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Presentation from the

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www.worldwaterweek.org

The Role of Water in Todays and Tomorrows Sustainable and Competitive Energy Systems

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Water has been a source of life for centuries

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Electricity generation with Hydro has a long history in Sweden

- Development began in the late 1800s
- Large-scale hydro power in Sweden during the 1900s
- Vital for the electrification and industrialization of Sweden
- Been used to replace other energy sources
- Major expansion era after World War II and in the 70s
- Today, half of all electricity in Sweden is generated with hydropower
- High efficiency and availability
- Hydropower has also made great impact in and along our developed rivers

Hydro power in Sweden

Installed capacity	Number of plants	Share of total production	Total production
>10 MW	208	94%	*62 TWh
1,5 MW - 10 MW	187	3,9%	2,6 TWh
125 kW - 1,5 MW	681	2,1%	1,4 TWh
<125 kW	1030	0,5%	0,3 TWh
	2106		66 TWh

* Whereof Vattenfall 33 TWh

- 75% of the production in power plants with dry riverbeds downstreams
- Used for regulation of the whole Swedish electricity system

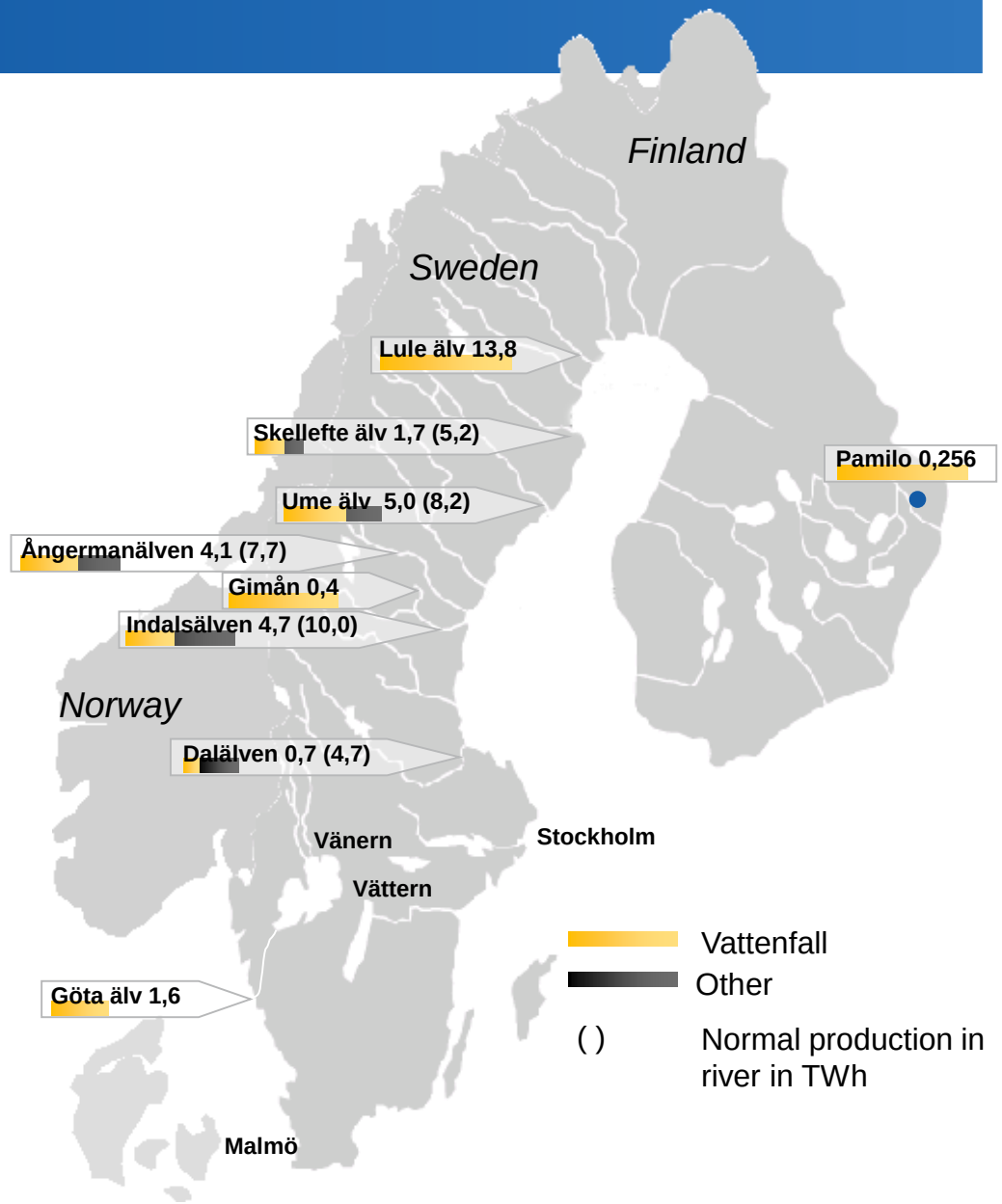
Vattenfall Hydro power

Vattenfall Hydro power is the third largest hydro power producer in Europe.

Annual production is about 33 - 35 TWh or approx. 50% of the Swedish hydro power production.

Power is generated in 110 large- and small-scale hydro power plants in Sweden and Finland.

In Germany we have eight pumped storage plants and three small-scale hydro plants.



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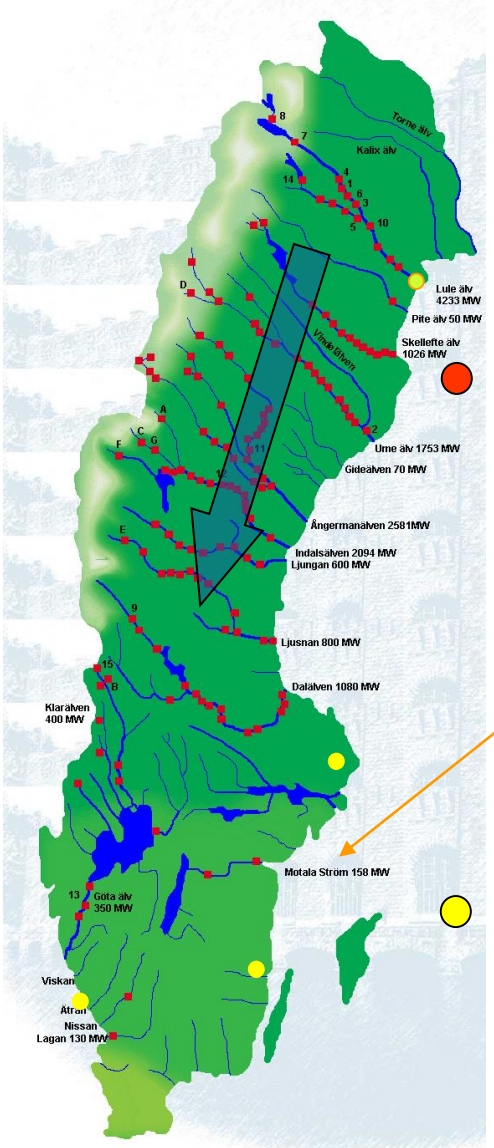
Generation and consumption



Hydro 16 200 MW

Nuclear 9000 MW

- The major part of hydro power generation is located in the northern part of Sweden
- The major part of electricity consumption is located in the southern part of Sweden

We have large transportation of electricity from north to south

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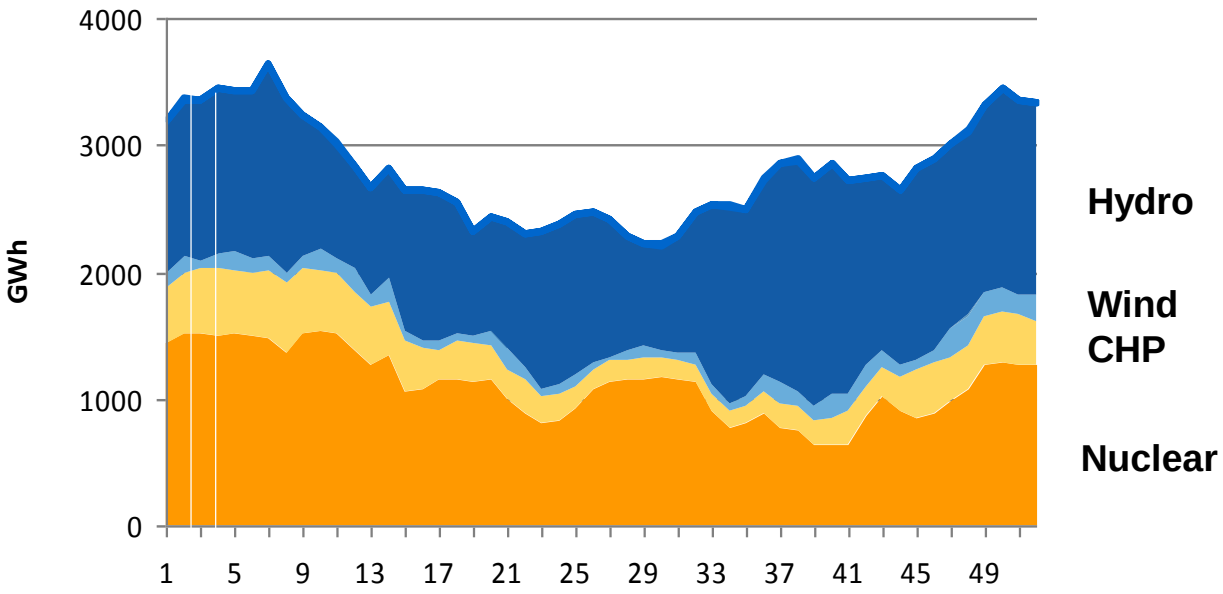
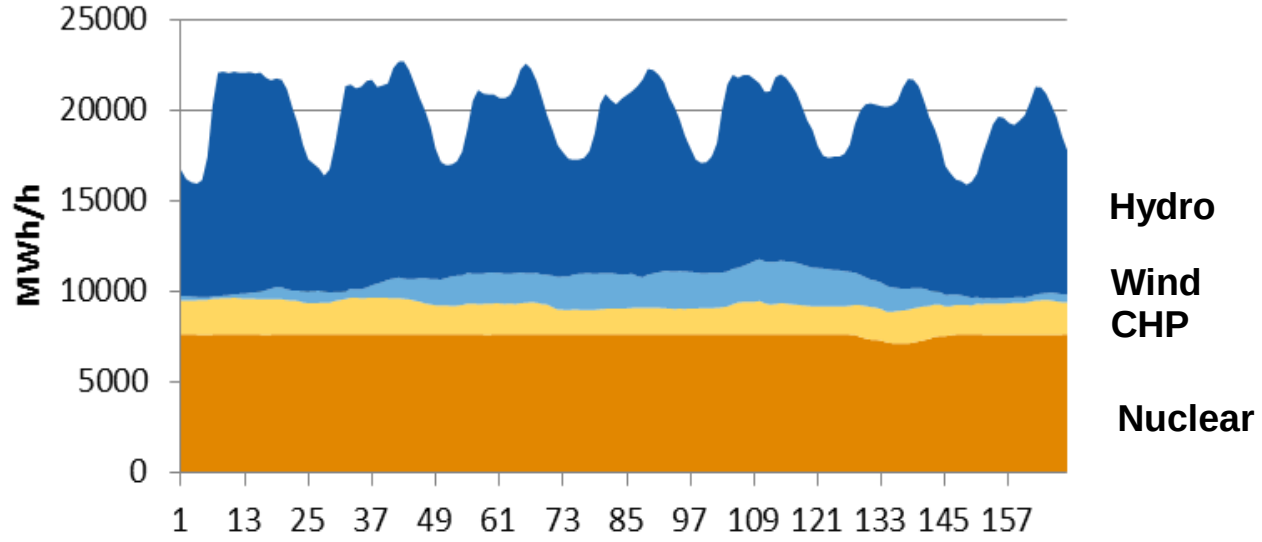
The role of Hydro Power – Balancing & Renewable power

Electricity production, Sweden Full year 2012



Electricity production, Sweden Week 2 2012



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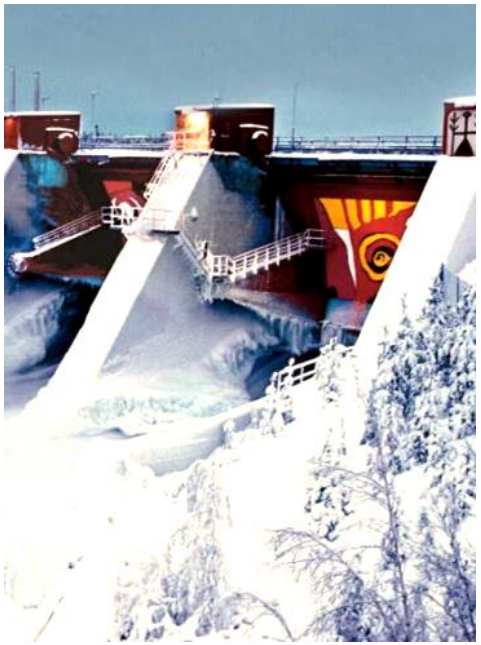
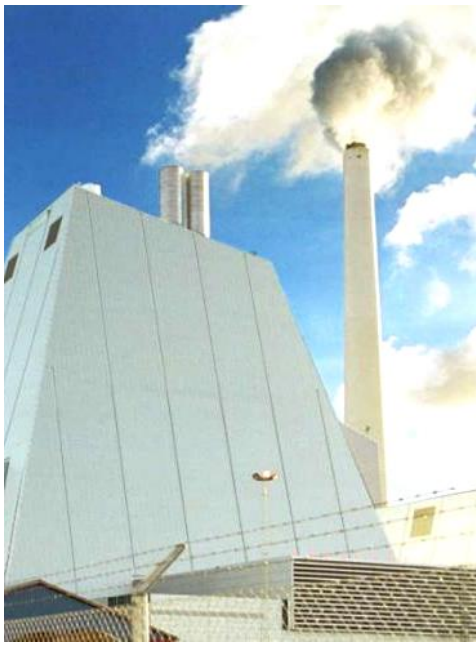
The future energy system means an extended role for Hydro

- Wind - Solar
- Nuclear
- Biomass
- Hydro – important fast, renewable regulator but also baseload



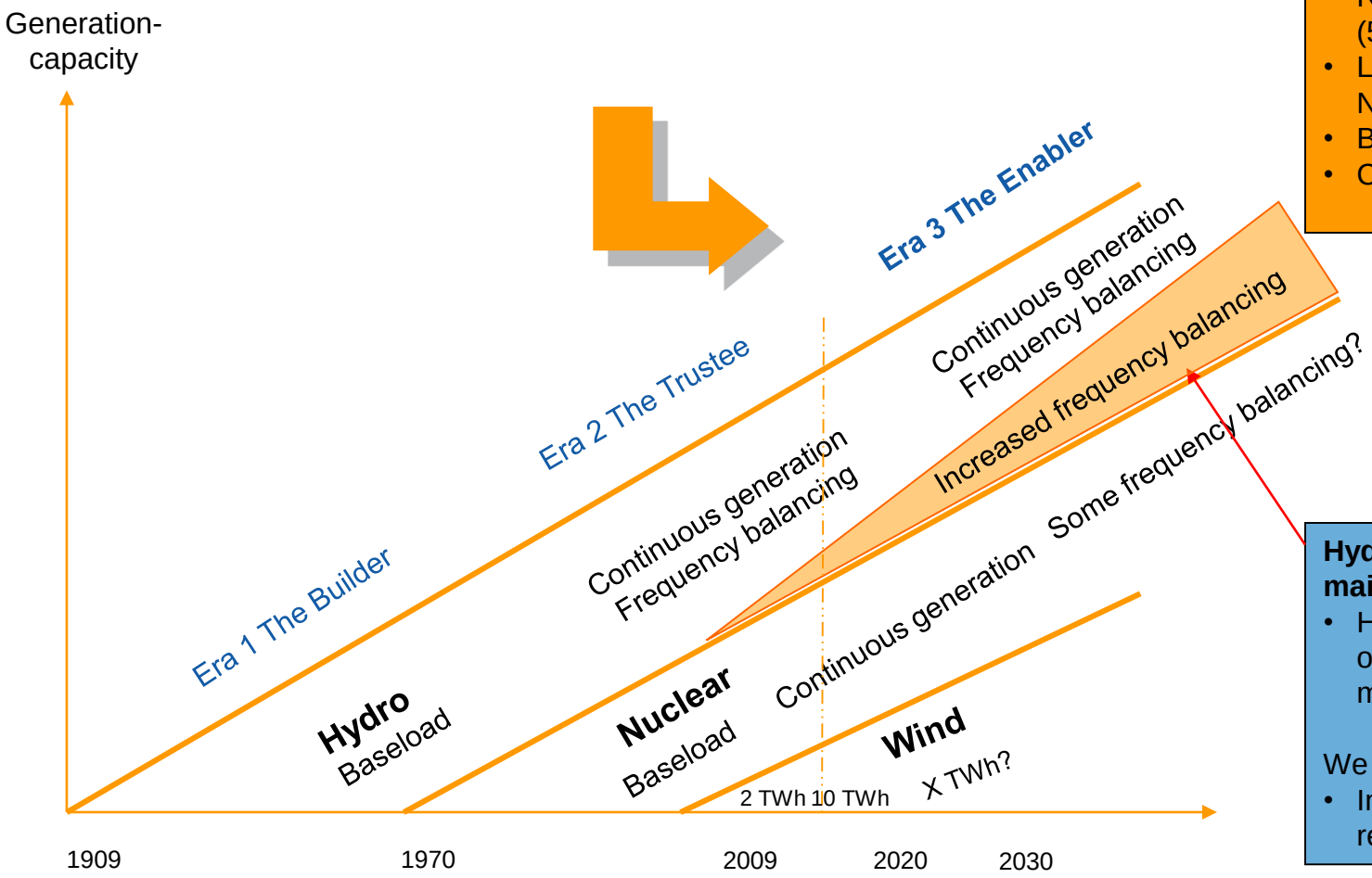



Challanges for Hydro

1. **EU Water Framwork Directive (WFD)**
2. **Review of the Environmental Code**
3. *Taxation of Hydro Power*
4. *The Salmon regulation in the Baltic Sea*
5. *The Eel regulation*
6. *Pricing of Water Services*

Hydro Power - an Enabler

We are facing a third era of hydro power



External factors

- Water Frame Directive
- Renewables 40 to 49% (50%)
- Large-scale wind power, North/South
- Bottlenecks in the grid
- Climate changes

Hydropower – main issues

- How should we design our facilities in order to meet future demands?

We are facing a new era

- Increased need for fast renewal regulation

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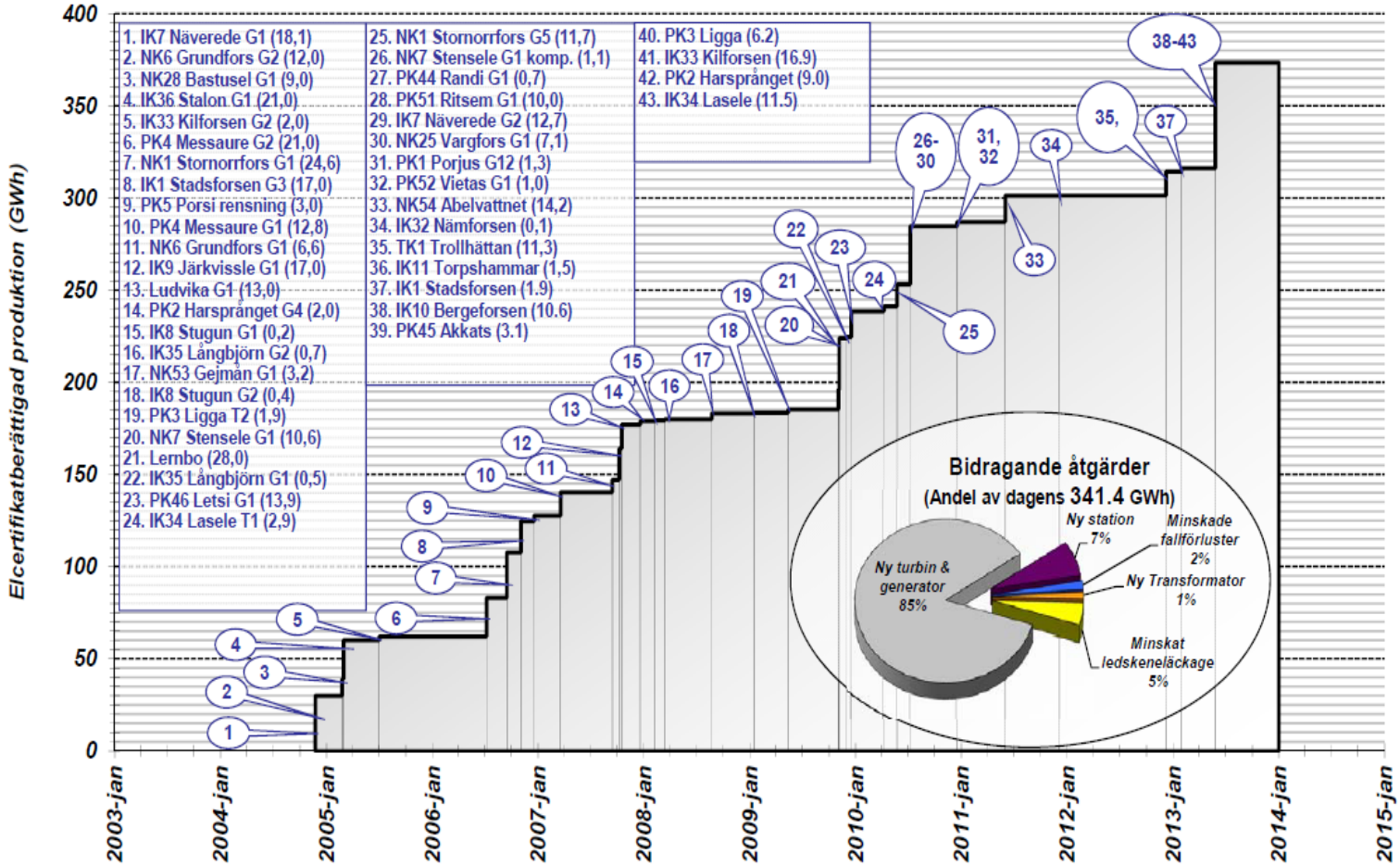
Increased generation/efficiency

10 years, 373 GWh, 43 Hydro plants/Plant parts



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What can we do to meet new Environmental demands?

- Vattenfall conducts a Program for biodiversity during 2012 -2017. The Program is implemented in three stages with evaluation after every stage.

- The Program focus on mitigations that doesn't effect the hydro production.
- Small-scale hydro and tributaries to the large-scale hydro are possible areas. Two pilot projects have so far been initiated in the River Lule älv.
- For the Program to be successful close cooperation with HaV, water authorities and stakeholders are needed.

Trust - our main energy source

Trust is nothing we gain for free – it is something we must earn

The energy industry must be transparent and explain the value and importance of renewable hydro power in the future energy mix - to politicians, the public, authorities and other decision makers.

We also need to take initiative and work with authorities and stakeholders, and make environmental investments where they will have the greatest impact.