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# Sustainability and barley production

## Promoting Local Sustainability

### The Case of Þorvaldseyri



# Local sustainability

- **Local sustainability** means that an area is designed, built and operated in a way that uses energy and natural resources efficiently and equitably, for both present and future generations of humans and other species.



# Agriculture – Environmental Impacts

Global emissions by sources from agriculture, forestry and other land uses were more than

**10 billion tonnes CO<sub>2</sub> eq in 2010**

Emissions from energy use in agriculture added another

**785 million tonnes CO<sub>2</sub> eq in 2010**

The data include emissions from fossil fuel energy needed to power machinery, irrigation pumps and fishing vessels.



The largest emitters in agriculture are:

40%



Enteric fermentation

16%



Manure left on pasture

13%



Synthetic fertilizers

10%



Paddy rice

7%



Manure management

5%



Burning of savannahs

# Northern Cereals - Þorvaldseyri

- The original concept of this work on Life Cycle Assessment (LCA) was to identify the environmental impacts and energy use at the Icelandic cereal and dairy farm Þorvaldseyri
- The results would be used to demonstrate how environmental impacts and resources use can be minimized
- It was decided to adjust the scope in the direction of more practicability.
- **We wanted to make something useful for both the project and the farmer**

# Northern Cereals - Þorvaldseyri

- Adjusted the scope to introduce and show the local sustainability of Þorvaldseyri
- The farm receives huge numbers of domestic travelers and foreign tourists every year where the residents at the farm showcase the influence of a recent eruption on the farm and its surroundings and how they have managed to create a sustainable small community.



# Þorvaldseyri

- The result was that an infographic of the farm's activities was created which visualizes how the farm operates, maintains local sustainability with the aim of reducing environmental impacts and costs.
- The fundamental principles of LCA was still used to determine the release of GHG emissions



# Þorvaldseyri – Special conditions

- The farm itself can in theory be 100% self-sufficient for energy, raw materials, feed, water and food, while still selling end products to consumers.
- The Þorvaldseyri model can be used as a soft blueprint for other farms with similar conditions.
- The information presented on the infographic was chosen to be as understandable and accessible for everyone to enjoy







## Promoting Local Sustainability

### -for farmers

**Food production**, including agriculture, utilizes the limited resources of the earth and delivers significant amounts of greenhouse gases into the atmosphere and is generally considered one of the major driving forces of environmental impact. While the basic need for nutrition must be fulfilled, we are at the same time creating threats to the environment. Natural resources are increasingly used due to population growth, changes in lifestyle and growing consumption. Food waste is also a problem which further increases the burden on the environment and resources. When food is wasted, land, water, energy and other resources that were used to manufacture the food are also wasted.

**Food Security** Together, these pressures on the environment have brought the concept of food security to the forefront of international food system discourse. How to provide food security in light of increasing populations and shifting dietary patterns in face of climate change and competition for limited land, water, and other resources figures among the central governance challenges of the modern era. Food production sectors like agriculture are often dependent on the import of fossil fuels, synthetic fertilizers and feed ingredients from all over the world. Minimizing import by utilizing local resources strengthens food security.

**Local sustainability** means that an area is designed, built and operated in a way that uses energy and natural resources efficiently and equitably, for both present and future generations of humans and other species. There are many opportunities for farms to reduce negative ecosystem impact by incorporating sustainable standards to its operations and save money and reduce negative environmental impacts in the process.

**Life cycle thinking** refers to a sustainability management approach that takes into consideration all relevant interactions associated with goods and services from a supply chain perspective for the purpose of improved decision making. In the context of environmental management, the life cycle approach requires attention to material and energy inputs and emissions that occur along the entire life cycle of the activities of concern. Social acceptance and market access for agricultural producers are increasingly becoming about the willingness and ability of producers to measure and communicate their environmental performance, as well as demonstrate a commitment to continuous improvement. Life cycle thinking and related tools like Life Cycle Assessment have become a critical component of effective environmental management. There is a need for extensive research on the agricultural food production topic, both applied- and basic research, where local production and production processes are compared to the production and importation of various foods.

By adopting sustainable thinking and practices much can be gained, both financially and environmentally for single farms and agriculture in general:

- Take steps to utilize all available local resources and by-products
- Minimize the use of fossil fuels
- Minimize the use of synthetic fertilizers
- Reduce the import of fossil fuels, fertilizers and feed material
- Reduce waste generated



**Porvaldseyri** is situated on the south coast of Iceland and rests right under the vigorous Eyjafjallajökull volcano, most famous for its 2010 eruption that made the headlines worldwide after grounding tens of thousands of flights across Europe. Although Porvaldseyri and surrounding lands were completely covered in dark ash, resulting in failed crops and even dead livestock, the residents decided to utilize this event to further strengthen their farm operations and nearest community. **Porvaldseyri** has very specific conditions: the farm produces a large share of its own electricity from a small power plant on the premises and has wells for hot water, feed for animals and fertilizer is mostly produced locally from by-products. Rapeseed oil is sold to consumers but can also be used as fuel on the farm's machinery. The household is sustainable for the most part; farm products serve as food and vegetables and fruit are grown for personal consumption. The NPA funded project Northern Cereal described this local sustainability and its implications in environmental and social terms. The LCA methodology was used for calculations based on data from the farm. According to the calculations, the farm could save about 146.800 EUR and 18 tons of greenhouse gas emissions per year by adopting sustainable thinking.