50-65 65+
3. Gender: Male Female Other

#### *Home Information*

1. How old is your home? (Approximately) \_\_\_\_\_ years
2. Do you have Solar Panels on your home? ( Yes / No )
3. What type of cooktop do you use in your home?  
Gas Electric Electric Induction None Unsure Other: \_\_\_\_\_
4. What type of home heating do you use in your home? (Circle all that apply)  
Gas Electric/Electric Space Heater Wood Burning Hydronic  
Reverse Cycle Air Conditioner (Heating) None Unsure Other: \_\_\_\_\_
5. What type of home cooling do you use in your home? (Circle all that apply)  
Gas Electric Reverse Cycle Air Conditioner (Cooling) Evaporative  
Fans (Ceiling, Table, or Floor) None Unsure Other: \_\_\_\_\_
6. What type of water heating do you use in your home?  
Gas Electric Heat pump Solar None Unsure Other: \_\_\_\_\_
7. How many bedrooms are in your home? \_\_\_\_\_ bedroom(s)

8. How many individuals live in your home?

1 person .... 2 people .... 3 people .... 4 people ... 5 people .... 6+ people

9. On average, how much do you pay for electricity each quarter?

\$0/qtr   \$1-249/qtr   \$250-499/qtr   \$500-749/qtr   \$750-999/qtr   \$1,000+/qtr

10. On average, how much do you pay for gas each quarter?

\$0/qtr   \$1-99/qtr   \$100-249/qtr   \$250-499/qtr

\$500-749/qtr   \$750-999/qtr   \$1,000+/qtr

#### *Interest in Transitioning to an All-Electric Home*

The all-electric home encompasses insulating, draught proofing, and replacing gas appliances with electric. Research has shown these changes improve comfort, health, and carbon footprint (when using electricity generated without the use of fossil fuels). In addition, it has potential to save money on monthly energy bills.

11. Have you heard of the “All-Electric Home”, or a home that uses electricity as the only source of power within a home? ( Yes / No )

12. Have you transitioned to an all-electric home? ( Yes / No )

13. If you answered ‘No’ to question 13, what factors contributed to your transition to an all-electric home? (Check all that apply)

- ☐ A friend recommended the transition
- ☐ My council recommended the transition
- ☐ Government incentives
- ☐ I wanted to save money on my energy bill
- ☐ I wanted to lower my emissions
- ☐ My house already had electric power
- ☐ I installed solar panels and wanted to use the energy they generate

- ☐ My existing appliances were already electric
- ☐ Other (list all): \_\_\_\_\_

**If you answered 'No' to question 13, please skip to the last page**

To start the transition of a home from gas to electric can be as little as \$900 depending on the quality of appliances chosen, number of appliances installed, and amount of insulation updates chosen. The transition can occur over several years, or all at once.

14. Would you consider transitioning your home to all-electric?

( Yes / No / Already started )

15. If you answered 'No' to question 14, what factors prevented you from transitioning to an all-electric home? (Check all that apply)

- ☐ I haven't considered it
- ☐ Upfront costs
- ☐ Length of payback time
- ☐ Too much research involved
- ☐ Lack of reasons to transition
- ☐ Alternative power sources were cheaper
- ☐ My home would need extensive infrastructure changes
- ☐ Other (list all): \_\_\_\_\_

16. If you answered 'Already started' to question 14, What factors contributed to your transition to an all-electric home? (Check all that apply)

- ☐ A friend recommended the transition
- ☐ My council recommended the transition
- ☐ Government incentives
- ☐ I wanted to save money on my energy bill
- ☐ I wanted to lower my emissions
- ☐ My house already had electric power



- ☐ I installed solar panels and wanted to use the energy they generate
- ☐ My existing appliances were already electric
- ☐ Other (list all): \_\_\_\_\_

17. How much money would you be willing to spend towards becoming all-electric?

\$0/yr   Less than \$500 /yr   \$500 /yr   \$1,000/yr  
 \$3,000/yr   \$5,000/yr   Over \$5,000/yr

18. Would you rather transition to all-electric or do it as part of a renovation?

Transition   Renovation   A Combination   Unsure

19. What kind of information would you like to know about the all-electric home?

(Check all that apply)

- ☐ The procedure for transitioning
- ☐ Differences between electric and other power sources
- ☐ Costs associated with the transition
- ☐ Opportunities for long term savings
- ☐ Available government assistance (Rebates, support, etc)
- ☐ Benefits for the environment
- ☐ Changes to my home and lifestyle
- ☐ Other: \_\_\_\_\_

20. If your city council did the research and provided you with information about the procedure and costs for transitioning to an all-electric home, how likely would you be to participate?

Highly likely .... Likely .... Not Likely .... Not at All .... Unsure

21. Which medium would be most effective for providing you with information on the transition to an all-electric home? (Circle all that apply)

Social media   Internet Site   TV/Radio   Newspaper

City Councils   Community Groups   Live Demonstrations   Email

Other: \_\_\_\_\_

22. Are you interested in being interviewed about your thoughts on sustainability and the transition to an all-electric home? ( Yes / No )

If Yes, please provide us with your contact information below:

Name: \_\_\_\_\_

Phone or Email: \_\_\_\_\_

## **Part G – Preamble, Homeowner Interview**

Thank you very much for your participation. We are a team of Worcester Polytechnic Institute students working with the Moreland Energy Foundation to generate educational materials regarding transitioning homeowners to an all-electric home. The purpose of these questions are to obtain additional background information specific to the Melbourne community regarding homeowner behavior, technical aspects of transitioning power sources, environmental specific issues as well as economic issues.

You are not obligated to answer any question we ask, and if you do not want to answer a question please indicate this to us. Per your request, information gathered will remain confidential. You also have the right to review the information from the interview prior to publication of the case study. Also with your permission, we would like to turn your journey into a case study to encourage other homeowners to transition to an all-electric home.

Thanks again for your help!

## Part H – Homeowner Specific Interview Scripts

### Homeowners who have made the transition

#### Natalie Gray

1. What made you want to transition to an all-electric home? Was there anything that sparked your interest in particular?
  - Wanted to have...
    - One connection fee
    - One energy supplier
    - Use renewables
  - Renewables are important, but no specific interest in solar
2. Which appliances/parts of your home have you changed?
  - Has made full transition
  - All-electric
  - Zero gas
    - Uses induction cooktop
    - Overnight hot water heating
3. Do you have a preference between electric or other energy sources (e.g. gas)? For what reasons?
  - Likes the reverse cycle because it works quickly and is easily adjustable
    - Doesn't like how outdoor component takes up a lot of space on her apartment balcony
    - Can be noisy at times, neighbors makes a lot of noise
  - Doesn't like a radiator
4. Was there anything about electric appliances that you had a particularly hard time understanding or finding, if any at all?
  - Had no trouble getting information on all-electric
  - Has kept in touch with MEFL
  - Tried to get solar put on beach house
    - Too much shade
  - Payback period is not quick with solar
  - Talked to installers about options
    - Is getting double glazed windows
5. How has the transition had an effect on your utility bills (if there has been any change)?
  - No gas bill
  - Electric bill is about the same
6. What have you heard about electric appliances compared to appliances with other energy sources?
  - Believes electric appliances are cleaner and safer
  - Gas can be dangerous because of the open flame and combustion
7. What are the key points that you look for in appliance performance (e.g. appliance efficiency, financial implications) when considering transitioning?
  - Looks at star rating

- Won't consider gas appliances
  - Looks for convenience of use
    - Would've preferred instantaneous hot water
      - Smaller unit
      - Never run out
8. Does considering your impact on the environment sway your decision when choosing appliances?
    - Environment is an important factor
    - Works as a city planner
  9. Are you making any other upgrades to your home in addition to replacing your appliances?
    - Has transitioned to LED lighting
    - Is making changes for windows
    - Reinsulated roof at beach house
  10. Has your quality of life improved since you've transitioned to an all-electric home? Is your home more comfortable?
    - "I feel more comfortable"
    - More manageable household
    - Feels part of a better community
  11. What benefits of the transition stand out to you?
    - None not previously mentioned
  12. When considering the transition, was there anything preventing you from wanting to change?
    - Nothing prevented the change
    - Very much for the idea
  13. Do you think there are any benefits from not transitioning to an all-electric home? If you could go through the transition again, would you change anything?
    - There's no reason not to
    - Would have gotten instantaneous hot water
  14. Where did you gather your information when making the decision? (Internet, newspaper, community organizations, city councils, etc.) What types of materials persuaded you to start the transition?
    - Got some info from positive charge
    - Read product info before purchasing
  15. Did you speak with friends, community members, or neighbors when considering the change? Did they have any influence on you?
    - Has talked to others about the change
    - This method has been effective in garnering interest
  16. Were there any problems you encountered along the way or was the transition relatively smooth?
    - No problems
    - Smooth sailing
  17. Did you replace your appliances all at once or was it a gradual process? How long did it take?
    - Made the changes all at once
    - Process did not take long
  18. Your survey response says you do not have solar panels, however, would you consider adding them as a "next step"?
    - Doesn't really have the option to get solar panels
    - Has tried
    - Lives in 18 story complex

19. Would you recommend a friend to make the transition? Is there anything in particular that you think would help convince other homeowners to make this transition?
  - Induction cooking is very good
  - High control of heat
20. Would you be interested in being a case study to help convince other homeowners to make the transition?
  - Yes

Other notes:

- Buy appliances that suit needs
  - Don't get more than necessary
  - Limits the upfront cost
  - Made mistake of getting electrically heated bathroom floor
    - Is nice but doesn't use
    - "save energy"
    - "don't get caught up in everything new, buying biggest and best"
  - Save on transition cost
    - Get what you need versus what you want
- Positive Charge
  - Should do better job reaching out to people that live in apartments
  - Apartments have a lot of younger people who understand why sustainability is important
- Apartment
  - Has to tell owning agency changes she makes
  - They don't care about type of appliance
- People must be educated and informed to make good decisions for themselves and their home
  - Councils need to get info to community groups
    - More trust in these groups than in the councils

## Kate Silburn

1. What made you want to transition to an all-electric home? Was there anything that sparked your interest in particular?
 

I have been interested in making my home as energy efficient as it can be for a while now, I am interested in supporting increased use of renewables (however, as much of our electricity in Australia still comes from coal-fired power stations this is still a serious issue) and I do not want to encourage coal seam gas exploration. I also decided to do some renovations on my house about two years ago (and these happened in the first six months of 2016). Thinking about my energy source and useage was part of this process.
2. Which appliances/parts of your home have you changed?

Heating (went from gas space heating to reverse cycle air conditioning in four rooms), cooking (transitioned from gas cooktop and oven to electric induction cooktop and electric oven), hot water (from gas to electric with a heat pump). To go all electric I also had to upgrade the electrical input capacity into my house.

3. Do you have a preference between electric or other energy sources (e.g. gas)? For what reasons?  
Electric – because there is the potential for the use of renewables and it removes incentives for coal seam gas exploration (and I have roof top solar).
4. Was there anything about electric appliances that you had a particularly hard time understanding or finding, if any at all?  
Yes. There is a lot of very technical information around, but this is not helpful to someone who is wanting accurate information to inform decision-making (including so that you can compare different options etc). I had to spend a lot of time reading and talking with experts (such as those at the ATA, Moreland Energy, Pure Electric, Enviroshop etc) to feel like I had a good enough grasp of the information to make decisions. This took a lot of time (for both myself and the people advising) and it would be good if there was relatively sophisticated, easy to access information readily available. I was also considering using hydronic heating run off heat pumps and it was very difficult to get good information about this (except that in the end it appears that this was not yet a good option in Australia due to the size of the heat pump required).
5. How has the transition had an effect on your utility bills (if there has been any change)?  
I haven't done a proper analysis, but my impression is that while my electricity bills have gone up, my overall energy bills have gone down. I also no longer pay a supply charge for gas to my house. However, to achieve this I had to make a significant investment in appliances and electrical line upgrade.
6. What have you heard about electric appliances compared to appliances with other energy sources?  
I'm not sure what this question is asking. The two things I can think of are that using heat pump technology enables greater energy output than energy input; and that induction cook tops require a higher capacity circuit (which has implications for installation).
7. What are the key points that you look for in appliance performance (e.g. appliance efficiency, financial implications) when considering transitioning?  
Both of these things – although I prioritized appliance efficiency (as the cost of transitioning was high).

8. Does considering your impact on the environment sway your decision when choosing appliances?  
Yes (as described above) – this was one of my primary reasons for transitioning.
9. Are you making any other upgrades to your home in addition to replacing your appliances? How are you prioritizing the replacement of different appliances?  
Yes – as noted above I did a significant renovation on my house. As well as replacing appliances I also increased the insulation in my house and where I was replacing windows put in double glazing.
10. Has your quality of life improved since you've transitioned to an all-electric home? Is your home more comfortable?  
Yes – but I'm not sure this is entirely due to upgrading to electric appliances – I think any upgrade of my old appliances (particularly wrt heating) would have improved my quality of life and I also had other renovations done.
11. What benefits of the transition stand out to you?  
This is difficult to say –probably feeling like I'm doing a bit to support renewable energy generation and hopefully, over time, consuming less energy through use of more efficient appliances.
12. When considering the transition, was there anything preventing you from wanting to change?  
Cost, difficult technical information, engaging tradespeople.
13. Do you think there are any benefits from not transitioning to an all-electric home? If you could go through the transition again, would you change anything?  
I'm glad I did it, so probably wouldn't change anything.
14. Where did you gather your information when making the decision? (Internet, newspaper, community organizations, city councils, etc.) What types of materials persuaded you to start the transition?  
Alternative Technology Association (this was my primary source of information as I read their magazines and also went to a 'speed date an expert' event), Moreland Energy Foundation, Pure Electric (Matthew Wright was an excellent source of information and very patient about answering questions), Enviroshop, internet.
15. Did you speak with friends, community members, or neighbors when considering the change? Did they have any influence on you?  
I didn't really discuss it much with friends at the time, but have done since (as some are also considering making the change). At the time the person I would have spoken about it most to was the



builder who did the renovations – he was interested in following up on how it went, but his opinion was that I was mad and that my electricity bill would become very expensive!

16. Were there any problems you encountered along the way or was the transition relatively smooth?

Mostly problems were associated with limited information, getting appropriate tradespeople, not knowing that I would need to get an electricity line upgrade (and sorting that) etc.

17. Did you replace your appliances all at once or was it a gradual process? How long did it take? Was there a particular order?

All at once (as noted above along with other renovations).

18. Do you have solar panels? Would you consider adding some to your home as a ‘next step’?

I have solar panels. Later I might add some more and get a battery, but not at the moment.

19. Would you recommend a friend to make the transition? Is there anything in particular that you think would help convince other homeowners to make this transition?

Yes, I would recommend a friend to make the transition. Things that would help are good, accurate, easy to understand (but not ‘dumbed down’) information, a campaign about supporting renewables, etc.

20. Is there anything else you would like to add?

No. Goodluck with your work!

## Homeowners who are transitioning

### Cheryl

#### *Establishing understanding of the Homeowner*

1. I was told about the solar panels you have installed, have you made any other sustainable energy improvements to your home?

She has draught proofed her doors with draught strips. Replaced her down lights with LEDs, it was more expensive when she did it but she got a bout 40% off from the government. She installed solar panels – cut her electricity by 50%. She installed a toilet with better water efficiency not too long ago.

She plans to eventually double glaze her windows but that is more down the road.

#### **Homeowners that did change appliances:**

1. What made you want to add solar panels to your home?

She is very environmentally conscious and she also wanted to save the money.

2. Do you have a preference between electric or gas? For what reasons?

She prefers that some things be gas. She currently has a gas hot plate because she likes how instant it is and didn't have a lot of information about the electric alternatives.

3. What were some specifics about electric compared to other energy sources that you had a particularly hard time understanding or finding, if any at all?

There was no information that she had available to see in order to make an informed decision, she would have gone electric had she known.

#### *Decision Points*

1. What are the key points that you look for in energy performance (e.g. appliance use, financial implications) when considering transitioning?
2. Did considering your impact on the environment sway your decision to choose to put solar panels on your home or make the other changes?

#### **Homeowners that have transitioned/are transitioning specific questions:**

1. Has your quality of life improved since you've transitioned to an all-electric home?

Not really, other than saving the money not much has changed. She had a pretty well sealed home before she did the draught proofing. She has had the LED for 3 years now and only had one problem which was with the connection and not with the LED dying.

2. Did you notice a difference in your utility bills after the transition?

Yes, large decrease bills since the solar panels. She assumes about 50% reduction.

3. What benefits did transitioning have that really stood out to you?

She felt that she was helping the environment a lot through these changes and the bills.

4. Have you or would you suggest a friend also make these changes to their home?

Her parents have them but that is from someone walking around their neighborhood. She has talked to her friends but hasn't seen them do it necessarily. However, she has begun to notice a lot more solar panels in her community.

#### *Information Gathering*

1. Where did you gather your information when making the decision? Did you speak with friends, community members, or neighbors when considering the change? Did they have any influence on you?

She got the information from her council. She didn't really know anything about buying solar panels or installing them or what size. However, the program that was going on with her council and the green energy group?? she was able to have it all done for her. They called her and told her where and what size she needed and before she knew it they were all installed and ready to go.

2. Did you find information was being presented in a clear, non-confusing way? Were certain mediums more helpful than others, like explanatory videos, straight reading, or interactive demonstrations?
3. What helps you learn best when researching?

Getting the information from the council.

#### *The Transition Process*

##### **Homeowners with electric appliances specific questions**

1. Were there any problems you encountered along the way or was the transition relatively smooth?
2. Did you replace your appliances all at once or was it a gradual process? How long did it take? Was there a particular order?

She had replaced some things but she also likes her gas fire and some other gas appliances.

#### *Closing*

1. Could we follow up with any additional or clarifying questions?

Yes, we can.

## **Relle Graefe**

1. What made you want to start the transition to an all-electric home?

We bought our current home in July 2014, and began planning to renovate almost immediately. We want to make our home as sustainable as possible, and as part of my readings I came across discussions of the benefits of going off gas. There has been much written about the environmental disadvantages of gas and also of the price of gas rising in coming years so it seemed like a good idea to make all the necessary changes as part of the renovation.

2. **Which appliances/parts of your home have you changed so far? What parts are you planning to change?**

We are planning to change our gas cooktop to an induction cooktop. During our renovation we are also changing our gas hot water to heat pump hot water (we had initially planned to install a solar hot water service) and our heating from central heating to a hydronic system and have decided to install a heat pump with the hydronic system rather than using gas. Ideally we would eventually like to go off the grid with batteries, but that is some years away yet (it's not viable financially for us at this stage).

3. Was there anything about electric appliances that you had a particularly hard time understanding or finding, if any at all?

There doesn't seem to be a huge amount of information available on heat pumps. I did some research, as did our architect.

4. Do you feel you're paying too much for your utility bill, and have there been noticeable improvements because of the transition?

Yes to paying too much. Regarding improvements, not applicable at this stage but we hope so!

5. What have you heard about electric appliances compared to appliances with other energy sources?

We have always preferred cooking with a gas cooktop but we had friends who had installed an induction cooktop so we discussed the pros and cons with them. They love their new cooktop and any doubts we initially had vanished after discussing our concerns with them.

We hadn't heard much about heat pumps at all, and it was only after we had made the decision that a friend told me that they had one for their hot water.

6. What are the key points that you looked for in appliance performance (e.g. appliance efficiency, financial implications) when considering transitioning?

Environmental efficiency, followed by appliance efficiency and then lastly, financial implications.

7. Does considering your impact on the environment sway your decision when choosing appliances?

Absolutely.

8. What benefits of the transition stand out to you?

Environmentally, providing as much of our energy as we can via sustainable methods. Also, not having to pay a gas bill – benefits in both time saved and money.

9. Would you recommend a friend to make the transition?

Yes.

10. When considering the transition, was there anything preventing you from wanting to change?

The cost was initially an issue for us but we decided to blow the budget in the knowledge that we will be saving money in the long run – as well as saving the environment!

11. You had mentioned that you are doing other renovations to your home, what are the other renovations?

Since moving in to our house, we have had the insulation in the roof replaced, new curtains and pelmets installed and windows refurbished in two bedrooms and the lounge, and solar panels added (via bulk buy).

Now our large renovation has started (which is planned to take 8 months), and so far they have knocked down the “lean to” that had been added to the back of the house. This space had zero insulation and so was virtually unusable in hot or cold weather. It housed an extra living room, a second bathroom and a space for a washing machine.

The new addition (kitchen/dining and separate lounge room) will have concrete floors and an western double brick wall and eaves wide enough so that the two back rooms can be solar passively heated.

There is going to be a “cool cupboard” in the walk in pantry off the kitchen – see <http://www.permaculturesydneyinstitute.org/2015/02/new-energy-saving-cool-cupboard-and-pantry-retrofit-at-bandusia/>

What benefits do you see from not transitioning to an all-electric home (if any)? Have you had any regrets?

None.

12. Is the monthly operating cost a significant factor when considering electricity vs other energy sources?

Environmental factors are our main concern but we do take into account post renovation savings. So it is a factor but I wouldn't say a significant factor for us. We don't expect to recoup the money we spent on making the changes but it will be wonderful if we do.

13. Where did you gather your information when making the decision? (Internet, newspaper, community organizations, city councils, etc.) What types of materials persuaded you to start the transition?

I've been reading quite widely in preparation for our renovation, but I generally like to keep up to date anyway with environment/sustainability news.

I've been regularly reading two magazines – Sanctuary Magazine and Green Magazine - for the last few years as well as a website, Houzz.com.au which occasionally has articles on sustainable houses.

I also follow via email, FB and/or Twitter MEFL, Positive Charge, Moreland City Council, EnviroShop, CERES, community groups and various individuals in relation to the environment and green issues.

It's hard to know what materials persuaded us to decide to give up gas – it was probably a combination! I think I read about it somewhere, thought it was a good idea, and then did some more research on the internet.

Did you speak with friends, community members, or neighbors when considering the change?  
Did they have any influence on you?

No.

14. Have you encountered any problems in the transition yet?

I think information about heat pumps is a bit harder to locate but otherwise no problems.

15. You had mentioned that you anticipate the transition taking about 8 months. Can you describe the timeline in a little bit more detail?

Our renovation is scheduled to take approximately 8 months. The original lean-to at the back of the house has been demolished and a new kitchen/dining and separate lounge room will be built. In the old part of the house, a new laundry and bathroom will be installed.

Therefore the change to the induction cooktop won't occur until the new kitchen is built. We're not sure when they are changing the heating over as yet but that will be when the gas is disconnected.

16. Do you plan to install solar panels?

We already have, as part of a bulk buy program run by Moreland Council with Energy Matters. There's a possibility we will add to the panels we have, once the new section of roof is completed.

17. Is there anything else that you think would help convince other homeowners to make this transition?

Readily available information and costings would make the decision and process easier.

Other notes:

- Questions were an interesting way to think about what they were doing
- Willing to do a case study

- Had a difficult time finding information on heat pumps
    - Architect assumed they would want to use heat pump
    - Liked the idea of no gas
    - Heat pumps and info on them are not common knowledge
  - Have not yet decided on a heat pump
    - Considering using one for hot water and hydronic heating
  - Battery
    - Waiting for the technology to get better
    - Likes idea
  - Cost versus environmental benefits
    - Something they think of when looking at appliances
    - Got solar through PC bulk buy
      - Wanted someone else to do the research
    - Continued waiting for new technology
  - Upfront costs
    - Barrier to overcome
      - Environmental impact is important to them
      - Preferred getting it done at once rather than having the process drawn out
        - Time is money
      - Already hired architect for home addition
        - Convenient to do now
        - Would have probably done later if they weren't renovating now
  - Would absolutely participate in an "all-electric bulk buy"
- 
- Heard about MEFL through involvement with the Greens Party
    - Natural interest in the environment
    - Strong local involvement in the Greens Party
  - City Council
    - Not much of an influence on environmental matters
    - Especially with residents
    - Tend to be more big picture
    - Council has interest in facilitating programs similar to bulk buy
    - Would not go to the council for information
    - Moreland council has good social media people
    - Relle finds a lot on social media
  - What they would like to see on outreach materials
    - Emphasis on saving money
    - Highlighting ease of using PC to do this
    - Having a case study of a family who has done it
    - Have to push harder to the more conservative crowd
      - Might be better to use traditional family
    - Targeting difficult types of people
      - Area has high population of working class immigrants

- Persuasion
  - "easy" -> cheaper than you think
  - People don't trust themselves to make decisions on things they are not familiar with
- Replacing as things die
  - Must already be educated enough to make the decision we want them to
  - If they are not then they will get what they already had because they are used to it
- MEFL "emergency hotline"
  - Tradespeople need to get behind the green movement
- Hoping to insulate home
  - They don't use AC
  - Fans for cooling
  - "fans of fans"
- Insulation
  - Tough to sell because you can't show it off
  - People are more inclined to get things they can see
  - Windows are as important for insulation as walls
  - Must get a certain star rating for renovation

## Stuart McQuire

*\*The interview started according to the script and then developed into a conversation which covered most of the questions without following the prepared questions*

1. What made you want to transition to an all-electric home?
2. What steps have you taken already in transitioning to an all-electric home? Which appliances/parts of your home have you changed?
3. Do you have a preference between electric or other energy sources (e.g. gas)? For what reasons?
4. Was there anything about electric appliances that you had a particularly hard time understanding or finding, if any at all? (Use word "information" if they don't get the question)
5. Did you feel you were paying too much for your utility bill, and have there been noticeable improvements because of the transition?
6. What are the key points that you look for in energy performance (e.g. appliance use, financial implications) when transitioning?
7. Does considering your impact on the environment sway your decision when choosing appliances?
8. What benefits of the transition stand out to you?
9. Would you recommend a friend to make the transition?
10. When considering the transition, was there anything preventing you from wanting to change?
11. Do you think there are any benefits do you see from not transitioning to an all-electric home? Have you had any regrets?
12. Is the monthly operating cost a significant factor when considering electricity vs other energy sources?



13. Where did you gather your information when making the decision? (Internet, newspaper, community organizations, city councils, etc.) What types of materials persuaded you to start the transition?
14. Did you speak with friends, community members, or neighbors when considering the change? Did they have any influence on you?
15. Have you encountered any problems in the transition yet?
16. How long do you anticipate the entire transition to take? Can you describe the timeline in a little bit more detail?
17. Is there anything else that you think would help convince other homeowners to make this transition?

- Has been working on GHG reductions since 1990s
  - Based on internal audit he reduced 90% of his GHG emissions
  - Reducing electricity consumption
    - Originally switched electric to gas for cooking because of price and it was technically better and cheaper
  - Electric has the potential to increase GHG emissions because grid electric is often produced by brown coal :(
- solar
  - got solar in 1996
    - 1<sup>st</sup> in VIC, 2<sup>nd</sup> in AUS
  - Has high feed in tariff (income after gas and electric bills)
  - Originally had 2 kW system (full cost of \$20000) at the time
  - Upgraded to total of 3.5 kW in 2010
- Induction cooktops
  - Has looked at induction cooktops and would like to try them
    - Would require a full kitchen renovation because of the size of the cooktops
    - Has gas stovetop
    - Electric oven
  - Doesn't really have a preference
    - Is used to gas
- Existing gas appliances
  - Hot water (supplementary)
  - Cooktop

- Space heater
- Reverse cycle AC
  - Has reverse cycle AC and has been using increasingly for heat
  - Heats spaces faster
  - Has gotten three smaller units after original
  - 6 star heating and cooling
  - Less than half the price of the one 7 star unit on the market
- Battery systems
  - Looked into it
  - Didn't follow through because of economic reasons
  - would consider coming off the grid
- Hot water
  - Has solar hot water
    - Evacuated tube system, used to be a flat plate system
  - Doesn't know a lot about heat pumps
    - Is open to more information
  - Likes having gas supplement and turning it off in the warmer months
  - Has 250L containment tank, enough water
    - 3 adults, was 2 adults, 2 children
  - Hot water must be heated to 60 degrees celsius for safety reasons and then cooled to 50 degrees to prevent scalding
  - On a hot water the solar can be as hot as 80 degrees
- Barriers
  - Money and economic reasons
  - Not knowing the difference something will actually make versus the cost
    - Cost benefit analysis is difficult to do
  - Has a personal lack of motivation due to home being in a developmental area so if he sells it will be knocked down
    - Can't really add buying value to home
- Insulation
  - Has double glazed windows
  - Many, but not all walls are insulated
    - Feels that finishing insulation will probably be the next step

- Recommendations
  - Would suggest making changes if designing or as you remodel
  - Wouldn't leave solar for last
  - Has been working on this in his own home since 1994
- Information
  - Looks for energy ratings on the government energy efficiency site
  - Sustainability victoria
    - Fact sheets
  - Would have read MEFL stuff

## **Greg Potter**

*\*First question worked as a conversation starter, other questions were used to steer conversation back on track, however, the interview did not follow the specific question order*

1. What actions have you taken to make your home more sustainable?

- Which appliances/parts of your home have you changed?
- What made you want to transition to an all-electric home?
- What were some specifics about electric compared to other energy sources that you had a particularly hard time understanding or finding, if any at all?

### *Decision Points*

3. What were the key points that you looked for in energy performance (e.g. appliance use, financial implications) when transitioning your home?
4. Did consideration of impact on the environment sway your decision when choosing appliances?

### **Homeowners that have transitioned/are transitioning specific questions:**

5. What benefits did transitioning have that really stood out to you?
6. Has your quality of life improved since you've transitioned to an all-electric home?  
Have improvements led to more comfort in your home? How so?
7. What was the difference in your utility bills after the transition? Would you say it was financially worth transitioning to electric?
8. Would you recommend a friend to do the same?

### **Homeowners that have not transitioned specific questions:**

1. When considering the transition, was there anything preventing you from changing?
2. Are there other upgrades to your home that you prioritized first?
3. Do you see any benefits from not transitioning to an all-electric home?
4. Is the monthly operating cost a significant factor when considering gas vs other energy sources?

#### *Information Gathering*

4. Where did you gather your information when making the decision?
5. Did you speak with friends, community members, or neighbors when considering the change? Did they have any influence on you?
6. Did you find information was being presented in a clear, non-confusing way? Were certain mediums more helpful than others, like explanatory videos, straight reading, or interactive demonstrations?

#### *The Transition Process*

3. How long did the transition take?
4. Were there any problems you encountered along the way?
5. Do you have solar panels? Would you consider adding some to your home as a ‘next step’?

#### *Closing*

2. Could we follow up with any additional or clarifying questions?

- Actions taken after purchase of home
  - Home was built in 1947, by soldiers post WWII
  - Connected gas line from street to house
  - Added gas cooking
    - Had electric
  - Replaced “massive inefficient unit for heating and cooling”
    - Gas hot water and fire place
  - No A/C cooling
  - Retrospect
    - Would ramp up solar
    - Would not have connected a gas line
    - Would add induction cooktop
- Prefers gas to electric cooking
  - Doesn’t have a preference on any other appliances

- Hazelwood Closure
  - More sustainable electrical production
  - 1000 jobs lost
  - If government had created market for sustainability, a sustainable energy jobs market could have been created
  - Government pushes fossil fuels
  - Solar rebate scheme was started
    - Was successful, feared for ability to sustainably fund, pushed out by govt
  - Another project aimed at getting young people jobs after GFC, 2 died, federal government ran with the 2 people dying to get it pushed out
- Sustainability Information
  - In a state of flux
  - Used to be that gas was known to be much more sustainable than electricity
- Solar
  - Added to house 2 years ago
  - Would recommend to a friend depending on financial circumstances
  - Feels guilt free about “running dryer”/using electric during the day
  - Through positive charge bulk buy
  - Powers general electrical appliances in the house
  - Gets about 6 cent feed in tariff
    - Makes a good impact on his monthly electricity bill
  - Has an east-west facing roof, has enough solar, assumed he didn’t have enough without a northern facing roof
  - Installation
    - Talked to Lucy
    - Made a few phone calls
    - Had to be there the day of installation
    - Flicked switch
      - Done
  - Procurement
    - Took a few months
    - Had problems with the grid electric company
    - A couple missed emails with PC and the grid company
    - When installed it was fine
    - Installed 2 years ago, had no issues
- Potential future actions
  - Would change oven to electric from gas
  - Got appliances fairly recently, no need to make changes
    - Would consider electric replacements as appliances fail
  - Believes has is more efficient for heating
  - Is open to making change for reasons of sustainability
  - Economics are a barrier
- Insulation
  - Has 90% double brick
  - Replaced ceiling insulation at point of purchase of the house
  - “keeps heat out or in”
  - Only about 10 days per year are “unbearable”

- Reach out to consumers
  - When reaching point of making changes, could find PC helpful
  - Could push him to making a change if he's thinking about it in the first place
- Batteries
  - Wants them
  - Prices are a barrier, hope for better technology and cheaper prices
- Information on Flyer
  - Why should make change
  - Benefits
    - Personal and general
  - Emphasize financial advantages
  - Ease of doing
    - Ring number and be guided
    - No personal research necessary
- The grid
  - Feels good not to be reliant on the grid
  - Would get batteries
  - Solar and batteries were enough he would want to go off the grid
    - No line charges
  - Has low infrastructure funding
    - Prone to disasters; SA shutdown
    - Service fees are skyrocketing
  - Clean grid energy
    - Hasn't looked into it very much
    - Powercore(company) -> more sustainable production
  - Building a tiny house(caravan) for holidays
    - Potentially to be totally independent
    - Solar
- Personal relationships and influence with neighbors and trusted sources
  - Without any he probably would have looked to do it through a government department or the yellow pages
  - Community is helpful
    - Knows people involved -> contacts in the greens party
    - Resources do exist, unsure which way to get them without personal relationships

## Jon Rawlings

1. How long have you been in the process of transitioning your home to all-electric? How long do you expect the entire transition to take?
  - Owned his house for 3 years, sort of started the process when they bought it right away. Probably have another 2 years to go.
2. Which appliances/parts of your home have you changed? Which parts are you planning to change? (if any more)

- House designed in the 1980s by an architect. Has underfloor electric slab heating (I.e. especially inefficient). House was wired for 3kw to power this heating. Their first winter this heating cost them \$3,000 – which was the nail in the coffin to start their journey right away. [Post interview note: Could have gone gas, but because he already had his mind set on electric, he went for the electric switch. More later]
  - Installed a Reverse Cycle Air Conditioner on his ground floor, which is relatively open concept.
  - Installed a 5kw solar array, in response to high usage in the summer was looking to power the AC 1-to-1 (even though it was already relatively efficient to start with). Swapped power companies to a smaller one which allowed him to get a higher feed in tariff of 0.08c up to 0.06c.
  - Installed a heat pump water heating system, which was on a timer to power in the middle of the day when solar generates the most power. This was prompted in response to the fact his gas water tank was 30 years old and literally shattered when they went to uninstall it – a welcomed upgrade. The entire process has been ‘staged’ [meaning, in stages] to help ease the cost. His spouse and him work part time. Goal was to eventually go further solar.
  - Bought an induction cooktop because it was the most efficient he could find. Not installed yet as the kitchen needs to be renovated first to get it installed. The next steps is to avoid paying for power, which was why he swapped power companies for the higher feed in tariff.
- Q: Did you insulate?
  - Walls and roof are insulated pretty well already. Part of the roof is flat and other is pitched. Wants to eventually make the flat part pitched and wider to increase their solar potential. When this happens, he will be insulating. They also have a big sun roof, which heat concrete floor in the winter (nice) but needed to install blinds over for the summer: “Was getting 60degrees in the kitchen bench, no longer a problem.”
  - This is why he has another 2 years to go.

### 3. What made you want to transition to an all-electric home?

- Realized recently his father always wanted solar water (back when they lived in Perth, his father was a coal miner and engineer. Had a fascination with solar powered water before it was a commercial thing, he managed to get the plans for it and wanted to build it himself). It impressed him that his father wanted to do that. Saving money and making something out of nothing was what really motivated his father and him. Then at RMIT he (jon) did sustainability policy. Now being in his first home that he owns and knows is a keeper, he became willing to invest in it. Even if he did end up moving before the payback started coming in, the thought of leaving a legacy by transforming this home himself was appealing.
- ### 4. Do you have a preference between electric or other energy sources (e.g. gas)? For what reasons?
- In the past he had preferences to gas. Used gas heating before but now with the export of gas, the cost is just rising too much. Planning ahead with solar, it just made sense to forgo those preferences. Gas heat does have a pleasant effect compared to the reverse cycle, however, for just heating the air around it gently. The blowing of hot air from a reverse cycle tends to be uncomfortable.
  - Q: Do you have multiple Reverse Cycles?

- Downstairs is open plan so only 1. Later after the reno they'll do another upstairs. If you only use part of the home (and the fact that reverse cycles are so instantaneous), may as well just have multiple units instead of a ducted one.
  - Australia has surpassed US in the new house development that are huge floor space. The cost to heat and cool those are immense and due to poor design will result in no choice other than to have many, many of these and have them running constantly...
5. Was there anything about electric appliances that you had a particularly hard time understanding or finding, if any at all?
- Expert in broad policy, but not in the specifics of the change. Had to research and get advice from Positive Charge (when the old CEO was here) and from installers. Everything is changing so quick, you know, the question of late has been "when can I afford batteries?" Have to stay in tune with it all. "I think that anyone can be across it all the time."
  - Q: Did installers ever get in the way?
    - I had an inkling of what I wanted to do. I was determined that would be the end result. Even the Air con installers were providing advice against electric. If you aren't committed or fully informed of the economics, people could easily slip back to gas. They will say "we'll do gas for \$1,000, why do \$4,000 electric?" It depends on your motive.
6. Do you feel you're paying too much for your utility bill? Have there been noticeable differences because of the transition?
- Solar installed the second year they were in the home as a response to the utility bill shock. The 1<sup>st</sup> quarter in the winter, heating bill was \$3,000. The next year's quarter was \$300 (after the reverse cycle + solar). Now sits around \$150. Recognize he also installed LED lights, which replaced super old, super high wattage light bulbs (read: waste).
    - Q: Were there any other factors that prompted this?
    - Economic played a large role, but eventually the grid will be 100% carbon neutral. I need to be electric to join that, so why not do it locally? Accepting cost of electric is going up but gas is going up even more is important. Not just about spending less on power (the transformation as a whole cost 22-23,000 dollars, which it would be unfair to say he's making his money back compared to the \$3,000 bill he was facing because he could have just gone cheap gas). But being carbon neutral also helps convince him. [Post interview note: read more later, there's more reasons]
7. Is the monthly operating cost a significant factor when considering electric vs other energy sources?
8. What have you heard about electric appliances compared to appliances that use other energy sources?
- Electric vs other power sources, what have you heard? First an observation: Possible that as you go all-electric and more renewables come into play, that there is a slight risk that people will believe just because they get electric appliances that they will be greener. There is an efficiency factor that needs to be accounted for, that not everyone will be aware of. Back to the question:



Could never understand exact efficiencies or how to compare gas to electric. He went by the star system to help him, but it raises questions as to whether or not the star system accounts for the same factors in gas appliances that they do in electric. [Story time] For people electric is electric, they don't recognize that the power tool they are using may use less wattage than their tea kettle may. So some are disappointed solar doesn't immediately kill their bill, because they haven't accounted for the efficiency of their appliances to start with. It raises questions of how do you compare gas to electric, does the star rating account for the sources of power for the appliances? How do you know gas and electric are on equal grounds for comparison?

9. What are the key points that you look for in appliance performance (e.g. appliance efficiency, financial implications) when considering transitioning?
  - Really just the stars. Fridge is next, pick a size range that they need, then pick an appliance over 4 stars (because that is the minimum he chose to choose from). Then the price comes into play, which they will always trend to the cheaper side. "Efficiency first, then price."
10. Does considering your impact on the environment sway your decision when choosing appliances?
  - Because of his background, environment was a platform. Now in a position to afford to do more. First home they've owned, so now in position to afford more. The irony is that poor people can't afford to do more, but they are already efficient because they are already trying to eliminate sources of expenses, like utility bills. In Coberg, fixed pay retirees are recycling the heck out of water for their gardens. Ultimately, the context of your content will differ by audience. For lightbulbs, it's an economic decision, not an environmental one. Buy where there is more money, you can appeal to other factors.
11. What benefits of the transition stood out to you?
  - Bills reduced. Sense of satisfaction based on making a difference. His department even had a "lowest utility bill" competition against one another...
  - Q: Was it all just an economic decision, though? What kinds of comforts did you notice all-electric bring, if any?
    - Having two kids, getting rid of gas makes home feel safer, in a sense he doesn't have to worry about someone leaving the gas on. Comfort wasn't the first thing he'd think about as a benefit, but is intrigued now that we mention it. Partner suffers from asthma. Not having open flames burning oxygen makes regulating air easier, not having open flames to the outside world keep air clean and regulated. [Essentially is now realizing some of the benefits he happened upon by going all-electric, such as safety and health which he mentioned completely unprompted].
  - Q: Is the gas cooktop last?
    - After that It will be off the gas grid. Will need to pay for that. His friend went completely off the electric and gas grids, but the electric company wanted him to pay ridiculous fees for this. To say to the company "going off the grid", they want to cash in one last time. Instead the friend did something a little shady and said he was moving, could you shut off my power. And they did, but he just never moved... If it was cheaper, people may be willing to pay a couple hundred to just set the book right.
    - Observation: Due to the diversity in power companies and recent privatization, it would be interested to observe how people believe the sources of information are coming from.

If all electric gets abundant, people may start to think it's a ploy by the electric companies trying to spin a profit. How do you avoid this?

- Q: Any comments about the electric grid failure that occurred and any concerns that may bring?
  - Good question. Having gas would avoid the worries of no heat or cooktop. But the issues around the blackout itself isn't much of a concern, since power is so reliable to Victoria and the cause wasn't within Victoria. Having batteries would eventually make it a non-issue. Not concerned about putting all eggs into one basket. As battery prices drop, the backups can start to power the grid. Not a big concern. Reassurance to others is important, however, that they are NOT making yourself vulnerable to blackouts and for a few extra hundred you can overcome these fears entirely [with batteries].

## Homeowners who have not transitioned

### James McKay

*\*First question worked as a conversation starter, other questions were used to steer conversation back on track, however, the interview did not follow the specific question order*

1. Have you transitioned or begun the transition to an all-electric home? Would you be interested/what would spark your interest in transitioning to an all-electric home?
  2. Have you heard anything about electric appliances compared to appliances with other energy sources?
  3. Do you have a preference between electric or other energy sources (e.g. gas)? For what reasons?
  4. Do you feel you're paying too much for your utility bill?
  5. You mentioned that you have a record of your utility bills over years. How have your utility bills changed over time? Are there any trends?
  6. What do you look for when purchasing a new appliance?
  7. When considering the transition, what is preventing you from changing?
  8. Are there other upgrades to your home that you are prioritizing first?
  9. Do you see any benefits from not transitioning to an all-electric home?
  10. Is the monthly operating cost a significant factor when considering gas vs other energy sources?
  11. Where would you want to gather the information about this transition from – newspaper, city council, Positive Charge, family, etc.?
  12. When considering the change, do friends, community members, or neighbors' opinions have an impact on your decision?
  13. Could we follow up with any additional or clarifying questions?
- Was the first in his neighborhood to have solar
    - Did it because he considers himself "forward thinking"
  - Agricultural engineer
    - Ground engineering tool design
    - Finished in oil industry working for Exxon-Mobil
      - Fun fact: there is a Shell and an Exxon-Mobil oil refinery on Port Phillip Bay
    - always privy to ecological effects of human actions
      - driven by his profession
  - shared his story to solar in writing
    - says it's sort of irrelevant because after 5 years technology is obsolete

- solar hot water
  - able to use 140x per year on average
  - same applies to a heat pump
  - without heat/sun they both need electric boost
- gas use
  - biggest is central heating system
  - also barbeque outdoors and stove cooktop
- insulation
  - home is double brick
  - uses double blinds
    - leaves insulating pocket of air
  - windows are not double glazed
  - no wall insulation
  - new houses may have to be built with double glazed
    - brokham frame
      - insulated window frames
  - has tons of windows facing west
    - terrible for keeping heat out uses blinds to insulate year round
- gas pricing
  - gave us records
  - prices have more than doubled since 2007
  - changed from fixed price usage to time of use
  - driver for reducing overall electric usage
  - 30cents at peak hours, 13cents in off hours, 68cents when the sun is shining
- Dishwasher
  - Most work over cold water
  - Attached hot water
  - This uses half of the home's electricity
- Refrigerator
  - Cut holes in wall for ventilation
  - Stops from area around refrigerator getting hot
  - Significant electric usage reduction
- Induction
  - Everything he has heard has been positive
  - Very open to the idea
  - Wife is also open to the idea
  - Current gas top is not aesthetic
  - Has weber barbeque
  - Has to cook all meat out there because wife does not eat meat
- Tracking usage
  - Gets gas and water readings form smart meter at the beginning of every month
    - More often than billing period
  - In the warm months the gas connection is a lot more than the actual cost of gas
  - This connection(service) charge is increasing year to year
  - Once he turned 65 he got a gas price credit
- Had the first smart meter that's programmed to track electrical output to the grid

- Didn't really trust it because of negative publicity
  - Jemena -> electric wholesaler
  - Red Electric -> biller
- Benefits of not transitioning
  - No initial cost benefit
  - Takes time to make money back
- Transition process
  - Transition at time of appliance failure
  - Has never had problems with solar hot water or regular solar
    - Except massive hail storm that broke some of the evacuated tubes
    - Did \$20,000 of damage on house \$7,000 on car
  - Have to encourage thoughts of action for purposes of
    - Efficiency
    - Comfort
    - Reducing carbon footprint
- Gas prices
  - Companies are sneaky
  - Will change .191 to .199
- Electric pricing
  - Without solar, was enormous part of the budget
  - Big pushback because of carbon tax
  - 10% increase because of the carbon tax after PM said it wouldn't happen but was forced because politics
    - Pre tax peak = 24cents off-peak = 9cents
    - At time of tax peak = 39cents off-peak = 16cents
    - Resolved price peak = 31cents off-peak = 13cents
  - Has given us his electric usage by bill and by month
  - No one is honest about pricing
    - Advertises discounts without pricing
    - People don't know the price that is getting discounted
  - Red Energy
    - Uses the because they give him the best feed in tariff pricing
      - Regular electricity is more expensive than most
      - Wouldn't have them without his feed in tariff
      - No discount from getting gas and electric from the same company
- Reducing electric usage
  - Got more efficient appliances
  - Insulated
  - Changed all lights
  - From 28-31 to 11-12 kWh per day
  - Background usage of 140Wh per night
  - Is able to do month long analysis in roughly 45 min
- Cooler system
  - Evaporative
  - Uses energy that runs a fan
  - No temp setting
  - No higher than 26° on hottest days

- Very comfortable
- Comfort
  - Extremely important
  - Won't compromise comfort
- Problems with homes
  - Dark roofs make no sense at all
  - All homes have insulation from gov't
    - Gov't program to combat GFC
    - Has insulation under tiles and above ceiling
  - Queensland homes tend to have silver/white roofs
    - Much smarter
- WARS rating
  - Measure of amount of energy used by heating and cooling a home
    - Function of size, nature of home build, and lifestyle
  - Possibly more important than energy usage
- Information
  - ATA
  - Whirlpool forums
    - Company monitored
  - Person to person interaction is helpful to a certain point
    - People will eventually get annoyed
- Transition is not for the "faint-hearted"
  - Need a certain technological aptitude
    - Process, how things work
    - Ability to fix
    - Keep track of usage
  - Lot of people are not interested
    - Older don't want to
    - Builders need to stop building with the cheapest of everything
  - Cleans solar
    - Like windows 3x per year, before and during summer
- Regrets
  - Wishes he had gotten more solar but got double the average at the time of installation
  - Could have had total profit from the feed in tariff
  - Has high tariff until 2024
- MEFL
  - Heard of them through moreland council
  - Daughter used PC solar bulk buy
  - Likes PC
  - Similar to electricity council of AUS
- Getting off the grid
  - Great idea
  - Would have gotten battery and done this with the lower feed in tariff
  - "no brainer"
  - "Batteries would turbo-charge the solar industry"
- Electric hookup
  - Have to pay for connection to grid when a house decides to go on the grid

- Used to be complementary
- Energy
  - Renewables will never run out
  - Gas certainly will
- Carbon emissions
  - China will increase 3x in 10 years
    - Air pollution is incredibly evident
    - Visibility severely reduced
    - Opens 1 coal powered generator every 2 hours
  - India will increase 2x in 10 years
  - US not even keeping track
  - AUS is 0.04% of world carbon emissions
    - Still trying to reduce
    - Seems sort of useless
    - Companies now need to have to photograph steam cooler releases as “pollution
    - It’s just water vapor
    - Everyone used to use incinerators for trash
      - Now this could obviously never happen
- Reverse Cycle AC
  - Has massive background electric usage
  - Sometimes have to go to electric panel just to turn off
  - Up to 70W
- Compared to painting a house or a vacation
  - Return on spending is 100%
- Can contact for further questions

## Part I – Research Notes

### Appliances

#### Cooktops

Induction	Gas	Ceramic (Electric)
<p>Cost:</p> <ul style="list-style-type: none"> <li>\$549-3190</li> </ul> <p>How does it work:</p> <ul style="list-style-type: none"> <li>Heating is from electric currents induced in the pots and pans by rapidly shifting magnetic fields</li> <li>Cooktop itself does not become hot, only when the pot comes in contact with the surface</li> </ul> <p>Installation:</p> <ul style="list-style-type: none"> <li>When your appliances fail, opt for an electric high- efficiency model (look @ energy rating labels)</li> <li>May need a wiring upgrade because of power output</li> <li>Keep in mind the operational settings- If an appliance has the same star rating, look at operation energy consumption on label</li> </ul> <p>Benefits:</p> <ul style="list-style-type: none"> <li>Safety: cooktop does not get hot- no open flame or potential danger for children</li> <li>Very easy to clean- essentially cleaning a window- it is just a piece of glass</li> <li>The cooktops are “auto-sensing” so when the pot/pan is removed, the stove shuts off (uses less energy, won’t forget to turn off)</li> </ul>	<p>Cost:</p> <ul style="list-style-type: none"> <li>\$300-3000</li> </ul> <p>How does it work:</p> <ul style="list-style-type: none"> <li>Burn gas to heat directly</li> </ul> <p>Installation:</p> <ul style="list-style-type: none"> <li>Need a licensed plumber to install and connect</li> <li>Flame heights may need to be adjusted- plumber may need to come back- if “low” settings are not low enough</li> </ul> <p>Benefits:</p> <ul style="list-style-type: none"> <li>Visual feedback on how much heat is being supplied</li> <li>Variety of designs</li> <li>Familiar</li> <li>Special “wok” burners for stir fry</li> <li>Can potentially grill on some models if you have an attachment replacement</li> <li>Range of burner sizes- and conveniently located: simmer at the back (not a lot of stirring), wok at the front (stir frequently)</li> </ul> <p>Efficiency:</p> <p>Potential Barriers/cons:</p> <ul style="list-style-type: none"> <li>Very difficult and tedious to clean— trivets, burner caps, stovetop, etc.</li> <li>Not efficient compared to the other models</li> <li>Heat in the kitchen- fumes &amp; temperature</li> </ul>	<p>Cost:</p> <ul style="list-style-type: none"> <li>\$499-1229</li> </ul> <p>How does it work:</p> <ul style="list-style-type: none"> <li>Ceramic radiant- coiled metal under tampered ceramic glass</li> <li>Halogen- halogen bulbs</li> <li>Semi-halogen- combo</li> <li>No difference between performance between these</li> </ul> <p>Installation:</p> <ul style="list-style-type: none"> <li>Need a licensed tradesperson to install</li> </ul> <p>Benefits:</p> <ul style="list-style-type: none"> <li>“Sleek cooking surface that’s stylish and easy to clean</li> <li>Great for cooking at low temps</li> <li>Can have dual elements with two heat rings on the same burner- provides flexibility in size of cookware you can use</li> <li>Easy to clean- without dirt traps</li> <li>Automatic switch off- if a heat setting is not selected 10 seconds after you turn the stove on, it will shut off</li> </ul> <p>Efficiency:</p> <ul style="list-style-type: none"> <li>Power range is 12-22 kW</li> </ul> <p>Potential Barriers/cons:</p> <ul style="list-style-type: none"> <li>Ceramic remains hot long after it is shut off-</li> </ul>



<ul style="list-style-type: none"> <li>• Distribution of heat is even, and heats up fast- responses to change in heat level are also fast- “delivery of heat can be finely controlled” – like with gas</li> <li>• Less exhaust noise- no fan is required for cooking because no fumes of gas</li> <li>• Keeps kitchen cooler in summer months- gas adds heat to the air, making the kitchen workspace less comfortable- or make air conditioning work harder to cool the space (counterintuitive)</li> <li>• Easy to “add on” burners- if you only use 4 burners 360 days a year, but need 6 around the holidays, it is easy to get portable single or double burners to use when needed. Saves money on the big unit without sacrificing the max capacity you may rarely need.</li> <li>• Safety sensor monitors temp of cookware so if you accidentally leave a pan on the stove, it will adjust the power output as to not damage the cookware or stovetop</li> <li>• Auto heat-up: If you want to boil something then simmer after a certain period of time, there are settings for that</li> <li>• If spills occur, the stove will automatically shut off the heat and beep- you can clean it and move on</li> </ul>	<ul style="list-style-type: none"> <li>• “Now you’re cooking with gas!” = a saying with good connotation- you’re on the right track... even in their language that gas is positive</li> <li>• Potentially dangerous- “flame failure device” is when the flame goes out, the ignition automatically restrikes to recreate the flame. This safety feature is not in all models- if it is not, then gas could be escaping from the burner without you even knowing... V bad.</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• make sure the appliance has a warning light</li> </ul>
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<ul style="list-style-type: none"> <li>• Child lock- no open flame, but there is still this safety feature</li> <li>• Simmer setting uses residual heat to cook</li> </ul> <p>Efficiency:</p> <ul style="list-style-type: none"> <li>• Induction uses half of the energy of a gas cooktop</li> <li>• About 10% more efficient than standard electric</li> </ul> <p>Potential Barriers:</p> <ul style="list-style-type: none"> <li>• Power requirements may require electrical wiring upgrades- part of normal installation- “A normal everyday home plug has a 10Amp connection, whereas an induction cooktop may require a 20A, 32A or even 42A connection. These will have to be hard-wired by a licensed electrician.”</li> <li>• Cheaper appliances may have a “buzzing” noise- try to test out the cooktop before you purchase</li> <li>• Some cookware is not compatible- require pots/pans with ferrous metal as a base (steel, cast iron) and copper and some aluminum does not work. People may be discouraged because they will have to purchase new</li> </ul>		
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<p>cookware, however, a few hundred \$\$ in cookware is not as much of a burden as a few thousand \$\$ cooktop. *</p> <p>A test for cookware is that if a fridge magnet sticks to the pot/pan, then it should work with induction cooktops*</p> <ul style="list-style-type: none"> <li>• There are wok “attachments” for stir fries... people might not know much though</li> <li>• Pot bases need to be within the range of recommended sizes for each zone</li> <li>• Require specific dimensions- needs to get rid of heat adequately- may hear fans during/after operation to get rid of heat</li> </ul>		
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Choice Magazine. (n.d.). Cooktop buying guide. Retrieved from <https://www.choice.com.au/home-and-living/kitchen/cooktops/buying-guides/cooktops>

Keech, R. (2015). *The Energy-Freedom Home*. Brunswick, AUS: Scibe Publications.

## Draught Proofing

Creating an energy retaining home.

Developing a space that is energy efficient and green is important, but ensuring the energy you are using is being conserved is equally relevant. This is where the talk of insulation comes in. Through proper insulation and conscious design, a home can regulate temperatures much more comfortably and effectively. There are 8 unique climates in Australia with varying ways to maximize effectiveness of the home’s envelope, but one critical point remains:

*Good passive design means occupants are thermally comfortable with minimal use of cooling and heating systems*

Overview

Human bodies are most comfortable around 37C, albeit a large factor is the psychological perception of being comfortable. A cool breeze or radiating heat can trigger innate responses that we are not comfortable, even though our bodies may be the proper temperature. Because of this, we have varying levels of comfort that we all know.

Melbourne is situated in the defined region of “Mild Temperate” climate, albeit the surrounding region can also reach Cool Temperate. East and west facing wall space should be minimized to reduce temperature gain. Proper management of passive heating and cooling will remove need altogether for outside heating and cooling sources.

### Shading

Direct sun can generate the same heat as a single bar radiator over each square meter of surface. Effective shading can reduce heat within the home by 90%, which is amazing for the summer time. This comes in the form of awnings, shutters, plantings, and eaves.

Light colored roofs can reflect up to 70% of summer heat

Home Orientation	Shading strategy
North	Fixed or adjustable horizontal shading above window and extending past it each side
East and west	Fixed or adjustable vertical louvres or blades; deep verandas or pergolas with deciduous vines
NE and NW	Adjustable shading or pergolas with deciduous vines to allow solar heating or verandas to exclude it
SE and SW	Planting: deciduous in cool climates, evergreen in hot climates

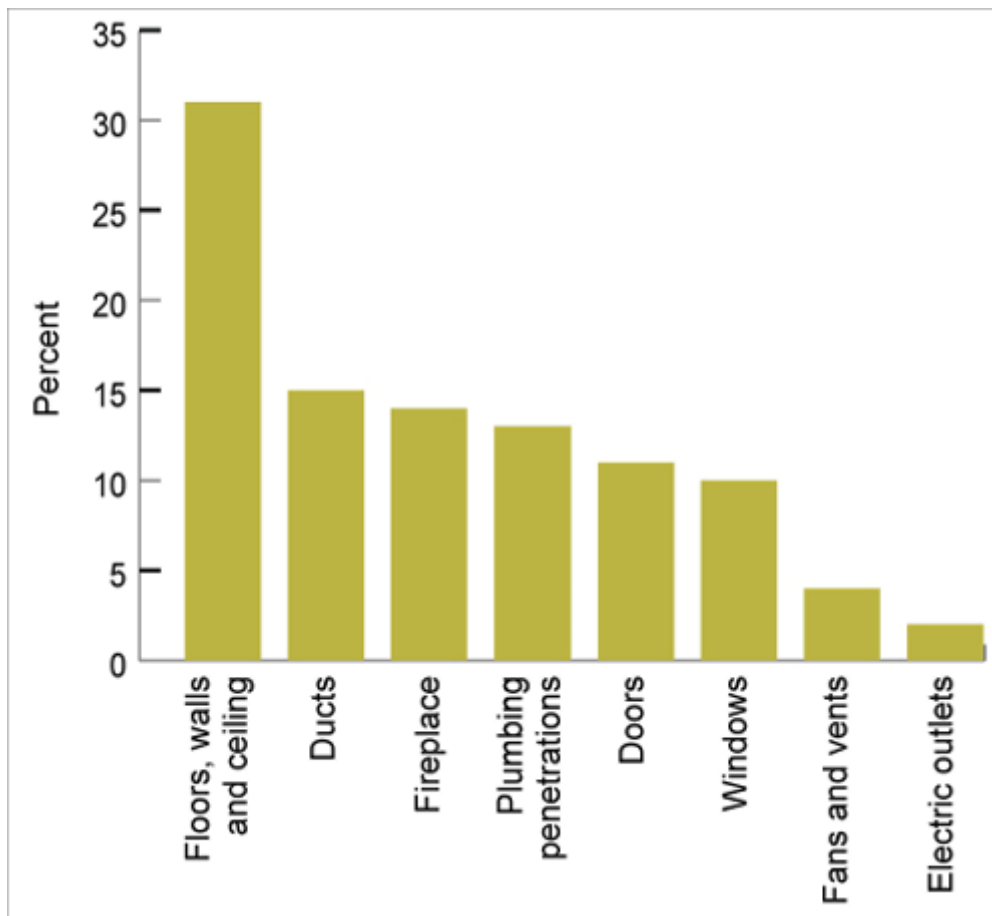
Light colored shadings are better than dark for reflecting heat, but internal shading does not prevent heat gain unless the material is reflective due to shorter wavelength radiation becoming absorbed in non-reflective materials (which then dissipates into the home).

North facing opening have higher angle sun in the summer, so using fixed horizontal shading above the opening is best (In the winter the sun is lower and can sneak under these horizontal planes). East and west facing opening get a low angle morning and afternoon sun, so adjustable shading like external blinds is best.

### Sealing

- Air leakage accounts for 15-25% of winter heat loss and can contribute heavily to cool air loss in buildings. Air typically leaks through:
- unsealed or poorly sealed doors and windows
- the poor design or omission of airlocks
- unsealed vents, skylights and exhaust fans

- gaps in or around ceiling insulation and around ceiling penetrations (e.g. downlights, pipes and cables)
- gaps around wall penetrations (e.g. pipes, conduits, power outlets, switches, air conditioners and heaters)
- gaps between envelope element junctions (e.g. floor–wall or wall–ceiling)
- poorly fitted or shrunken floorboards



To properly seal many locations, use weather stripping appropriate for the door or window to close major gaps. Any ventilations to the outside world should be caulked.

#### Insulation

- Not only does insulation improve temperature conditions year around (heat and cool), but it provides sound dampening as well. Properly insulating a home can cut home heating and cooling bills in half. The most economical time to do this is during construction.
- Use bulk **and** reflective insulation in ceilings, and bulk **or** reflective insulation in walls.
- Insulate all thermal mass externally.
- Refer to Insulation for recommended optimal insulation levels.

- Insulate under concrete slabs if using in-slab heating.
- Insulate elevated floors (concrete and lightweight)
- Seal thoroughly against draughts and use entry airlocks.
- Window glazing (aka the glass in side of a window) should be minimized to prevent loss of heat to exterior – since glass is a poor insulator.
- Floors account for 10-20% of winter heat loss
- Walls account for 15-25% of winter heat loss
- Ceilings and roofs 25-35% of winter heat loss
- Do more insulation than required, as high insulation is required for success. Insulating right above the ceiling is most effective as it is where most thermal contact would occur.

R – Values dictate how effective the insulation is at resisting heat flow. The higher the R rating, the greater the resistance. Bulk and reflective both have R values, but Bulk refers to the resistance of the product alone. Reflective depends on if the installation is proper. Up R values refer to resistance of reflective insulation to heat flowing upwards (aka in the winter). Down R values is the resistance to heat flowing downwards in reflective insulation (aka in the summer).

Bulk works by exploiting air pockets trapped inside to prevent heat from escaping. When installing, prevent mashing or else you lose these pockets. It can be shoved into cavities and is used to prevent heat transfer from physical contact.

Reflective requires 25mm of space on the shiny side. This allows it's heat reflective / re-reflective properties to function correctly and return heat into (or away from) the home. Reflective surfaces should be either vertical or downwards, but never facing upwards where dust can settle on it (this reduces performance).

Notes:

- Under the roofing material to prevent heat gain.
- In between joists in the ceiling to prevent heat loss and gain
- External wall cavities / outside of solid external walls
- Be wary of covering electrical wires with electric conductive insulation (that's bad) or breathing in insulation that shouldn't be (that's bad too, don't DIY if inappropriate)

Retrofitting insulation is possible, the ceiling and floor being easiest due to access. Batting can be added to the underside of tiles roofs if the roofing is not being retiled. Metal roofs can be removed, insulated with reflective / waterproof barrier, and then reinstalled without much damage to the roofing itself. Ceiling can be done easily if access is there, if not, it should be done when the ceiling is being replaced. Walls can be done as well, but require either removal of sheeting or some form of damage to the shell to expose an opening. In some cases like cavity brick walls, insulating material can be pumped into the walls (Small polystyrene balls or mineral fibers). For Brick Veneer / timber pumping can still be done, but the ideal method is to rip the inside sheeting down and fit the bulk/reflective insulation to the studs.

## Glazing

Up to 40% of a home's heating can be lost through glazed windows and 87% of its heat gained, depending on the season. Glazing refers to the material that makes up the window itself. Glass can be toned, which normally won't affect heat transfer amount. Low emission/High transmission glass or Low emission/low transmission gas, on the other hand, affects the amount of light and heat that enter the home. High allows a lot of light, but prevents a lot of heat loss. Low reduce amount of heat coming in, while maintaining good light transmission.

Secondary glazing lets another sheet of glass or plastic bit fit to a window to create an air gap that reduces heat transfer and noise transfer, but is not as effective as windows that are manufactured with this property (IGUs).

## Draught Sealing Retrofit

Found the most cost effective way to improve home was through comprehensive draught sealing. If done by commercial company, it would take 6.6 years for payback and cost ~\$1,019.8 (varying by home, Avg 16 homes). If done by yourself, it's 2.8 years for return (significantly cheaper). Saves (on avg) \$153.9 per year. This included:

Draught sealing measure	% of Houses Applied To	Air Leakage Reduction		Cost		
		Total Reduction (m³/hr)	% of Total Reduction	Total Cost (\$)	% of Total Cost	\$ per m³/hr
General caulking	87.5%	1,750	26.1%	\$4,947	30.9%	\$2.83
Evaporative cooler outlets	56.3%	1,343	20.0%	\$2,695	16.8%	\$2.01
Exhaust fans/vents	87.5%	1,040	15.5%	\$1,742	10.9%	\$1.67
Seal external door	68.8%	800	11.9%	\$1,891	11.8%	\$2.36
Seal wall vents	62.5%	447	6.7%	\$815	5.1%	\$1.82
Caulking heating/cooling <sup>16</sup>	50.0%	275	4.1%	\$731	4.6%	\$2.66
Combined <sup>17</sup>	12.5%	225	3.4%	\$637	4.0%	\$2.83
Seal chimney	18.8%	206	3.1%	\$241	1.5%	\$1.17
Seal larger gap or hole	25.0%	174	2.6%	\$223	1.4%	\$1.28
Seal louver window	6.3%	120	1.8%	\$66	0.4%	\$0.55
Seal downlights	43.8%	98	1.5%	\$1,287	8.0%	\$13.07
Seal windows	25.0%	67	1.0%	\$423	2.6%	\$6.30
Seal manhole cover	12.5%	52	0.8%	\$67	0.4%	\$1.31
Tape leaking ductwork	6.3%	43	0.6%	\$39	0.2%	\$0.91
Seal sliding door	12.5%	25	0.4%	\$106	0.7%	\$4.26
Caulk ceiling rose	6.3%	25	0.4%	\$69	0.4%	\$2.80
Seal plumbing penetrations	6.3%	23	0.3%	\$42	0.3%	\$1.81
<b>Total</b>		<b>6,713</b>	<b>100.0%</b>	<b>\$16,021</b>	<b>100.0%</b>	<b>\$2.39</b>

Some houses had varying degrees of sealing. Over sealing can be a problem, causing condensation, gas, and other toxin build ups. It is important to have controlled ventilations in place and to utilize where appropriate.

It was found that the top 5 most effective measures accounted for 76% of the draught sealing costs and 80% effectiveness of the overall houses leakages, making it easier to focus on a few key components when draft proofing:

General Caulking

Sealing evaporator cooling outlets

Exhaust vents and fans

Doors (Now windows)

Wall vents

So with that in mind, the cost drops further for homeowners, making the return on investment much more easily obtained given that most of these can be done with spray foam, putty, or caulking. Cost of implementing these 5 methods totals \$1,028.5 per home (assuming all 5 can be implemented into a home with effectiveness). These 5 methods also account for 78.2% of the leakage reductions, so assuming that is proportional to the amount saved, these 5 ways would save homeowners \$808 per year. That means turnaround time is roughly 1.5 years if homeowners DON'T DIY it. DIY would make turnaround time most likely under a year.

Australian Government. (n.d.). Passive design. Retrieved from

<http://www.yourhome.gov.au/passive-design>

Sustainability Victoria. (n.d.). Energy efficiency technical report. Retrieved from

<http://www.sustainability.vic.gov.au/services-and-advice/households/energy-efficiency/toolbox/reports/technical-reports>

## Heating and Cooling

- Insulating is much more important than having a good system
  - Why have a good system if it can't be used effectively
- 1<sup>st</sup> in projected home energy use
  - 40% (DEWHA 2008)

### Heating

- Insulation such as heavy curtains can help to minimize draughts
- Heater position for prevention of draughts is important
  - Deflect draughts -> cold and warm air as vectors
- Correct size of heater is important for optimal comfort and energy use
  - 5-6 star rated heaters use 1/5 energy of conventional heaters



- Efficient reverse cycle A/C uses 1/3 energy of conventional heaters

### Central Heating

- Uses more energy than space heaters -> energy wasted from distribution system
- Should not be bought “off the shelf”
- Central thermostat will leave rooms at different temps
  - Important to have thermostat in rooms that are not temperature outliers
- \$5000-\$10000 for reverse cycle ducted system including install
- \$1200-\$2200 for gas heating system including install
- Ducted Air
  - Can be run by gas or reverse cycle A/C
  - Floor outlets are better than ceiling outlets
    - Heat rises
  - Needs return air path for cold air to be reheated
  - Typically, fans are used to move the air
    - More efficient fans use less energy
    - Depends on system
  - Can be controlled for zoning
    - Some areas need more heat than others due to layout, draughts, necessity, etc.
  - Running cost and greenhouse gas emissions for high efficiency natural gas ducted system are both low
  - For reverse cycle A/C the costs are medium and greenhouse gas emissions are low when using a properly efficient system

### Space Heating

- Heats smaller areas
  - 1-2 rooms
- Reverse Cycle A/C wall units
  - May be connected through split unit duct system

### Heat Shifters

- Fan and duct system that moves air from warm to cool areas

### Cooling

- Split unit A/C
  - Has indoor and outdoor unit
  - Air compressor is outdoors -> mechanism for cooling
- Reverse Cycle A/C
  - Dissipates heat extracted from a room to outside
  - Uses refrigerant and works like split system

### Miscellaneous

- Timer System
  - Prevents need to constantly have system on
  - Could set to begin 15 mins before arriving home

- 5-10% increase in energy use for every degree increase of heating/cooling
- Insulation prevents need for more energy use
- Reverse cycle A/C is better for larger rooms, gas is better for smaller to medium rooms
- Reverse cycle is a good idea if building or replacing because of the high cost
- Wear warm clothes to save money
  - Don't have to turn heat up as high
- Heat only the rooms being used

Australian Government. (n.d.). Heating and cooling. Retrieved from  
<http://www.yourhome.gov.au/energy/heating-and-cooling>

## Hot Water and Heat Pumps

- "Water heating is the largest source of greenhouse gas emissions from an average Australian home"
  - 21% of energy
  - 23% of greenhouse gas emissions
- Half of Australians use electric water heaters but they account for 80% of hot water greenhouse emissions
- Water Heaters
  - Storage Systems
    - Operate on "mains pressure" or "gravity feed" (constant pressure)
    - Mains Pressure
      - Storage tank is normally on the ground floor in the house or outside
      - Most popular
      - However, there is a lot of heat lost from the storage of the water
    - Gravity Feed
      - Hot water is brought from the roof down to the house at a lower pressure
      - Common in old houses
      - Maintenance includes replacing the copper and glass lining of storage tanks
  - Continuous Flow (Instantaneous)
    - Heat only the water needed
    - Operate on natural gas ,LPG or electricity
    - Can't run out of hot water
    - Saving energy by not having to dilute already hot water with cold water to gain the desired temp
  - Both these systems can use solar, gas and electricity
- Types of hot water service
  - Electric (COST: \$300 - \$1500)
    - Electric heated storage tank system
      - Usually the most expensive to run but has low upfront cost
      - Can be installed indoors or outdoors
  - Heat Pumps (COST: \$2500 - \$4000)
    - Air-sourced heat pumps

- Takes heat from the environment and uses to heat water
  - Electricity is used to run the compressor but it isn't used as often
  - Basically operates like a fridge in reverse
    - Air is used to heat a refrigerant which is converted to gas and that gas is compressed, expelling heat that is then transferred to the water
  - Cost more but save more money and energy
    - "STC"
  - Air-sourced heat pumps work best in warm/humid climates
  - Electric boosters are put in place to help increase the temperature of water in colder climates
- CO<sub>2</sub> heat pumps are new and use carbon dioxide as the refrigerant
- Geothermal heat pumps
  - Use a body of water, shallow trench or deep bore as a heat source
  - "Electricity is used to pump water or refrigerant around a loop buried in the ground or immersed in a water body"
  - Best application is in multiple residential areas where the high cost can be spread across lots of people
  - Can produce 4x the units of energy as an electric energy user
- Natural Gas (COST for gas: \$900 - \$2000)
  - Far less greenhouse gas emissions compared to electric resistance storage systems
    - Natural gas burns more efficiently than the coal
  - Storage systems have quick heat recovery time and use smaller tanks
  - Instantaneous systems require high gas flow rates and could need larger pipes to be installed
- Liquefied petroleum gas
  - Typically 2 to 3 times more expensive to run than natural gas
  - Unnecessary for people whos only need for hot water is showers or sinks
- Solar hot water systems (COST: \$2000 - \$7000)
  - Roof mounted to absorb energy from the sun to heat the water
  - This heated water is moved to a storage tank
  - Lots of different options when it comes to solar
    - Boosting with gas or electric to help heat the water at certain times
    - Collecting with flat plate panels or evacuated tube collectors
    - System configuration can be thermosiphon or a split system
  - Solar HWS can provide 90% of hot water for free while reducing greenhouse gas emissions but the cost to buy and install is high
  - They also last longer and add value to a home
- Electric storage system
  - Relatively cheap to buy and install but usually the most to run
    - Especially if its continuous rate
  - Off peak electricity are much cheaper but need a larger tank since the water is
  - Installed inside or outside
  - Can also purchase electric instantaneous water heaters
  - Cost: \$300 - \$1500 (not including installation)

- Gas
  - If you have a connection to gas it's a good option
  - Cheaper than electricity but gas prices are rising
  - Usually installed outside cause they need to vent about their problems from time to time
  - Are given an energy efficiency star rating
  - Liquid petroleum gas bottles are an alternative but they are much more expensive
  - Cost: \$900 - \$2000 (not including installation)
- Solar
  - Solar collection panels and a storage tank
    - Need a large tank for when there are days with less sun
  - May need a larger collection area for panels if the roof is not in a good position
  - Storage tank normally has a booster of some kind (either gas or electric)
  - Compared to the others, it is expensive and time consuming to install
    - It can potentially pay for itself however, if the right system is chosen due to the low running cost
  - Government rebates and incentives can help offset cost
  - Cost: \$2000 - \$7000 (not including installation)
- Heat Pump
  - Much more efficient form of electric storage tank system that works like a fridge or air conditioner
    - Extracts heat from the air and uses it to heat the water tank
  - Normally tank and compressor are together but they can be split
  - Usually installed outdoors for the well ventilated area
  - Compressor can be loud like a outdoor AC unit noise
  - Work best in warm temperature regions but there are other models available for cooler climates
    - Most have a booster element
  - Government rebates and incentives can help with the cost
  - Cost: \$2500 - \$4000 (not including installation)

Australian Government. (n.d.). Hot water service. Retrieved from <http://www.yourhome.gov.au/energy/hot-water-service>

Choice Magazine. (n.d.). Hot water system buying guide. Retrieved from <https://www.choice.com.au/home-improvement/water/hot-water-systems/buying-guides/hot-water-systems>

## Part J – Campaign Materials

### Postcard





Going all-electric removes harmful gas fumes and flames from your home. Combine that with solar or GreenPower™, and you get an environmentally conscience home that is more efficient than gas.

**We've done the research for you:**

- Get straight-talking, tailored home advice
- Find great deals on top quality products
- Access ongoing support when you need it

If you want to feel more comfortable in your home, improve your efficiency, create a healthier and safer household, start becoming energy independent, or go solar, our experts are here to help.

Visit [positivecharge.com.au](http://positivecharge.com.au) or call us on 1300 23 68 55.

**positive  
charge**

Supported by:

*Council logo here*

Positive Charge is a social enterprise owned and operated by the Moreland Energy Foundation Ltd. We draw on more than 16 years of experience in energy related projects with residents, businesses, schools and community organisations.

## Double Letter (DL)



### Transition to All-Electric

Feel comfortable in your home

With gas prices rising 30% this year\*, remove your dependence on gas and transition your heating, cooling, water heating, and cooktop to efficient electric versions.


Becoming all-electric leads to:

- + A more comfortable, draught free home
- + Being more efficient and green with fossil fuel free energy sources
- + A safer and healthier home for your family by removing gas fumes and flames.

There's no rush,  
Replace your gas appliances as they die with efficient electric ones - or do it all at once!

\*depending on region and provider

**positive  
charge**



### What is efficient electric?

The new generation of energy efficient, electric appliances are outperforming their gas counterparts.



By utilizing:

- + Reverse cycle air conditioners
- + Electric water heat pumps
- + Electric induction cooktops
- + Effective insulation

You can reduce your energy usage, minimize your bills, and lower your environmental impact. If you have solar panels, you'll be seizing their full potential, powering your appliances in the cleanest way. If you don't, no worries - GreenPower™ is readily available.


Find out more  
by calling 1300 23 68 55  
or visiting [positivecharge.com.au](http://positivecharge.com.au)

Or find us on:

-  @Positive\_Charge
-  @positivecharge.energyexperts

Positive Charge is a social enterprise owned and operated by the Moreland Energy Foundation Ltd. We draw on more than 16 years of experience in energy related projects with residents, businesses, schools and community organisations.

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charge**

Supported by: 



## Make Your Home the Home of the Future



The All-Electric home is the home of the future: More Efficient, More Comfortable, and More Affordable.

### Why the All-Electric Home

The all-electric home is the home of the future. With gas prices expected to rise substantially over the next few years and greenhouse gas emissions destroying our environment, you can save money whilst also doing your part to save the environment. All the while, increasing your comfort inside your home.

Becoming all-electric opens opportunities to power even more of your home from your solar PV system. If you don't own a solar PV system, there's no need to wait - you can purchase 100% green, renewable energy from the grid today with GreenPower™.

### The Parts of the All-Electric Home

The all-electric home contains four key components: insulation and draught proofing, reverse cycle air conditioning, a heat pump for hot water, and an induction cooktop.

#### Perfect Compliments

Cooking with induction removes harmful gas and wasted energy from your family's home. Heating water with a Heat Pump opens new opportunities towards harvesting heat energy from nothing but air. Controlling your home's temperature with a reverse cycle air conditioner yields unparalleled responsiveness in heating and cooling, all the while minimizing wasted energy. Combined with proper insulation, your home can be transformed into the safe, comfortable, efficient home of the future thanks to the removal of gas fumes and exposed flames.

### Be like Jon.



Jon and his family moved into their Melbourne home about three years ago. After paying a large amount to heat their home in the winter with underfloor electric slab heating, the family began transitioning to all-electric.

#### Introducing Solar

After Jon installed some of the key components to an all-electric home, he wanted to reduce his bills even further by powering his electric appliances with the sun. For Jon, there's a satisfaction in reducing his bills while saving the environment.

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## Insulation and Draught Proofing

Installing insulation gives immediate comfort to your home by preventing the loss or gain of heat from your walls and ceiling. In addition, proper draught proofing removes those cold breezes found within your home, further guarding against the outside elements. An air tight home means you won't need to run your appliances for as long either - reducing your energy bills!

It's generally recommended to insulate your home first, to best take advantage of the energy savings all-electric, efficient appliances can provide!

## Reverse Cycle Air Conditioning

Reverse cycle air conditioners installed on your floor or wall can cool and heat your home. They are connected to an outside unit, pumping heat from the outside in to warm, or pumping heat from inside out, cooling your home! Units can be set individually for optimal room to room comfort and set by timer to save energy when a room isn't occupied. They don't only accurately control the temperature, but can do so at near-instantaneous speed.

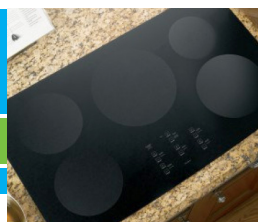
Typically, you'll want to install these in any living area of your home. One can cover open floor plans too!

## Induction Cooktop

Induction cooktops are a great replacement for your gas cooktop. These cooktops use the power of magnets to heat just the pan, allowing unparalleled efficiency, safety, and "gas like" temperature control. Any pan that a magnet can stick to will work. Incompatible pans can still function too, with the addition of a heating plate they can sit on top of to act as the heating element. Since the surface is totally flat and gapless, cleaning is as simple as wiping down - no need to take apart anything.

## Electric Heat Pump

Electric heat pumps are an efficient way to produce hot water for your home. Akin to reverse cycles, they use heat from ambient air to produce hot water. Hot water is stored in a tank for later consumption. Often these units are combined with external boosters to ensure hot water is met on demand. With the correct size tank and the usage of timers, this can provide an efficient way for you to have hot water whenever you need it without wasting energy on sitting water.



## Common Questions

Where do I start?

You'll want to visit our website or call one of our energy experts, whom can guide you where to begin with your home's transition. We'll also connect you with one of our trusted suppliers, which have undergone an extensive vetting process focusing on reliability, affordability, and environmental consciousness. After working with us, you can be confident you're making the best choice possible.

I already have solar water heating, what do I do?

That's fantastic! For homes with solar water heating there's no need to install a heat pump. If your unit has a booster, however, ensure it's electric if you plan to remove your gas line.

Why should I go all-electric?

Beyond the advantages from each of the four steps above, you'll see a large economic benefit in the long run. While it may feel expensive step to step, replacing appliances as they die means you'll only need to spend a few hundred more dollars upfront when it comes time to replace. From the energy you'll save with efficient electric appliances, you'll make those couple hundred of dollars back sooner than you may expect!

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or by calling us on 1300 23 68 55

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## Case Studies

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### Case Study

Enjoying the comforts  
of going all-electric

Natalie Gray currently lives in an apartment in South Yarra where she has fully transitioned to all-electric. Being the owner of her apartment, she was able to make renovations and install electric appliances she wanted. With helpful information from Positive Charge and research into the star ratings of appliances that fit her needs, Natalie was prepared for the journey to all-electric.

**“The transition to an all-electric home was desirable because the energy is cleaner and there was no disruption resulting from the change.”**

Natalie opted to replace all of her appliances at once to reduce the transition time. She added a reverse cycle air conditioner, electric hot water heater, and an induction cooktop and replace old halogen lights with energy efficient LED lights. All of these upgrades have led to

her ability use only renewable energy and no longer pay the connection fee for gas.

**“It was much simpler to pay one utility bill, and cheaper, since I didn’t have to pay the additional connection fee.”**

The environmental benefits were a large factor in Natalie’s decision to transition her home. Additional benefits have been an increase in thermal comfort and safety as well as a more manageable household that feels a part of a better, cleaner community. Her induction cooktop is one appliance that she has been very impressed with:

**“The induction cooktop is safe because turns itself off with no pot on it and is as responsive as gas.”**

The next step for Natalie is to replace her current windows with double



**Natalie loves her reverse cycle air conditioner  
- it tucks away perfectly into her bookcase**

glazed windows. This will continue to improve her thermal comfort by reducing both the heat loss in the winter and the heat gained in the summer. Natalie is a great example of a homeowner who has helped improve the environment around her while improving her quality of life at the same time.

**“Working with the environment simplifies how I live; reduces the costs; and improves my health, the health of my plants, and the health of my building.”**

Jon Rawlings and his family moved into their Melbourne home about three years ago. After paying a large amount to heat their home in the winter with underfloor electric slab heating, the family began transitioning to all-electric. With advice from Positive Charge and personal research, Jon felt prepared to begin making his journey.

**“...although we may not be at the very vanguard of eco-change we are trying to do as much as possible within our means.”**

In the past 3 years Jon and his family have installed a reverse cycle air conditioner, heat pump water heating system, energy efficient washer machine and dishwasher, 5 kW solar array, and replaced lights with LEDs. All these upgrades have helped to reduce their gas and electricity bills year round.

**“We decided that although going solar and all electric would cost money and may have a long payback, for those who can afford to, we must do what we can now”**

Despite the low cost of gas appliances, Jon opted for the electric alternatives for two major reasons; to reduce his family's gas bills and to gain a sense of satisfaction knowing they were making a difference for the environment.

**“It is clear we need to act with urgency on reducing our carbon emissions...”**

Jon hopes that in the next two years he will be able to complete his journey to all-electric and no longer be reliant on gas. He has an idea of what he can do next:

**“The next stage of the transition**



**Jon and his family couldn't be happier with their move to all-electric and solar.**

**to low carbon living is to replace the gas cook top with an electric induction stove”**

## positive charge

### Case Study

Efficiency is the heart  
and soul of All-Electric

James McKay moved into his home 8 years ago after owning the property and renting it out beforehand. Since moving in, he's been slowly becoming all-electric while tracking his electric and gas usage on a monthly and bill-to-bill basis to see the difference.

**"Increasing our home's efficiency was very important"**

James was the first in his neighbourhood to add solar. Since installing solar in 2009, he has added solar hot water with an electric booster for the winter time. After adding solar, his electric bill has reduced significantly.

**"All-Electric is a no-brainer"**

He plans on replacing his gas central heating, outdoor barbeque, and stove cooktop when they fail with efficient electric versions. He likes the idea of induction and welcomes the addition when the time comes. For him,

however, comfort goes above all:

**"I am not willing to sacrifice mine or my family's comfort for anything"**

Which is why he is hesitant to replace his evaporative home cooling system. Currently, their system keeps his home comfortably cool in the summer, which makes installing a reverse cycle in its place a hard decision. Given the high background electricity consumption of a reverse cycle, James believes his evaporative system works just fine currently.

James' has looked to other places for improving his efficiency in the meantime, such as his windows. He has insulated them using a double blinds system rather than double glazing due to the high cost of double glazing so many windows. His double-brick walls naturally insulate his home as well. He has also replaced his



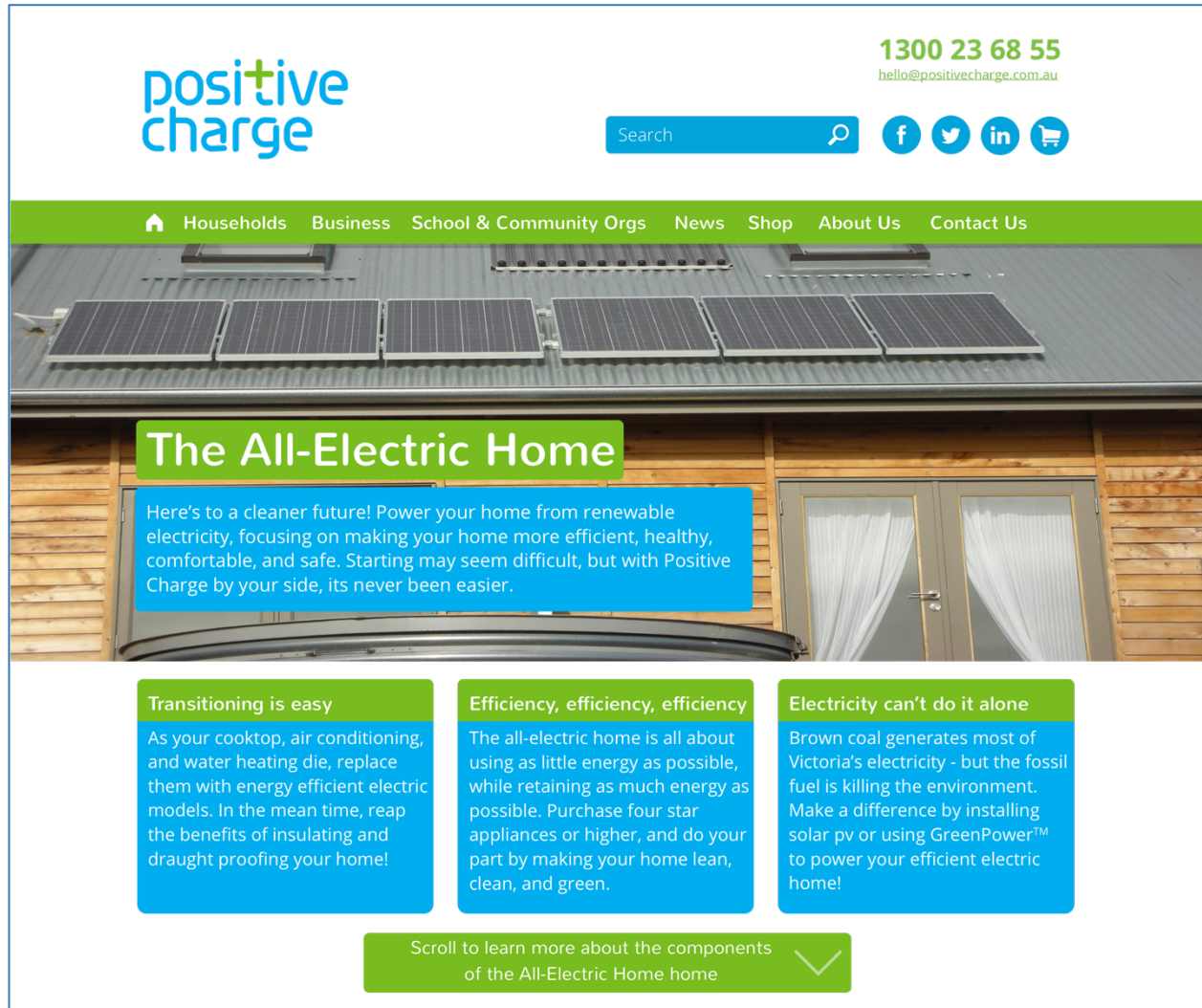
**James' double blind insulation allows his solar panels to accomplish more with the power they generate.**

lightbulbs with LEDs, and has grown the habit of using his appliances during times when electricity is cheap and he is not receiving a feed-in tariff from his solar.

Overall James has been able to reduce his usage from 28-31 kWh to 11-12 kWh. For James, the process is slow, but becoming all-electric to him is a

**"Method of becoming totally independent of the Electric Grid. And that just has to be good news."**

## Website





## Insulation and Draught Proofing

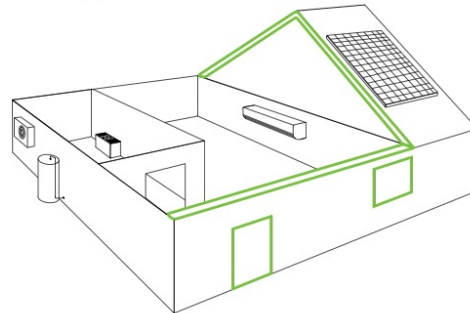
### How does it work?

Your home naturally loses heat in the winter or cold in the summer due to air escaping through your walls, cracks near doors, windows, and vents. It's similar to your morning cup of coffee: after a little while in its cardboard cup, it goes cold. To counteract this, your appliances must run longer to accomplish the same amount of work, costing you money and jeopardizing your home's comfort.

### What's the solution?

Draught proofing any seams, cracks, or openings in your home will prevent air from entering or exiting. In addition, insulating your walls will prevent heat from leaving through them, just like how putting your morning coffee in a thermos prevents it from going cold for longer!

Proper insulation and draught proofing of your home can regulate temperatures much more comfortably, effectively, and efficiently. Never underestimate insulating and draught proofing.



When draught proofing, specifically look at the seams around doors and windows, as well as static vents found in evaporative coolers and over old radiators. Insulation is most effective in your walls, ceiling, roofing, and sometimes flooring.

### See for yourself:

#### Pros

Improves temperature control throughout the year

Improves sound dampening

Reduces heating and cooling bills

Improves efficiency and comfort due to better retention of air.

#### Cons

Some insulation is difficult to install after a home is already built

Some homes will benefit more than others depending on severity of leakage.



## Reverse Cycle Heating and Cooling

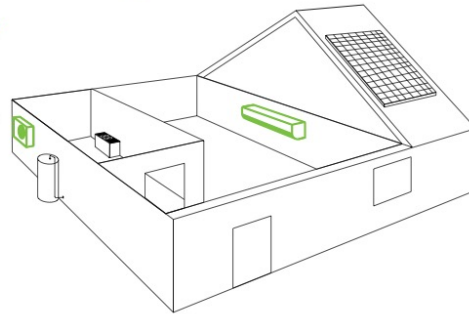
### What is a Reverse Cycle Air Conditioner?

Reverse cycles are highly efficient heat pumps that are used to cool and heat your home, consuming approximately 1/3rd of the energy conventional heaters do. Units are mounted on the wall or floor, connecting to an exterior compressor to interact with the outside world. They heat your home by pumping heat found outside, in. They cool your home by pumping heat from inside your home, out.

### Did you know...

You can heat your home with a reverse cycle air conditioner? Contrary to what the name suggests, your existing reverse cycle can heat as well as cool, more effectively, cheaply, and controlled than conventional heating methods!

Reverse cycles are also highly effective at controlling temperature, producing hot or cold air within seconds - much faster and more effective than traditional methods for heating and cooling.



There are different sized reverse cycle air conditioners available to suite your room's needs. Due to their efficiency and effectiveness, most units are capable of heating and cooling an open floor living area all on their own! If you wish to vary the temperature between rooms, multiple units can be installed.

### See for yourself:

#### Pros

Low cost to run due to high efficiency, leads to good payback time.

Capable of heating and cooling effectively

Long lifetime: between 10 and 15 years

Some models can filter and dehumidify air

No need for many units, one unit can handle a large area on its own

#### Cons

Depending on the model, exterior units can get noisy

Poor placement can lead to air blown directly on users, which can be uncomfortable.



## Induction Cooktop

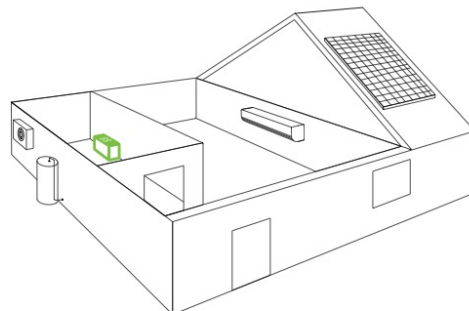
### What is an Induction Cooktop?

Electrically powered, induction cooktops generate alternating magnetic fields to just heat the pan on it. This means the surface is cool to the touch, can be uniform and luxurious in appearance, and extremely easy to clean. Due to its usage of magnets rather than electrical resistance to heat a pan, an induction cooktop can rival, and even outperform, gas in its ability to control temperature and boil water.

Induction cooktops use half the energy of a gas cooktop, and are 10% more efficient than electric resistance cooktops.

### Can I use my existing pans?

The rule of thumb is: if a magnet can stick to the pan, it can be used. That doesn't mean your high end copper pots and pans can't be used, however. Specialised magnetic pads can be placed on top of the designated burner regions, acting as heating elements for non-magnetic pans!



Induction cooktops produce no fumes and their surface stays cool to the touch when turned on, meaning your family can feel safer in your home. And if you ever need more burners around the holidays, you can purchase independent units that can be plugged in on their own or stowed away when not in use!

### See for yourself:

#### Pros

No fumes or direct heat; safer than gas

Perfectly distributes heat thanks to magnetic waves.

Easy to clean; no disassembling or grooves to clean

Rivals gas in control and performance, at half the energy usage.

Expandable to meet demand

#### Cons

Units can be large, requiring modification to countertops

Electrical upgrades may be necessary

Cheaper units can lack in quality





## Electric Water Heat Pump

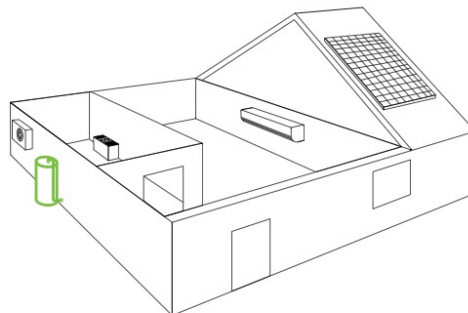
### What's an Electric Water Heat Pump?

Akin to a Reverse Cycle, electric water heat pumps are electrically powered heat pumps used to heat water. They pump heat into the tank from outside, heating the water inside. Not only are they highly efficient, but they do not produce fumes or combust like gas does, meaning they can be stored inside if desired.

Electric water heat pumps don't require hot climates either: they are still capable of saving energy in temperate or slightly colder climates. Taking into consideration their safety, available government small scale technology certificates, and low running costs - they make formidable competitors to gas alternatives.

### What if I have a Solar Water Heater?

Solar water heaters work just as well for the all-electric home, as their reliance on the sun as a power source makes them efficient and fossil fuel free. Be sure to use an electric booster if you have one, however, to ensure you can disconnect your gas line at the end of a full, all-electric transition!



Electric water heat pumps tend to be connected to timers, controlling when they turn on to save energy when not in use. Combined with a properly sized, well insulated storage tank, demand will be met without issue!

### See for yourself:

#### Pros

Government rebates available in form of STCs

No combustion or fumes; safe to store inside

High efficiency makes for low running costs

#### Cons

Compressor can be as loud as a Window AC unit

Performance can vary by climate



## Solar PV

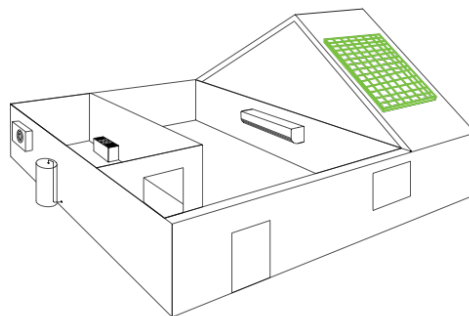
### What is Solar PV?

Solar Photovoltaic systems (or solar pv for short) are electricity producing panels that sit atop your roof. All day they soak up the sun's energy, transforming it into electrical energy to be used within your home - saving you money on your electric bills and reducing your carbon footprint. It's a win-win!

Interested in solar pv? Check out our bulk buy program!

### I already have solar PV on my home:

That's fantastic! Going all-electric opens opportunities to utilise your home's solar pv system to its full potential. Why power just your homes lighting and small electronics, when you can power the largest consumers of energy in your home - for free? All the while reducing your carbon footprint and utility bills further than you have already! Don't worry about powering all of your appliances right away - what you can't power with your solar pv system can be powered straight from the grid.



Whether you have solar pv already or plan on doing so eventually, going all-electric is the perfect pairing to any solar system. While lighting and small electronics consume a fair amount of energy, powering your home's big energy consumers will allow your solar pv system to make even greater impacts with the excess energy it produces.



Image courtesy of Powershop

### GreenPower™: The solar alternative

Not every home is suitable for solar pv, due to rental agreements, positioning of your home, or other factors. Thankfully, there is another option: GreenPower™ by Powershop. Powershop has been voted Australia's Greenest Power Company, generating 100% of their electricity from renewables and offsetting all carbon emissions associated with operations. At an affordable price, GreenPower™ opens opportunities for everyone to become carbon neutral in their all-electric homes!



## How do I become all-electric?

Going all-electric is simple, and can be done at a pace you're comfortable with. Whether you want to replace your appliances right away, or as they fail, you'll know you're making a difference each step of the way. When it does come time to replace an appliance, you'll want to remember these points:

- + Any home can become all-electric, no matter the condition or size
- + Investing a few hundred more dollars in an efficient, reliable appliance will save you hundreds more in the long term compared to cheaper, more inefficient models.
- + Always purchase from reputable distributors, who will support your decision along the way.
- + Our team is always at the ready to answer your questions, and will support your journey start to finish.

While you wait to replace your appliances, there's no better time to begin insulating your home. Not only will you see the immediate energy savings, but you'll proudly be able to say you're doing your part in creating a greener, cleaner, and leaner home.

### Want to hear other homeowner's all-electric stories?

Click on the portraits below to learn more about their journeys to all-electric!



"...although we may not be at the very vanguard of eco-change we are trying to do as much as possible within our means."



"All-Electric is a no-brainer."



"Working with the environment simplifies how I live; reduces the costs; and improves my health, the health of my plants, and the health of my building.."

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#### About us

Who we are  
How we work  
Our results  
Meet the Positive Charge team  
Meet our Suppliers  
Meet our participating Councils  
[Contact us](#)

## Part K – Sponsor Description

The Moreland Energy Foundation Ltd. (MEFL) is a not-for-profit foundation that was founded by the Moreland Council in 2000 to combat climate change by reaching out into the Moreland City community and encouraging the implementation of renewable energy resources. MEFL is a membership based organization and renders its services available to constituents of member organizations and city councils. MEFL was originally funded by money from the sale of Moreland City's state-owned energy company when Victoria's energy industry was privatized. It is now funded through membership fees and through the services provided by their outreach projects which include an energy helpline, workshops, and the purchase and implementation of sustainable energy solutions ("The MEFL Story", "Our History", "Our Vision", "What We Deliver"). As shown in Figure 8, CEO, Alison Rowe, oversees day-to-day operations at MEFL, while a board of ten individuals is responsible for strategy. The board is comprised of a chairperson, Monique Conheady, as well as a secretary, a member of MEFL, two members of the Moreland City Council, and four general members. MEFL has worked with dozens of clients and area city councils. MEFL's biggest partners include the Moreland City Council, Northern Alliance for Greenhouse Action (NAGA), and the One Million Homes Alliance. In the 2015 fiscal year, MEFL gathered \$2,165,403 in revenue, spent \$484,937 on projects and ended the year with a total surplus of \$32,957 after total costs and expenses<sup>1</sup> (*Moreland Energy Foundation Limited Annual Report 2014-2015*).

MEFL has been involved in a wide range of community outreach programs including assistance in updating a community health services clinic, delivering clean energy solutions to the northern suburbs of Victoria, and many more projects in the Victoria community. To further their outreach, in 2014, MEFL created Positive Charge to promote green energy alternatives in the community ("Community Engagement"). Positive Charge is a non-profit consulting company providing advice to homes, small businesses and the community on how to save money through conserving energy. Services such as an energy helpline, workshops, and events tailored to the local areas are funded by annual membership fees paid by local government councils. Their "core mission is to reduce greenhouse gases, and remain sustainable and viable through revenue generated from Council subscription fees and income from supplier management fees through the delivery of products such as bulk-buy programs" ("About"). MEFL is located in Moreland, but Positive Charge provides services to councils throughout inner Melbourne as well as East Gippsland.

Some of the offerings a city council will receive when purchasing a membership with Positive Charge include phone and email based advice, a quarterly report on sustainability, and customized assistance in reaching energy saving goals. Positive Charge also offers customized programs for specific

customers such as schools, businesses or homeowners and are tailored to the specific community. Under the Schools Package, representatives visit schools and provide an action plan to improve energy efficiency. The Business Package allows representatives to work individually with business owners to set energy saving plans and decide what types of green alternatives to implement, such as solar or wind power. Home and Community Care (HACC) representatives help homeowners identify how they can improve energy efficiency in all aspects of their lives. Extensive face-to-face interaction between representatives and customers helps build strong relationships and business integrity ("What we deliver"). In the first year of operation, 2014, Positive Charge worked with "five foundation councils, spoke to 3,200 households and 183 businesses while saving 20,316 tonnes of greenhouse emissions" ("What we've achieved").

The work of Positive Charge contributes to the goals of the Zero Carbon Evolution Strategy, led by Helen Eveleigh. The strategy takes a large scope, aimed at reducing carbon emissions in the Moreland community by 22 percent before 2020. This is in response to the Climate Change Authority's carbon emission budget that would limit the global temperature increase to less than 2°C for the 2013-2050 timeframe. That allots Moreland 24.4 million metric tons of carbon emissions in total. To meet that number, Moreland plans to reduce 330 kilotonnes of carbon emissions being emitted each year by 2020. Eventually the program aims to reduce emissions to zero by 2050. This task will require the full involvement of the community and local government, by transitioning households and businesses to solar power, introducing more energy efficient methods of travel and energy consumption, and wasting less energy in all forms (Zero Carbon Evolution 2014).

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