



ELINVOIMAA OULUN SEUDULLE
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Green Growth/Bioeconomy, innovative actions in rural regions CASE II

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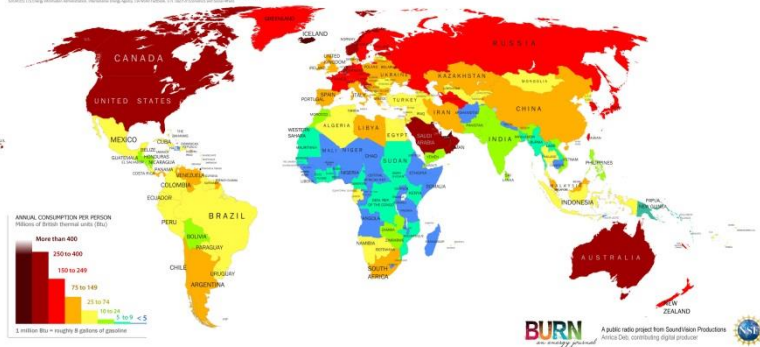
UUSIUTUVAN ENERGIAN- ja YMPÄRISTÖALAN OSAAJA
Expertise in green energy and environment



Micropolis

Expertise in green energy and environment
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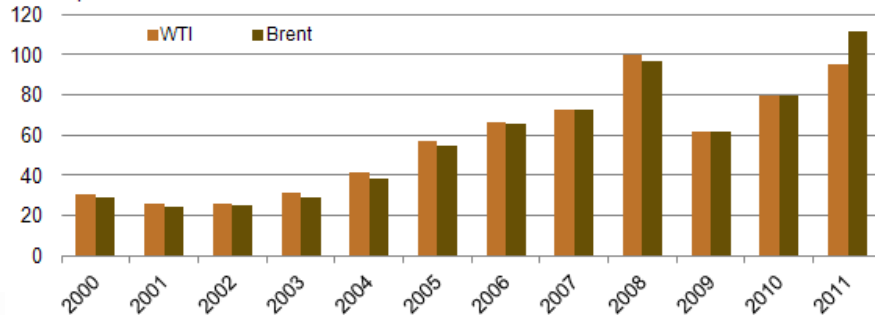
• Black growth

- Today's share of fossil fuels in the global mix, at 82%, is the same as it was 25 years ago
- The global cost of fossil-fuel subsidies reached \$544 billion in 2012 (IEA)

• Green growth

- The transition to a more efficient, low-carbon energy sector is more difficult in tough economic times,
- Improved energy efficiency
- Global subsidies to renewables reached \$101 billion in 2012, up 11% on 2011

Annual average crude oil spot price, 2000-2011
dollars per barrel





Green Growth Activities in Ii

2012-2014





Municipality of Ii

Energy independent

- ▶ Ii - 640 years history
- ▶ Ii, located by the seashore and three rivers, offers pleasant and secure living as well as plenty of leisure time activities
 - ▶ Population 9 600, density 6 people/km²
 - ▶ Over 1,500 leisure apartments
- ▶ Part of Northern Ostrobothnia, neighbor of city Oulu (pop. 250 000)





Sustainable Economic and Developmental Strategy 2014-2018

Improvements to region's competitiveness and viability

- ▶ **Population Growth**
 - ▶ *improvements in quality of living, availability of public and private services*
- ▶ **Reinforcing Local Business Operations**
 - ▶ *positive entrepreneurial attitude, infrastructure and support services*
- ▶ **Use of Renewable Energy Resources & Energy Efficiency**
 - ▶ *water, wind, wood based fuels, minerals, peat*
- ▶ **Regional and International Cooperation**
 - ▶ *cities & municipalities in greater region of Oulu / Northern Ostrobothnia*
 - ▶ *companies and research institutes*
 - ▶ *EU & regions*



Energy Independent Ii

- ▶ In June 2012 municipality of Ii and Ministry of Employment and Economy agreed on energy efficiency targets
 - ▶ In 2013 reduce use by 199 MWh (1%) and by 2016, 1790 MWh (9%)
- ▶ Ii region currently produces:
 - ▶ 400 GWh hydro power
 - ▶ 600 GWh peat power
 - ▶ 250 GWh wind power
 - ▶ 100 GWh wood based power (mainly to district heating station)
- ▶ Total annual energy consumption in Ii region is around 80 GWh





Hinku Forum

Towards Carbon Neutral Municipalities

- ▶ Project is coordinated by the Finnish Environment Institute. Ii joined in 2012
- ▶ 14 municipalities are committed to an 80 % reduction in greenhouse gas emissions from the level of 2007 by 2030 (more extensively and rapidly than EU targets would require)
- ▶ Municipalities create and carry out solution together with businesses, citizens and experts
- ▶ Actions include measures to save energy and improve energy efficiency in homes, public offices, companies and transportation, as well as promotion of renewable energy production and use
- ▶ www.hinku-foorumi.fi/en_GB/



Energy Efficiency in Public Buildings

- ▶ Gathering real time information on energy consumption
 - ▶ Heat
 - ▶ Water
 - ▶ Electricity

- ▶ 5 schools
- ▶ Industrial facility
- ▶ Technology center
- ▶ Elderly carehome
- ▶ 5 Apartment buildings

Adjusting

- ▶ Air ventilation
- ▶ Heating systems
- ▶ Insulation
- ▶ Water pressure

Stop the use of oil

- ▶ Geothermal / ground heat pumps
- ▶ Biomass e.g. woodchips
 - ▶ residues from logging and bush clearance
- ▶ Windpower



Geothermal heating

3 public schools

- ▶ Municipality organized a public tendering process
- ▶ One construction company was selected
 - ▶ Full service ability: earthmoving, responsible for building permits, taking care of drilling debris and disassembling old heating systems
- ▶ Installation of ground heat pumps
 - ▶ Drilling depth varied from 240m to 350m
 - ▶ 10 -15 drilled wells per school
 - ▶ Installation took 1-2 months
- ▶ Old oil boilers were kept as backup heating system

	Emission reduction kg CO ₂ e/a	Invest. cost €	Oper. cost €/a (before)	Invest. payback time in years
School 1: Alaranta	24 200	190 000	12 000 (36 000)	7
School 2: Asema	89 000	120 000	13 000 (45 000)	4
School 3: Pohjois-li	85 000	120 000	12 000 (41 000)	5
	Total save in operational cost 85 000 € / a			





Wood based fuels (Biomass)

School Olhava

- ▶ Woodchip heat plant is installed in a container outside of the school yard
- ▶ Heat is delivered from the container to the boiler room by a pipeline
- ▶ The ashes can be used e.g. for forest soil improvement
- ▶ Old oil boilers are kept as backup heating system
- ▶ Private investment, long time contract



Emission reduction

120 000 kg CO₂e/a

Investment costs

30 000 €

Operational cost (before)

35 000 €/a (47 000 €/a)

savings 12 000 €/a

Investment payback time

2,5 a



Improved maintenance and readjustment

School Valtari and industrial facility

- ▶ Installation of online electricity consumption measurement system
- ▶ Adjusting operational times of air ventilation systems
- ▶ Investment cost 0 € → savings 23 000 €/a
- ▶ Repairment of air ventilation's analog control system and setting new running times
- ▶ Investment cost 500€ → savings 38 000€ /a

Emission reduction	5 500 kg CO ₂ e/a
Investment cost	0 €
Operational cost (before)	181 000 €/a (204 000€/a)
Investment payback time	0 a

Emission reduction	77 000 kg CO ₂ e/a
Investment cost	500 €
Operational cost (before)	33 000 €/a (71 000 €/a)
Investment payback time	0 a





Technology center Micropolis

Electric consumption measurement system

- ▶ Real time automatic electricity consumption measurement system.
- ▶ Adjustment in settings of air compressors, resulting energy savings around 60 000kwh/a
- ▶ Automatic lighting adjustment and operational time
- ▶ Savings in operational cost 6 600€/a



Emission reduction

13 200 kgCO₂e/a

Investment cost

900 €

Operational cost (before)

8 800 €/a (15 400 €/a)

Investment payback time

0 a

Improving insulation

Elderly carehome

- ▶ Property's rooftop had water leakages which damaged indoor facilities
- ▶ 500mm of blowing wool was added all over attic (original 0 - 300mm)
- ▶ After improvements, heating and maintenance cost diminished



Emission reduction	2 200 kgCO ₂ e/a
Investment cost	10 000 €
Operational cost (before)	16 500 €/a (17 500 €/a)
Payback time	14 a



Apartment Buildings

Geothermal heating

- ▶ Changing five apartment buildings (oil) and one electrically heated apartment building to geothermal heating
- ▶ Same procurement process as with previous schools buildings
- ▶ Ready in November 2013
- ▶ Estimated savings in operational cost 60 100€/a

Estimated emission reduction	156 000 kg CO ₂ e/a
Investment cost	330 000 €
Operational cost (before)	27 300 €/a (87 400 €/a)
Investment payback time	3,3 a





Windpower

Finland's largest windfarm

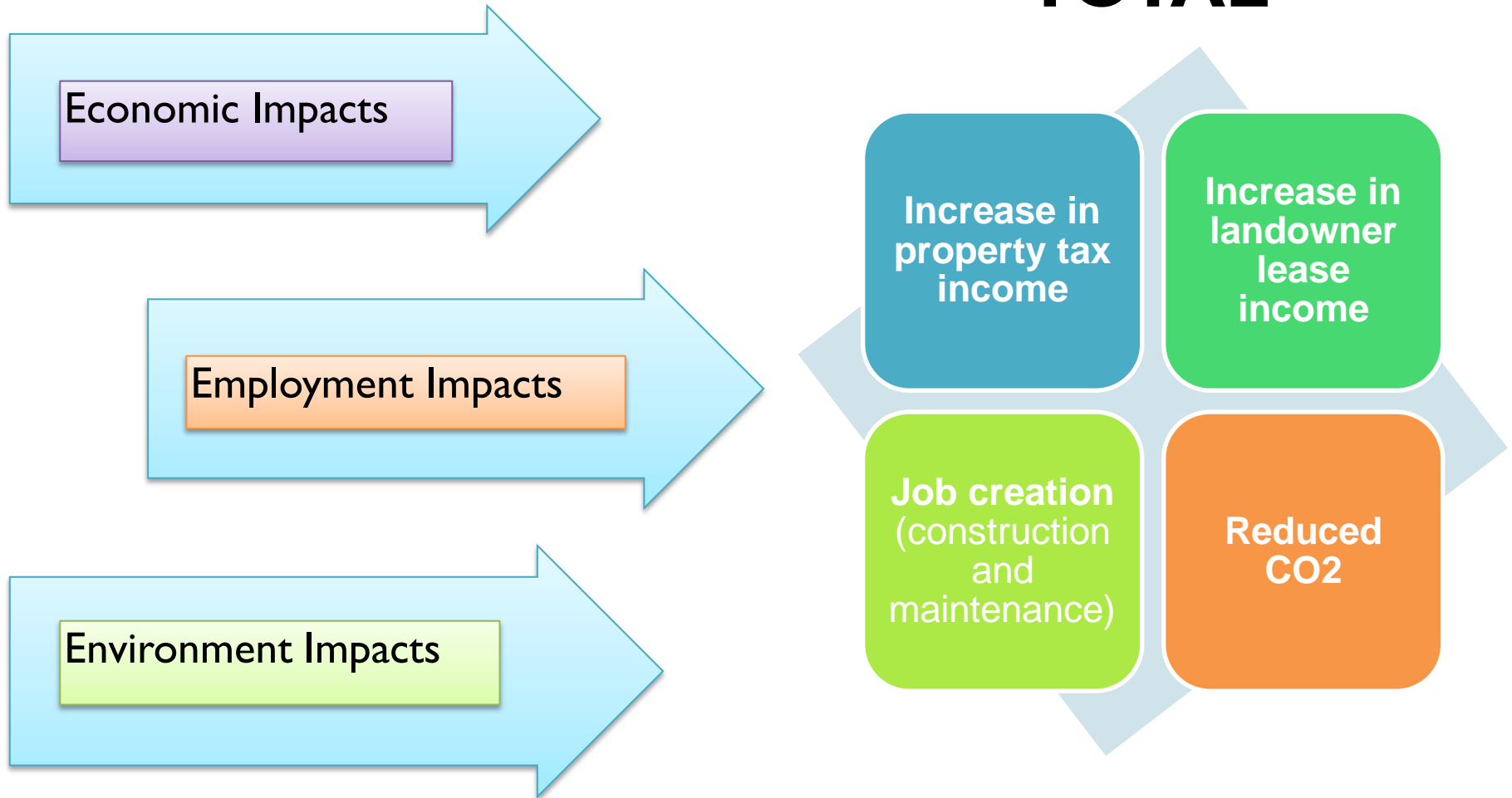
- ▶ Total investment 150 M€ , 38 turbines with total capacity of 114 MW
- ▶ Already operating 11 x 3 MW turbines by Tuuliwatti Ltd
- ▶ Under construction 27 x 3 MW turbines by Taaleritehdas
- ▶ Under planning, several onshore & offshore windparks





Assessing Regional Impacts of Green actions

Windpower, 30 year lifecycle (up to 60)





Woodchip terminal

Combined Heat and Power plant

- ▶ On planning stage (private investment)
- ▶ Open storage area for wood based raw material, facilities to produce **high quality woodchips**
- ▶ One of the first small scale CHP in Finland that uses biomass (woodchips) as fuel and provides district heating to the residents and businesses in Kuivaniemi

Estimated CO ₂ reduction	1 926 900 kg/a
Light oil reduction	10 000 MWh
Heavy oil reduction	300 MWh
Increase in local logistic jobs	30





Energy information days in schools

Reuse and recycle

- ▶ Energy and Environment - information days were organized in public schools between 2012-2013
- ▶ Students and teachers were introduced to energy saving methods and tips were given on recycling, minimizing energy and water use and lighting.
- ▶ 50/50 project





Total energy savings & new jobs

2012-2014

- Total calculated savings in
 - ▶ Energy: 1 900 MWh
 - ▶ CO₂: 587 895 kgCO₂/a
 - ▶ Euros: 240 000 €/a

- New jobs
 - ▶ Wind production 10
 - ▶ Woodchips production 30
 - ▶ Energy efficiency na



- Oil consumption:
 - ▶ Year 2010 367 492 litres/year (l/a)
 - ▶ Year 2014 57 500 l/a (3 buildings)
 - ▶ Reduction 309 992 l/a

Municipality will reach the 9% level of energy reduction already during 2014, two years ahead of time. (Ministry of Employment and Economy – Energy Reduction Agreement)





Further plans in Energy Efficiency

- ▶ Improve and efficient lighting (outdoor / indoor)
- ▶ Install more online electricity consumption measurement devices
- ▶ Stop the use of fossil fuels in heating (3 public buildings)
- ▶ Evaluate potentiality to use solar energy applications and **install the pilot PV solar system in Micropolis Technology Centre**
- ▶ Evaluate potentiality to use biogas / electricity in transportation and logistic and **start eCar pilot**
- ▶ Promote energy saving methods (companies, property owners, residents, community members) **and organize energy informations days**



Thank you!

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Ii - Municipality of Energy Independence

