

Local & community energy: what, why, how?

NZWEA, May 2019, Wellington

a.harnmeijer@auckland.ac.nz

@AnnaHarnmeijer

What is local & community energy?

Any energy activity that is

i) Managed in an open and participative way

ii) That has positive local and collective outcomes

Diverse..

- Technologies, scales of deployment
- Finance, ownership and delivery models, legal & organisational structures
- Needs, motivations
- Extent of participation.

“Self consumption” projects

Project type	Description	Technologies	Avg Scale	Charitable	Where?
Facility projects	Charitable organisations supplying heat or power to community facilities	solar PV, micro-wind, ground/air-source heat pump, solar thermal, woodfuel boilers, (hydro)	<u>15</u> kW	Most	Many
Social enterprise – microgeneration projects	Energy provision for residential and facility buildings, serving as additional income generation for local NGO’s with another primary activity	solar thermal, solar PV, ground/air-source heat pump, wind, woodfuel (hydro)	65kW	Most	Many
Micro-grids	Fully integrated generation, distribution and supply on private wires or grids	wind, hydro, solar PV, integrated	90kW	Most	Scottish Isles, USA, Italy, rural remote areas with high fuel cost / poor energy access
District heat networks	Generation and supply of heat (and power)	Woodfuel (CHP)	308kW	Some	Finland, Denmark
Low carbon micro-generation projects	Local organisations owning and managing local domestic micro-generation as part of broader carbon mitigation programmes.	solar PV, solar thermal, ground/air-source heat pumps, micro-wind	20kW	Few	Many
Grid integrated direct supply	Direct supply to members of consumer co-operatives.	wind, hydro	400kW	Few	Sweden, Netherlands (“Windcentrale”)

“Electricity export” projects

Project type	Description	Technologies	Av. Scale	Charitable	Where?
Custodian projects	Environmental and conservation organisations developing standalone renewable energy installations to fund / complement their activities.	hydro-electric, solar PV, woodfuel (solar thermal, heatpumps)	450kW	Some	Many
Development projects	Run by charities / trusts owning privately constituted project entities that house income generating projects and earmark profits to a wide range of development projects	wind, hydro-electric, (solar PV, woodfuel, tidal)	1300kW	Most	Scotland
Grid - integrated microgrids	Microgeneration and storage units integrated in low voltage networks and interconnected to the upstream network, typically with demand management strategies.	Solar PV, micro CHP, Heat pumps, EV's	NA	?	USA, Netherlands
Energy enterprises (co-operatives)	Standalone grid-export or installations directly supplying power to local industry, typically financed through IPS's that offer citizens shares, with local, regional or national membership, including crowd sourced projects.	solar PV, wind, hydro-electric, woodfuel (solar thermal, anaerobic digestion)	450kW	None- Few	Germany, UK, Denmark, Australia
Landowner projects	Local farmers or estate owners collaborating to co-own installations	Wind	800kW	None	UK

What is local & community energy?

		Community ownership	
		Low	High
Investment source for community stake	Community Body Includes local development organisations such as Development Trusts	Shared ownership arrangements with local development organisations	Community-led projects
	Individuals Includes co-operatives of all kinds	Shared ownership arrangements with co-operatives	Wholly cooperatively-owned projects Wholly crowd-funded projects


What is local & community energy?

Characteristic		Types
Source of community finance		Community body (commercial debt, public loans, angel investors)
		Individuals (co-operatives, crowdfunding)
Legal structures	Of project vehicle	SPVs, LLPs
	Of community entity	Development Trusts, charities, private limited social enterprises, bona fide co-operatives, community benefit societies
Respective roles		Community leads
		Developer leads
Timing of community investment		Pre-planning
		Post-planning
		Through warrants

Why local & community energy?

Local benefits

Social	<ul style="list-style-type: none">• Better local engagement; sense of ownership• Control over siting, scale, technology• Social cohesion and community empowerment• Positive public perception and buy-in
Economic	<ul style="list-style-type: none">• Regional development, local employment• Reduced cost of energy in rural areas• (Defers costly upgrades and extensions of the transmission network)• (Low cost heat)
Technical	<ul style="list-style-type: none">• Scale and quality of energy generation matched to load• 'Islands of stability' and voltage stability• Increased reliability of electricity for community buildings in rural areas• (Improved system efficiency if waste heat used locally)



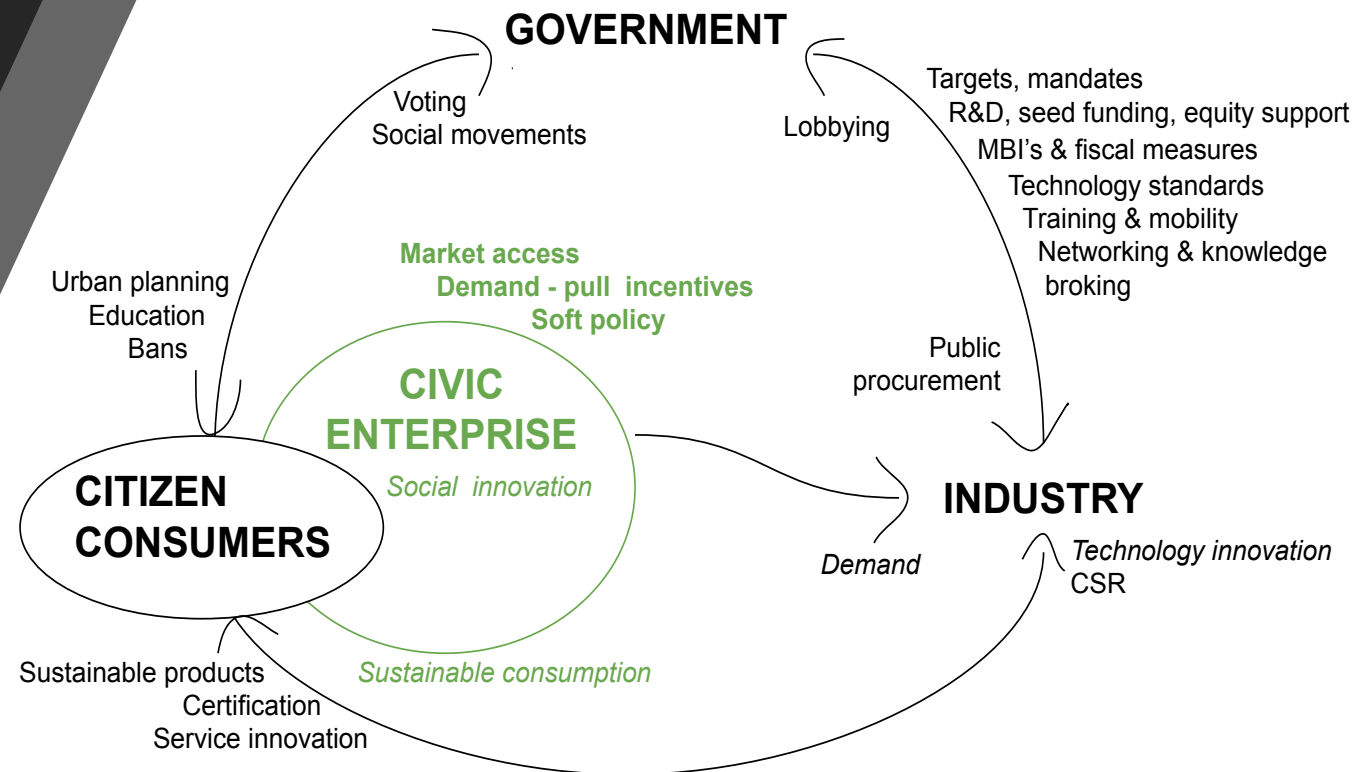
Why local &
community
energy?

National benefits

- Consumers are central to achieving 1.5°C GW
 - Reduced ownership of cars and electronics: ‘usership’ & ‘sharing economy’
 - Optimal operation of household electronics for demand side response.
 - Large and rapid gains in heating and cooling efficiency
- Individualised approaches have their weaknesses
 - Competing trends in home convenience, comfort & time saving
- Community- based approaches are central
 - Increasing energy awareness, reducing energy demand
 - ‘Low carbon lifestyles’ and reduced GHG emissions

Civic enterprise has been a key component of successful low carbon innovation to date

- Demand for pre-commercial cleantech
- Widens distribution of benefits = public buy-in = conducive legislative reforms = policy stability = more rapid energy transitions.



A. Windcentrale, Netherlands - 2010



Consumer co-operative

- Dutch citizens can buy equity shares for 250-300EUR
- 10 turbines, 850-2300kW, 15.000 investors, 15m EUR invested
- Members receive dividend in form of electricity based on actual power production
- Windcentrale does not own equity; manages the project only, takes fixed fee per share (10%).
- Seed financed by two founders + NGO + bank grant
- Motivation: energy savings, political mobilisation, increased environmental values/behaviour



Harm Reitsma

B. Mittelgrunden Vindmøllelaug, Denmark - 1996

Shared ownership with producer co-operative

- 20*2MW Siemens Windpower
- 3.5km East of Copenhagen harbour
- Site identified by Danish Action Plan for Offshore wind
- Initiative led by Copenhagen Environment and Energy Office
- 50% Municipal utility (Copenhagen Energy) > sold to Energi E2
- 50% Mittelgrunden wind turbine co-operative - 8.553 members, 48.5m EUR total investment
 - Each share = 1000kWh/y, sold for 567 Euro.



C: ACCESS, Scotland, 2014



Celebrating 20 years of...
MULL & IONA
COMMUNITY TRUST
1997 - 2017

A electricity-to-heat and load shifting project

- 70 households, adjusted off- and on-peak tariffs, remote management of residential storage heaters and hot water cylinders.
- Objectives: optimise use of existing wind / hydro capacity, reduce fuel poverty, offload excess electricity in context of grid constraints
- Collaboration: community organisation, lines-retail company, community energy developer, dynamo manufacturer
- Finance: 1.8mGBP from Local Energy Challenge Fund

Take home messages

- Local & community energy emerging worldwide in developed, emerging and less developed country contexts
- Policies marry local social and economic needs, decarbonization and energy system objectives.
- Community energy projects build local capacity for a wide range of carbon mitigation activities:
 - Energy efficiency, housing, waste, mobility, education, food and agriculture.

Take home messages

- There are challenges:
 - Legitimacy
 - Local capacity
 - Access to finance
 - Policy streamlining
 - Messy and time-consuming
- Shared ownership models overcome some of these challenges
 - Can increase development times but also increase engagement, learning and benefits
 - Improve trust and reputation of utilities

Take home messages

- **Commitment from policy makers generates public interest and awareness of possibilities**
- **Growth is dependent on programmatic support:**
 - **Energy policy** - low risk market integration mechanisms, civic energy targets and strategies, shared ownership obligations, loan schemes
 - **Social 'third sector' policy** – tax exemptions, capacity building
 - **Rural development policy** – project entrepreneurship, knowledge exchange
 - **Devolved energy and climate change policy and planning**
 - Mapping demand and supply, regional energy plans.
 - Site identification, project entrepreneurship & co-ordination by local authorities
 - Socio-economic impacts material consideration in resource consent

Take home messages

The opportunity in New Zealand:

- Public opposition to wind
- Widespread distrust of energy utilities
- Disempowered citizens
- An active local and community energy base: iwi trusts, environmental charities, consumer trusts, local authorities, peer-to-peer start-ups
- Uneven regional development, social inequality.

MBIE, BEC, Vivid 2050 low emission scenarios	Opportunities for local & community energy
Reduced peak seasonal lighting & heating loads	EE and self-consumption
20-50 TWh additional generation	Local / shared ownership in geothermal (8TWh) & wind (12-30TWh); solar (1-5TWh).
ST flexibility and ancillary services	Hydro (2-10TWh), demand response
Renewable dispatchable alternatives to gas	Small-scale biomass CHP

Contact me for best practice guidelines for shared
ownership, policy overviews

a.harnmeijer@auckland.ac.nz

@AnnaHarnmeijer

Example: Scottish shared ownership guidelines

Good Practice Principles



1. **Consistent** delivery of shared ownership for renewable energy projects.
2. **Flexibility** incorporated by all parties.
3. Increased **mutual understanding and engagement** in the development itself, renewable energy and the local area.
4. **Commercially viable** for both/all partners.
5. **Inclusive**, to involve all relevant stakeholders.
6. **Distinct** from community benefit funds.
7. **Timing** should be reasonable and workable for all parties.
8. **Transparent** communications, particularly **cost transparency**.
9. **Liability** should be minimised.

Policy instruments enabling community energy

(2) Market access for independent power producers	Grid connection guarantees
	Net metering or billing
	Power purchase guarantees
	Regulated buy-back rates above wholesale price
	Priority dispatch
	Grid upgrade and congestion management costs distributed
	<i>Fees for energy export and/or system services</i>
	<i>Tax on electricity sales</i>
	<i>Zero payment for grid injection</i>
	<i>Tax on generation or capacity</i>
(3) Demand guarantees and market based investment incentives	R&D grants
	Investment subsidies/ capital grants
	Public loans
	Feed-in-tariffs
	Premiums
	Renewable Heat Incentives
	Tax credits / exemptions
	Supplier mandates or obligations
	Quota based Renewable Certificates
	Auction systems (parallel to wholesale auctions)
	Incentives for small-scale DSR & ancillary services

(4) Regional resource planning	Regional investment incentives
	Direct investment by local authorities
	Regional energy demand and supply mapping and planning
	Local authority mediated site pre-feasibility mapping
	Procedures facilitating access to public or private land
	Preferential/rapid planning procedures
(5) Targeted community energy legislation	Community tariffs or premiums
	Community energy grants
	Public seed / capital loan programmes, loan guarantees for community energy
	Local ownership legislation / shared ownership legislation
	Tax privileges
	Service / knowledge exchange / capacity building platforms
	Integrated Civic Energy Strategy

Country level variation

	UK	New Zealand	Denmark	Spain
Dominant functional activities	Electricity generation	Distribution, electricity generation	Distribution, heat and electricity generation	Electricity generation
Dominant organizational types	Scottish local development trusts (41%), energy co-operatives (24%)	Distribution network operators arms-length owned by consumer trusts and co-operatives (56%); Iwi trust joint ventures (9%)	Municipal companies and consumer co-operatives; wind guilds; traditional and new wind co-operatives; foundations; joint ventures.	(1987-1990: regional and local authorities; Joint ventures between regional economic corporations, local utilities and turbine manufacturers)
Dominant technologies	Onshore wind, standalone solar PV	Hydro, geothermal, standalone solar PV	Wind, gas and biogas CHP	Wind, (solar PV)
Prevalence	<1% of total generation capacity (2016)	7% of total generation capacity (2018)	30% of wind capacity (2016); 95% of DH companies (2016)	<<1% of total generation capacity (2016)
Total	790 organisations, 105MW	131 organisations, 294MW	507 – 1575MW wind	< 100 MW solar PV
Emerging activities	Shared ownership; PPA's; behind the meter innovation	Peer-to-peer; gen-tail; rural solar-battery	Wind to heat; small-scale DSM, ancillary services	Co-operative retail

Abundance, UK

Crowdsourced debenture

- An intermediary
- Individuals buy transferrable debentures – provide debt – to a commercial project, and earn interest on their investment through an FCA regulated online platform.
- School solar rooftop projects – receive low cost electricity
- Wind/ AD/ hydro projects
- Minimum investment 5GBP, payback 15-20 years.

Abundance