



Centre for Sustainable Energy Studies



Tyson Weaver

Stipendiat September 2011 – August 2014
Høgskulen i Sogn og Fjordane

Årskonferensen

Oslo 14.12.11



Our world by night

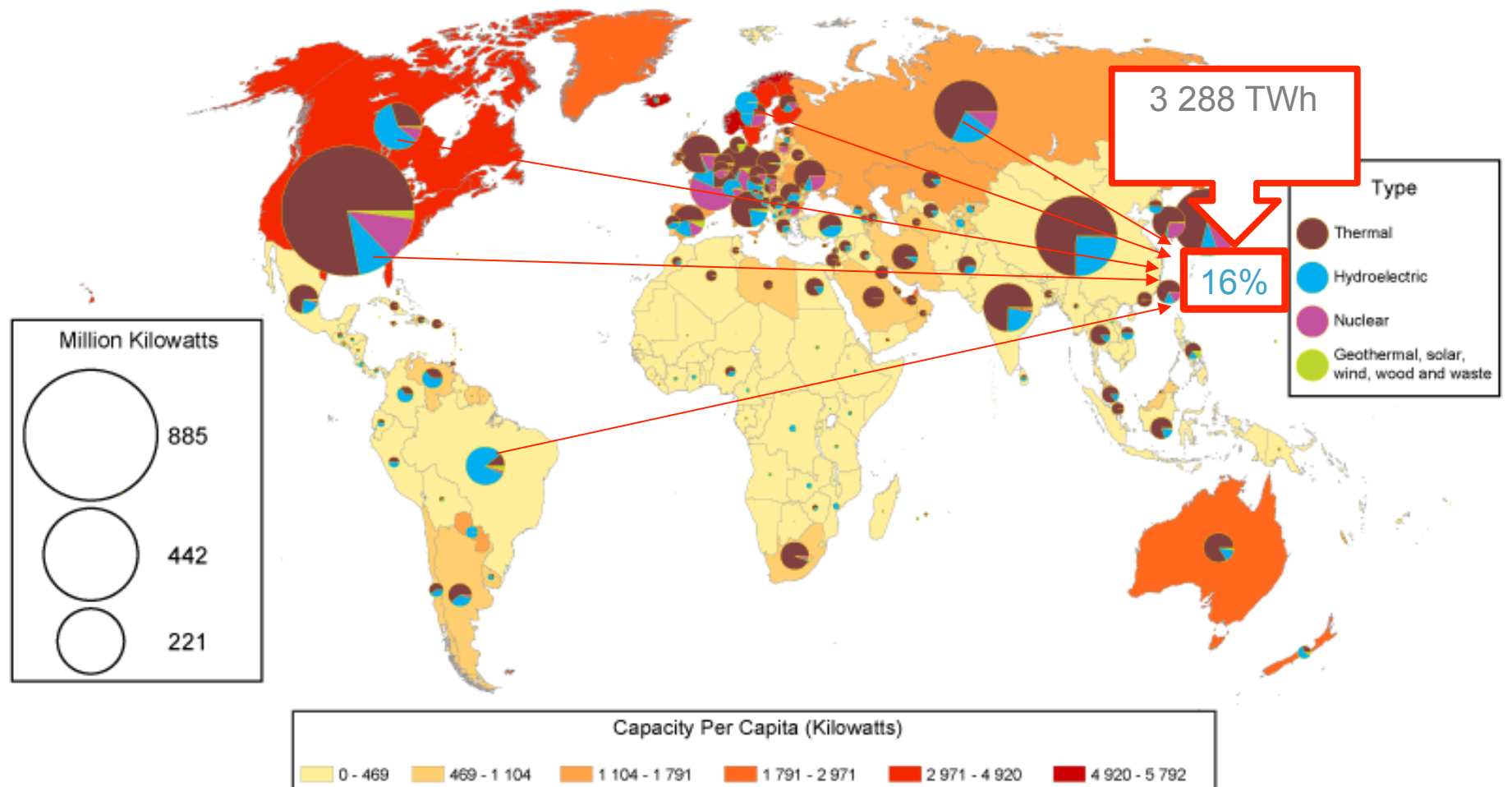


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Source: World Bank 2005
Photo source: NASA



World Electricity Installed Capacity by Type, 2004



Data source: International Energy Annual

Produced by Kazimierz J. Zanlewski
Cartographic source : Articque

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Technical potential: 16 400 TWh, mostly in emerging markets

Source: IEA 2010

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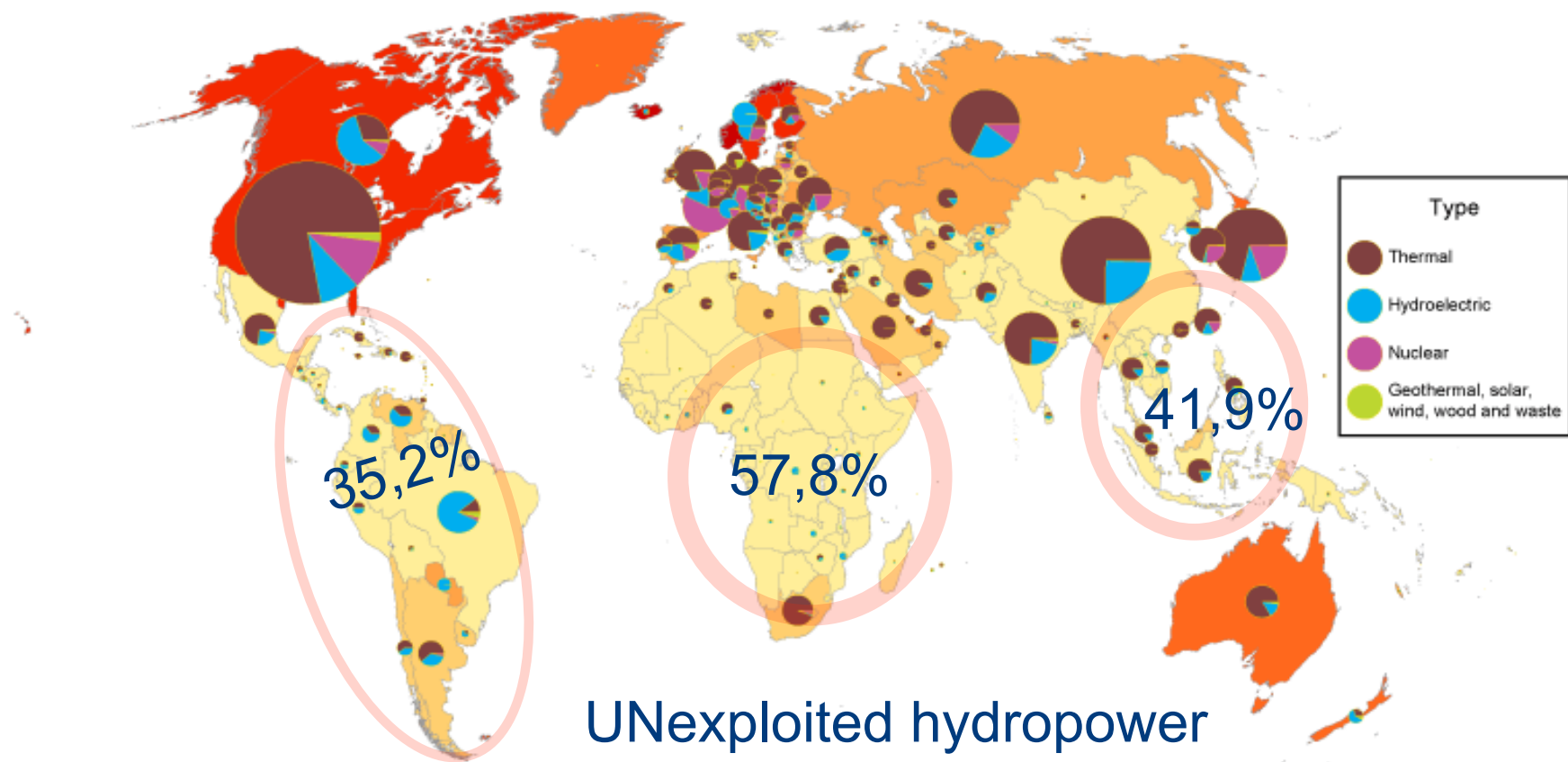
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UNexploited hydropower resources*

Data source: International Energy Annual

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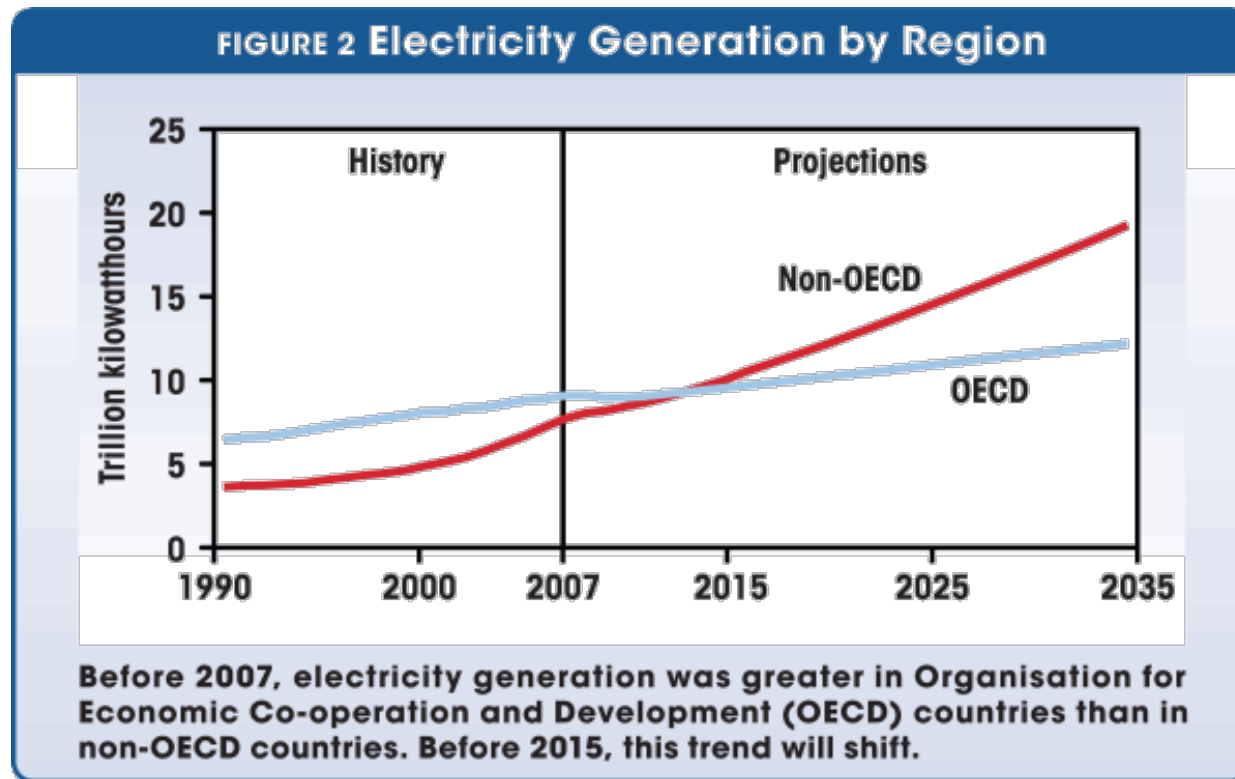
*that are technically and economically feasible
(as a percentage of total GWh/yr)

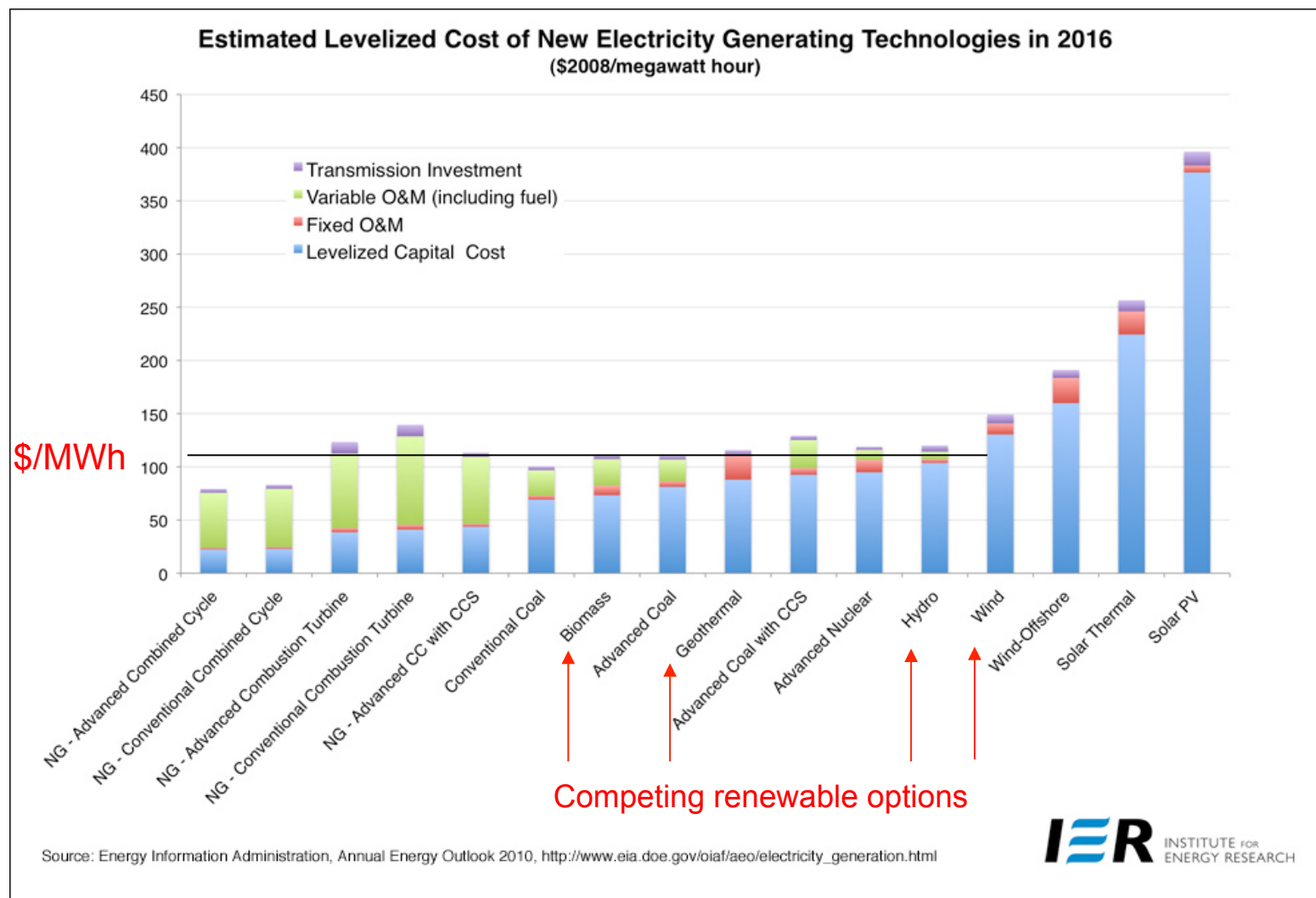
Source: Journal on hydropower and dams 2009

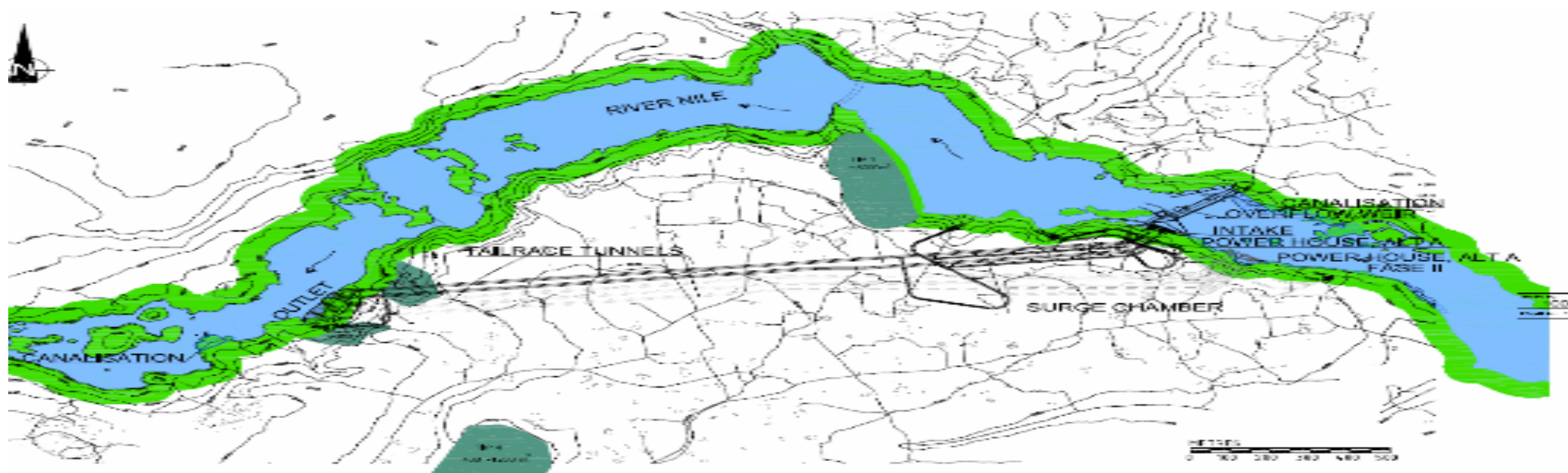
Produced by Kazimierz J. Zaniewski
Cartographic source : Artique



Power pendulum swinging







“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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Supervisors: Øystein Moen IØT- NTNU & Erling Holden- HiSF



Motivation

domestic

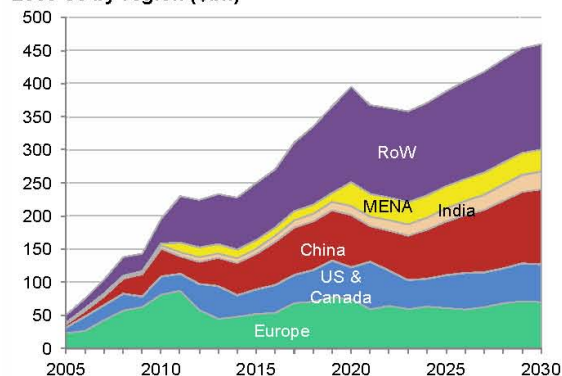
- ❑ In Norway: “the days of constructing large hydropower are over” (Jens Stoltenberg 01)
- ❑ Firms seeking new ‘virgin’ watersheds to demonstrate & transfer development skills
- ❑ 49% Forecast for global energy increase by 2035*
- ❑ 80% Increase in energy demand in non-OECD countries by 2035*
- ❑ 54% Projected increase in global hydroelectricity **

Sources: International Energy Outlook 2010*;
SN Power 2010**

global

- ❑ Growing RET market - \$211B (2010)
 - ❑ South and Central America: up 39%
 - ❑ Middle East and Africa: up 104%
 - ❑ *“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”*

Annual value of renewable energy capacity installed, 2005-30 by region (\$bn)



Source: Bloomberg
New Energy Finance 2011

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Value proposition

- ❑ Recognized reputation in hydropower development, production, & operations
 - ❑ human & technical dynamic competence
- ❑ Technological solution oriented
- ❑ Demonstrated social & environmental responsibility
- ❑ Ethical business culture with transparent history
- ❑ Strong financial position
- ❑ Long term capital investment perspective
- ❑ Offering operations & maintenance knowledge transfer

Research question

How do traditional Norwegian hydropower production firms pursue and achieve international development growth strategies?

Internationalization in new business landscapes

❑ Challenges

❑ Cultural risk

❑ Behavioral, ethics, values

❑ Political risk

❑ Law & tax interpretation, corruption

❑ Financial risk

❑ Foreign currency hedging

❑ Market risk

❑ Volume risk, counterparty risk in PPA

❑ Competition

❑ Chinese do it cheaper

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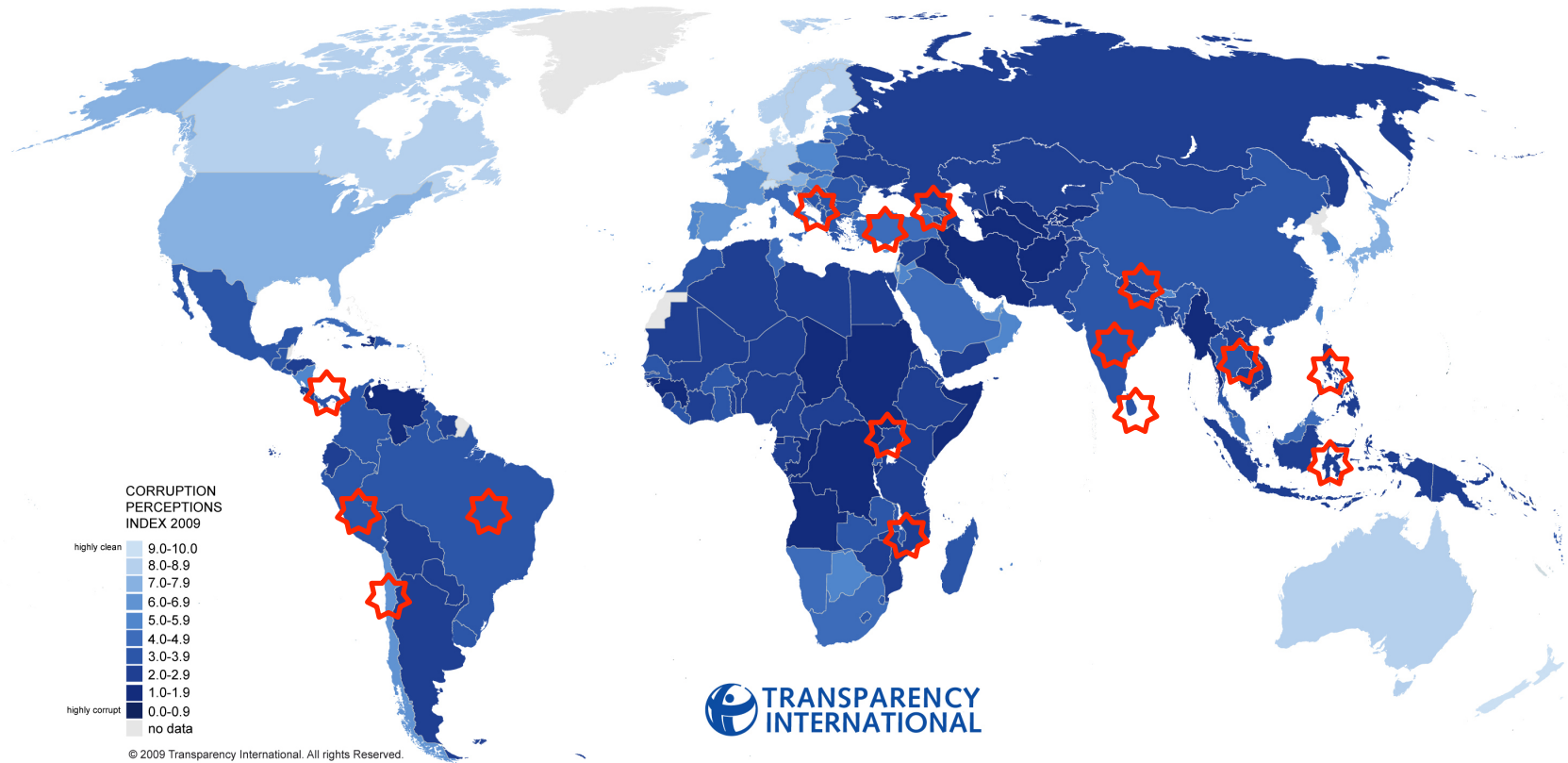
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Challenging business environments



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Existing norwegian presence



Shift is underway

New operational capacity

Co.A: 14,2 MW

Co.B: 10 MW

Co.C: 23,5 MW

Co.D: 1 140 MW

Co.E: 42 MW

Total Norwegian investment in
international hydropower projects:

~11,4~ B NOK

Plans & growth targets

Co.A: 100 MW target Africa by 2015

Co.C: 50% of new production by
2015 abroad (800 GWh)

Co.D: 880 MW by 2015

Co.E: 833 MW by 2016

Co.F: 395 MW by 2015

Co.G: 700 MW target by 2015

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Theories, terms, methods, data

❑ Theoretical perspectives:

- ❑ Vanguard projects: test existing products in new markets

- ❑ Entrepreneurship umbrella

 - ❑ Corporate: individual change agents (environmental champion)

 - ❑ International: innovative, proactive, risk seeking behaviour internationally

 - ❑ Sustainable: economic, social, environmental value creation

❑ Case based research to underpin:

- ❑ Motivation; growth plans; actors & activities; resource allocation, success factors, lessons learnt

 - ❑ Firm level: TrønderEnergi; BKK; NTE; SN Power; Norfund

 - ❑ Project level: TBD

❑ Longitudinal survey acquired (2010, 2011)

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User partner collaboration

- ❑ Scoping interviews conducted with:

- ❑ Trønder Power Ltd; SFE
- ❑ Norplan (Multiconsult); NVE
- ❑ INTPOW; Energi Norge

- ❑ Seeking opportunities to work with:

- ❑ BKK
- ❑ Norfund
- ❑ NORAD
- ❑ Statkraft
- ❑ SN Power
- ❑ Agua Imara

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CenSES applicability

Energy technology– a commercial opportunity

(Norwegian) emission reduction technologies will be examined through intensive case studies in emerging economies”

“increased understanding of knowledge transfer
and value creation within the energy sector”

Research project will understand how the concerted Norwegian public and private ‘package’ successfully exports world leading hydropower competence with a social-environmentally conscious based approach to development that helps us move towards a global sustainable energy system

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The water wheel

We know: basically all there is to know

It generates clean, reliable, domestic, secure, dispatchable, low cost electricity providing societal wide benefits with commensurate financial returns over the capital investment cycle

Lets not reinvent the wheel, just move it.

Thanks

Tyson.weaver@iot.ntnu.no



Construction of Trønder Energi – Norfund's
Bugoye 14,2 MW project in Uganda
Photo source: Trønder Energi

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