Group Projects: Business models for community energy


Co-operative News


Mittelgrunden, Tildy Bayar

Energy Economics Summer School 30-2-17: 9.45 -11.45 AM

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This week, we learnt:

- NZ..

.. imports vast amounts of oil,

…economy increasingly service and electricity - dependent (Basil)

…energy demand is slowly growing (1.6-.8%) (Steve Poletti)

…has ample clean power in the mix / pipeline for 2030 (Mike Allen)

- Generators/retailers have to vertically integrate/hedge to deal with spot market volatility (Shane)
- Unless we wait for low cost storage…
  ..domestic solar uptake will not cap peak demand, and
  ..disproportionately affect non-solar consumers (Tony)

- To meet its 2030 climate targets

…NZ should probably focus on EE, heat, demand-side response and transport

More questions than answers

What will happen..

.. to electricity demand under different transport scenarios?

.. to gentailer balance sheets and tariff schemes esp. if / when price of solar drops?

..when storage makes intermittent renewables more readily available at any given time?

Group Projects

Introduction [9.45-10.15]:

1. Community energy projects across the world – some distinguishing factors
2. Self-consumption projects
3. Electricity export projects
4. Common business models
    A. Producer co-operative (*Mittelgrunden, DK*)
    B. Shared ownership with a consumer co-operative (*Windcentrale, NL*)
    C. Crowdsourced debenture (*Abundance, UK*)
5. Other models
    A. Peer-to-peer (*Brooklyn microgrid*)
    B. BlueSkin Bay, Dunedin
6. Common pitfalls and challenges
7. The assignment

Group discussions + Tea [10.15 – 11.10]

Regroup and present [11.10-11.45]

Community energy projects - distinguishing factors

- Fully community owned v. shared ownership
  - Joint ventures between commercial or public entities and community organisations
  - Advantages and disadvantages

- Legal incorporation
  - Trusts or charities with pltd. subsidiaries that house projects
  - Co-operative (or Industrial Provident Society or Community benefit society)
  - Pltd. companies

- (Project) Finance

  Seed funding for feasibility assessment and resource consent:
  - Low risk public loan, grant, credit, revolving funds, private investment, incubators

  Capital investment for technology, construction, commissioning:
  - Member equity, private investment, crowdsourced debenture, commercial loan

https://energyarchipelago.com/#/map

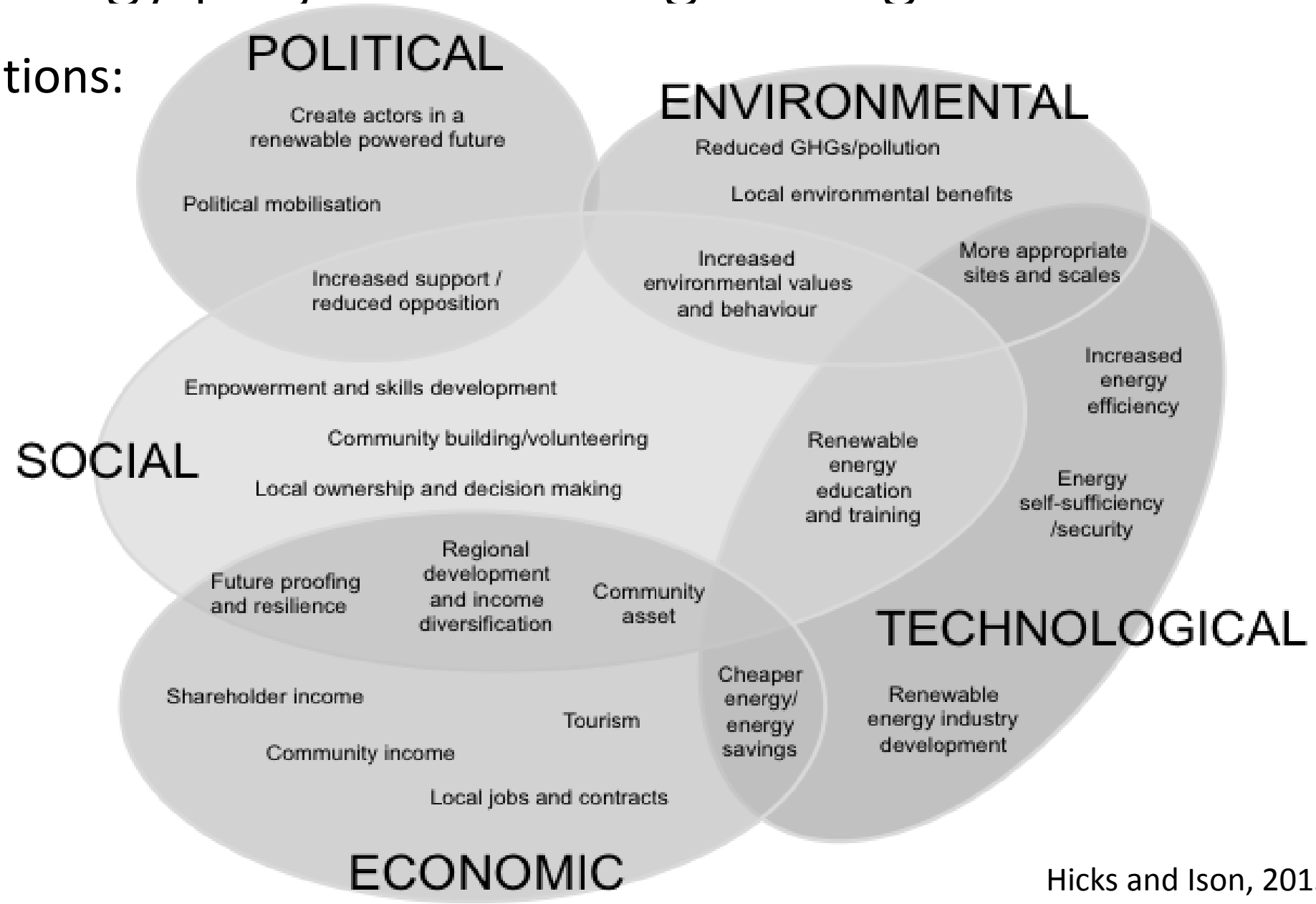
Community energy projects – distinguishing factors

- Operational models
  - Fee-for-service / pay-as-you-save models
  - Co-operative models
  - Organisational support models - eg. housing association
  - Market linkage models - eg. peer-to-peer trade facilitation or co-operative retailer

- Community engagement
  - Early, direct, inclusive engagement
  - What are the local needs?
  - Clear communication of motivation, distribution of benefits
    - Not just for community organisation but wider community
    - How will project process and outcome deliver tangible benefits?
    - How will the project address local needs?
    - Identify and engage with key opposing parties early in the process

Community energy projects - distinguishing factors

- Different motivations:



Hicks and Ison, 2015

“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)	15kW	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”)

See Berka & Creamer, 2016

“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.		NA	?	Eg. Brooklyn Microgrid
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

See Berka & Creamer, 2016

Common business models

Harm Reitsma

A. Consumer co-operative (*Windcentrale, NL*)

- Any Dutch citizen can buy equity shares for 250-300EUR
  - 1 share = approx 500kWh
  - Share price depends on cost and number of shares per turbine
  - Plus fixed opex cost per year per share
- 10 turbines, 850-2300kW, 15.000 investors, 15m EUR invested
- Members receive dividend in form of electricity based on actual power production
  - Power produced is deducted from annual electricity bill at average annual retail price incl. VAT but excl. energy tax
  - The more wind the lower your bill - up to 85% of own consumption
  - Delivered to members via dedicated retailer
  - Net return to customer if retail price increases.
- 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

de Windcentrale

Common business models

B. Crowdsourced debenture (*Abundance, UK*)

- 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

https://www.abundanceinvestment.com/why-abundance/our-track-record/funded-projects

Common business models

C. Shared ownership with producer co-operative (*Mittelgrunden Vindmollelaug, DK*)

- 20*2MW Siemens Windpower, 89GWh 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.
  - Av income after depreciation for 1 share: 317.50 DKK/yr

Larsen, 2005

Other case studies..

D. Development Trust - *BlueSkin Wind Farm, Otago*

- 3*800kW turbine, 125m
- Feasibility and EIA (2009)
  - Funded by EECA DG fund, fundraising, pro-bono contributions by network company
  - Met mast, data logger and monitoring by students, Windflow Technology, Transpower, Pioneer Energy, DNV-GL (2013 – now)
- Privately owned land – ‘supportive landowner’ – MoU
- PPA – joint Contract for Difference with gentailer
- Financial modelling: consulted and pro-bono by Deloitte, EnergyLink
- Awaiting appeal for resource consent..

http://www.blueskinenergy.co.nz/

Early stages..

E. Peer-to-peer (Brooklyn microgrid)

- Peer-to-peer pilot project in South Brooklyn based on TAG-e technology
- Generators will be able to: 1. trade peer-to-peer, 2. store the energy in a battery located on / off site, or 3. continue to use the energy to offset own consumption.
- BMG – benefit corporation. Owned by LO3 energy
- O&M by local utility - ConEdison.

http://brooklynmicrogrid.com

Factors for success

Financial	Social	Organisational	Human
Land acquisition – ownership, lease, cost	Trust, history of collective agency	Established internal management procedures	In-house technical skills
Access to at risk finance	Leadership	Legal status	Project management skills
Grid connection – headroom, distance to substation, cost		Experience running revenue – generating projects	Legal expertise
		Established procedures for community engagement, self-evaluation	Manpower
		Pro-active financial management	
		Facilities	
		External networks	

Risks, challenges

ONSHORE WIND	PROJECT STAGE				
	CAPITAL COST (CAPEX)			OPERATING COST (OPEX)	
COST CATEGORY	FEASIBILITY	PLANNING	(PRE)-CONSTRUCTION	OPERATION	DECOMMISSIONING
MANAGEMENT	PROJECT MANAGEMENT; LEGAL FEES	PROJECT MANAGEMENT; LEGAL FEES	PROJECT MANAGEMENT	PROJECT MANAGEMENT	PROJECT MANAGEMENT
TECHNOLOGY	GRID APPRAISAL	UTILITY UPGRADES, TRANSFORMERS, PROTECTION, METERING AND WIRING; DESIGN ENGINEERING	TURBINE AND TOWER ACQUISITION AND TRANSPORT ; WIRING TO TURBINE BASE ; TURBINE ERECTION	INSURANCE & WARRANTEE, OPERATION AND MAINTENANCE	TECHNOLOGY DECOMMISSION AND TRANSPORT
SCOPING, DESIGN AND PERMISSION	TECHNICAL FEASIBILITY STUDY;	ENVIRONMENTAL STATEMENT/IMPACT ASSESSMENT AND PLANNING FEES	-	-	-
OTHER MATERIAL INPUTS	-	LAND ACQUISITION	CONSTRUCTION CONTRACTS, CONSTRUCTION OF ACCESS ROADS AND FOUNDATION; LAND LEASE	LAND LEASE	-
FINANCING	-	-	INTEREST, EQUITY RETURNS, FINANCING FEES	INTEREST, EQUITY RETURNS, FINANCING FEES	-
RISKS	ERRONEOUS PRE-FEASIBILITY ASSESSMENT; LACK OF VIABLE PROJECTS SITES	PLANNING REJECTION; GRID CONNECTION QUEUES AND TERMS OF POWER PURCHASE AGREEMENT	LANDING DELAYS; DELAYS IN COMMISSIONING; CHANGES IN SUPPORT MECHANISMS	EXPORT/GENERATION TARIFF; DOWN TIME; RESOURCE VARIABILITY; ELECTRICAL LOSSES; WAKE EFFECTS	-

Source: Harnmeijer et al 2015

The assignment

- Groups of 5
- Choose 1 of 5 case studies (A-E) to establish in New Zealand
  i. Financial viability:
     - Could eg. an excellent wind resource compensate for costly grid connection and wholesale power purchase price?
     - If not, what else could you do to make it financially viable?
  ii. How would you incorporate the organisation?
  iii. Where might you obtain finance for feasibility assessment and for resource consent?
  iv. How would you go about involving the wider community in the project?
  v. How would you persuade stakeholders of the benefits?
  vi. How might you secure finance for technology acquisition?

Criteria examples

Advantages of proposition
Capabilities
Competitive advantages
USP's (unique selling points)
Resources, Assets, People
Experience, knowledge, data
Financial reserves, likely returns
Marketing - reach, distribution, awareness
Innovative aspects
Location and geographical
Price, value, quality
Accreditations, qualifications, certifications
Processes, systems, IT, communications

Strengths

Weaknesses

Criteria examples

Disadvantages of proposition
Gaps in capabilities
Lack of competitive strength
Reputation, presence and reach
Financials
Own known vulnerabilities
Timescales, deadlines and pressures
Cash flow, start-up cash-drain
Continuity, supply chain robustness
Effects on core activities, distruction
Reliability of data, plan predictability
Morale, commitment, leadership
Accreditations etc

Criteria examples

Market developments
Competitors' vulnerabilities
Industry or lifestyle trends
Technology development and innovation
Global influences
New markets, vertical, horizontal
Niche target markets
Geographical, export, import
New USP's
Tactics: eg, surprise, major contacts
Business and product development
Information and research
Partnerships, agencies

Opportunities

Threats

Criteria examples

Political effects
Legislative effects
Environmental effects
IT developments
Competitor intentions - various
Market demand
New technologies, services, ideas
Vital contracts and partners
Sustaining internal capabilities
Obstacles faced
Insurmountable weaknesses
Loss of key staff
Sustainable financial backing
Economy - home, abroad
Seasonality, weather effects

Useful references

Typology

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Benefits

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Community engagement and shared ownership

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