HYDROPOWER AND SUSTAINABLE DEVELOPMENT

A MATTER OF ETHICAL, SOCIAL AND ENVIRONMENTAL CONSIDERATIONS

United Nations symposium

27-29 October 2004

Beijing, China

Björn S. SVENSSON
SwedPower AB

Urban NORSTEDT
Vattenfall AB

VATTENFALL

SUSTAINABLE DEVELOPMENT

- Neither just sustainability
- nor just development

- No sustainability without development
- No good development without sustainability

VATTENFALL

Human and Nature

Human is a part of Nature

- **With the right to be there**
- **With certain responsibility**

VATTENFALL

Electrification

- Vital precondition for
  - Economic development
  - Quality of life
  - Poverty alleviation
  - Increasing the well-being of people
- But
  - Never without adverse effects
- Hydropower seems to be on of the best options

VATTENFALL

First some words about Vattenfall

Vattenfall
– A Leading European Energy Company

5th in size in Europe

- ***160 Twh***
- ***31 000 MW***
- ***44% Fossil, 34% Nuclear and 22% Hydro Power (in Sweden50%)***

VATTENFALL

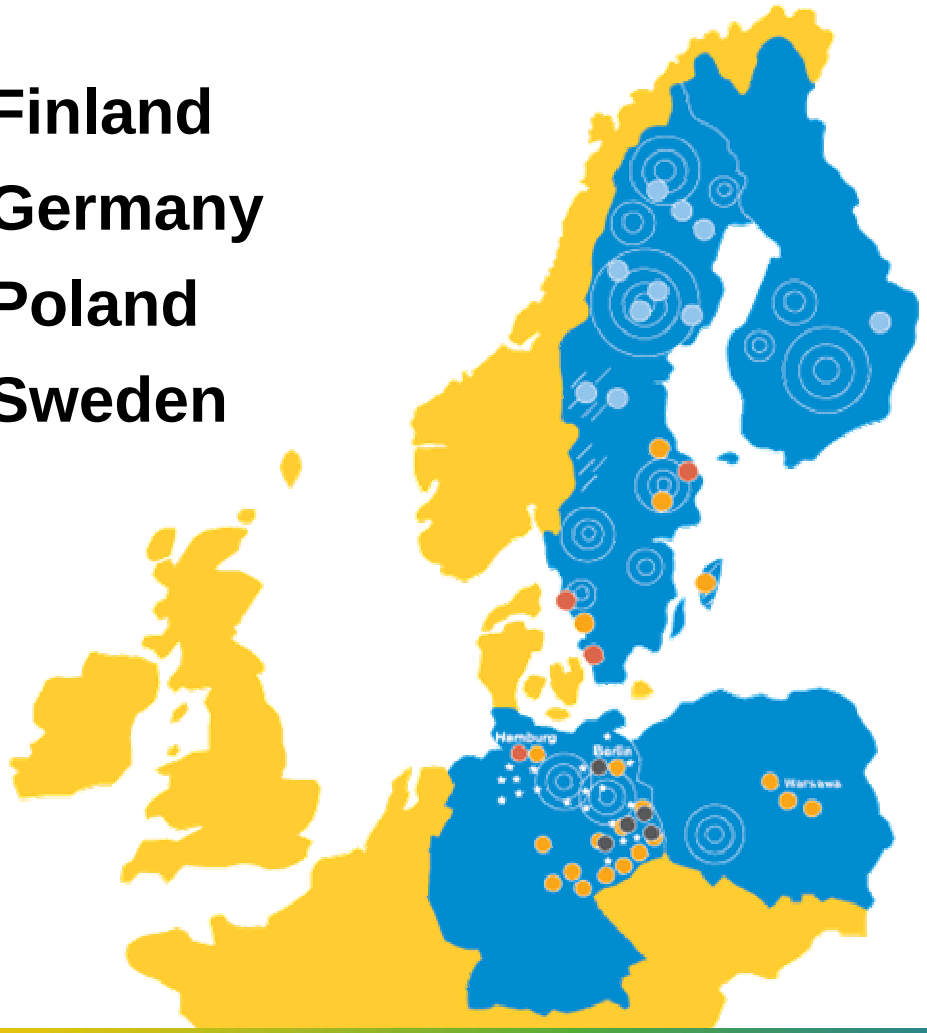
So far we operate mainly in..

Finland

Germany

Poland

Sweden



- Hydro power
- Nuclear power
- Thermal power/other
- Thermal power/lignite
- Network operations
- Transmission operations
- Partly-owned networks

VATTENFALL

Social commitment

Lars G Josefsson
President and Chief Executive Officer

"As a leader of Vattenfall, **I see no conflict between profitability and responsibility** - on the contrary they are two sides of the same coin. **The energy business must** provide benefits to society and **earn public acceptance.**

Society rightly expects a great deal from us. As an energy company, our work directly influences industry as well as the quality of life of all our customers."

Company Ethics

Business goals includes limitations!

- Business seems some times to be just about money
  - –But it is not!!
    - At least not short-term money!!!

VATTENFALL

Ethic Drivers

Escaping for life

First protection of

- Life
  - *–Ethic values*
- Health
  - *–Ethic values*
- Environment
  - *–Ethic values*

VATTENFALL

Vattenfall Ethic Values

In brief

- ***We shall behave responsibly towards the world around us - towards people as well as nature.***

- We shall **treat everybody with due respect** and act towards others in a way that we would wish others to act towards us. This applies insides Vattenfall as well as outside.

- We shall **respect** the prevailing views and values of **the different cultures in which we operate**. All our operations must obey national and local laws, stipulations and agreements.

And now I would like to hand over to..

Dr Björn S. Svenson

SwedPower AB

VATTENFALL

GREENHOUSE GASES EMISSION

FROM DIFFERENT KINDS OF POWER PLANTS
[g CO_2-equivalents per kWh_{el}]

FUEL	GHG emission	Comment
Coal	1272 (600)	Global average (Best Available Technology)
Oil	≅733	
Natural gas	≅650 (508)	(Advanced cycle)
Nuclear	<35	
Hydro	Negative – (<1200)	Emissions >1000 are exceptional
Wind	(≅35)	Non-firm electricity, i.e. emission from back-up must be considered

BIODIVERSITY

Calculation of Impact

Amount of land (m^2) required to produce 1 kWh

X

Abundance (no. of inds.) of insects per unit area

BIODIVERSITY

Impact

PROJECT	Annual average energy production (GWh)	Land appropriation (km^2)	Specific loss of insects ($inds \times kWh^{-1}$)
Hornsö	***10***	***0.15***	***75***
Lule älv	***13 600***	***328***	***120***

Biomass Fuel and Biodiversity

- Annual Yield of Wood = 0.5 kg· m^{-2}
- 1 kg_{dw} = <5 kWh_{heat}
- 1 kg_{dw} supports >500 insects
- 20% of annual yield is available as FR

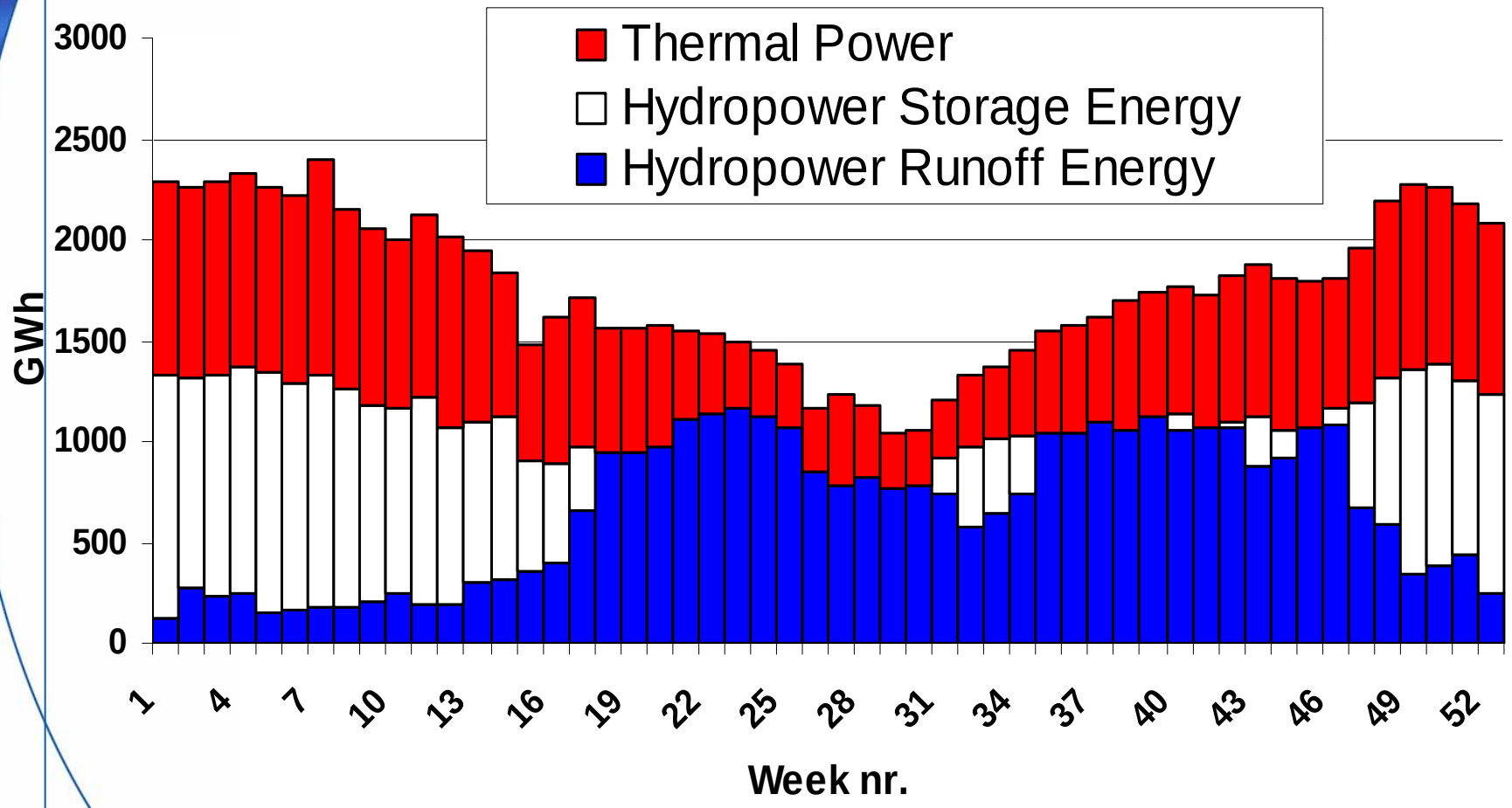
→ >1000 insects ·kWh_{heat}^{-1} are lost

VATTENFALL

Summary: Loss of Biodiversity

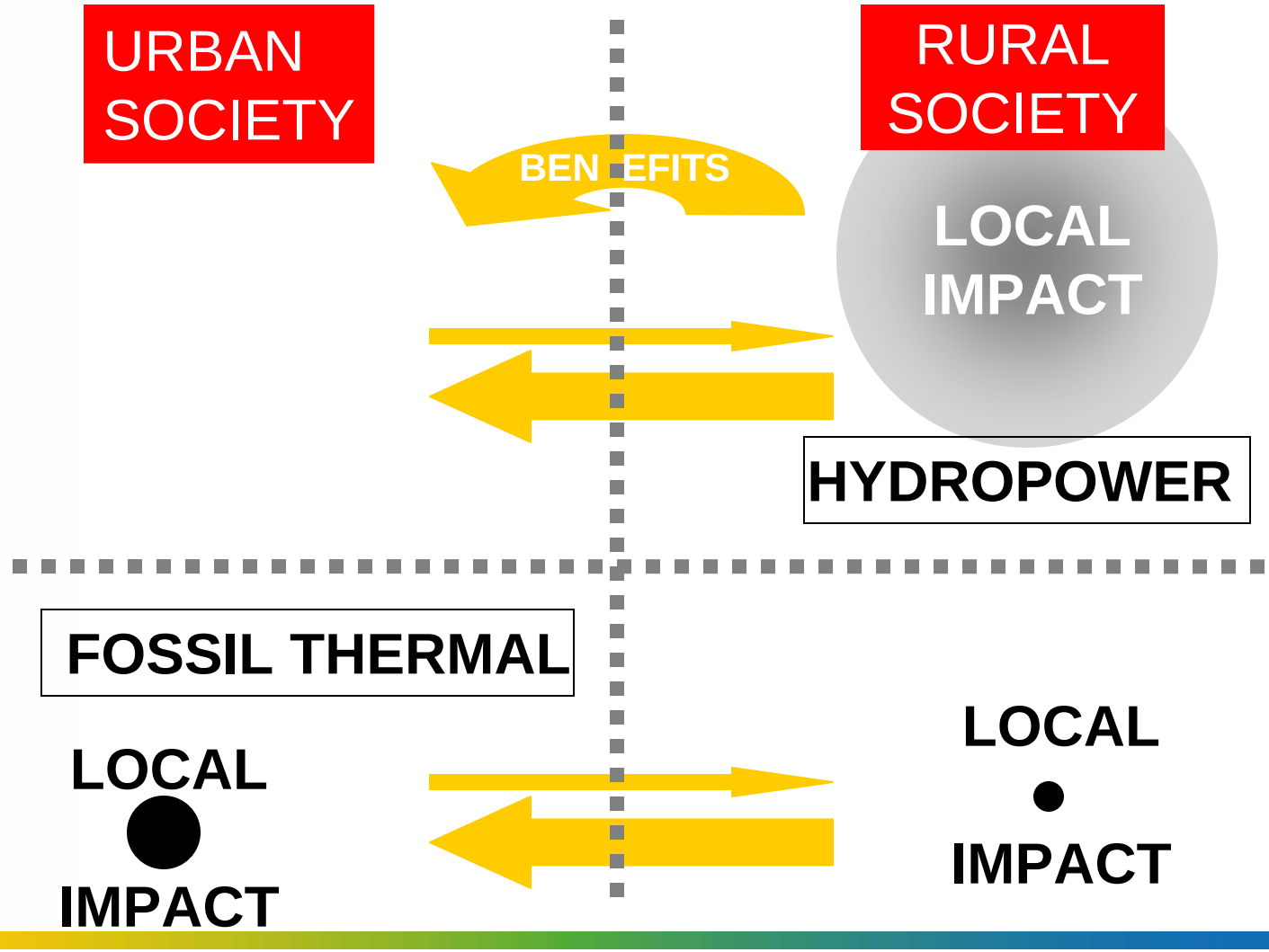
Power	Reduces insect abundance by
•Hydropower with reservoirs	• <120 inds · kWh_{el}
•Run-of-river hydropower	• <<75 inds · kWh_{el}
•Biomass fuel as forest residues	• >1000 inds · kWh_{heat}

Electricity production in Sweden 1987



VATTENFALL

Benefits and Concerns



VATTENFALL

SUSTAINABLE HYDROPOWER?

Yes!

Provided:

- *people are better off following flow regulations*
- *hydropower provides a better degree of service that is less expensive compared to other options*
- *specific impact on biodiversity is less than or equal to alternative means of power generation*

And provided that:

- *People know and appreciate all this!!*

- Thanks!!

VATTENFALL