HANDIHEAT Final Conference
Energy Transition in Rural Areas
Online – Hosted by NIHE
Belfast
Northern Ireland

Evidencing excellence

BEST-PRACTICE & OPPORTUNITIES FOR BETTER ENERGY RESOURCE UTILIZATION

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AGENDA

- [WP 1.1] Research problem and idea
- [WP 1.1.1] Evidencing excellence
- [WP 1.2.1] Gap analysis
- [WP 1.3.1] Fuel mix report
- [WP 1.4.1] Underutilized resources & opportunities
- [WP 1.1] Conclusions

”The Cottage” in East Iceland (CC BY-NC 2.0 Alex Berger)

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[WP 1.1] Research problem and idea

Problem

- Energy legislation accommodates the needs of population centers in NPA
- Rural and sparsely populated areas left behind
- Fuel inequity remains a challenge for rural areas

Idea

- What examples for successful energy initiatives exist in rural NPA areas?
- What made these initiatives successful (i.e. drivers gaps)?
- What is the present state fuel mix in the NPA regions?
- What opportunities exist for improving the present state?

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[WP 1.1.1] Evidencing excellence

Method:

- Multiple case study approach allows for investigating: ”sticky, practice- based problems where the experiences of the actors are important and the context of the action is critical” (p. 370 Benbasat, Goldstein, and Mead 1987)
- Case identification based on snowball/ chain approach (Patton 2002)
- ”ask people who know people who know what cases are information rich, that is good examples for study” (p. 243 Patton 2002)
- Case selection was for ”deviant” or extreme cases (Miles and Huberman 1994)
- Data collection based on semi-structured questionnaires, documents, and interviews

[WP 1.1.1] Evidencing excellence

Vignettes:

(V01) Geothermal - district heating
(V02) Hydro - district heating
(V03) Lava, fish residue, sea water - central heating
(V04) Housing refurbishment
(V05) Anerobic digestion
(V06) Empowering Rural Communities
(V07) LED lighting project
(V08) Dairy processing evaporator
(V09) Better Energy Program
(V10) Carbon Management
(V11) Tidal turbines
(V12) Waste burning -District heating
(V13) Energy certificates residential
(V14) Biogas farms

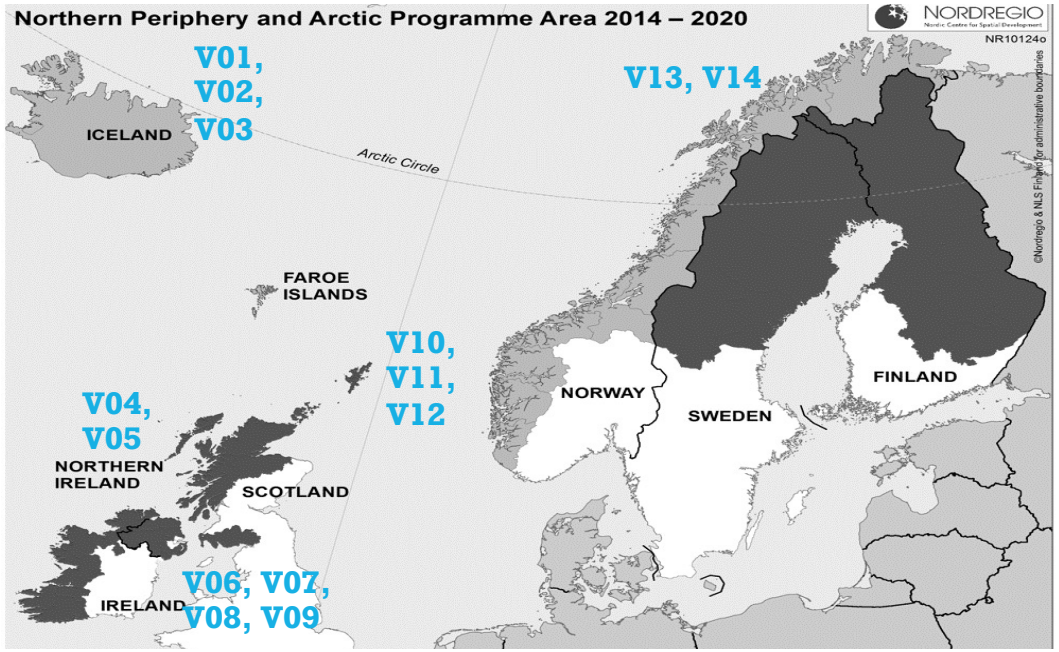

Fig. 1 Overview of the vignettes from the NPA region (modified © Nordregio and NLS Finland)

[WP 1.1.1] Evidencing excellence

Iceland		
Vignette	Driver(s)	Problem(s) solved
(V01) Geothermal central heating	• Fossil and coal prize • High temperature geothermal fields • "Grassroots" innovators	• Removal of coal stoves and diesel generators in Reykjavik, remote villages, and farms • Less cases of respiratory illnesses
(V02) Electric district central heating	• Fossil and coal prize • Hydropower and backup generators • "Grassroots" innovators	• Removal of coal stoves and diesel generators in remote villages
(V03) Lava, fish and sea water central heating	• Fossil and coal prize • Lava, fish processing, and sea water • "Grassroots" innovators	• Power and heat for 4.300 homes
Northern Ireland		
Vignette	Driver(s)	Problem(s) solved
(V04) Housing Executive	• Climate change concerns • Fossil fuel prize • Grant schemes • "Top-down" governmental initiative	• Reduction in energy consumption in thousands of social housing units
(V05) Anaerobic digestion	• Climate change concerns • Fossil fuel prize • Grant schemes • Use of biodegradable waste • "Grassroots" corporate innovators	• Power and heat for 13.900 homes

[WP 1.1.1] Evidencing excellence

Republic of Ireland		
Vignette	Driver(s)	Problem(s) solved
(V06) Sustainable Energy Communities Network	• Climate change concerns • 300 networked communities • Initiated by national government • Top-down and bottom-up	• Completed thousands of small-scale projects • 21.350 home energy upgrades in 2018
(V07) Dublin Airport carpark lighting project	• Climate change concerns • New LED lighting • Government grant • "Grassroots" corporate innovators	• Reduced energy consumption by approximately 3,750,000 kWh
(V08) Dairy farming	• Climate change concerns • Fossil fuel prize • Grant schemes • "Grassroots" initiative local farmers	• 20% reduction in carbon emissions from evaporator plant
(V09) Better Energy Program	• Climate change concerns • Fossil fuel prize	• Reduction of energy consumption in 25 homes

[WP 1.1.1] Evidencing excellence

Shetland Islands		
Vignette	Driver(s)	Problem(s) solved
(V10) Shetland Island Council – Carbon management	• Climate change concerns • Government and European Union funding •	• Developed the hydrogen production lifecycle strategy • Carried out several sustainable projects on public property
(V11) Tidal turbines	• Climate change concerns • EU project and national funding • Wave and tidal resources	• Provide power for 30 homes, a port, and a freezing facility
(V12) Waste burning district heating	• Reduce amount of unrecyclable waste • Provide heating • Reduction of fossil fuel consumption	• Plant burns over 23,000 tons of waste per year • Generates 7MW of thermal power
Finland		
Vignette	Driver(s)	Problem(s) solved
(V13) District heating and energy certification	• Climate change and economical concerns • Governmental initiative	• Energy efficiency has become an integral part of a buildings value • District heating established in most large towns
(V14) Biogas farms	• Fossil fuel prize • Use of biodegradable waste • "Grassroots" corporate innovators • Research and practice collaboration	• Farms collaborate to produce heat and power • New concept of agroecological symbiosis • Start-ups selling biogas services and products

[WP 1.2.1] Gap analysis

Idea:

- Understand how the drivers behind the „vignettes“ are similar or different
- Apply Rogers DOI (Diffusion of innovation) theory as a framework
- DOI explains "*the process through which an innovation is communicated through certain channels over time among the members of a social system*" (Rogers, 2003 p.23)
- DOI postulates that individuals exist along a spectrum ranging from technological "innovators" to "laggards"
  (1) Innovators - who are venturesome, educated individuals having multiple information sources
  (2) early adopters – who are popular, educated, social leaders
  (3) early majority – deliberate individuals having many informal social contacts
  (4) late majority – sceptical and traditional individuals having lower socio-economic status
  (5) laggards – Individuals whose neighbours and friends are the main source of information and who have a strong fear of debt (Rogers, 1995).

Results

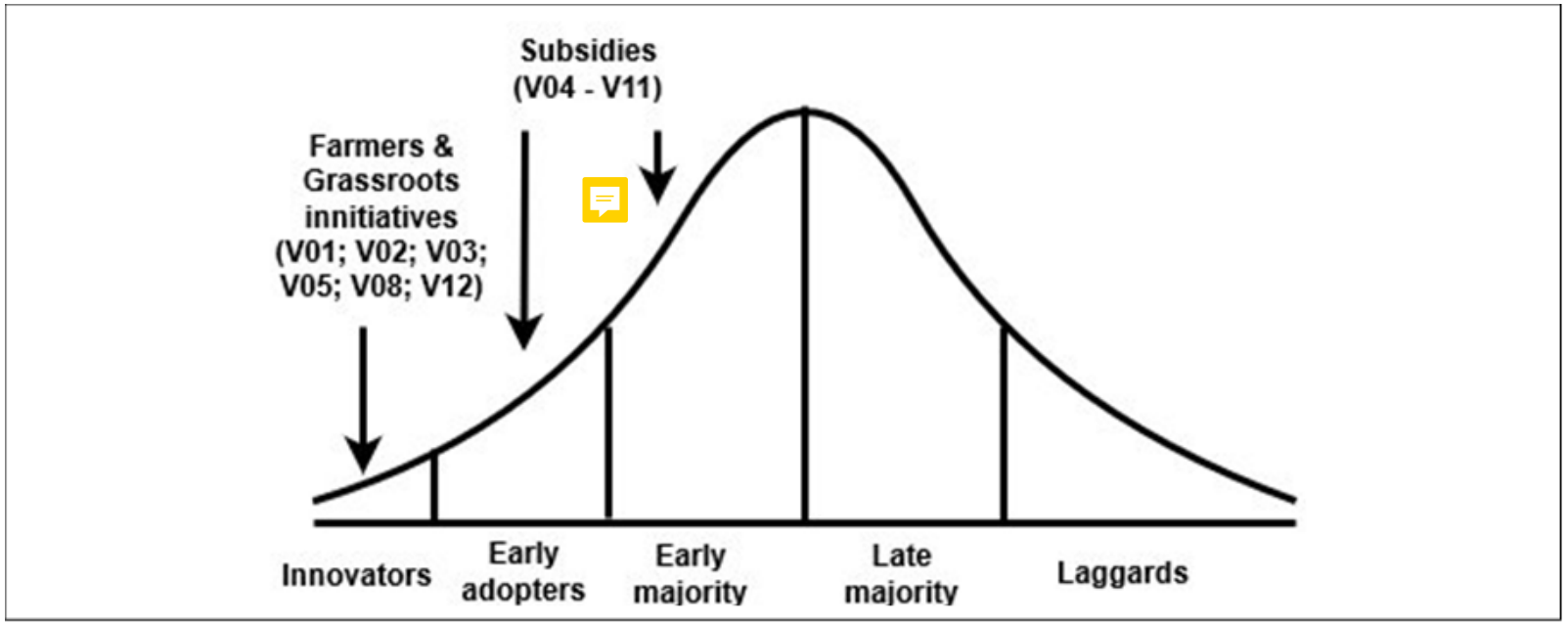

Fig. 2 Diffusion of Innovation in NPA (modified Rogers 1962)

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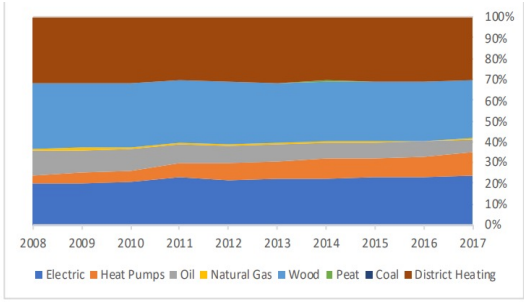
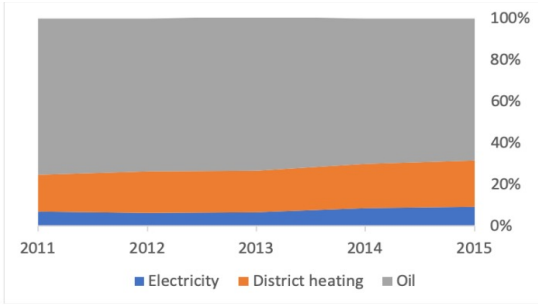
[WP 1.3.1] Energy mix – Domestic space heating by energy source

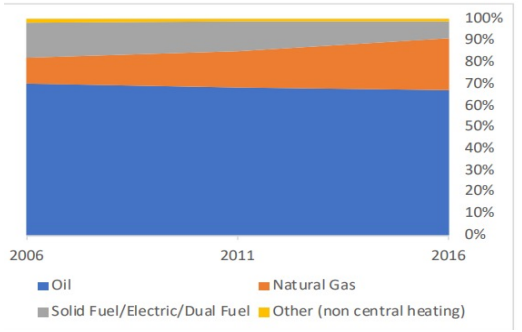
(a) Finland



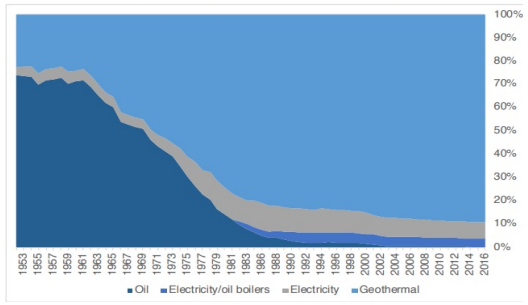
(b) Greenland



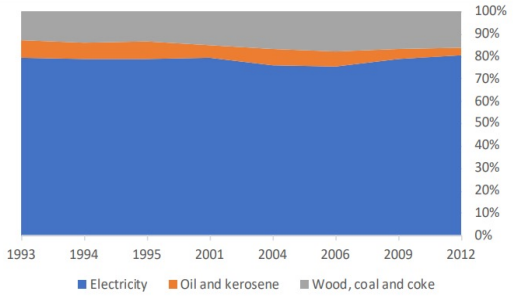
(c) Northern-Ireland



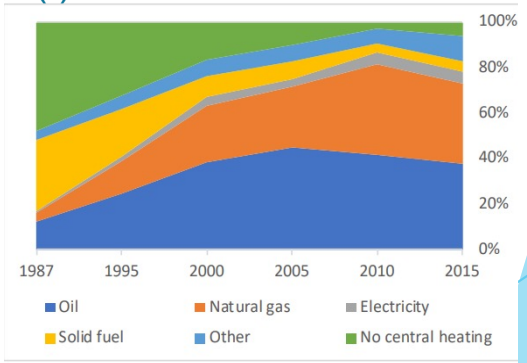
(d) Iceland



(e) Norway



(f) Ireland



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[WP 1.4.1] Underutilized resources & opportunities

Country	Vignette	Type of resource	Underutilized power
Iceland	01	Industrial waste energy	20MW
	02	Medium enthalpy geothermal	70MW
	03	Rural electricity transmission	na
	04	Tidal wave power	80MW
	05	Small scale hydropower plants	1600MW
Ireland	06	Group Water Scheme -solar power	na
	07	Better energy communities	na
Finland	08	Biogas	16TW
	09	Wood pallets	23000-28000MW
	10	Flue gas heat recovery	3.4TW
	11	Solar PV in apartment buildings	1094MW
Northern Ireland	12	Electrification of heating off the gas grid	na
	13	Utilize wind curtailment	na
	14	Utilize generation and storage householders	na
	15	Biofuel for oil boilers	na
Scotland	16	Scottish transmission grid	na
Sweden	17	Pelletized magnetite ore energy in Kiruna	na
	18	Steel manufacturing excess heat radiation	90-130 GWh
Faroe Islands	19	Wind power	na

[WP 1.1] Conclusions

- Many examples for innovative energy practice identified in the NPA region
- Multitude of different drivers for the initiatives (i.e climate change concerns, prize and availability of fossil energy source)
- Multitude of regional problems have been solved (reduction of energy consumption and emissions, and positive health outcomes for people~~,~~…)
- Frequently in~~n~~itiated by innovative individuals or groups independen~~d~~ of government initiatives
- The fuel mix ~~of~~ for domestic heating in the regions differs considerably depending on resource availability but learning across regions appears still possible
- Many opportunities to harvest underutilized energy resources in the NPA region
- range from industrial waste energy to improvements in transmission grids to the installation of hydro and tidal power plants

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Thank you!

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Q&A?