

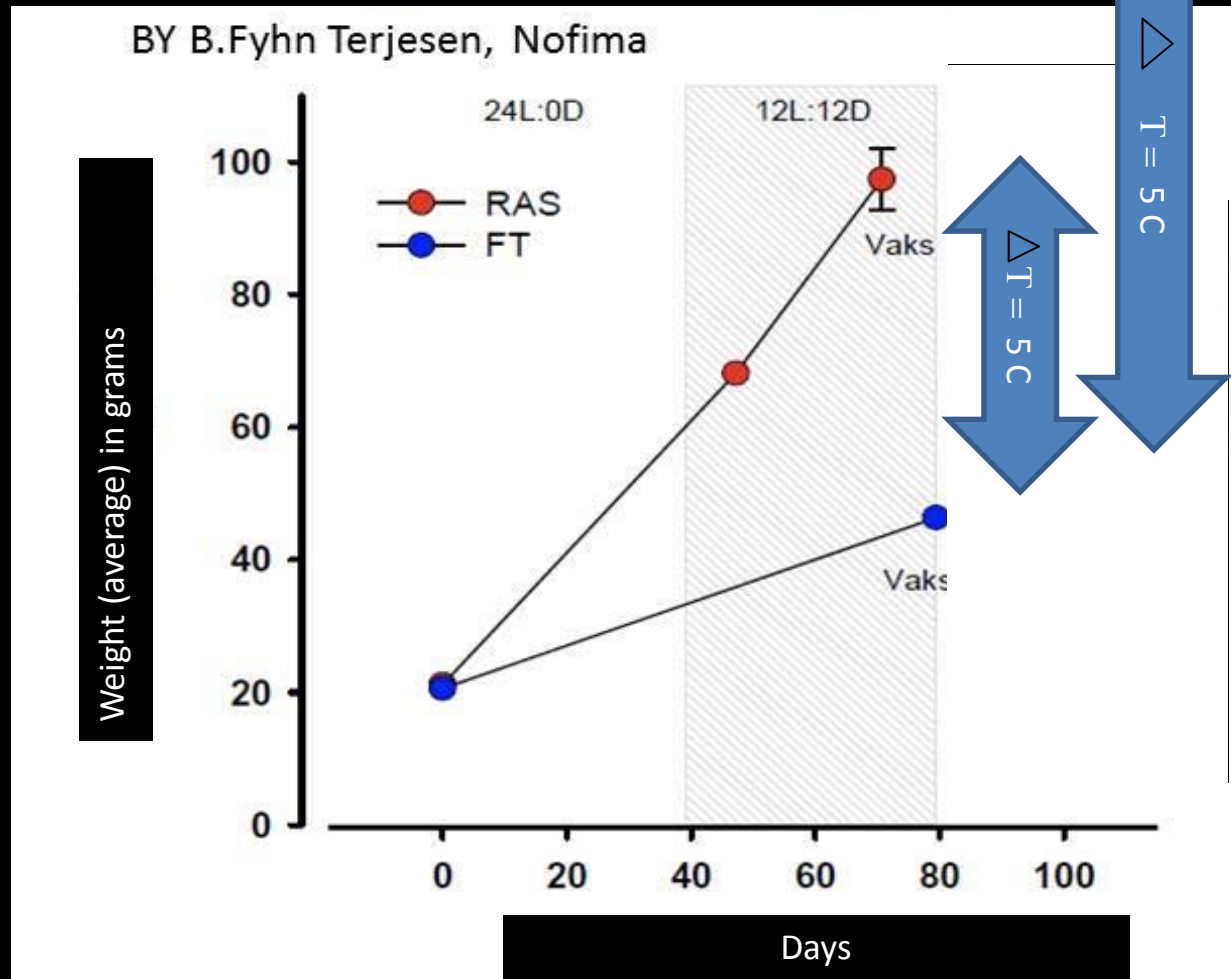


Swedish Surplus Energy Collaboration

Low grade Surplus Heat

1. Enormous amounts of heat $< 60\text{ }^{\circ}\text{C}$ is lost as cooling, ventilation or insufficient insulation.
2. In Sweden it is estimated to 150 TWh $\Rightarrow \frac{1}{4}$ of Swedish energy use.
3. In EU it is estimated to 500 billions Euro in petrol equivalents.
4. **Growth of fish, plants, algae are all stimulated by a moderate increase in temperature.**

An increase in temperature from 8.6 to 13.7 °C doubled the growth rate in salmon smolt.



Specific Vision

To utilize a good portion of
the Swedish Surplus Energy
for biological production and for
human health and well being.

Is there an advantage to produce in water when utilising low grade surplus heat ?

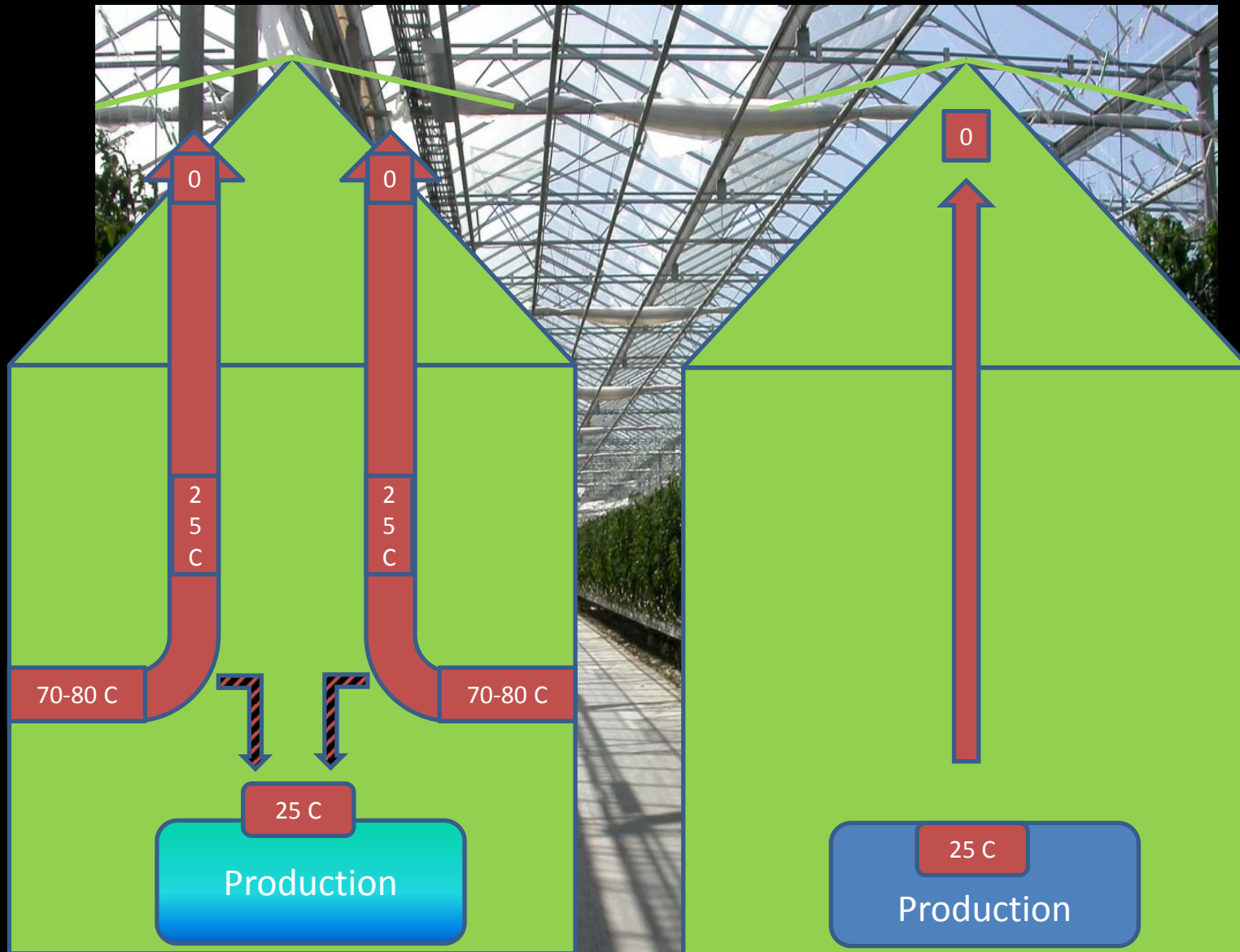
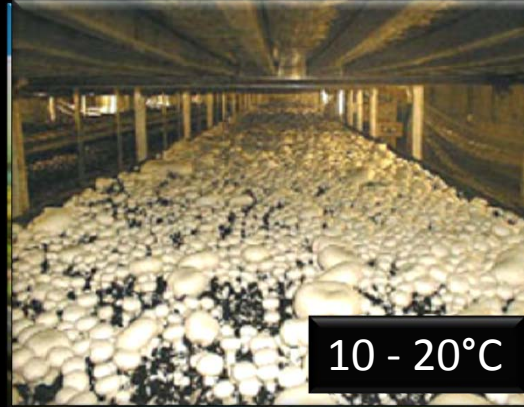


Illustration A.Kiessling

Surplus energy cooling chain



40 - 70°C



10 - 20°C



10 - 28°C



10 - 20°C



10 - 20°C



10 - 28°C

Food Production Surplus Energy Cooling Chain

Inputs; examples

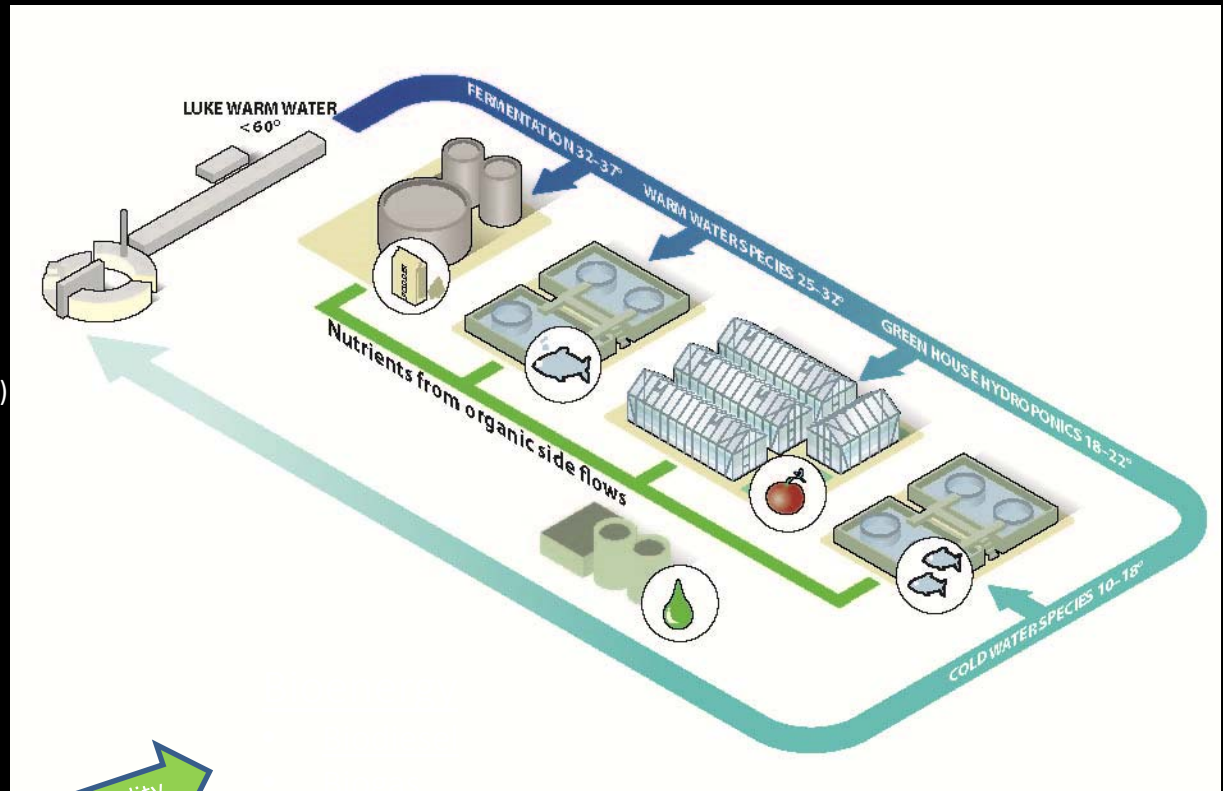
Nutrients:

- Retailers
- Large kitchens
- Restaurants
- Processing
- Production
 - Plant (e.g. rapeseed, wheat, etc)
 - Animal (e.g. slaughter fish/terrestrial)

Surplus Energy; examples

(luke warm water):

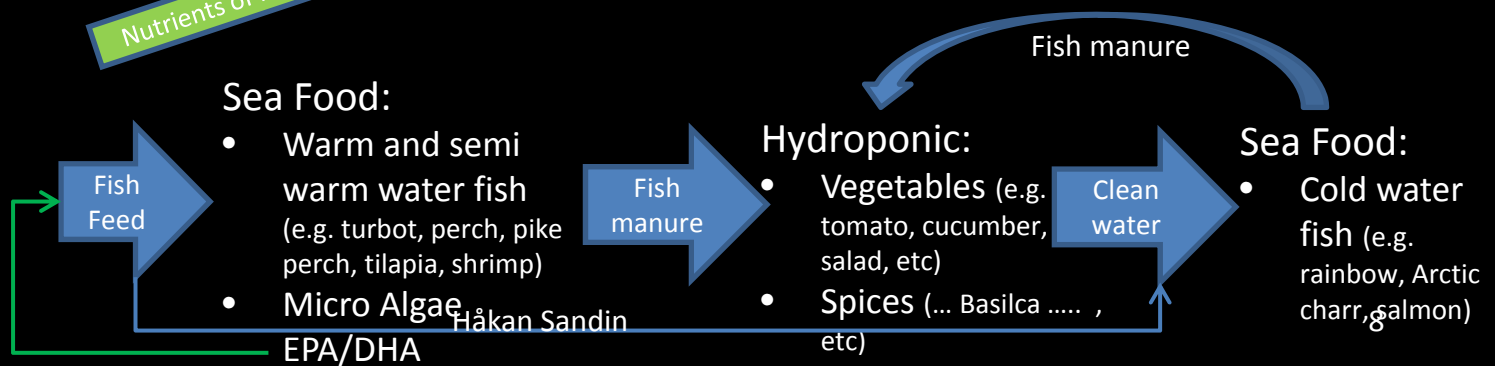
- Power industry
- Steel industry
- Pulp industry
- Computer terminals



Outputs; examples

Feed ingredients:

- Microbial protein
 - Microbial Feed lipids
 - Algae/yeast EPA/DHA
- 29 januari 2014



Sea Food:

- Warm and semi warm water fish (e.g. turbot, perch, pike perch, tilapia, shrimp)
- Micro Algae EPA/DHA

Hydroponic:

- Vegetables (e.g. tomato, cucumber, salad, etc)
- Spices (... Basilca, etc)

Sea Food:

- Cold water fish (e.g. rainbow, Arctic charr, salmon)

Håkan Sandin



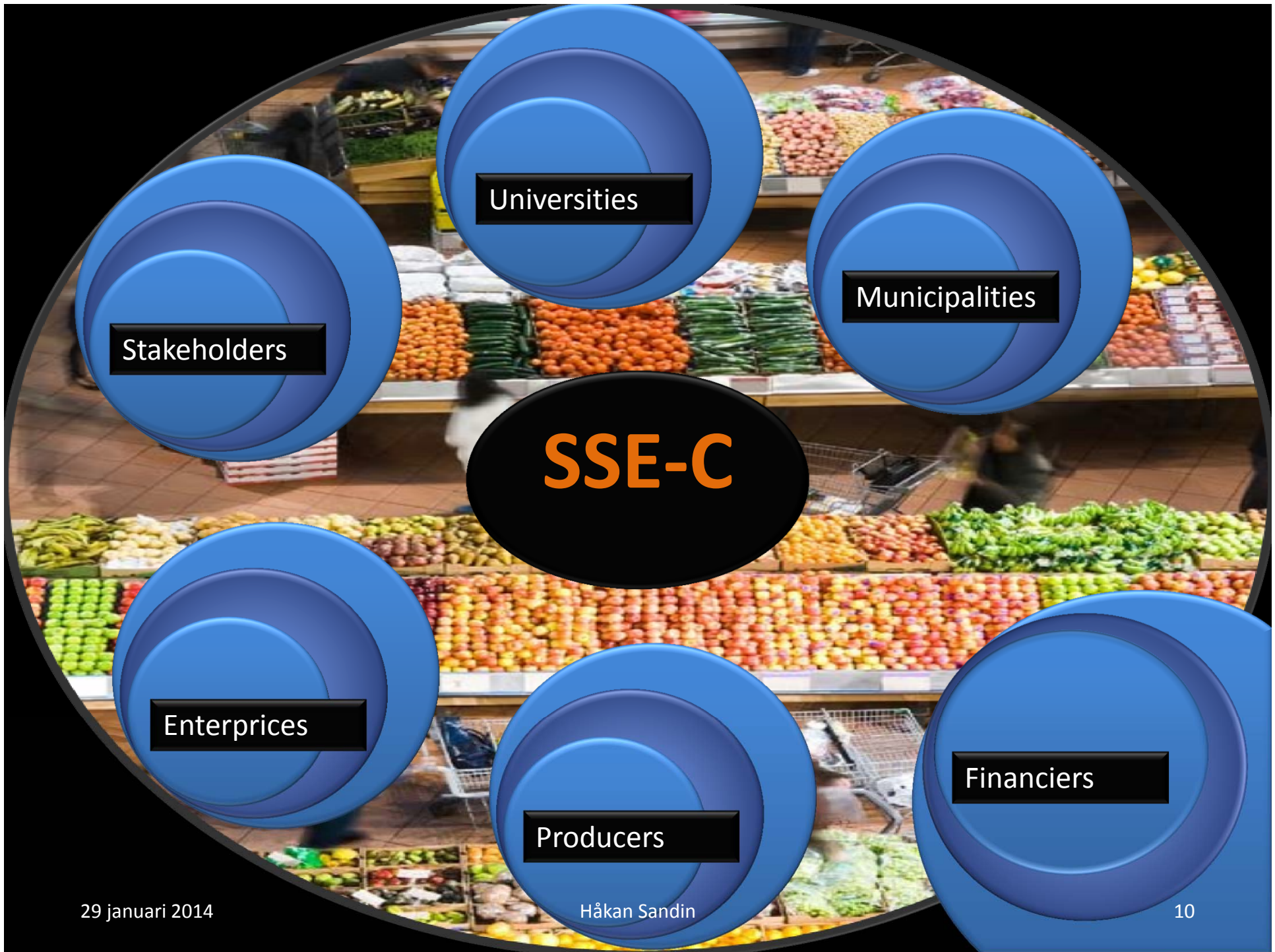
Attractive cities

Where we can help!

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Swedish Surplus Energy Consortium

Umbrella organisation

Services Municipalities	R & D Universities	Business Enterprices	Intressenter Production
Gävle Härnösand Bjuv Malmö Karlshamn Oskarshamn Mönsterås	SLU ESS NOVA KTH HiG	ESS EON Ramböll Findus Kraftringen	Tillväxt Trädgård LRF HS Blekinge Grönt Odlarlaget Syd Grönt Moek

Jointly funded project