Hydropower project ventures: testing international waters

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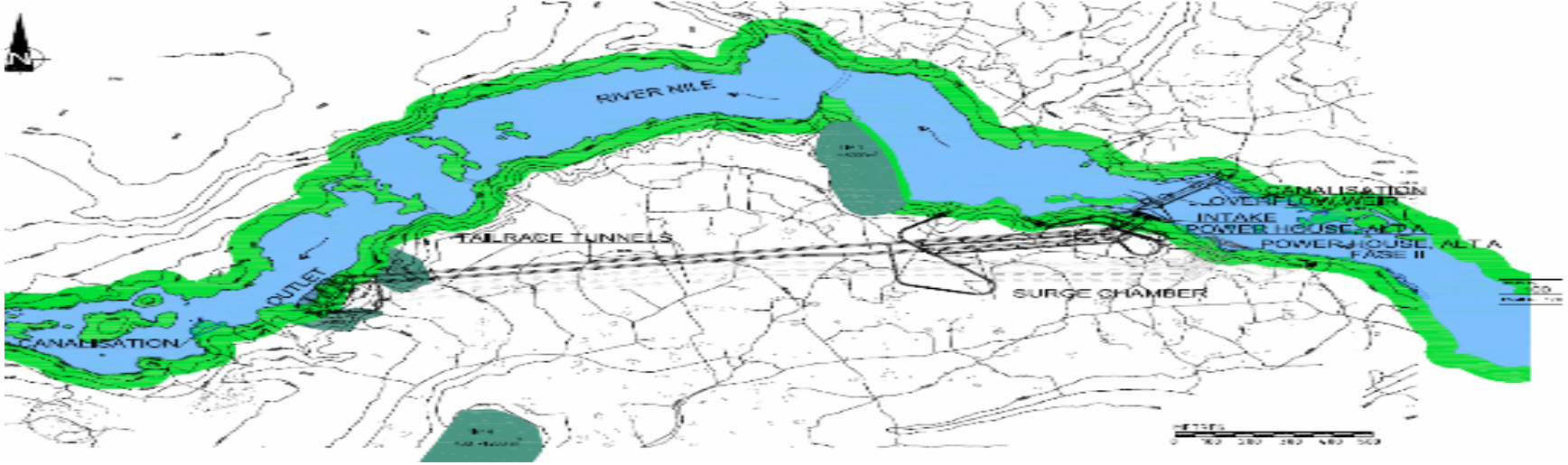

Last year…. Project plan presentation:

"Expanding Norwegian hydropower abroad: Implementing international project development and growth strategies"

Research Area 4

Work package 4.1 objective:

Increase our understanding about how firms makes decisions and develop strategies, focusing on the development of new renewable energy (capacity installments)

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FME Forskningssenter for miljøvennlig energi

SINTEF NTNU Det skapende universitet IFE Institutt for energiteknikk NHH 75 år HØGSKULEN i SOGN OG FJORDANE VESTLANDSFORSKING UiO : Universitetet i Oslo SNF Et selskap i NHH-miljøet

Outline

- Research question
- Background context
- Drivers
- Theoretical considerations
- Methods utilized
- Results
- Implications

Research question(s): numbers and their narratives

What are the current and future degrees of internationalization within the Norwegian hydropower production sector?

Ancillary & supporting questions:

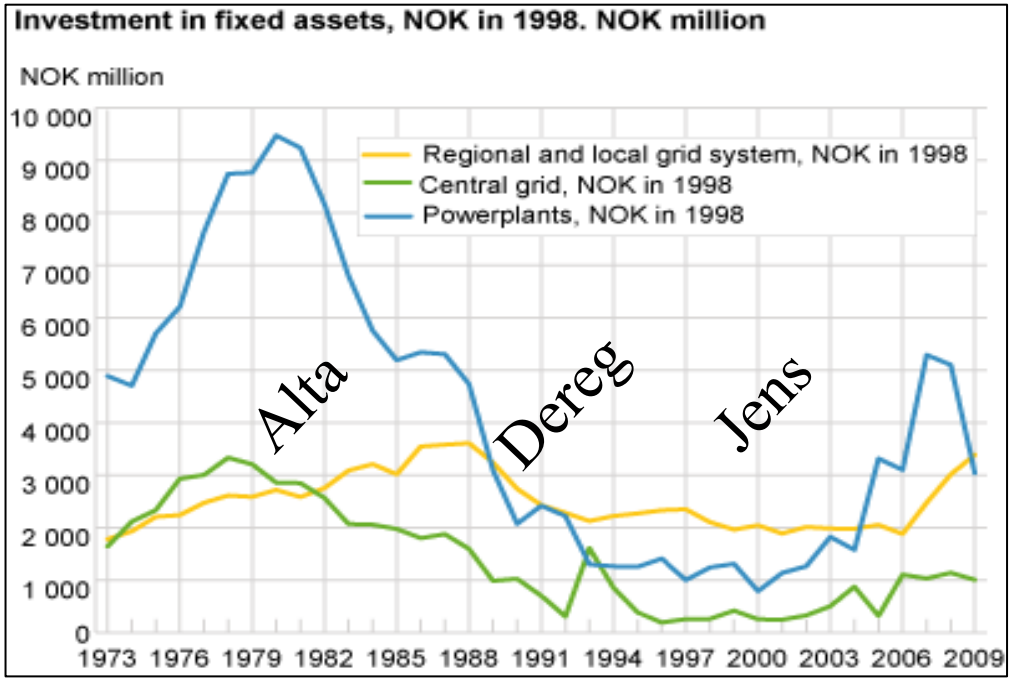
What factors drive the shift or act as barriers to begin operations outside of the core domestic market?

Background

- Norway's electric backbone is hydro
  - 29,2 of 29,6 GW installed capacity
- Strengths across the value chain:
  - Project planning
  - Power sector reform
  - Dynamic control & operations
  - Incorporating environmental & social concerns
- Deregulation of '91:
  - Created decentralized public ownership models
  - Subjected them to competitive landscape
- Uncovering of capacity oversupply
- Initial adverse wholesale & retail profit margin impacts

Declining investments in generation

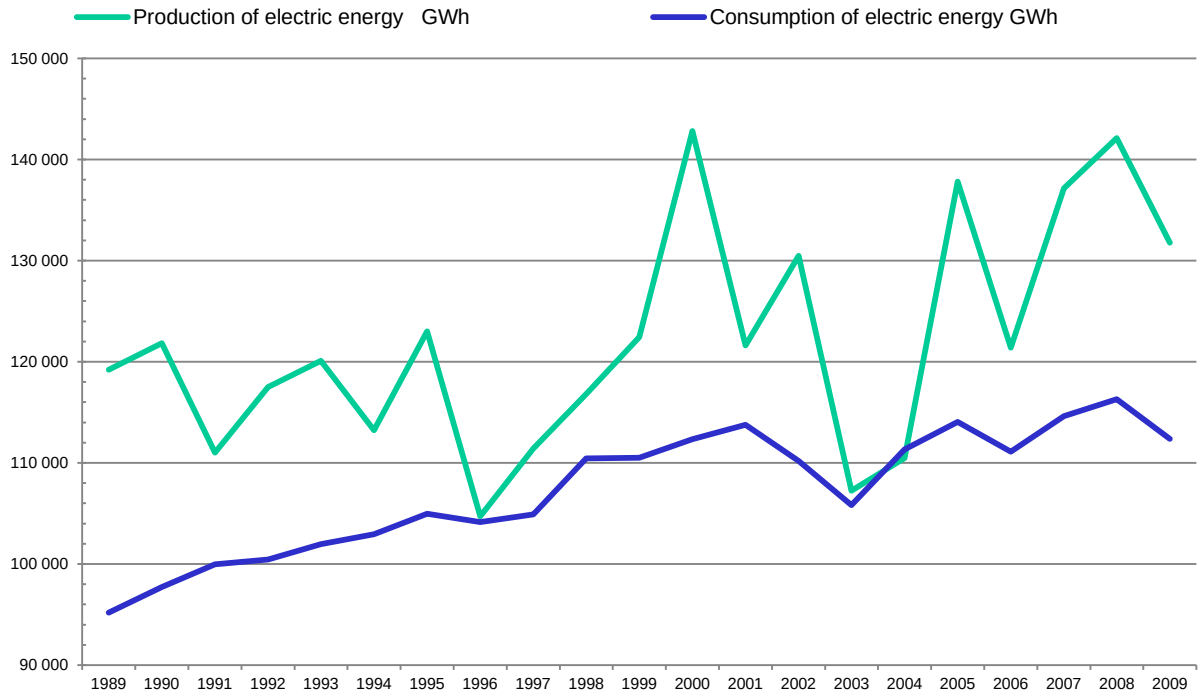
- 80's: env. movement + high costs of capital
- 90's: dereg
- 00's: days of large dam building were 'over'+ led to M&A activity
- Lower investments and accumulated returns (opportunity seeking)



Norwegian electricity sector's investments in fixed assets 1973-2009

Source: Statistics Norway 2009

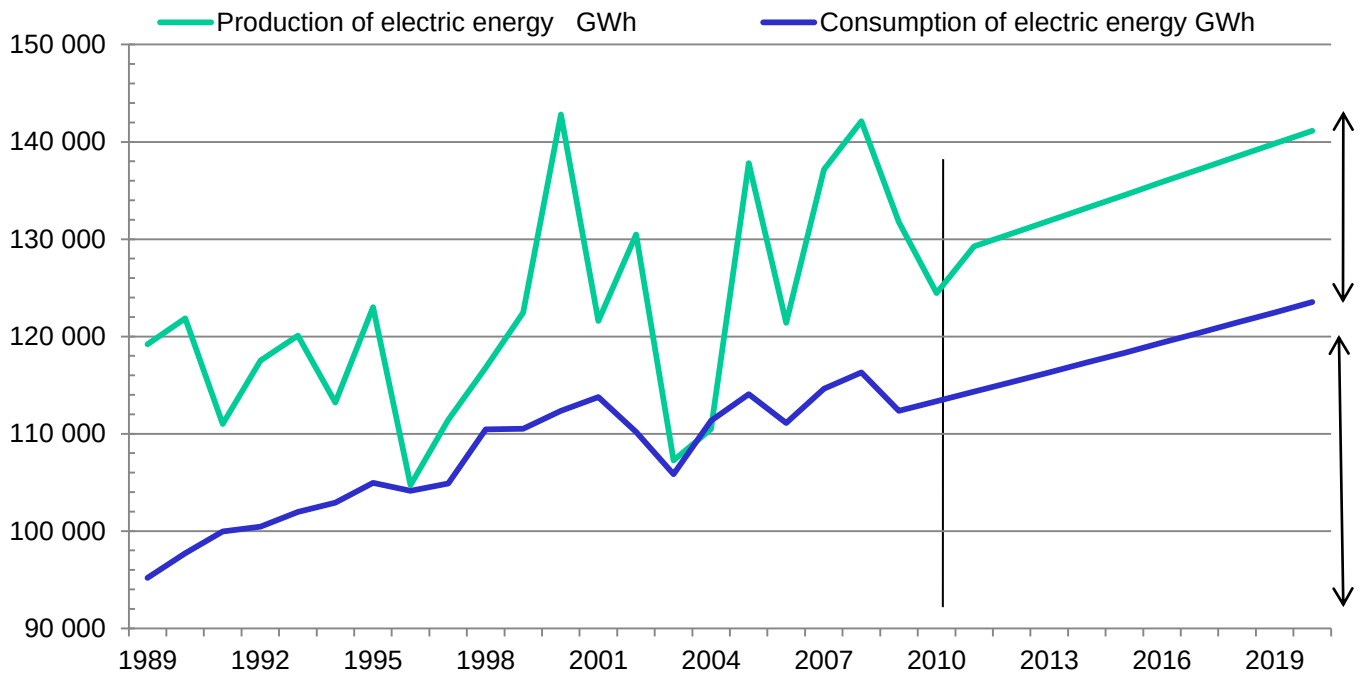
Excess production = exports



Production and consumption of electrical energy in Norway 1989-2009

Chart data source: Statistics Norway 2011

The influx of new generation must export (south or west) or find new loads to service (EV, industry)



2020: +13,2 TWh

(1,32 Twh/år over tidligere 5års prod. gjennomsnitt)
(0,86% bruk økning pr. år over de siste 20 årene)

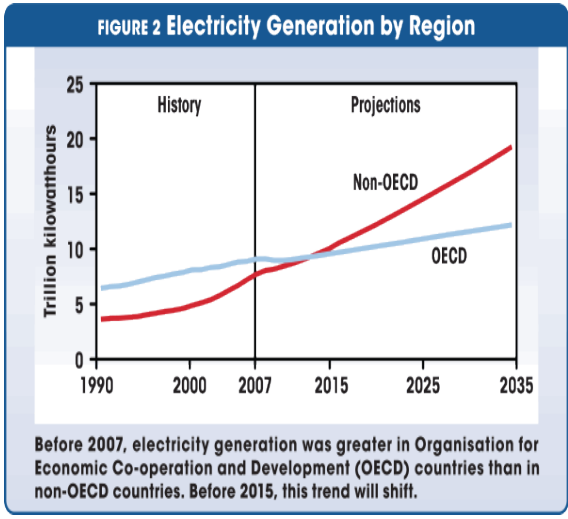
Kilde data fra: Statistics Norway 2011

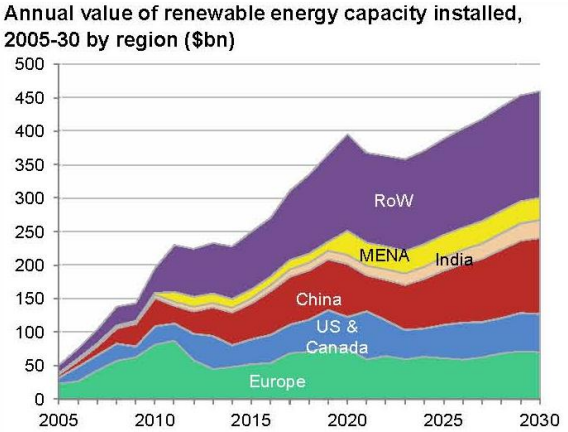
Background

- Long history of hydropower throughout value chain
- Deregulation opened competitive landscape
- Wholesale & retail profit margin impacts
- Uncovering of capacity oversupply
- Implications on growth of the firm
- Identification & assessment of growth options
  - Diversify into other infrastructure projects
  - Pursue new RETs
  - Utilize existing technical competance in new markets: Internationalization

Global macro drivers

- 49% energy growth <2035, of which 80% is to come from NON OECD (IEA 2010)
- Strong need for clean energy in developing world (capacity shortfalls)
- Markets are deregulating with tailored /favorable IPP & FDI framework conditions
- "*Big winners over the next 20 years will be the emerging renewable energy hubs in Latin America, Asia, the Middle East and Africa* with projected growth rates of 10-18% per year" BNEF 2012





Domestic sectoral drivers

- License cue is long
- Grid capacity constraining
- Competence leaving (retirement)
- Competition for new promising engineers
  - *'we need new exciting projects to work with to transfer our technical knowledge between old and new engineers'*
- 26,4 TWh new generation <2020
  - Downward pressure on Nordic wholesale market prices
  - Growing domestic market saturation concerns
  - Impacts of everybody going all in at once will have adverse market impacts in absence of other load offtakers (export, new industry, EV etc)

Political drivers

- ”*BRIICS & ROW is where all future energy demand growth will come from…everybody is latching onto the green movement on the policy front*”
  -Trond Giske @ Technoport 15.4.12
- ”*We need many like Trønder Energi*” *(that have invested into green energy for development abroad) -
  -Eric Solheim addresseavisen 4.4.12
- Policy platform declared that its vision is for Norway to be an environmentally friendly energy producer and a world leader in the development of green energy & will use public funds to catalyze private investment in clean energy abroad
- NORAD- Clean Energy for Development Mechanism
  - Alleviate upfront information costs through project development facility
- INTPOW ’promoting renewable energy partners’ (abroad)

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Political drivers

"Solheim will help Norwegian companies go to Africa- the government can take a little of the risk" (aftenposten14.2.12)

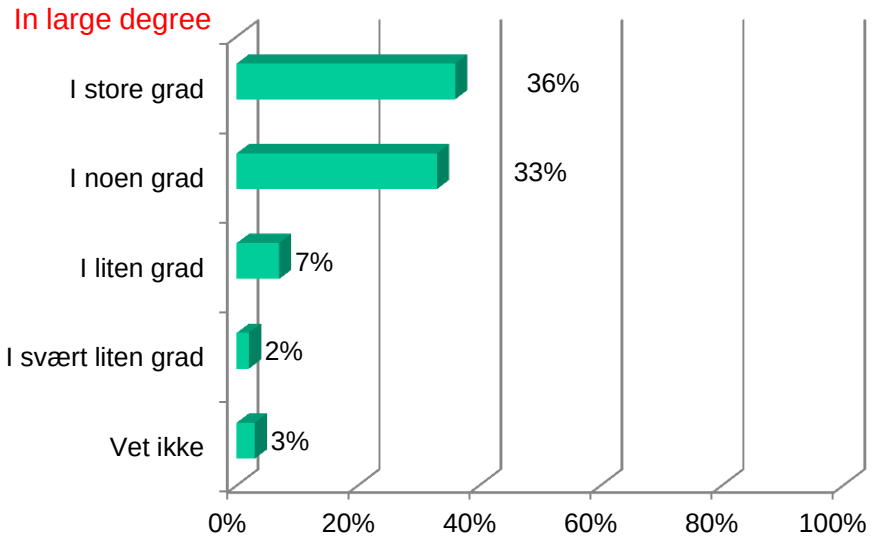
Political drivers

- *"BRIICS & ROW is where all future energy demand growth will come from…everybody is latching onto the green movement on the policy front"* -Trond Giske @ Technoport 15.4.12
- *"Vi trenge flere som Trønder Energi"* *(that invest abroad offering technology transfer) -Eric Solheim (addresseavisen 4.4.12)
- Policy platform declared that its **vision is for Norway** to be an environmentally friendly energy producer and a world leader in the development of green energy & **will use public funds to catalyze private investment in clean energy abroad** (2007)
- Norfund- largest direct support mechanism
- NORAD- Clean Energy for Development Mechanism
  - Project development facility; institutional cooperation & capacity building support (NVE, Statnett, & Norplan)
- INTPOW 'promoting renewable energy partners' (abroad)
- ICH – International Centre for Hydropower

Societal perspective

- **1 of 2 Norwegians think Norway should help developing countries with renewable energy**
- ‘Should Norway help developing countries build out more renewable energy production?’

- Just over half the population thinks norway should help to develop renewable energy in developing countries
- Most believe it is correct to make money on this



Antall respondenter 1032 personer

TNS Gallups Klimabarometer / Energi: høst 2011

Background summary

- Limited opportunities through 2000s with good financial results on existing assets led to accumulated returns (opportunistically sought places to park it)
- Anticipated future LT downward price pressure
- Strong political will (domestic & global)
- Global market opportunities
- Societal acceptance
- But does it make good business sense?

The bottom line?

- "We have realized a project (abroad) that gives us better return than we could have got in Norway"
  - CEO av Trønder

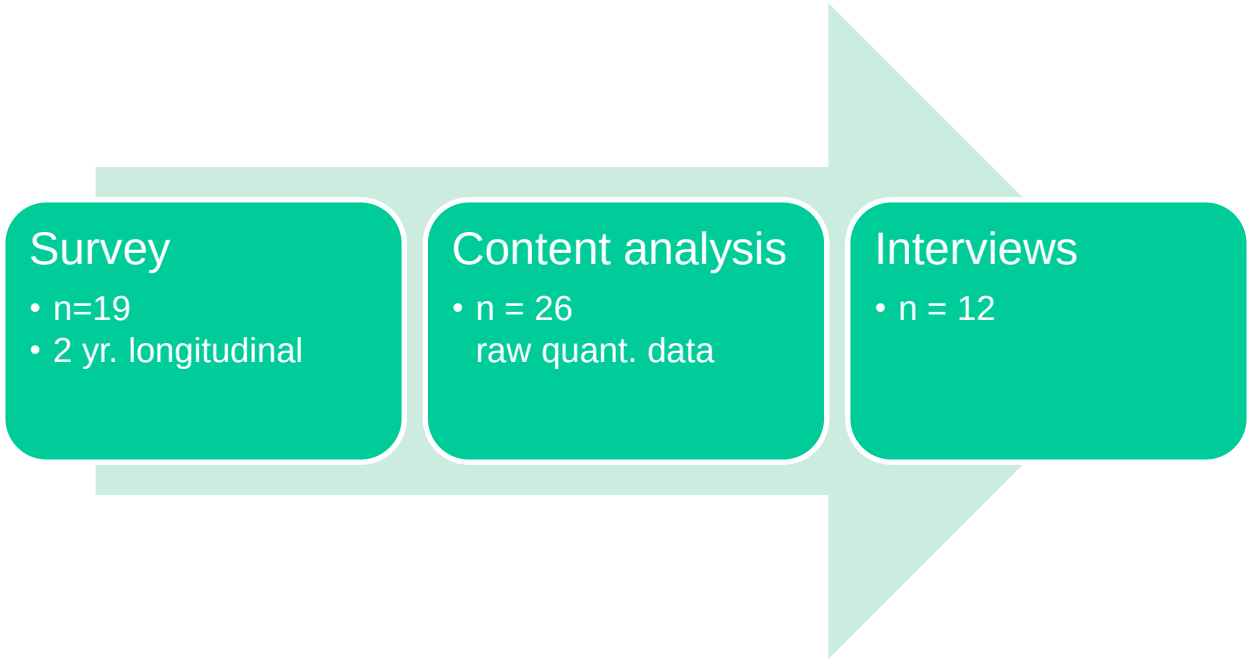
- "*Vi har fått et prosjekt som gir bedre avkastning enn vi ville fått i Norge*"
  - konsernsjef Ståle Gjersvold av Trønder Energi

(addresseavisen 5.5.12)

Former research: IPP internationalization

- Högselius: Vattenfall case
  - Pan EU strategy focused around moving into markets within “a cable lengths distance” & close cultural proximity
  - Key takeaways: managerial deficiencies at first, M&A entry strategy successful to gain foothold & transfer market knowledge
- Del Sol: Endesa case
  - Chilean spread through Latin America
  - Key takeaway: privatization & deregulation of neighboring markets provided vast business opportunities for fast & first movers (consistent with AES conclusions)

Mixed method three stage exploratory sequential design



Quantitative data collection: survey

- Scoping interviews led me to other recent work
- Energy Norway *Energy and Development 2009-2011*
- Longitudinal design (2010 & 2011)
- Theme: current plans or intent to go abroad
- Sample of 19 regional energy companies
  - Direct CEO response
- Good start, but survey design not robust enough for academic rigor to warrant publishability

Concurrent quantitative and quantitative data collection: content analysis

- Gatekeeper (user partner) provided access to content
- 26 company presentations from foreign and domestic business delegations
- Content offered both numbers and narratives

Qualitative data collection: interviews

- Overcoming information bias

Classification of data providers

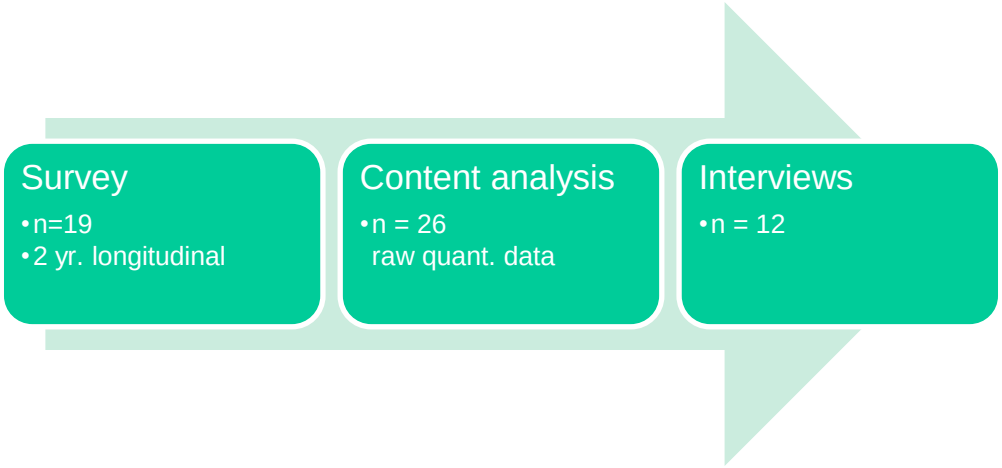
Term	Definition	Examples	Relevance
Direct industry	Employees in firms of the Norwegian hydropower production sector	Managers, executives, board members, project managers, engineers	Subjects directly under investigation
Related industry	Employees of organizations that play a facilitating role to those in the production sector	Governmental officials, outside consultants to the direct industry, industry representatives	"Outsiders" with an unbiased view of the activities under investigation

- Sample, n

Project Manager	Board Member	Executive; Sr. Manager	External Consultant	Industry Representative	Governmental Representative
1	1	2	3	3	2

Methods summary

- Sequential design, use one to inform the next… offering the benefit of researcher expansion within the field



Empirical data table

Firm Country Project Stake % MW GWh Cost

Firm	Country	Project	Stake (%)	Operational Capacity (MW)	Annual Project Gwh (GWh)	Stake MW	Gwh stake	Cost (MUSD (mil)	Under development (MW)	Est. Production (GWh)	MW stake	GWh stake
Tronder Power	Uganda	Bugoye	73 %	14,4	82	10,44	59,45	63				
	Uganda	Kikagati	100 %						14		14	
	Uganda	Nsongezi	100 %						20		20	
	Uganda	Muhuki 1	100 %						5		5	
		Agua Imara	19 %									
NTE	Montenegro	Glava Zete	49 %	4,5	11,8	2,2	5,7	10,7		63,1		30,9
		Slap Zete	49 %	1,2	3,8	0,5	1,8					8,2
BKK	Nepal	Khimti-1	26 %					140,2				
	Nepal	Kirne	100 %						67			50
	Turkey		100 %									250
		Agua Imara	20 %									
Norfund	Uganda	Bugoye	28 %	14,4	82	3,96	22,55					
		Agua Imara	10 %									
		SN Power	40 %									
Clean Energy Invest	Georgia	Shuakhevi	100 %									
	Georgia	Koromkheti	100 %									
	Georgia	Chorokhi	100 %									
Statkraft	Turkey	Kargi	100 %									
	Turkey	Cetin Main	100 %									
	Turkey	Cetin Lower	100 %									
	Turkey	Cakit	100 %	20	95	20	95					
	Albania	Devoll 1	50 %									
	Albania	Devoll 2	50 %									
	Albania	Devoll 3	50 %									
	Laos	Theun Hinboun	20 %	210	1100	42	220					
	Laos	Theun Hinboun2	20 %									
	Bosnia	Vrbas										
		SN Power	60 %									
SN Power	Chile	La Confluencia	50 %	158	672	79	336	350				
	Chile	La Higuera	50 %	155	761	77,5	380,5					
	Chile	Colmito	50 %	60	350	30	175					
	Chile	Trayenko										
	Peru	Arcata	100 %	5	37	5	37					
	Peru	Cahua	100 %	43	280	43	280					
	Peru	Gallio Ciego	100 %	37	150	37	150					
	Peru	La Oroya	100 %	9	65	9	65					
	Peru	Malpaso	100 %	54	200	54	200					
	Peru	Pachachaca	100 %	9	43	9	43					
	Peru	Parlac	100 %	5	24	5	24					
	Peru	Yaupi	100 %	108	800	108	800					
	Peru	Cheves	100 %	168	837	168	837					
	India	Allain Duhangan	49 %	192	800	94,08	392					
	India	Malana	49 %	109	375	53,41	183					
	Nepal	Khimti-1	57 %	60	350	34,26	199					
	Nepal	Kirne	100 %									
	Nepal	Tamakoski 3	100 %									
	Sri Lanka	Assupiniella	30 %	4	17	1,2	5,1					
	Sri Lanka	Belihuloya	30 %	2	10	0,6	3					
	Philippines	Ambuklao	50 %	105	332	52,5	166					
	Philippines	Binga	50 %	124	419	62	209,5					
	Philippines	Magat	50 %	381	929	190,5	464,5					
		Agua Imara	51 %									
Agua Imara	Panama	Bajo Frio	50 %									
	Zambia	Mulungushi	51 %	28,5	250	14,535	127,5					
	Zambia	Lunsemfwa	51 %	18	160	9,18	81,6					
	Zambia	Lower Lunsemfwa	51 %									
	Zambia	Mukuski	51 %						100			
	Mozambique	Alto Malema							55			
	Mozambique	Massingir							27			
Technor Energy	Bosnia-Herz	River Bosna							85	420		

>Full paper presented at Technoport published through *Energy Procedia* link<

Quantitative results

Firm	Current degree of Internationalization	Planned degree of internationalization by 2015
NTE**	0,19%	0,99%
Tronder Power*	2,49%	23,81%
BKK**	0,92%	11,94%
Statkraft Group*	5,14%	20,76%
SN Power*	100%	100%
Agua Imara*	100%	100%
Technor Energy	100%	100%
Tinfos & KF Gruppen	100%	100%
Clean Energy Invest	0%	100%
Miklagard Energy	0%	100%

Born globals

Firm level of internationalization as a percentage of capacity* or generation**

Qualitative results

- Summary of motivational factors
- Firms had diverging push and pull mechanisms

Offensive pressures	Defensive pressures
Response to global / domestic political ambitions	Knowledge transfer
Global macroeconomics	Compete for young talent
Higher financial returns	Lack of domestic opportunities
Portfolio diversification effects	Fear of declining domestic market prices & market consolidation
Testing new opportunities	Stimulate internal motivation
Streamlining ‘start up’ (license acquisition to generation)	

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Barriers

- Green certificates
- Protecting corporate image
  - Extremely critical NGOs
- Organizational HR capabilities: lacking international experience
- Risk tolerance: INTL is a whole new game for the entire organization (including the board)
- Ownership structures & friction
  - Decentralized regional players (locally / publicly owned)
  - Appointed board members of local political office face double negative: risk capital without prospect for jobs (demand for regional economic dev.)
  - The big brother syndrome

Results summary

- 11 firms pursuing international hydropower project developments (Corporate scale & entreprenuerial endeavors)
- 53 projects in total
  - 29 in operation: 1 126 MW ~ 5 564 GWh (~4% NO prod.)
  - 23 under development; 3 135 MW *(15,6 TWh) (~12%)
- Geographically widespread across 4 continents (Africa, S. & C. America, SE Europe, Asia)
- Country selection shows developing or emerging markets as primary targets
  - Cited rationale: best prospects for long-term sustained economic & load demand growth

Conclusions

- Race for green certificates has taken the near term cash
- But many (government & industry) that internationalization is inevitable in the long run
- Industry is seeking long term political committment (beyond current policy) to seriously consider moving investments in generation abroad
- Public (kommune) ownership model challenged as firms move beyond the markets they were created & intended to serve (Midttun '00)

Future research & outlook

- Market selection criterion & entry strategies
  - The ladder approach, subjective scorecards
  - M&A vs greenfield, PPP models
- Impacts of market structure on hydropower project design
  - No monetary incentive for storage under PPA single buyer market model (merchant structure allows for capitalization on balancing services provided through active storage management)

- Outlook: will the arrival of SE green certs have a vaccum affect on the rationale for pursuing international projects?
  - Elevated revenue with same risk profile in home market
  - Places pressure on internal competition for financial & human resources
  - But can the licence be acquired & generation commence in time?
  - '*everybody is speeding up their investments to capture as many certs as possible before 2020*' – board member
  - OR
  - Will internationalization offer viable diversification strategy outside core market with higher risk/reward profile?

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CenSES

Renewable strategies towards low carbon economies

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