8t society Sweden
Circular economy from theory to practice

RISE Research Institute of Sweden:
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Ulf Sonesson (food, F&B),
Corvey Steward (modell)
**8 ton society Sweden - Content**

1. **Project overview and project goals**
   Method – Lifestyle Material Footprint
   Examples for EU, Germany, Finland - 8 ton society

2. **Results for municipalities and cities - 8 ton society Sweden**
   Gothenburg
   Malmö
   Umeå

3. **Strategies for reduction and future scenarios**
   Workshops and circular action plans in cities
Participants and roles within the project

Calculations and workshops
Birgit Brunklaus (project leader, RISE, Maria Schnurr (scenarios), Ulf Sonesson & Christoffer Krewer (food) Corvey Steward (model och calculations)

Municipalities and cities:
Gothenburg, Malmö, Umeå

National experts:
SCB (national statistics) UHM (national purchasing) LMF method (Michael Lettenmeier)
1. Project overview and project goals
The goal of the project
• Material footprint of lifestyles
• more circular economy in cities
• Sustainable level = 8 ton (Planetary Boundaries).

The project include:
1. Literature review
2. Calculation national footprints
3. Workshop + Scenario

Carbon Footprint
Lifestyle Sweden = 10 ton
Sustainable = 2 ton

Material Footprint
Lifestyle Sweden = ?
Sustainable = 8ton
Method – LMF Lifestyle Material Footprint

\[ \text{LMF} = \text{consumption (national)} \times \text{MIPS database (total)} \]

Based on Lettenmeier et al 2018 and Wuppertal institute.
Examples of LMF for EU and Finland

Comparison of countries (EU and Finland) with various countries (WBSCD, 2016)
2. Results for Sweden
Municipalities and cities
Results for Sweden and cities (LMF 30 ton/pers)

High values
- Transport: Sweden 13 ton/pers, Max 21 tons/pers (infrastructure, distance km)
- Housing: Sweden 7 tons/pers, Max 10 tons/pers (bio-based heating, m²)

Low values
- Household goods: 1-2 tons/pers
- Leisure: 1-2 tons /pers
Results for Sweden and Finland (LMF in ton/pers)

**High values**
- **Transport**: Sweden 13 ton/pers, Finland 17 ton/pers (longer distances)
- **Housing**: Sweden 7 tons/pers, Finland 11 tons/pers (bio-based heating, m2)

**Low values**
- **Food**: 6-7 tons/pers
- **Household goods**: 2-3 tons/pers (electronics)
- **Leisure**: 2 tons/pers
3. Strategies for reduction and future scenarios
Strategies for reduction of LMF at the household level

<table>
<thead>
<tr>
<th></th>
<th>Reduction kg</th>
<th>Total reduction %</th>
<th>Required reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Housing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch to 100% wind power electricity</td>
<td>-550</td>
<td>-35%</td>
<td>(-78%)</td>
</tr>
<tr>
<td>Reduce living space to 20m² per occupant</td>
<td>-1950</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never driving car with single occupancy (carpool)</td>
<td>-5630</td>
<td>-44%</td>
<td>(-85%)</td>
</tr>
<tr>
<td>Take the bus instead of domestic flights</td>
<td>-90</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace 50% of meat with root vegetable-based products</td>
<td>-1750</td>
<td>-49%</td>
<td>(-55%)</td>
</tr>
<tr>
<td>Reduce dairy products by 50%</td>
<td>-930</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace 50% of processed sugar, chocolates, juice concentrates with berries or stone fruits</td>
<td>-575</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Household goods</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extend electronics and appliance lifetime (repair) by 50%</td>
<td>-270</td>
<td>-37%</td>
<td>(-64%)</td>
</tr>
<tr>
<td>Buy secondhand winter clothes</td>
<td>-145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair shoes to last an extra year</td>
<td>-95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Strategies and action plans in cities and national level

WORKSHOP with local and national actors in Sweden – Scenarios and action plans
1. Political ambition or digital
2. Sharing (20% or 50%) or circular (20% or 50%)
3. Effects on LMF (tons/person)
THANK YOU!

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My resource consumption per year

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>3.3 tons</td>
</tr>
<tr>
<td>Consumer Goods</td>
<td>1.2 tons</td>
</tr>
<tr>
<td>Nutrition</td>
<td>5.2 tons</td>
</tr>
<tr>
<td>Leisure</td>
<td>0.3 tons</td>
</tr>
<tr>
<td>Mobility</td>
<td>1.5 tons</td>
</tr>
<tr>
<td>Vacation</td>
<td>1.6 tons</td>
</tr>
</tbody>
</table>

What is the ecological backpack?

The ecological backpack visualizes the weight of all natural raw materials that are needed for your private consumption behavior. This includes all products and their production, use and disposal. For traveling by car for example not only the car itself and the fuel is considered but also the iron ore mine, the steel production factory, and the street infrastructure.

The overall amount of raw materials can be used to estimate the pressure on the environment. Not only the extraction of raw materials itself has an impact, but the materials will also go back into the environment as waste eventually. The less natural resources we need, the lower will also be our impact on the environment.

Usually we do not know the ecological backpack of the products we buy. And we cannot determine all the effects of our lifestyle on all the people living on our planet now or in the future, as these effects are much too complex. But we can contribute to protecting our planet and thereby improving people’s lives by being more aware of our consumption patterns.

www.ressourcen-rechner.de

Lettenmeier 8 tonnes material footprint
Strategies for LMF reduction in Finland

Material Diet 2050

- Achieving the 8 Ton Lifestyle will require a reduction of about 32 tons, or 60% overall
- Mobility, Housing, and Nutrition will constitute 85% of the reduction amount
- Large cuts to mobility and housing allow for more flexibility in other areas

Reductions required to achieve a sustainable LMF (example from Finland).
The goal of the project is to raise awareness among consumers, municipalities, the state and business about resource-efficient lifestyles for a more circular economy. This is achieved by increasing knowledge of household material consumption and waste in Sweden relative to a sustainable level.

The project includes the following activities:

1. **Knowledge overview of material flows in Sweden** and opportunities with a circular economy, as well as national/international initiatives.
2. **Calculation tool for national footprints** for Sweden with focus on food, mobility, housing. Estimated national footprint for Sweden (tons/person). Comparisons with other countries such as Finland and Germany.
3. **Scenario analyzes** with national and local initiatives such as future scenarios with different degrees of sharing and/or circular economy.
4. **Workshops and dialogue meetings** on local measures and strategy development for increased knowledge and action in municipalities. Basis for action plan/environmental strategy and increased understanding of a circular economy.
5. **Spreading results** through debate articles, seminars and other media (extra LCM conf 2019 Poland)
Results for Sweden - LMF 30 Tonnes

1. Transport 45% (infrastructure + fuel)
2. Housing 23% (infrastructure + heating)
3. Food 22% (meat + milk)

Leisure 9% (Hotel + trp)
Household goods 6% (Textile + Electric)

Material Consumption in Sweden

30 tons = EU average
Lower than Finland
Results Finland – LMF from 40 to 8 Tonnes

Method – LMF Lifestyle Material Footprint

Material flow accounting using total material consumption (TMR) and domestic material consumption (DMC).

\[ \text{LMF} = \text{consumption (national)} \times \text{MIPS database (total)} \]
LMF – What is included in the six categories?

**Mobility**
Covers the production and use of cars, flights, bikes, and public transport as well as the infrastructure that is utilized. For example, the system boundary for flights is extended to the entire airport since it is crucial for the use of air travel.

**Nutrition**
This includes all of the food and beverages that are consumed within or outside of the household. Nutrition is a difficult category to make strong reductions in because it is considered vital to quality standards of living. Aside from value chains, the material footprint of nutrition is largely dependent on behavioral shifts, i.e. to vegetarian diets.

**Housing**
Buildings are a substantial use of materials in our daily lives. Massive amounts of resources are required during the construction process and further materials are consumed in the form of energy for heating, cooling, and household electricity.

**Household Goods**
These include items such as clothing, electronics, appliances, shoes, books etc. This category is often the target of popular schemes to reduce consumption, such as buying second hand.

**Leisure Equipment**
Activities outside of the household are included because they are vital for well-being and require equipment and infrastructure. Examples can include exercising at a gym or attending a sporting event, both of which require materials outside of the household level, but still within an individual’s area of influence.

**Other**
The ‘other’ category is reserved for other goods and services consumed, such as tourism accommodation on holiday, or owning a pet.
LMF for Nutrition in Sweden

Breakdown of MF for Nutrition

- Bread and cereals: 6%
- Meat: 35%
- Fish and seafood: 1%
- Milk, cheese, and eggs: 31%
- Oils and fats: 1%
- Fruit: 3%
- Vegetables: 5%
- Sugar, jam, honey, chocolate, and confectionery: 8%
- Coffee, tea, cocoa, and other drinks: <1%
- Salt, spices, sauces, and homogenized baby food: 1%
- Alcoholic beverages: 3%
- Mineral waters, soft drinks, fruit, and vegetable juices: 6%
- Coffee, tea, cocoa, and other drinks: <1%
- Milk, cheese, and eggs: 31%
- Fish and seafood: 1%
LMF for Housing in Sweden

- Heating/hot water Energy kWh: 3133.545 kWh (52.21%)
- Electricity use (not incl. Heat) kWh: 201,884 kWh (3%)
- Cold water TMR kWh: 182.5 kWh (3%)
- Hot water TMR kWh: 1314 kWh (22%)
- Housing TMR kWh: 3086 kWh (5%)

Legend:
- Heating/hot water Energy kWh
- Electricity use (not incl. Heat) kWh
- Cold water TMR kWh
- Housing TMR kWh
LMF for Mobility in Sweden

- Car: 52%
- Public Transit: 4%
- Bike: 8%
- Air Travel: <1%

Legend:
- Bike
- Car
- Public Transit
- Air Travel