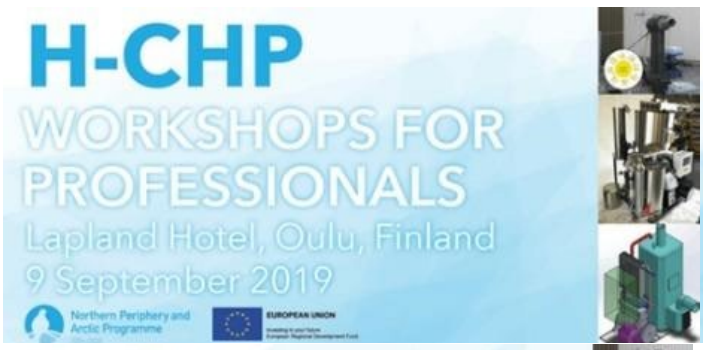
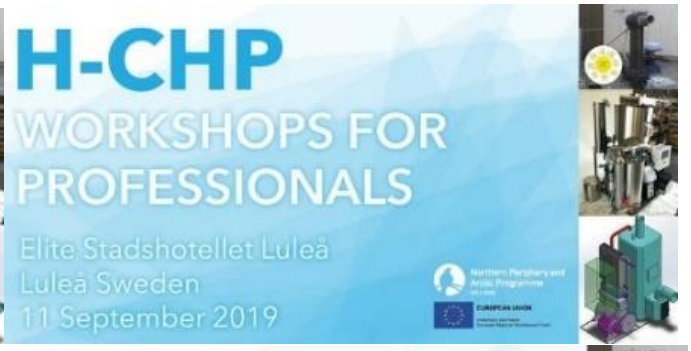
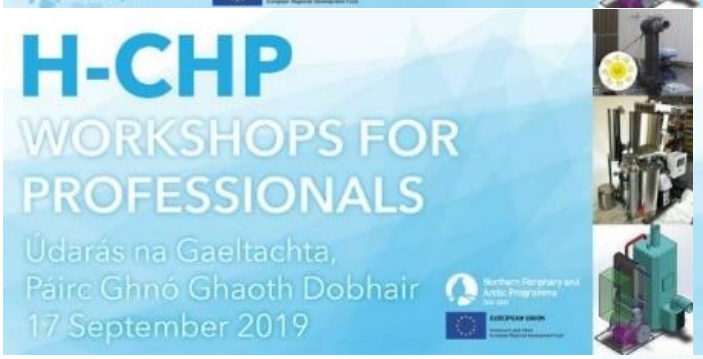
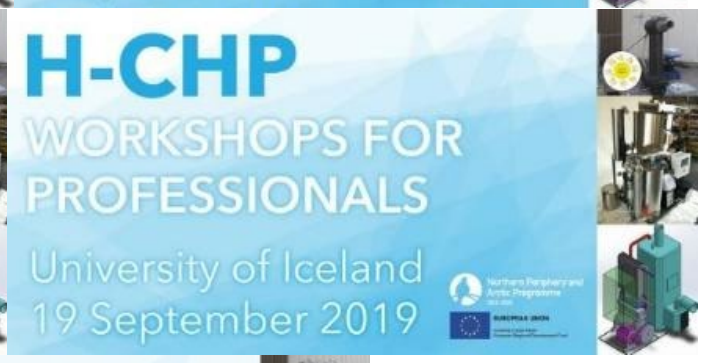
H-CHP Workshops for Professionals

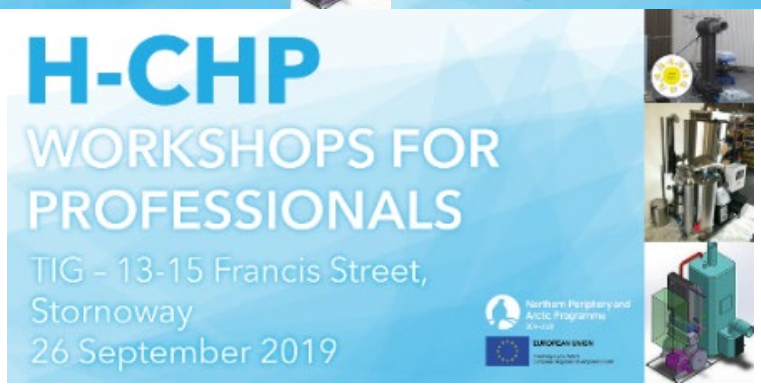
Feedback of the workshops conducted September 2019









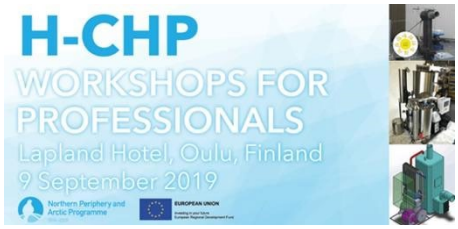


Organised by Tighean Innse Gall

Work Package 3 Household Combined Heat and Power systems

Funded by the Northern Periphery and Arctic Programme of the European Union.

Contents of the Feedback Report



H-CHP Workshops for Professionals

Lapland Hotels,
Oulu, Finland
9 September 2019

- Stewart Wilson opened the workshop, welcoming all in attendance.
- He gave an overview of the Project, what the Project has been analysing and better ways to run it.

Markku Kananen presentation –

- Some adjustments with the first CHP prototype
- Not many commercial CHP systems have been cost-effective (some companies have gone bankrupt soon after starting) and did not produce an adequate amount of electricity.
- Our system's motor has now been tested with compressed air – we will test with steam in two weeks.

Volter presentation –

- One unit has served 32 apartments in one building. Can be used on small detached houses or buildings within close proximity.
- Consumers need to be free to use their preferred electricity supplier
- Only used for general purposes e.g. ventilation, street lights.
- Many farms have benefitted from the system already.
- If there is more electricity produced than needed, the surplus can be sold to utility companies.

Markku Korhonen presentation –

- Countryside village with 400 inhabitants in Northern Ostrobothnia, Finland
- Forest owners produce final product, local entrepreneur arranges delivery once a week to the building.
- Extra heat is used for driers, etc,
- 4-5 days to dry the 'batch of feedstock'

Jarno Haapakoski presentation –

- Gave an overview of a Stirling engine rated at 5kw
- Gas engine exhaust gas to recover heat
- Small scale could be done to retrofit existing heating systems

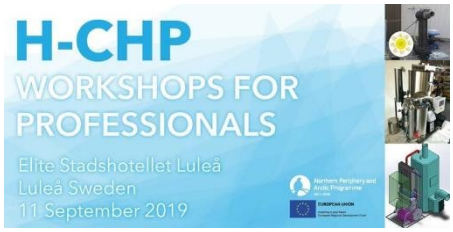
Esa Silomaa presentation –

- Choose your supplier – can buy electricity from one Company and sell to another.

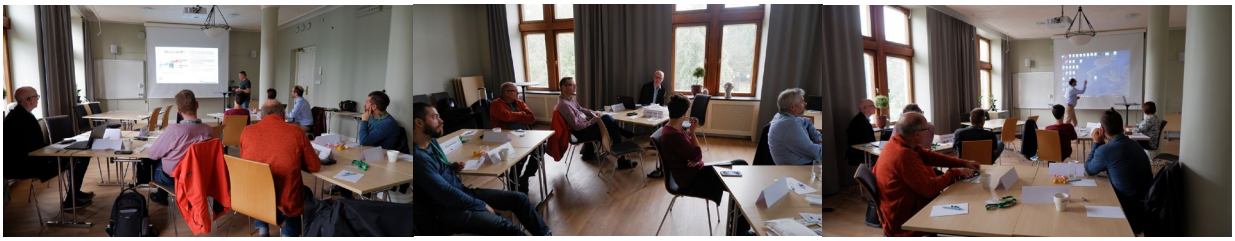
- When using equipment according to their designed configuration, it is very easy to install and use them.
- Commercial equipment have been mostly designed to work along with the existing grid system due to the demand focusing on this type rather than off-grid.
- In the project, we have attempted to get an off-grid system to modify for our purposes but this requires significant changes to the software, and there are no instructions in this process.

QUESTIONS / DISCUSSIONS:

1. Brian asked if all agree that biofuels are carbon neutral. All were in agreement, yes. In Ireland they are hesitant to support CHP as they don't agree that it is carbon neutral and causes a reduction in air quality.
2. Feed-in tariff has been removed in the Republic of Ireland.
3. Is peat sustainable?
4. Stewart asked for costs for a typical installation in a new build? Capital cost can be 20k euros +. Volter representative noted homeowners do not want high installation and subsequent maintenance costs.
5. Geothermal, district heating and solar panels are popular. District heating especially in the cities.
6. H-CHP is not attractive because of fuel costs – how do we become attractive to householders? Operating costs are too high, fuel costs and maintenance costs are higher than using electricity from the grid as a primary source.
7. Kw transfer cost is more than electric price.
8. RHI tariff is much lower in the UK
9. Will need to have a valuable use for most of the heat produced or it wont work.
10. Industrial size pieces of kit could be more sensible rather than small scale units.
11. Volter can scale down their equipment to 5kw. An average household will pay 10-15k euros for a geothermal unit so would be reluctant to pay 20k euros for H-CHP. Maintenance costs will also be higher.
12. Can we afford to develop something that would not be attractive financially?
13. Controls – would it be simple enough to use in all households. E.g. social rented properties?
14. Can they be controlled from mobile phones? Still a question of cost.
15. Fuel cost was agreed as the biggest issue – good quality fuel is expensive and where do you get the volume. At Government level it would be possible.
16. Possibly the retrofit option is the best option – a Stirling engine type retrofit? The existing heat source is already there so that the engine could be installed to modify the system to generate electricity.



H-CHP Workshops for Professionals
Elite Stadshotellet,
Lulea, Sweden
11 September 2019



- Stewart Wilson opened the workshop, welcoming all in attendance.
- He gave an overview of the Project, what the Project has been analysing and better ways to run it.

Silva Herrmann Comments on Project Presentation:

- Previously working on two projects interested in this technology.
- Didn't actually install CHP in their projects
- Looking at this project for households and small companies, farms, small district heating system, etc.
- Seeking viable options for use by the above.

Torborn Ilar

- The Inresol Stirling engine has been in use from 2012 (company now in administration)
- 2kw is currently in use and they claim it works well.
- It could be possible to couple the Stirling engine with a burner and get hands-on trial experience.
- Silva stated she has been in contact with users. Two people are happy with it and the third person felt that maintenance could be intense (south of Sweden).
- Popular among farmers.
- Inresol are working on a new approach and it could be back on the market in 2-3 months.
- The Stirling 'Okofen' is quite expensive at approximately 10k euros.
- The gasification unit, developed at Iceland University, is now on a trailer and almost ready to take to other countries.
- The steam engine prototype is still in development and it is hoped will be working in two weeks.
- Building another prototype – 10 bar which is lower pressure to help minimise risk and failures.

Iceland Presentation: (Brian)

- In Swedish communities, district heating is preferable.
- A 'wet' system would be an uncommon technology in Sweden.
- If you want to invest in your home, H-CHP would be a good advantage but requires incentives in terms of Government policy such as Scottish Government setting minimum energy efficiency standards.

- Cost is an issue: a high initial cost and high fuel costs and part of the project will be to calculate these costs.
- The gasification boiler would heat 5-6 houses: a mini district heating system.
- Possible fuels: food waste, natural gas, biomass? Need a version on the market to test – to what extent do you collaborate with other projects in Europe? E.g Coben, e-Lighthouse Project?

Volter Presentation (by SW):

- Looking at electricity from wood
- Size 4m x 1.8 m can power three houses.
- Also, the outdoor version can go into a trailer.
- Agricultural units use biogas used with a regular combustion engine.
- Heat related calculations for small users – will look at developing later on.
- Can sell excess electricity to the retailer.
- 12 cents per KW hour is typical purchase price in Sweden.
- If you sell your excess electricity to the retailer e.g. solar PV– you have to buy from the same one.
- In North Sweden one of the companies has raised the cost for the grid above the others. Electricity price is high.

Esa Solamman Presentation:

- Inverter and LG battery pack don't speak to each other.
- Have to manage the design and supply so you can store heat and electricity in the home.
- Power grid options – choice of system may impact Government- wise
- Commercial power outage – the grid inverter has to be disconnected from the grid.
- Tesla are fitting power walls on a small scale - not cost efficient if prices are high.
- Operation of the systems must be considered when the Grid fails – Isolation is essential.
- Finland export some electricity to Russia and Norway – strong infrastructure.
- Getting off-the-shelf components to work together is difficult.

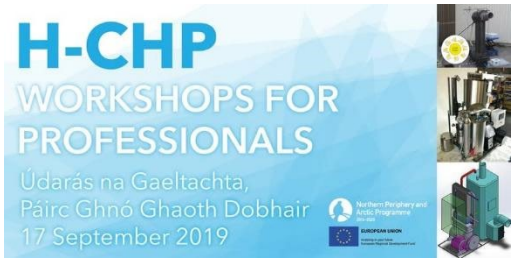
Supply Chain Issues Presentation: Brian

- When we looked at small scale biomass manufacturers, looking below the glossy brochure, 5 or 10Kw equipment did not exist at all or were at a less well developed state than this project.
- Buying pellets in Finland/Sweden is easy as most of the countryside is forest. 348m trees are planted every year. However, the issue will be supply chains in Ireland, Iceland and remote island communities in Scotland.

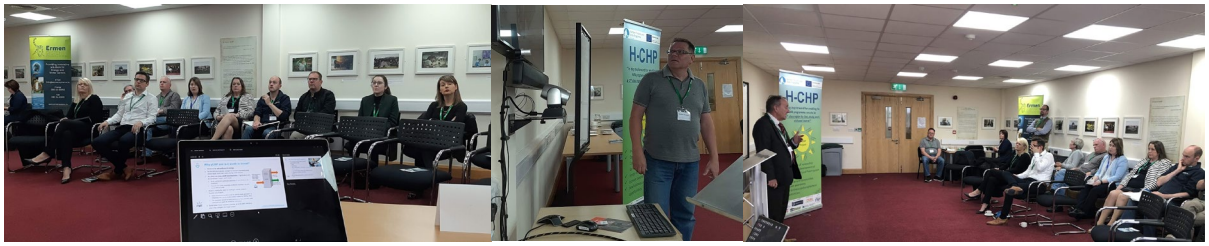
QUESTIONS / DISCUSSIONS:

1. Policies need to kick in to develop the market.
2. Education is needed – for the Installers – due to lack of awareness, understanding, etc.
3. Installers will need to know maintenance costs, accreditation, policies, etc, need to run in tandem.
4. Such as Shine 21 UK, used to train plumbers to install solar water heaters, which was really successful.
5. A Government top-down approach is needed?

6. We need fore-runners and pilots or things will stay the same.
7. Specifically trained people needed to make it “normal”, demonstrations, energy outreach and public education is needed.
8. Need to gain confidence for the marketplace with issues such as GDPR.
9. Swedish official policy – there is no fuel poverty.
10. Future issues to discuss: Public seminars on awareness raising to understand the technology and survey results published.



H-CHP Workshops for Professionals
Udaras na Gealtachta Business Park, Derrybeg, Gweedore, Donegal
17 September 2019



- Stewart Wilson opened the workshop, welcoming all in attendance.
- He gave an overview of the Project, what the Project has been analysing and better ways to run it.

Markku Kananen Presentation:

- Prototype based on steam engine.
- 3 – 6 Kw Electricity aiming to better meet the household demand in the NPA area.
- Cabinet size 600 x 600 x 1800
- Steam engine dimensioning notes can be sent out by Markku

Volter Presentation: (Stewart)

- One unit has served 32 apartments in one building. Can be used on small detached houses or buildings within close proximity.
- Consumers need to be free to use their preferred electricity supplier
- Only used for general purposes e.g. ventilation, street lights.
- If there is more electricity produced than needed, the surplus can be sold to utility companies.
- Volter's main customers are farms, industry, etc.
- Presentation is on the stick

Markku (Iceland) Presentation:

- Technology works on "syngas". Carbon monoxide mix, like old town gas.
- This kit is bigger and generally geared to more than one house.
- Cost is the main challenge and how the electricity to heat load works.
- It will be an issue to make it work in sparsely populated areas.
- There is no gas supply in rural areas.
- Organic waste could be looked at too. The technology is already there.
- Could we take the Sterling technology and bolt it on to existing systems cost effectively? The Sterling technology is relatively cheap.

Points of discussion:

- 50% of households use electric heating in the Western Isles – Why? Availability / Price / Culture?
- Storage heaters mostly.
- District network operator balances the grid and the retail arm sells the electricity on.

- Fuel poverty levels are high. People ration their energy use as they can't afford to heat.
- H-CHP could get that electricity load reduced.
- Would it not be more feasible to reduce on a wider scale your electricity generation? E.g. at community level? Regulations on electricity distribution are incredibly difficult to work round.
- SEAI will not give grants for oil in future – air source heat pumps only. Oil is no longer encouraged and use has dropped to 53%. If oil prices go up again, this will be a barrier to people heating their homes.
- Issues with rusting boilers difficult to overcome in Island communities.
- Moisture content of wood pellets also an issue.
- Wind turbine can be used instead of solar connection? Electricity produced by solar panels or micro-wind can be stored if the grid goes down, and can be used later.

Darren Cannan – Ermen Systems

- Magnetic water demineralisation treatment to prevent corrosion. Chemical Free.
- Installation – link it through the system. No need to drain. If the system is particularly corroded, it will need a chemical flush.
- Prices range from 750 to 1050 euros
- Talking to engineers, who are reluctant to engage. Approaching from the top down.
- Will increase the efficiency of the system: got a report from a hotel in Dublin who recorded a 42% saving on energy. Payback on that is less than a year for the hotel.
- Longevity of the boiler is being extended.
- Charlie noted: he saw this at Mitsubishi. Air source heat pumps need this or there will be severe maintenance problems.

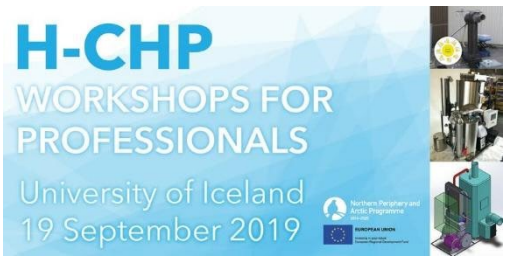
OAMK Presentation (Brian)

- Inverter does not comply with the battery
- Check before you buy a battery that it is compliant with the system.
- The Inverter has to be able to speak to the grid. Kit has to comply.
- Harder to get on the SSE grid in Scotland for community developments. Permission is needed for anything over 3.65.

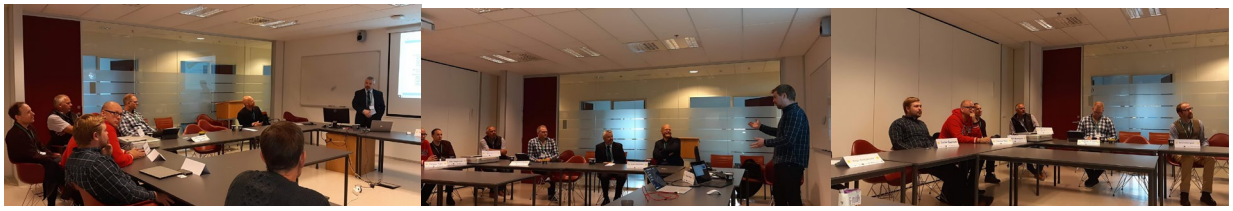
QUESTIONS / DISCUSSIONS:

1. SEAI introduced grants for CHP carried out in high rise flats and not well received.
2. Tried to encourage wood pellets in a whole estate and the pellets weren't available. It may have been too early for H-CHP then.
3. Electric vehicles: 40kw battery on wheels. Can be parked outside your house and with a connector, can connect the battery to charge the house- alongside the H-CHP system acting as if it were a PV cell.
4. It may be an attractive system in the Islands and the west coast.
5. Barriers to H-CHP: cost / supply chain insecurity / availability and constraints of deliveries of fuel.
6. Donegal County Council have studied this.
7. Scandinavian countries are far ahead of us due to higher percentages of forest cover.
8. It was thought that wood chip boilers would displace oil boilers.
9. Incompetent maintenance led to the industry getting a bad name in Ireland.
10. Education for the industry is important too.

11. Kirkwall District Heating Project – woodchip. Continual problems with fuel moisture content, etc.
12. Regulation and policy makers need to be approached. All solvable at regional levels.
13. The next stage will be public seminars and publishing the findings in the SPA areas.
14. Contact between the industry and the developers is essential.
15. Markku has talked to the Swedish company Inresol – not much co-operation as in administration.
16. Would like to have a prototype running to rent, loan or sell.
17. One unit currently being developed in Tipperary based on the Rankine system- but electrical output is less than 1 Kw
18. Some industry partners will be willing to advise us on setbacks, etc.



H-CHP Workshops for Professionals
University of Iceland
19 September 2019



- Stewart Wilson opened the workshop, welcoming all in attendance.
- He gave an overview of the Project and the challenges being faced.

Rúnar Unnþórsson Presentation

- Alternative fuels and gasification: waste separation – 3 bins per household in centre of Iceland – outer area only 2 bins.
- Heat exchangers used for showers, etc.
- Using hot air to top it up.
- 50kg of ash waste per tonne of feed pellets.
- Mixing our own pellets.
- Look at other waste, e.g. newspapers. Plastics melt
- All household waste is separated in Norway. Plastic, food and wood is removed. The rest is compressed and moved to Sweden to burn.

(Christiaan Richter comments)

- Paper briquette not easy to burn. Pellets in Iceland were tried – they fell apart.
- This is why gasification should be looked at.
- Suggested to Christiaan to come to the Western Isles next year.
- High cost to Local Authority to transport waste to Stornoway from the southern Isles and the footprint of the trucks is huge.

Saethor at Icewind's Presentation:

- Works during normal grid times
- You can buy a grid timer built in. Can tell it not to feed into the grid.
- No legislation for new build in Iceland
- Inverter has automatic switch-off.
- Legislation can be very slow – need politicians to change the agenda.

OAMK Finland Presentation (Stewart)

- Need a fourth option – so you don't feed into the grid?
- Disconnect from the grid?

Supply Chain Issues (College video)

- Conclusions page: add gasification as a point?

QUESTIONS / DISCUSSIONS:

1. Is it possible to get more waste from households? Yes – would need to be dried.
2. Seaweed? High water content. – needs to be dried.
3. Use of H-CHP in addition with solar and gasification?
4. Prototypes – 50k US Dollars to supply 5 homes.
5. 20kw electricity / 3 kw per house? Would run most appliances in the background.
6. Would still need energy from the grid
7. Electric cars – used to charge and discharge ?
8. Hybrid? E.g. hydrogen ferry being looked at in Point. Ferry to Icelandic islands is electric. Hydrogen buses in Orkney.

H-CHP Workshops for Professionals
Tighean Innse Gall, Stornoway
26 September 2019

- Stewart Wilson opened the workshop, welcoming all in attendance.
- He gave an overview of the Project and the challenges being faced.
- Oulu/OMAK leading project, production and evaluation
- Iceland University – looking at gasification systems
- Lulea – looking at controllers
- Ireland – dealing with the communications package
- UHI – assessment and evaluation
- Associate partners – PSDT and Woodland Trust.

Different technologies being looked at:

- Stirling
- Steam
- Organic Rankine
- Thermoelectric
- Gasifier and combustion
- Fuel cell
- Tesla turbine

Opening discussion:

- Important in the European context to realise everything is not the same as us. UHI has done a lot of work trying to find out what other countries' needs are.
- Icelandic engineers are looking at developing the use of plastics as a fuel.
- Icelandic waste disposal contractor was at that workshop and his local government are concentrating on how to use waste as a fuel.
- Gas unit 91Kw efficiency is 42%.

Volter Presentation: (Brian)

- One unit has served 32 apartments in one building. Can be used on small detached houses or buildings within close proximity.
- Consumers need to be free to use their preferred electricity supplier
- Only used for general purposes e.g. ventilation, street lights.

- If there is more electricity produced than needed, the surplus can be sold to utility companies.
- Volter's main customers are farms, industry, etc.
- Presentation is on the stick

Murdo Murray – comments:

- In terms of the units, if more effective on a larger scale, it would tie in with Scottish Government heat networks.
- The bolt-on part could be good for Western Isles houses and could be the way forward, e.g. solar panels for summer.
- Liked the concept of the Stirling engine.
- Is hydrogen an option? BW replied this is a biomass fired project and the rationale is for remote communities. The advantage of the supply chain in Finland, Norway and Sweden is the land mass of trees.

Andrew Mackenzie – comments:

- In the manufacture of CHP systems, there is not one unit that will do one type of house.
- Significant that you can't buy just one.

Iain Morrison:

- If we take peat out of the equation we don't have biomass – do we have to import?
- Seaweed as an option? UHI looking at uses of seaweed.
- Iceland has cheap electricity from geothermal production
- The fuel has to be specific to each area.

Giuseppe: Legislative Framework:

- It will take a minimum of six months to certify a new bit of equipment esp for MCS.
- H-CHP certification will be the BB Agreement – the only board in the UK that can accredit it.
- Then another six months for us to certify the kit.
- People may be able to claim ECO when they install them, through the Innovation Fund. The utility companies have 15% of their overall obligation towards innovation.

OAMK Finland Presentation:

- Possibility of having a separate DC network in the home?
- There are no DC home appliances in Finland.
- DC appliances in the home have to be plugged in to an AC adapter.
- There may be an opportunity to install DC adapters here?
- This was discussed with regard to the pilot but various issues prevented it as an option going forward.
- 230 volts for AC is an effective power voltage.
- Can be changed to 200 DC easily.
- Challenge would be how to store the energy in the batteries.

Andrew Mackenzie comments:

- This is getting complicated – is this for us?
- Current electricity network is reliable. Referred to Page 5 of his handout.
- If you connect to the grid, you will need a competent installer and apply to SSE for a connection.

- In our case, the option we're talking about is under 16 Amp.
- Straightforward for a one-phase system.
- Same process for PV system or H-CHP.
- No single house would generate enough electricity to need storage or export.
- Electric cars can be used to discharge electricity too.
- Transferring the heat into other forms of energy will lose the heat right away.
- Above 3.68 Kw can be fed back into the grid
- There are three steps after that.
- You have to apply to SSE for anything over 11 Kw
- If the grid can take that, they will give you a licence.
- Are you going to have your boiler on all the time? No = so you will have no power.
- The H-CHP unit will be tailored for winter here.
- For summer, you will have to find a compromise.
- If you shut down the unit when you don't need it, you won't get payment for it. The unit needs to be kept on to generate the funding.
- With the northern partners, their winters are colder and longer than ours and biomass makes more sense there. They also have the fuel on their doorstep.
- The gasification system, downscaled, seems more viable here.
- Greenland is looking at solar power plus cold resistant wind turbines – not looking at H-CHP at all.
- Will we be changing the burners on the system to match each area? Gasification parts are fixed in what they can use – difficult to adjust the heat settings for other fuel types.
- Bigger productions can be "daisy chained" for larger systems.

QUESTIONS / DISCUSSIONS:

1. The experience in the Western Isles of biomass isn't particularly good.
2. Fluctuations of price and sourcing of pellets, plus transport issues and costs.
3. More appropriate for larger installations.
4. Highlights there is a need to look at specific scenarios: some with solar, electricity, oil, etc, for individual scenarios in the Western Isles.
5. The project has some way to go to looking at the various bits of equipment and configuring these to house types.

Workshop brochures – Note, these were translated for each workshop into regional languages

H-CHP
WORKSHOPS FOR PROFESSIONALS

Lapland Hotel,
Oulu, Finland
9 September 2019

UNIVERSITY OF OULU
KERTTU SAALASTI INSTITUTE
FMT
FUTURE MANUFACTURING TECHNOLOGIES

Workshop Schedule

09.00 – 09.15	Arrivals and registration
09.15 – 09.30	Introductions
09.30 – 10.00	Outline of H-CHP concept
10.00 – 10.30	Presentation of equipment
10.30 – 10.50	Q & A with engineers
10.50 – 11.10	Coffee break
11.10 – 11.30	Legislative framework and permissions
11.30 – 11.50	Network arrangements
11.50 – 12.10	Supply chains and potential for fuel
12.10 – 12.30	Roundtable discussion
12.30 – 13.30	Lunch and close

Työpajan aikataulu

09.00 - 09.15	Ilmoittautuminen
09.15 - 09.30	Esittely
09.30 - 10.00	H-CHP-konseptin kuvaus
10.00 - 10.30	Laitteiden esittely
10.30 - 10.50	Q & A insinöörien kanssa
10.50 - 11.10	Kahvitauko
11.10 - 11.30	Lainsäädäntökehys ja käyttöoikeudet
11.30 - 11.50	Sähköverkkoon liitettävyys
11.50 - 12.10	Toimitusketjut ja polttoaineen saatavuus
12.10 - 12.30	Pyöreän pöydän keskustelu
12.30 - 13.30	Lounas ja tilaisuuden päätös

About the workshops

The purpose of our workshops is to raise awareness of Household Combined Heat and Power (H-CHP) and to engage with stakeholders. Professional stakeholders will be able to gain an understanding of H-CHP, feed into the programme and support its development. We aim to engage those with an interest in CHP at a household and community level, considering energy production and reduction in the home, use of biofuels, synthetic gas and promote new and current supply chains.

H-CHP can revolutionise energy use in the home, particularly for those who are off grid or in remote and sparsely populated areas. H-CHP is a tool in the fight against climate change.

The workshops will cover:

- Presentation of H-CHP concept
- Presentation of H-CHP equipment
- Meet the engineers and project team
- Results from testing of gasification
- Results from H-CHP units
- Use of H-CHP
- Feed into Toolkit development
- Feed into Community Guide development
- Open source access to H-CHP design

The workshops will be essential for:

- Energy companies
- Regulators
- Municipalities
- CHP companies / manufacturers
- Fuel suppliers of biomass
- Academics
- Architects
- Engineers
- Energy efficiency specialists

There will be an opportunity to question engineers from the H-CHP team in person and by VCR during the workshops. Equipment will be made available in physical and virtual form. The team are developing a toolkit and community guide. The workshops will give an opportunity to feed into these, to ultimately benefit the communities which you serve.

Tietoa työpajoista

Työpajamme tarkoituksena on lisätä tietoisuutta kotitalouksien lämmön ja sähkön yhteistuotannosta sekä tehdä yhteistyötä sidosryhmien kanssa. Ammatilliset sidosryhmät saavat käsityksen H-CHP:stä, voivat antaa palautetta sisällöstä ja tukea kehittämistä. Tavoitteenamme on aktivoida CHP:stä kiinnostuneita kotitalouksia ja yhteisöjä, jotka pohtivat energiakulutuksen vähentämistä, ja ovat kiinnostuneita biopolttoaineiden ja synteettisten kaasujen käytöstä energialähteenä, sekä haluavat kehittää uusia ja nykyisiä toimitusketjuja.

H-CHP voi mullistaa kotitalouksien energiankäytön etenkin niille, jotka asuvat syrjäisillä ja harvaan asutuilla alueilla, tai eivät kuulu sähköverkkoon. H-CHP on väline ilmastonmuutoksen torjunnassa.

Työpajat kattavat:

- H-CHP-konseptin esittely
- H-CHP-laitteiden esittely
- Projektiryhmän tapaaminen
- Kaasutuksen testauksen tulokset
- H-CHP-yksiköiden tulokset
- H-CHP: n käyttö
- Mahdollisuus antaa ehdotuksia työkalupaketin kehittämiseen.
- Mahdollisuus antaa ehdotuksia oppaiden kehittämiseen.
- Avoimen lähdekoodin käyttö H-CHP-suunnitteluun

Työpajat ovat välttämättömiä seuraaville:

- Energiayhtiöt
- Viranomaiset
- Kunnat
- CHP-yritykset / valmistajat
- Biomassan polttoaineen toimittajat
- Tutkijat
- Arkkitehdit
- Insinöörit
- Energiatehokkuuden asiantuntijat
- Energiatehokkuuden asiantuntijat

Työpajojen aikana on mahdollisuus tehdä kysymyksiä H-CHP-tiimin insinööreille joko henkilökohtaisesti tai tallenteena. Laitteet ovat esillä fyysisesti tai virtuaalisesti. Projektissa kehitetään työkalupakettia ja soveltamisopasta yhteisöille. Työpajoissa on mahdollisuus tehdä ehdotuksia työkalupaketin ja oppaan sisältöihin jotta ne palvelisivat parhaalla mahdollisella tavalla niiden käyttäjiä.

About the Project

The purpose of the project is to promote the uptake of household (micro) combined heating and power systems (H-CHP) using solid renewable biomass and gasification methods that will be appropriate for remote households.

The Northern Periphery Area has abundant natural fuel resources but is subject to a harsher climate than the rest of Europe and this results in the need for increased domestic energy. Attempts to exploit natural energy resources for households has been mixed.

Our project analyses the energy needs of remote households in the region. The available fuel is mainly solid which is unsuitable for existing gas CHP. We propose a new affordable solution that uses local renewable solid biofuel in a small-scale micro CHP system. The advantage of this approach is that all fuel used is carbon neutral, transport costs are minimal, and there are reduced CO2 emissions. This helps with carbon legislation compliance, reduced transmission losses from the grid, and the electricity-to-heat production ratio is a good match for our colder parts of Europe.

Tietoa hankkeesta

Hankkeen tavoitteena on edistää syrjäseutujen kotitaloukille sopivien kiinteää uusiutuvaa biomassaa käyttävien yhdistetyn lämmön- ja sähköntuotantojärjestelmien (H-CHP) käyttöönottoa.

Pohjoisella periferia-alueella on runsaasti energiavaroja. Ilmasto on karumpi kuin muualla Euroopassa jolloin energian tarve on suuri. Tavoitteena on hyödyntää saatavilla olevia energiavaroja monipuolisesti.

Projektimme analysoi alueen haja-asutetuilla seuduilla olevien kotitalouksien energiantarpeita. Käytettävissä oleva polttoaine on pääasiassa kiinteää, joka ei sovellu olemassa olevaan kaasulla toimivaan CHP-järjestelmään. Ehdotamme uutta edullista ratkaisua, jossa käytetään paikallista uusiutuvaa kiinteää biopolttoainetta pienimuotoisessa mikro-CHP-järjestelmässä. Tämän etuna on, että kaikki käytetyt polttoaineet ovat hiilineutraaleja, kuljetuskustannukset ovat vähäiset ja hiilidioksidipäästöt pienemmät. Tämä auttaa noudattamaan hiilidioksidilainsäädäntöä ja vähentämään sähkönsiirron aiheuttamaa hävikkiä sähköverkoissa. Lisäksi järjestelmän sähkön ja lämmön tuotannon suhde on sopiva Euroopan kylmemmille alueille.

Our project partners are / Hankekumppanimme ovat:

Oulun yliopisto – Suomi – (FI)
Oulun ammattikorkeakoulu Oy – Suomi (FI)
Tighean Innse Gall – Scotland (UK)
Lews Castle College – UHI – Scotland (UK)
Luleå tekniska universitet - Sverige (SE)
Energy Action - Ireland (IE)
Háskóli Íslands - Ísland (IS)

Associated Partners / Yhteistyökumppanit:

Point & Sandwick Trust (UK)
The Woodland Trust Scotland (UK)
Vuolux Oy (FI)

The project is funded by the Northern Periphery and Arctic Programme 2014-2020 of the European Union.
Hanketta rahoittaa Euroopan unionin pohjoinen periferia ja taiteellinen ohjelma 2014-2020.

Biographies of Presenters

Dr. Alasdair MacLeod

Alasdair Macleod is a Senior Lecturer in Energy Engineering at Lews Castle College, Stornoway, part of the University of the Highland and Islands, and has a PhD in Physics from the University of Strathclyde. He is the UHI BEng Energy Engineering programme leader and lectures on the following topics: Renewable Energy Generation, Conventional Energy Systems, Wind Energy, Mechanical Engineering Applications, Control and Instrumentation, and Future Energy. He supervises a number of PhDs on the topic of hydrogen and is involved in a number of European and national projects focused on renewable energy.

Andrew MacKenzie

Andrew is a Chartered Electrical Engineer with a degree in Electrical & Electronics Engineering and a PGCE (FE). He lectures at the University of the Highlands & Islands in Energy Engineering and Quality systems and is Hon Secretary for Institution of Engineering and Technology, Scotland North Local Network.

Before that he worked in the Oil Industry as a Field Seismologist, Computer Engineer and Graduate Trainer in many regions around the world. He, latterly, was Head of Strategy in the Local Authority in the Western Isles, was part of the Senior Management Team and Chairman of the Strategic Risk Management Group.

He is on the Board of the award-winning Point and Sandwick Trust that manages a 9MW Community Wind Farm outside Stornoway.

Brian Mcsharry

Brian was appointed CEO of Energy Action in January 2017. Before that he worked with the Department of Energy in Dublin in a number of roles including electricity, all-island energy market, finance and strategic management. He has a Bachelors degree in Political Science and a Masters in Policy Studies from Trinity College Dublin. His thesis examined energy efficiency in the Irish domestic sector. Brian served as a voluntary member of the Board of Directors of Energy Action from 1995-2007.

Biographies of Presenters

Brian Whitington

Brian is the corporate strategy and projects coordinator for Tighean Innse Gall (TIG), a not for profit organisation run primarily for the benefit of the Outer Hebrides' community at large.

Brian has 20 years of experience of developing and working on community-based energy across all four of the countries of the UK and within European projects. He is unique in the UK for being a teacher in adult education with a specialism (PGCE) on energy efficiency in a community context. He holds a masters in public administration from the University of London.

Catherine Anne Smith

Catherine joined TIG in 1995 as a part-time Admin Officer and was promoted to full-time Office Manager in 2000. Her duties within TIG include HR management, assistant to the CEO and Management Committee, and Health & Safety Administrator, implementing policies and procedures to ensure health and safety compliance within the organisation. Catherine is responsible for operations of H-CHP within TIG.

Catherine is also a Board Member of Point & Sandwick Development Trust who provide funding and assistance to groups within the local community from the proceeds of their community windfarm. TIG also works closely with the Development Trust delivering their LED community project.

Charles Roarty

Charles is an Energy Consultant with Energy Action and was CEO and Company Secretary up to December 2016 managing Energy Action since 1990, and would have been the principal driver of fuel poverty policy in Ireland, and has helped to establish 24 Community Projects nationally to deliver a similar energy efficiency service in their local area. Previous to this, he would have 20 years experience working in the steel, motor, chemical and banking industry in Ireland and Scotland as an accountant. He is a graduate of Caledonian University, and also a graduate of Maynooth University in Community and Social studies.

Since 1991, Energy Action has been a partner in 27 European projects, 4 INTERREG projects and he has been involved in all and been the legal representative for most of them. Energy Action are currently involved in 4 European projects as partner or on the advisory Board.

He has been responsible for Energy Action publishing a number of reports including Homes for the 21st Century - The Costs & Benefits of Comfortable Housing for Ireland, also Energy Conservation & Job Creation in the Domestic Sector, and Mapping Fuel Poverty in the Republic.

Biographies of Presenters

Giuseppe Petricca

Giuseppe Petricca, 32 years old, from Italy, has come to Lews Castle College, University of the Highlands and the Islands to complete his study cycle, culminating in an Honours Bachelor's degree last year, and preparing a Master in Research for the next. The projects in which he is involved range in the categories of Renewable Energies and Energy Distribution, with focus on the applications of Smart Grids in little and/or remote communities. Among them, the two biggest are a Model of the entire Western Isles Energy Grid and an extensive simulation process for the adaptation of H-CHP in small communities.

Markku Kananen

Markku is a project manager in the University of Oulu, Finland. He has over twenty years' experience as a professional engineering designer within both the private and public sector. Projects include interdisciplinary projects e.g. instrumentation of space crafts and stiff-in-light industrial products. His current project aim is to promote the uptake of CHP systems using solid renewable biomass and gasification methods in a small scale.

Markku Korhonen

Markku Korhonen was born in Finland in 1956. He received the B.Sc. Eng. and M.Sc. Tech., degrees from Raahe Institute of Computer Engineering and University of Oulu, Finland, in 1981 and 1994, respectively.

He joined Datamic Ltd. later Ahlstrom Automation Ltd, Raahe, Finland, in 1981. Between 1994 and 2001, he worked for Rauturuukki Ltd. and Nokia Corp. Since 2001 he has been with the Oulu University of Applied Sciences, Oulu, where he is currently a Senior Lecturer having responsibility of R&D projects in Energy and Automation department. His main areas of research interest are renewable energy systems.

Rúnar Unnþórsson

Rúnar Unnþórsson is a professor of engineering at the University of Iceland and the Dean of the Faculty of Industrial Engineering, Mechanical Engineering and Computer Science. His research is in the field of design, development and improvement of integrated systems. Runar is currently working on development of a methodology and hardware for gasification of organic waste and the production of heat and electricity. The solution is integrated heat and electricity generation and fuel organic waste.

Biographies of Presenters

Sanna Salomaa

Sanna has been working as a project manager for the University of Oulu since April 2018. She manages some the administrative and financial tasks for the Future Manufacturing Technologies research group, as well as the communicational and organizing responsibilities. Sanna also organizes the FMT research group's public seminars. She received her M.A. degree in Cultural Anthropology from the University of Oulu in January 2018.

Stewart Wilson

Stewart Wilson is CEO of Tighean Innse Gall (TIG), a not for profit organisation run primarily for the benefit of the Outer Hebrides' community at large.

Stewart's background is specialist Architectural Building Science consultancy assessing building performance particularly in the domestic and commercial sectors across the UK, Europe, Canada and the USA. He is a certified member of the Association for Project Safety with over 25 years' experience in construction, energy efficiency, housing development, building performance, health & safety and fuel poverty issues.

Torbjörn Ilar

Torbjörn is an associate professor at Luleå University of Technology, Sweden. He has more than 25 years of experiences in the development and performance of industrial driven research project at the division in the field of laser processing and modeling of manufacturing systems. This includes both technical research project and education project and has in many cases been multi-disciplinary, multi country and/or multi culture projects. The research during the last year has shifted more towards energy application including development of steam expander for waste steam application and the ongoing H-CHP project. The research also includes productivity assessments and manufacturing system development for construction industry.

Northern Periphery and Arctic Programme 2014-2020

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Full Attendance List at H-CHP Workshops

NAME	ORGANISATION	STATUS
Esa Silomaa	OAMK	University - partner
Mika Puirava	FMT	University - partner
Jani Kumpula	FMT	University - partner
Sanna Salomaa	FMT	University - partner
Heikki Ollila	OAMK	University - partner
Markku Korhonen	OAMK	University - partner
Markku Kananen	FMT	University - partner
Jarno Haapakoski	Volter	Private Sector - energy
Pekka Pääkkönen	City of Oulu	Government – municipality
Sanna Hiltunen	OAMK	University - partner
Ari Mickos	Sievin	Private Sector - business
Paaso Keinänen	Business Oulu	Private Sector - business
Torborn Ilar	Lulea TU	University - partner
Andreas Johansson	Energikontor Norr	Government – energy agency
Silva Herrmann	Jokkmokk	Government - municipality
Peter Paolo	Kirunen	Government - municipality
Alma Gallagher	Clar ICH Mayo	Private Sector – energy
Terence Gallagher	Premier Insulation Solutions	Private Sector – energy
Nick Timmons	Letterkenny Institute of Technology	University – interested department
Ben Graham	Letterkenny Institute of Technology	University – interested department
Aodh Mac Sibhne	Udaras	Public Sector – community group
Aisling Nic Aoidh	Udaras	Public Sector – community group
Heather Young	Derry Strabane City Council	Government – municipality
Cathal O Gallchóir	Eircom	Private Sector – energy
Harry Burke	Energy Action Ireland	Public Sector - partner
Maura Walsh	IRD Duhallow	Public Sector – community development and energy
Darren Cannon	Ermen Systems	Private Sector – Energy Company
Colm Rigney	Ermen Systems	Private Sector – Energy Company
Ivan Sproule	Community group	Public Sector – community group
John Carty	Enerpower	Private Sector - energy
Charles Roarty	Energy Action Ireland	Public Sector - partner
Micheal O Daibhir	Udaras	Public Sector – community group
Finola Fleming	Clar ICH	Private Sector - energy
Runar Unnphorsson	University of Iceland	University - Partner
Pàll Reynisson	Private business	Private sector - business
Birgir Kristjánsson	Islenska Gamafelagid	Private Sector - environmental management services
Unsure name	Seltjarnarnes Municipality	Government – municipality
Christiaan Ricther	CPR, U of Iceland	University - partner
Gudsleg Sigjonssen	Reykjanesbær Municipality	Government – municipality
Saethor Asgeiss	Icewind	Private Sector - energy
Brendan Harty	SB Architects	Private Sector - architect
Sturart Bagshaw	SB Architects	Private Sector - architect
Murdo Murray	Local Energy Scotland	Government – Scotland
Donald Thomson	CnES	Government – municipality
Iain Morrison	Quantity Surveyor	Private Sector – building trades
Christian Wagner	Private citizen	Private citizen
Stewart Wilson	TIG	Public Sector - partner
Brian Whitington	TIG	Public Sector - partner
Catherine Anne Smith	TIG	Public Sector - partner
Matthew Hebditch	TIG	Public Sector – surveyors

David Macphail	TIG	Public Sector – surveyors
Andrew Mackenzie	UHI	University - partner
Alex Durie	Fraser Architecture	Private Sector - architect
Giuseppe Petricca	UHI	University - partner
Angus Murray	UHI	University – interested department