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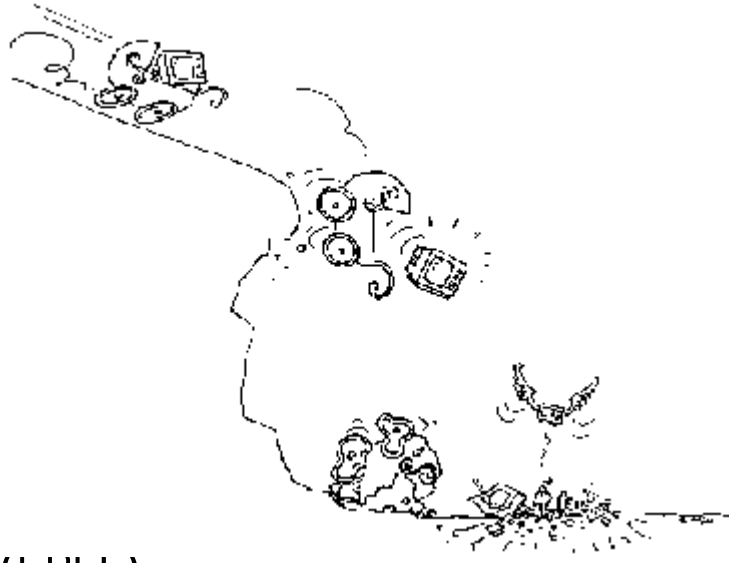
FÉDÉRALE DE LAUSANNE

ENVIRONMENTAL DECISION MAKING IN SUSTAINABLE CONSUMPTION: ASSESSMENT OF KEY DECISIONS AND CASE STUDIES



Josef.Kaenzig@epfl.ch

Olivier.Jolliet@epfl.ch

Industrial Ecology - Life Cycle Systems,
Swiss Federal Institute of Technology Lausanne (EPFL)

Goal & Approach

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Extracts from an ongoing study for the Swiss Agency for the Environment, Forests and Landscape (SAEFL):

1. Assess **the environmental impact per capita** with life-cycle approaches
2. Analyze and **identify key factors, decisions and actors** in regard to sustainable consumption
3. Elaborate **sustainable consumption patterns** presenting important benefits for the environment

Functional unit: Quantity Q of products needed to fulfill the demand of Swiss consumers per year.

Consumption domains

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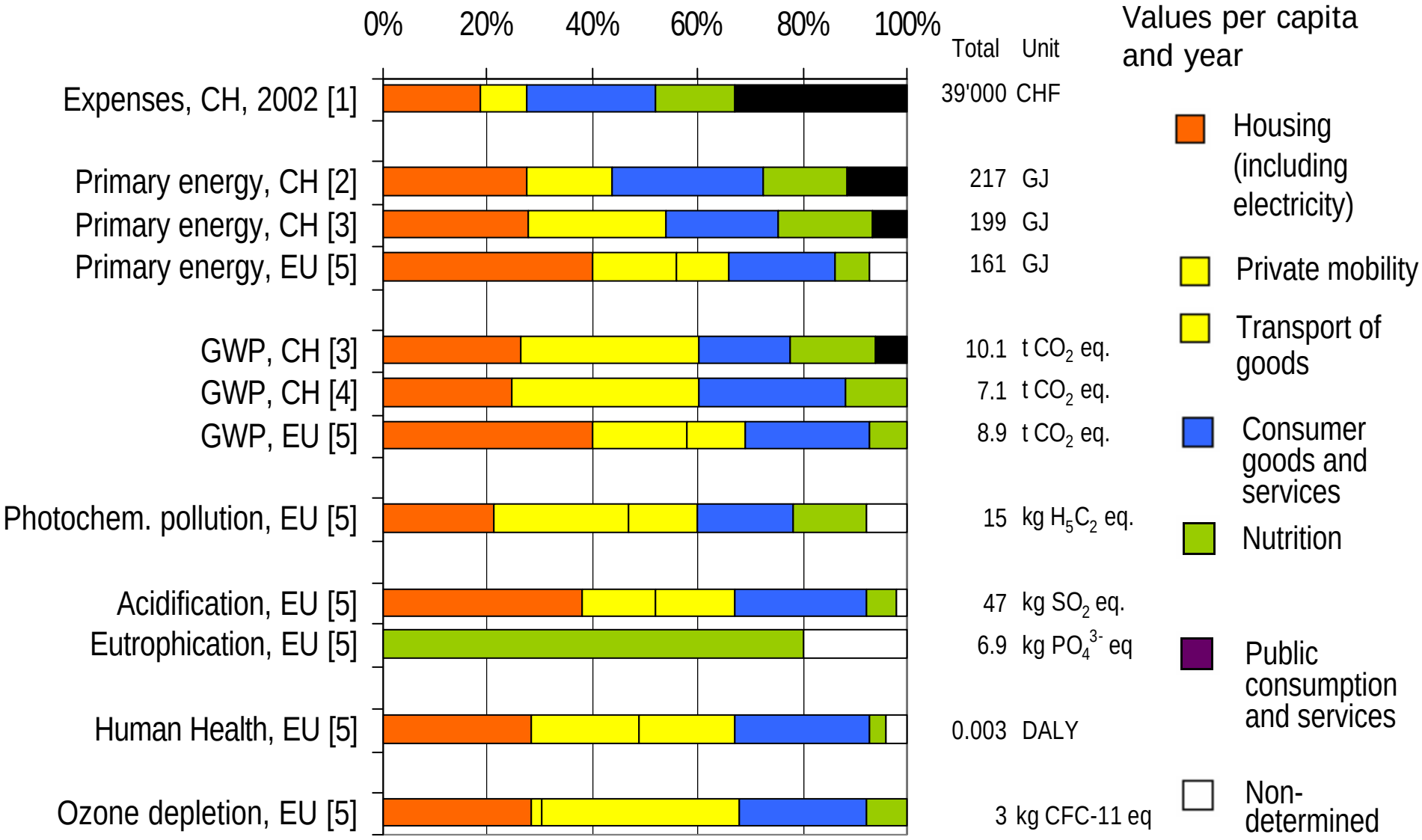
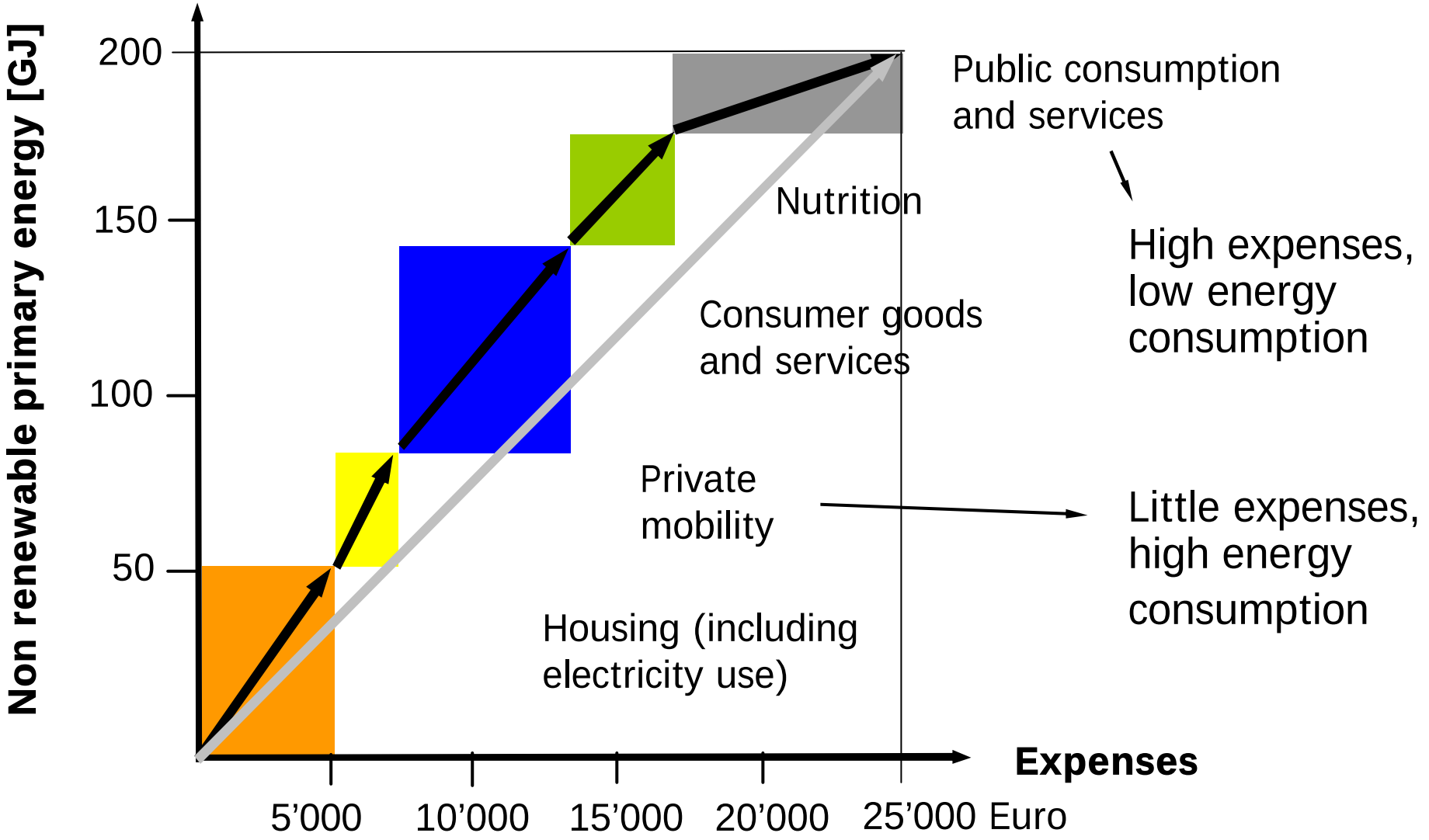
Consumption domains	**Attribution of particular elements**		
LC: Life cycle	**Transport of goods and persons**	**Household appliances**	**Heating**
Housing • LC building • Living	Transport of construction materials and waste	Use stage (electricity, ...)	Private housing
Private mobility • LC vehicle • LC infrastructure	Private mobility (commuting included)		
Consumption goods and services • LC other goods	Up to retail store	Production and end of life	Offices and production plants
Nutrition • LC food	Transport of food an animal feed		
Public consumption and services	Mobility at work		Public buildings

Comparisons of different studies



E2 vectors (Energy & Expenses /capita)



Key factors: Consumer behaviour

http://www.oekoweb.at:8080/Humor/

... some truth ...

Consumer‘s behaviour is of importance for the environmental impact!!!

Key factors, decisions and actors

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Domain	Key factors & decisions	Key actors
Housing including electricity (Use stage!)	• Thermal quality (isolation) • Living space (m^2/capita) • Type of housing • Consumer behaviour (°C, etc.)	• Builder-owner, Architect • Government (regulation, financial incentives) • Buyer - Consumer
Private mobility (Use stage!)	• Distances (km) • Mode of transport and occupancy • Motor technology	• Government (regulation, financial incentives) • Buyer - Consumer
Consumer goods and services (Whole life cycle)	• Energy consumption and material use etc. • Useful time • Eco-design / Label • Recycling rate	• Government (regulation, financial incentives) • Producer • Buyer - Consumer
Nutrition (Production!)	• Animal or cereal production • Origin, season (greenhouse, air transport etc.)	• Government (regulation, financial incentives) • Producer • Buyer - Consumer
Public consumption and services	• Number of employees	• Companies • Government

Life Cycle Assessment of a low energy house

House built according to the standard MINERGIE.
Architect: atelier Pont12, F. Jolliet.

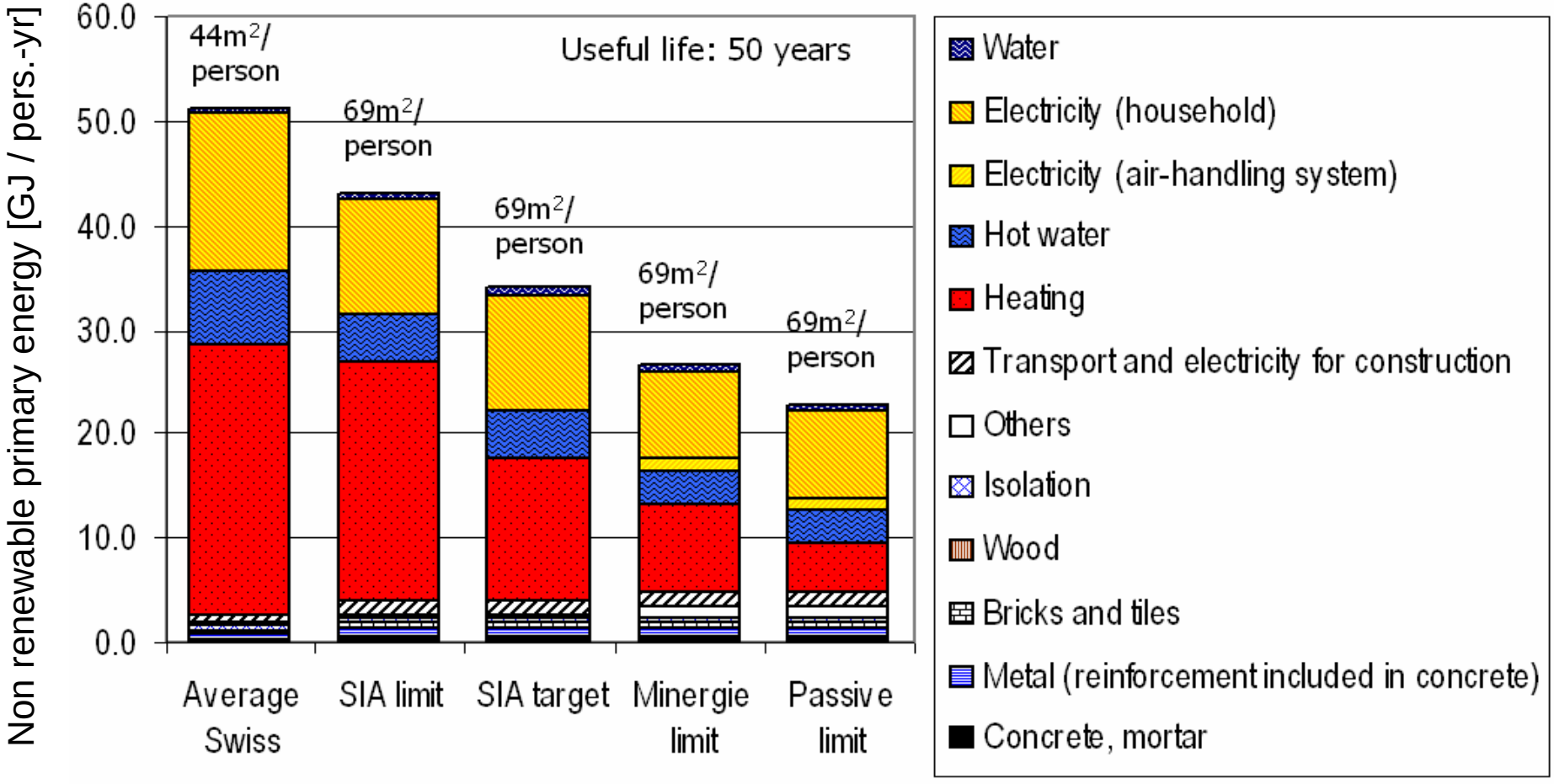
Important environmental benefits.
Problem: ~5% higher capital costs for MINERGIE.

Advantages:

- Energy savings → Less dependent on energy prize
- More comfort: Noise protection, no disturbing flows of air etc.

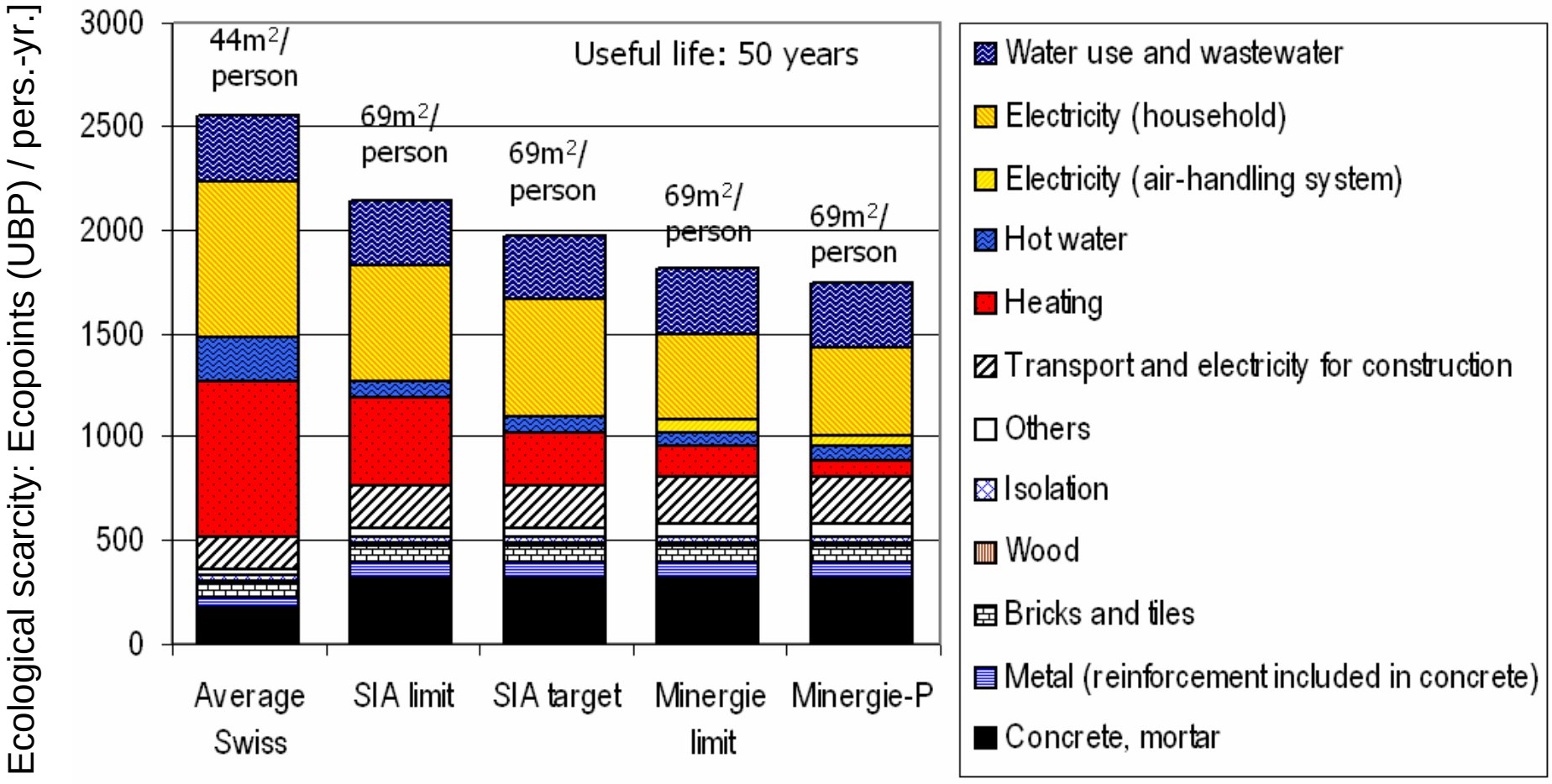
- Isolation: 20 cm
- Double-glazed windows
- Heat recuperation
- Gas heating
- Solar thermal collector for hot water

Life Cycle Assessment housing: Energy (Average vs. conventional vs. low energy)



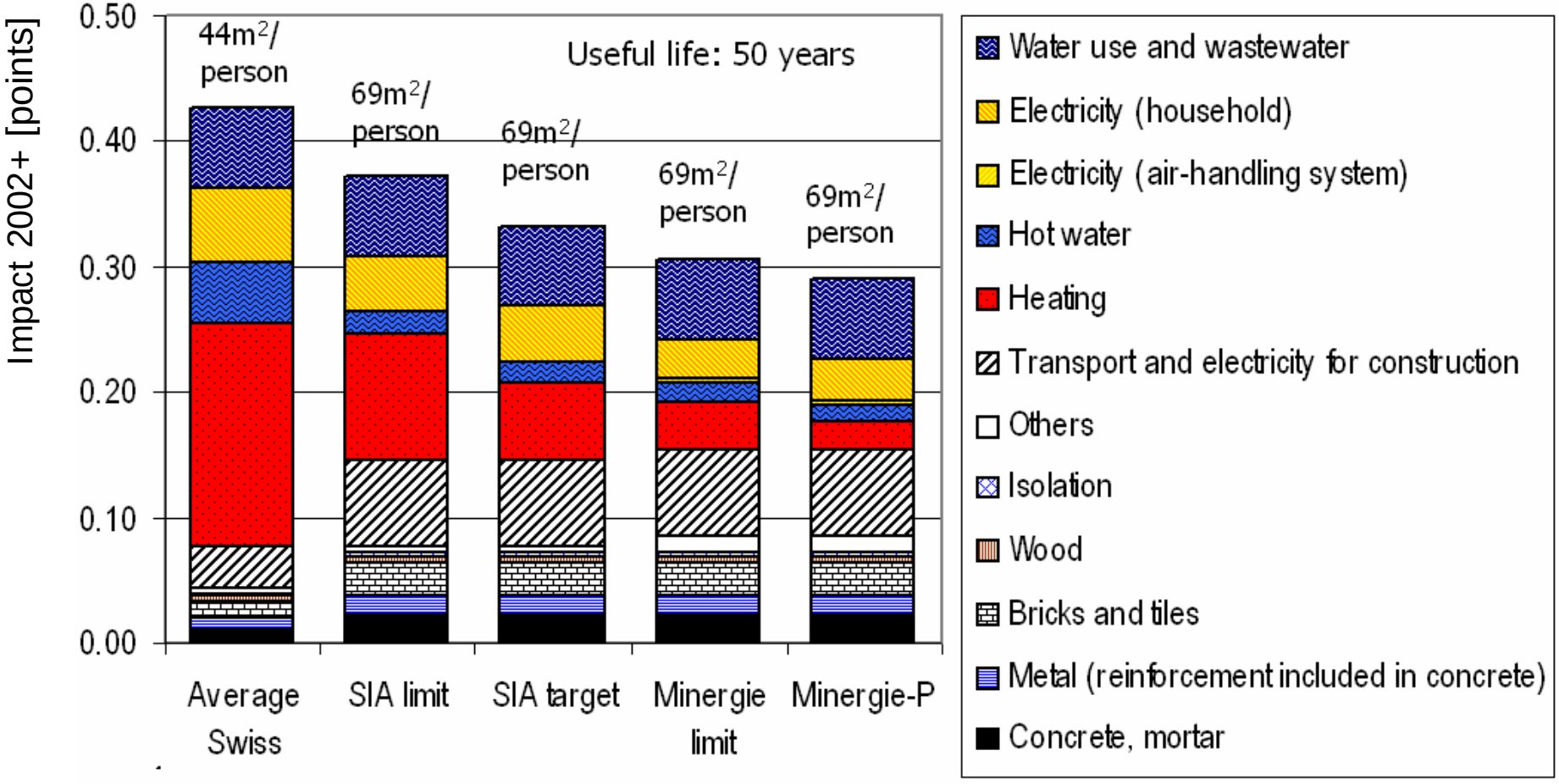
→ Energy use during the use phase is more important than energy use for materials and construction. Materials: No significant differences.

Life Cycle Assessment housing: Ecological scarcity (Average vs. conventional vs. low energy)



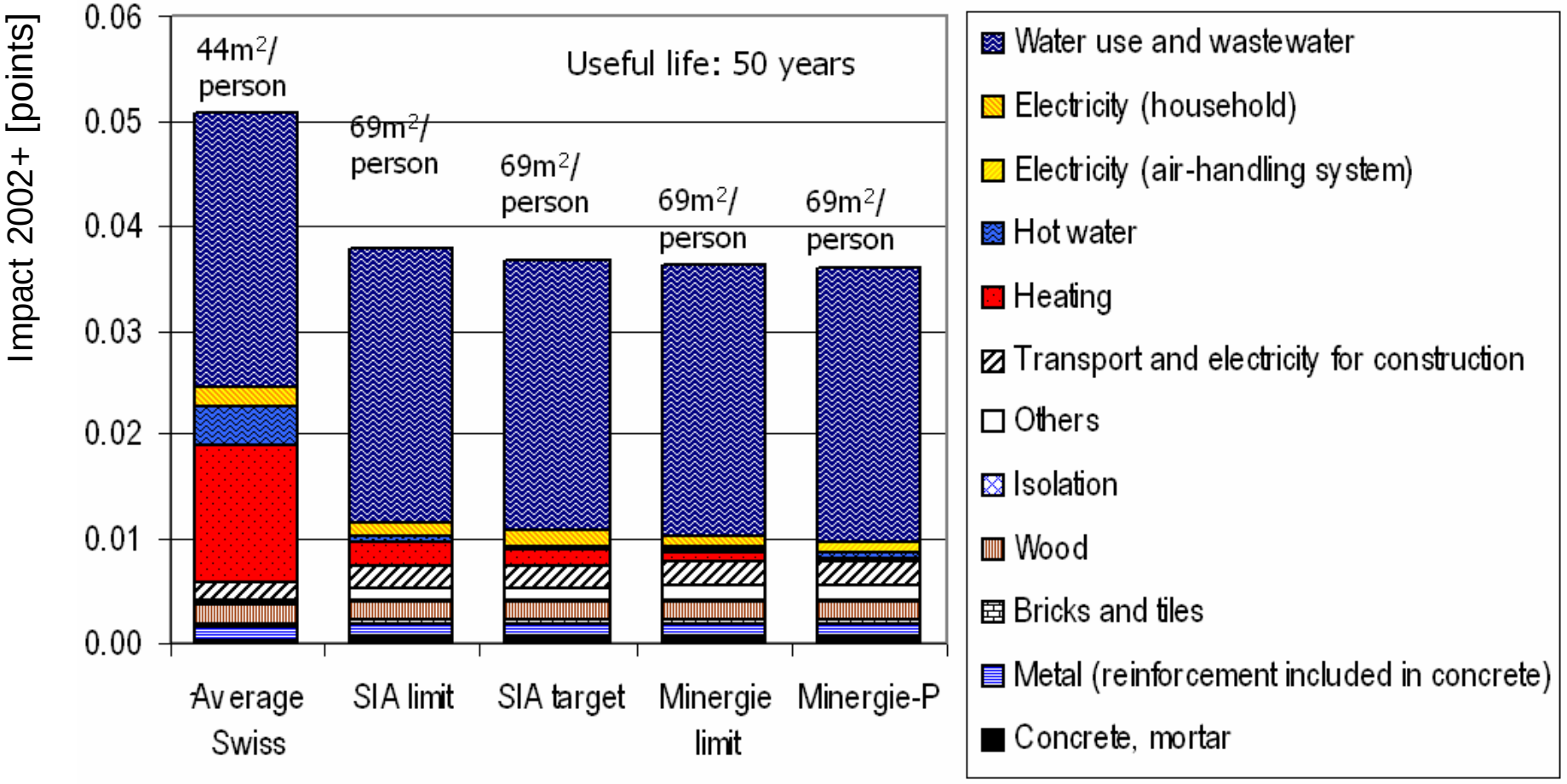
→ Impact due to use stage is much more important than impact due to materials and construction.

Life Cycle Assessment housing: Human health (Average vs. conventional vs. low energy)



→ The impact of housing on human health is quite important.

Life Cycle Assessment housing: Ecosystem quality (Average vs. conventional vs. low energy)

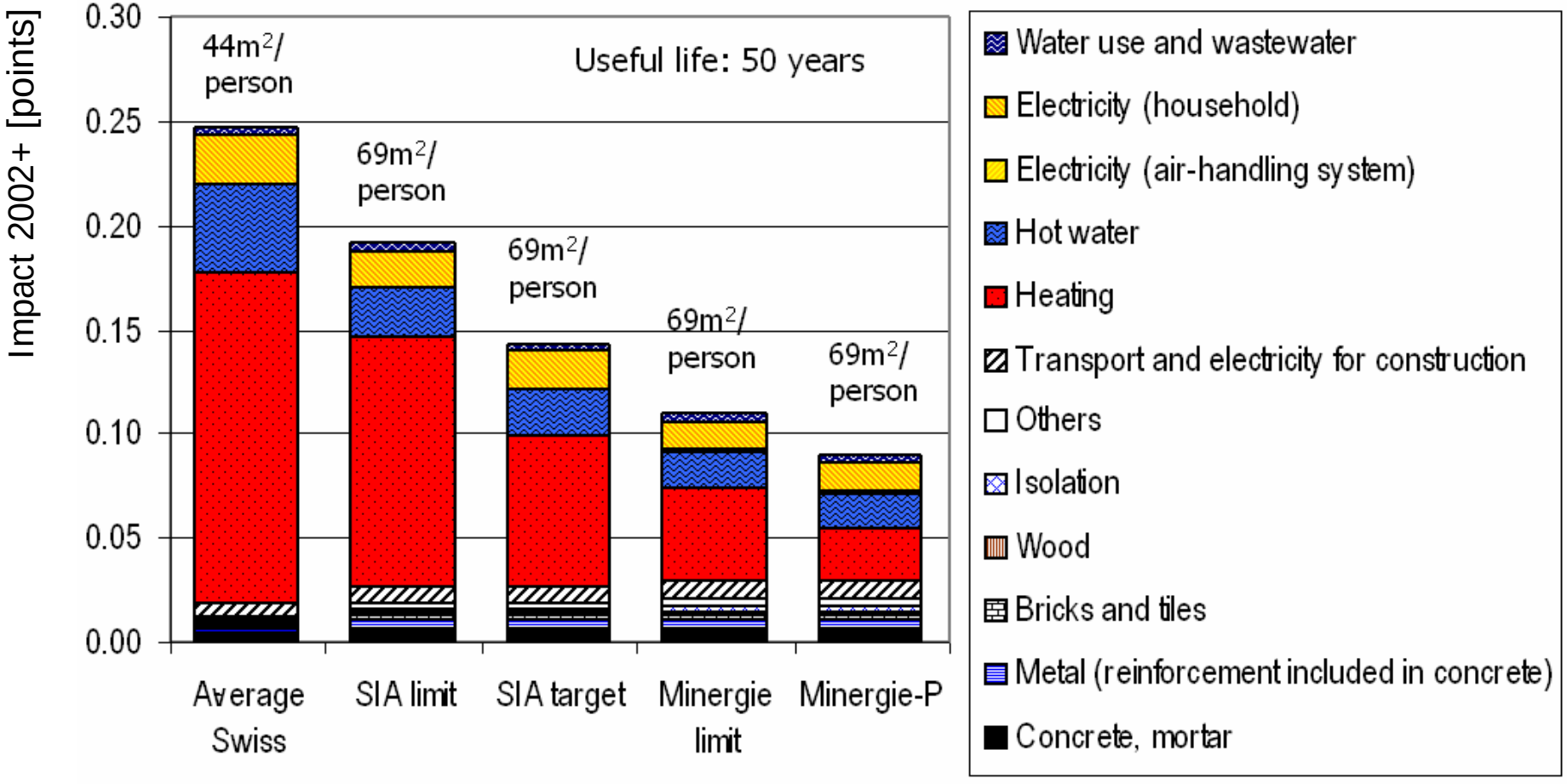


→ Impact on ecosystem quality rather small.

→ Impact due to wastewater dominates.

Impact 2002+

Life Cycle Assessment housing: Climate change (Average vs. conventional vs. low energy)



→ The use stage has the most important impact on climate change. The standard MINERGIE reduces the global warming potential of heating by 2!

Impact 2002+

Housing: Dissipater and ecologist

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Key factors	**Dissipater**	**Ecologist**
Heating (room temperature)	21-23°C (24h/24h)	19-20°C day 17°C night
Air condition	> 26-28°C	> 33°C
Quantity of warm water	Bath	Shower
Open windows	Hours	2-3 times a day 5 min.
Boiler (T. of warm water)	80°C	55°C
Valorisation of waste	No sorting	Sorting

→ High potential for improvement ? !

Private mobility: Characteristics

Example: Passenger car

average distance per capita (Switzerland):

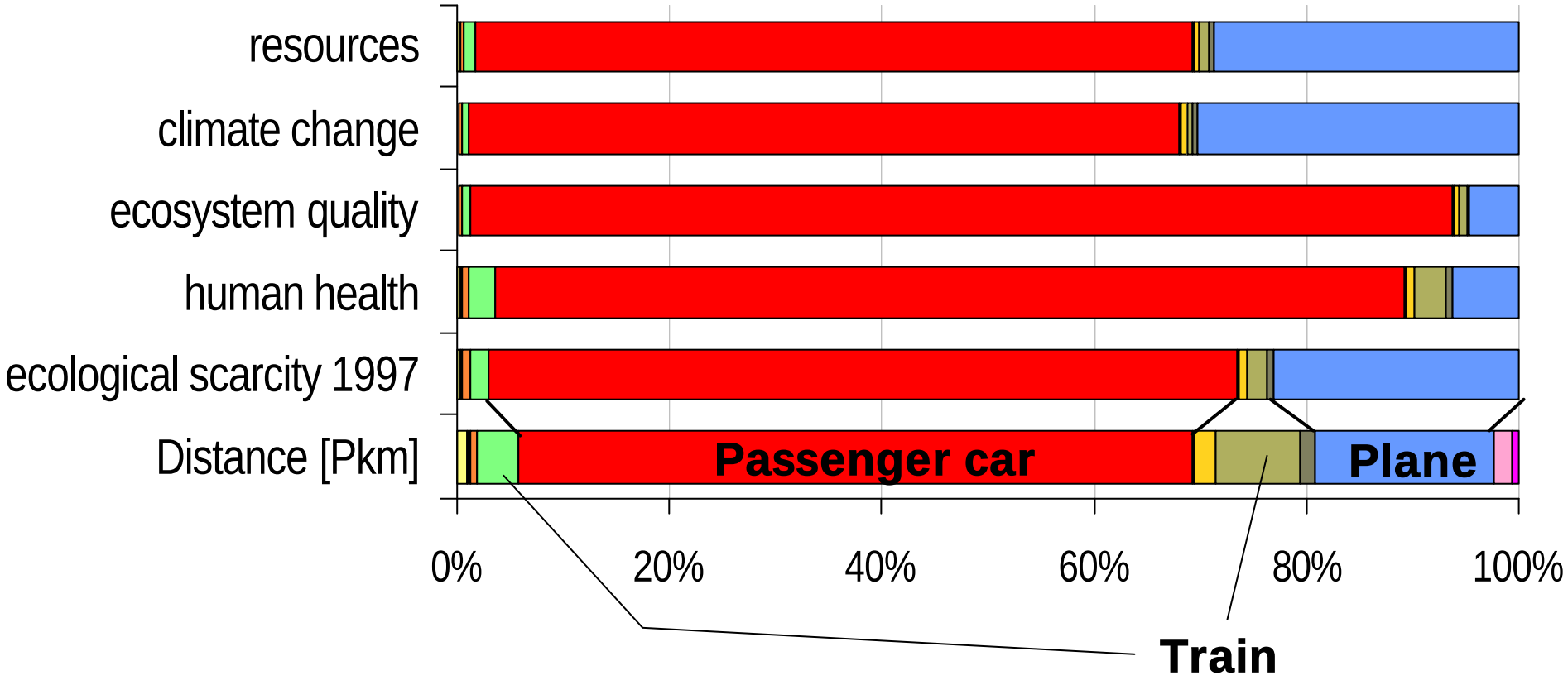
~9000 passenger-km/year

Key parameters:

- Distance!
- Gasoline consumption [litres/100km]
- Occupancy of the vehicle (e.g. 4 persons per car instead of only one person reduces impact per person almost by a factor 4)
- Behaviour of the driver (eco-drive => -12% of gasoline)
- Motor technology

➔ **High potential savings that are directly dependent on consumers behaviour.**

Private mobility: Impact due to total passenger kilometres in Switzerland



→ Impact of passenger car use is dominant! (Noise is not included).

→ How to reduce impacts of private mobility?

Private mobility: Impacts of different modes of transport

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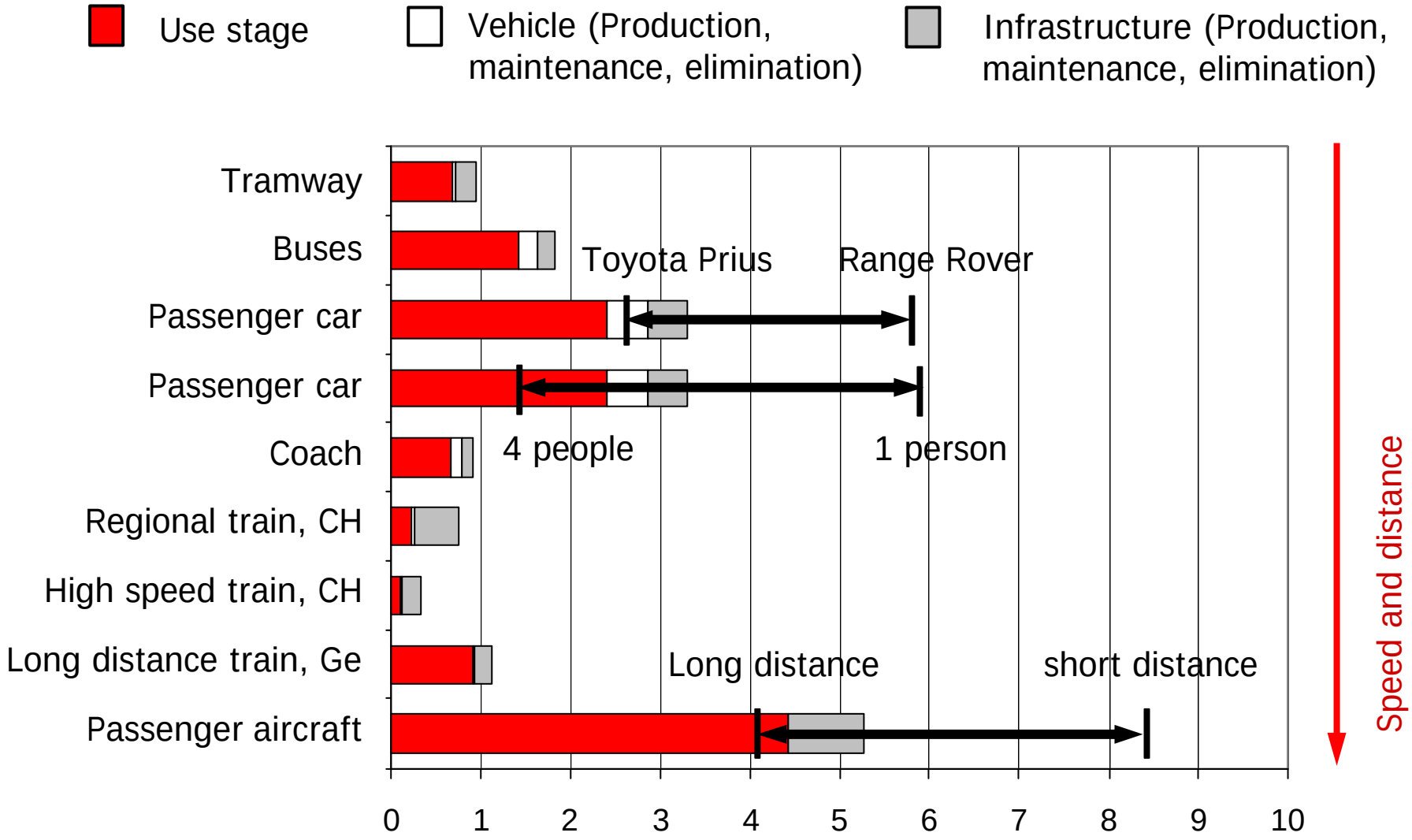
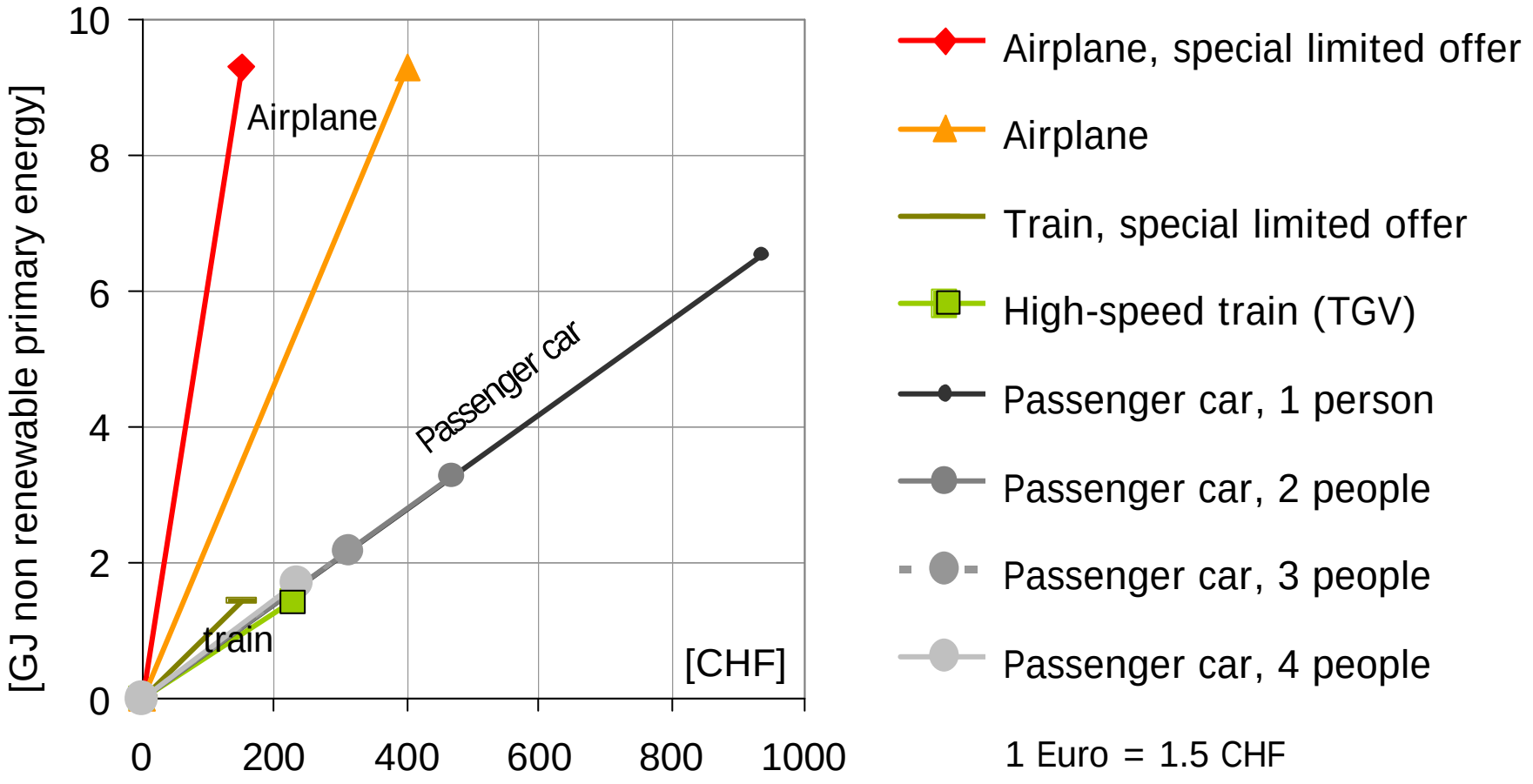


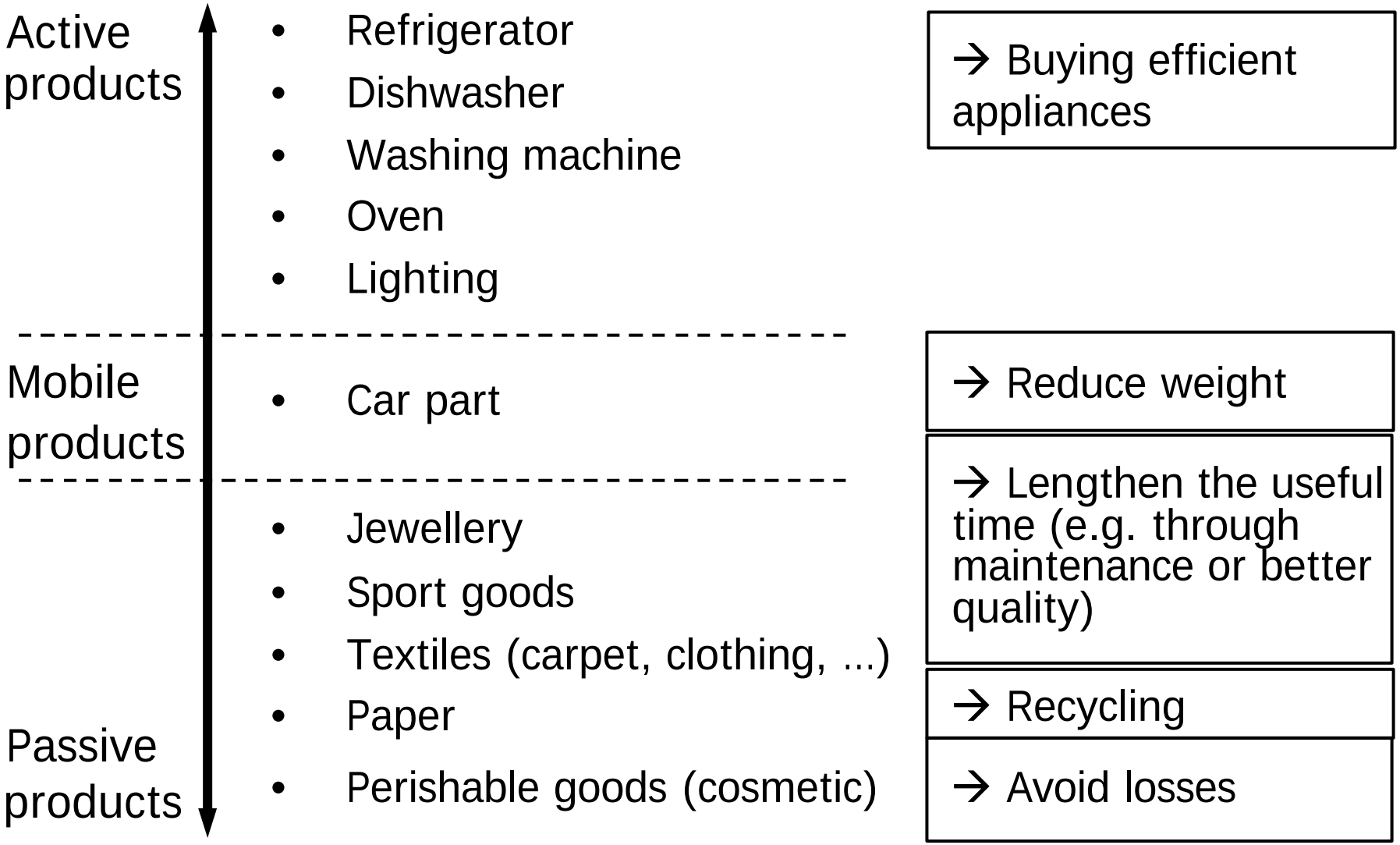
Based on database ecoinvent 1.1

Private mobility: Week-end in Paris (2*650 km)

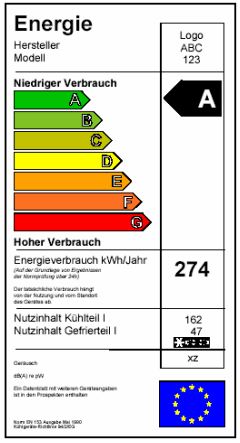


→ Factor of 6 difference between train and airplane as far as non renewable energy consumption is concerned. Occupancy is very important!

Consumer goods: Characteristics

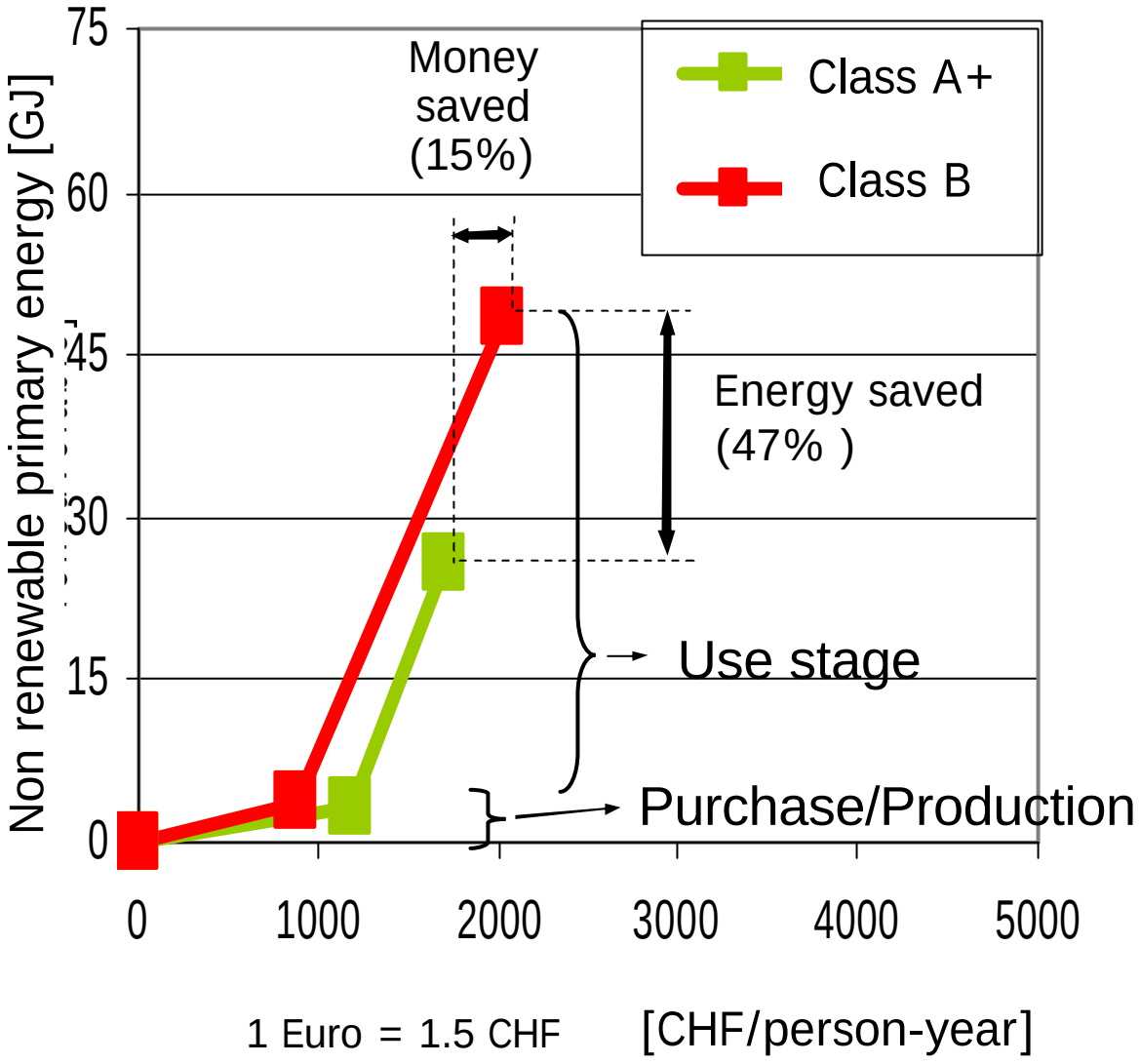


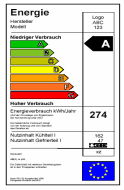
EU energy labeling: Fridge class A+



Savings with an energy efficient refrigerator (class A+, volume: 230 litres, lifetime: 15 years).

→ Use stage is dominant as far as energy is concerned.





Efficient household appliances (class A(+))

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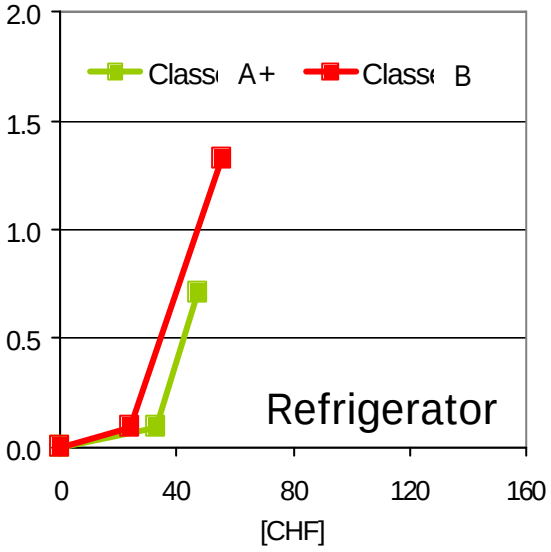
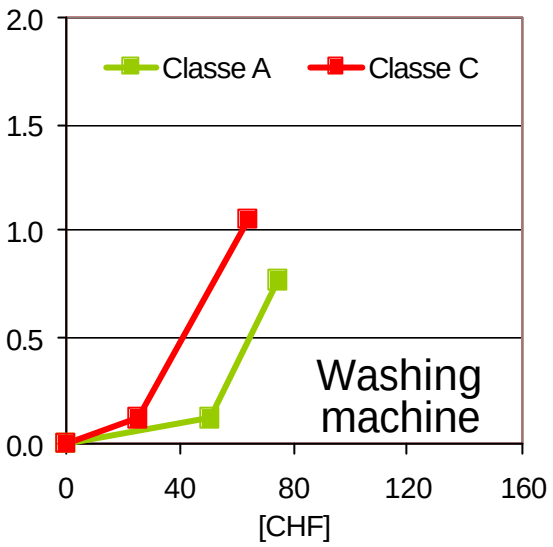
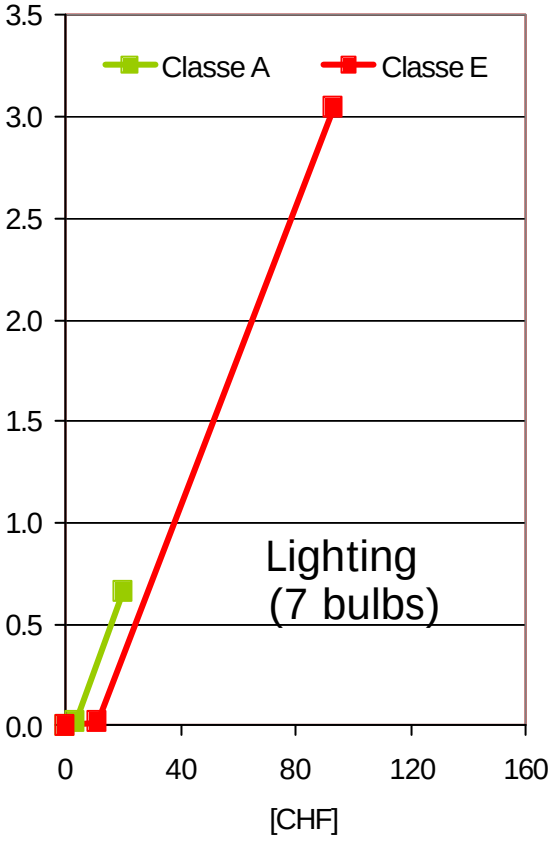
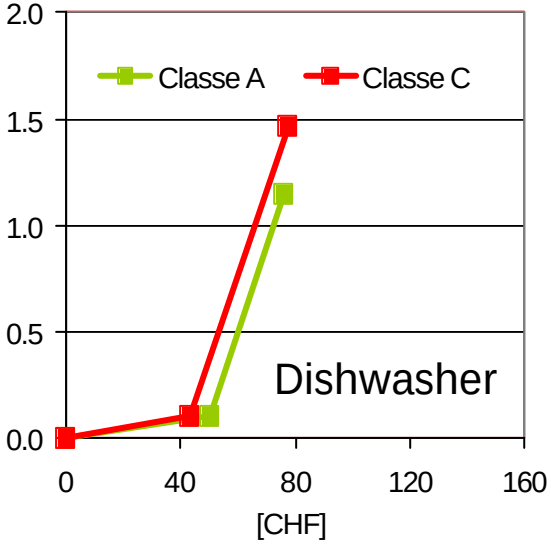
Energy savings / person-year with efficient household appliances A(+)

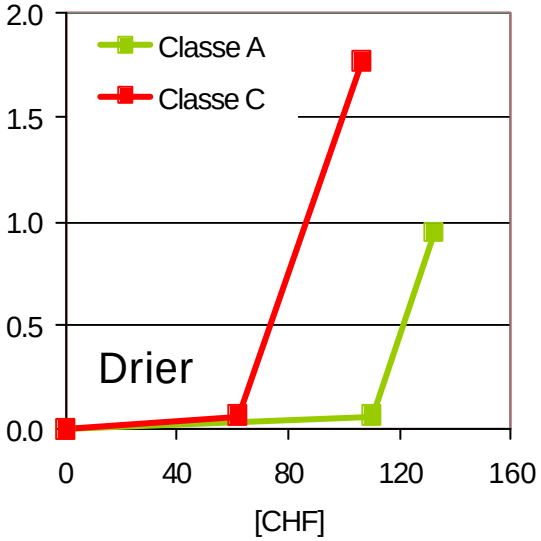




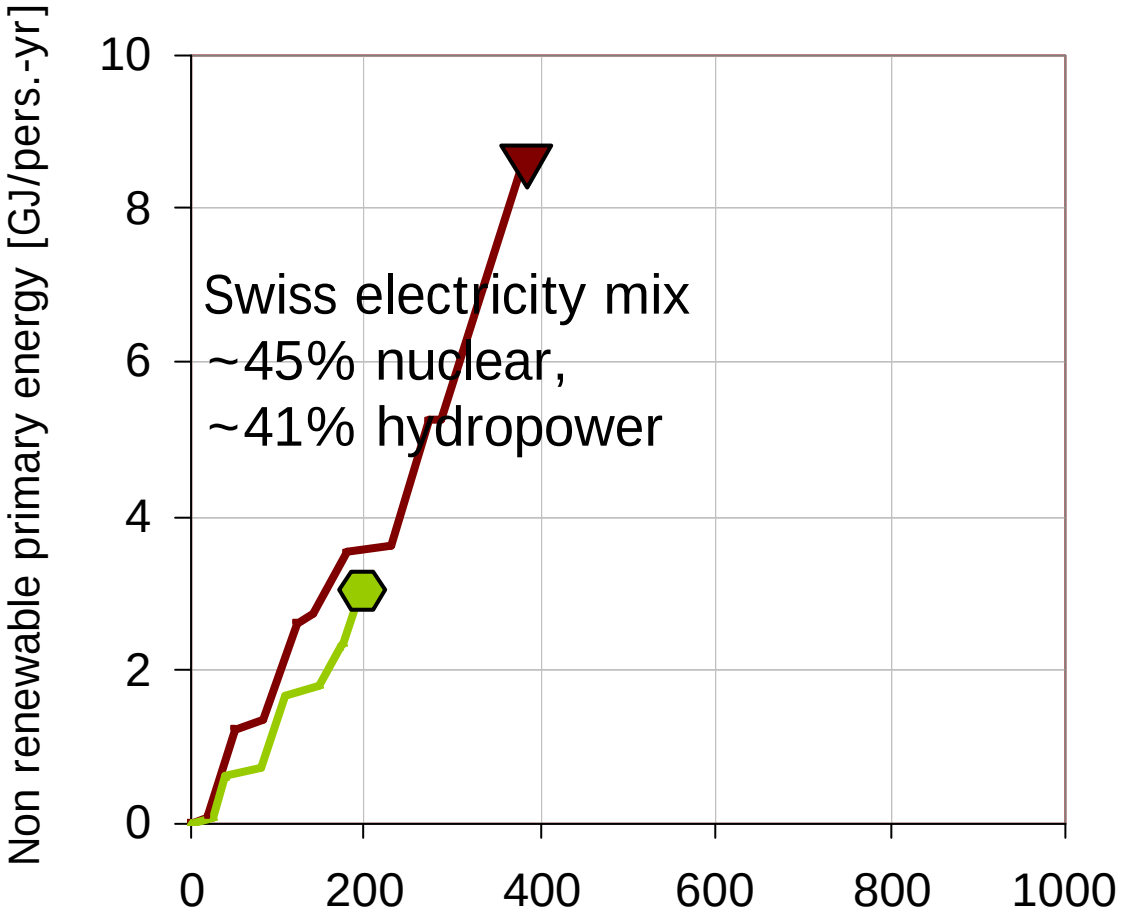
1 Euro = 1.5 CHF







Cumulated savings with efficient household appliances (class A(+))



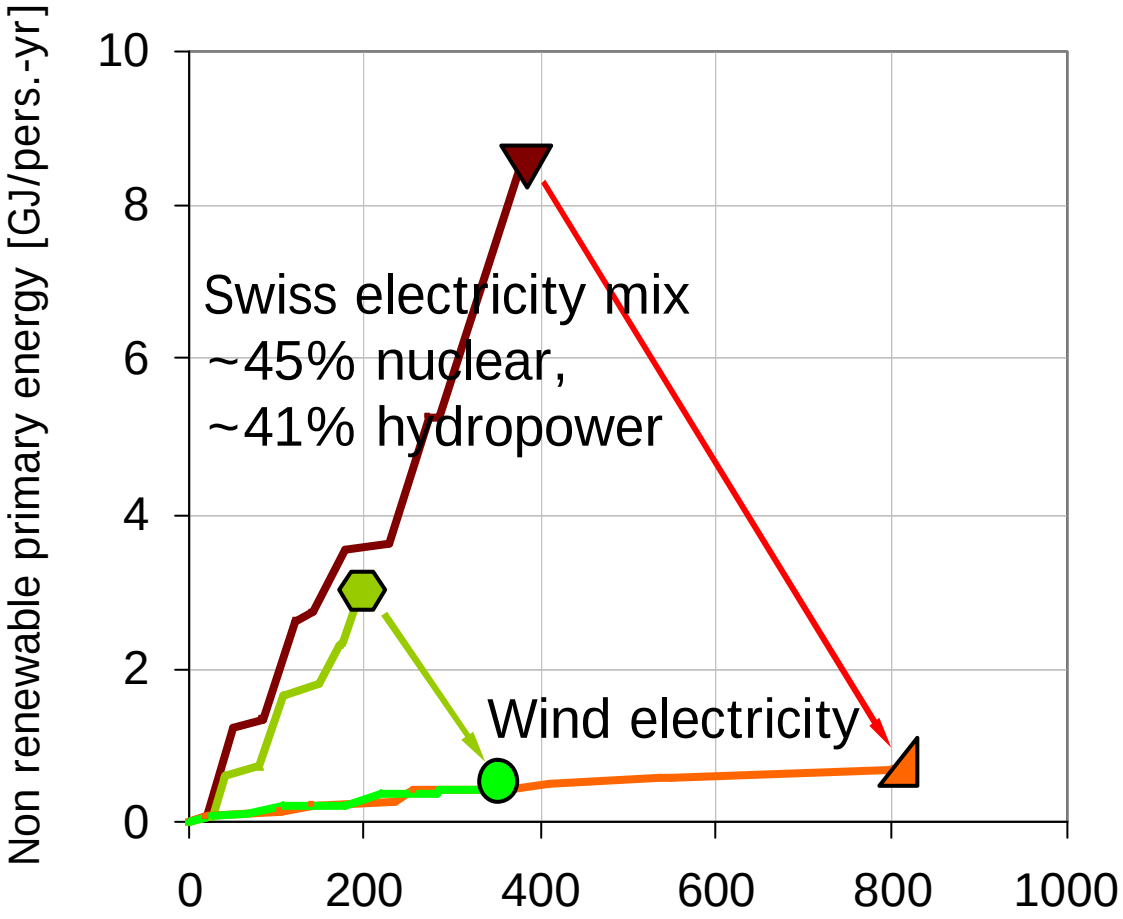
Inefficient household appliances

Efficient household appliances and drying the washing on the line

[CHF/pers.-yr] 1 Euro = 1.5 CHF

→ Savings: **5.5 GJ and 180 CHF** per person and year.

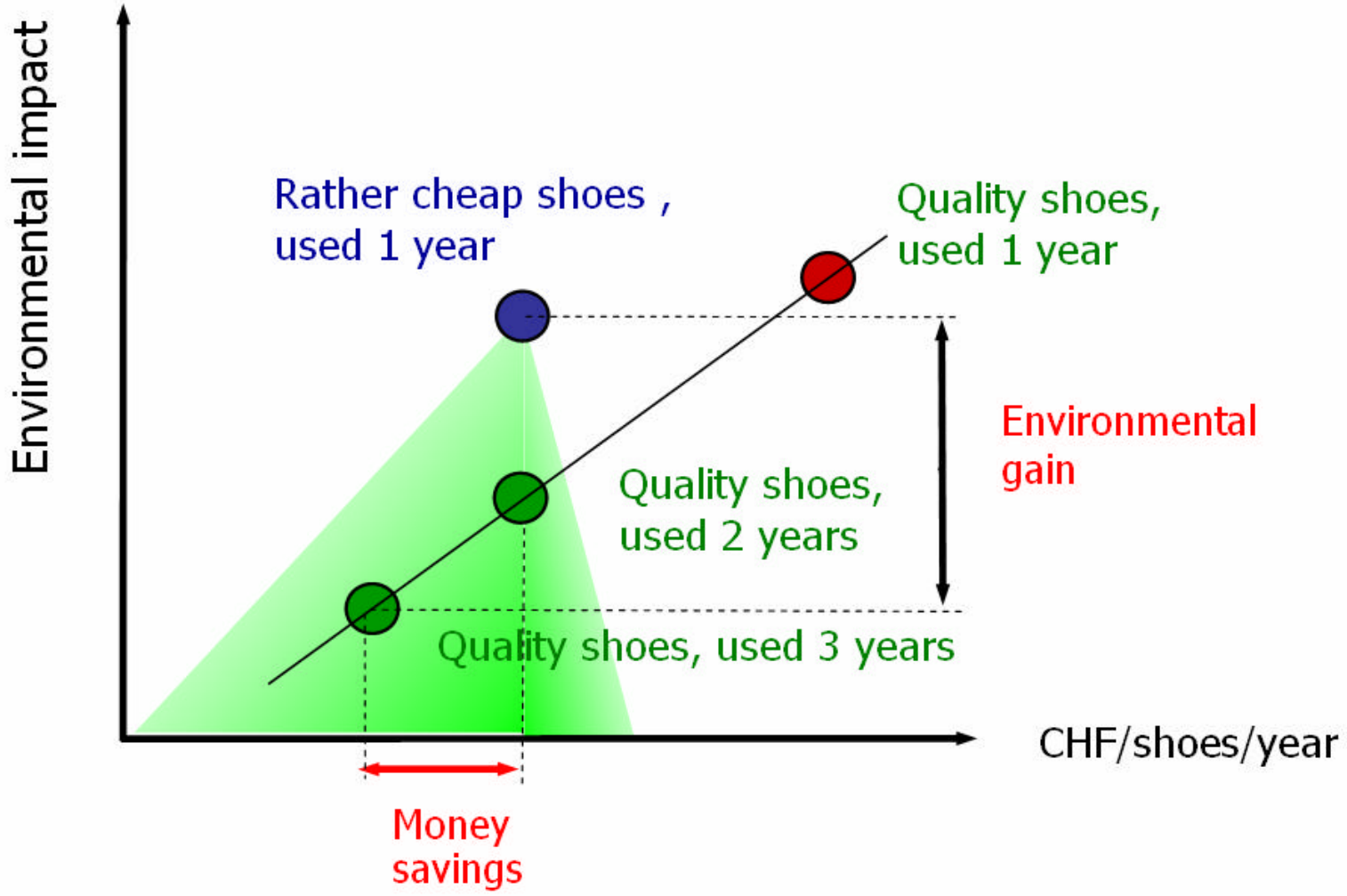
Savings with efficient household appliances and renewable energy



- Inefficient household appliances
- Efficient household appliances
- Inefficient household appliances + wind power
- Efficient household appliances + wind power

→ Save energy first and then invest in renewable energy!

Consumer goods: Useful time and costs of shoes



→ The longer a passive product is used, the better.

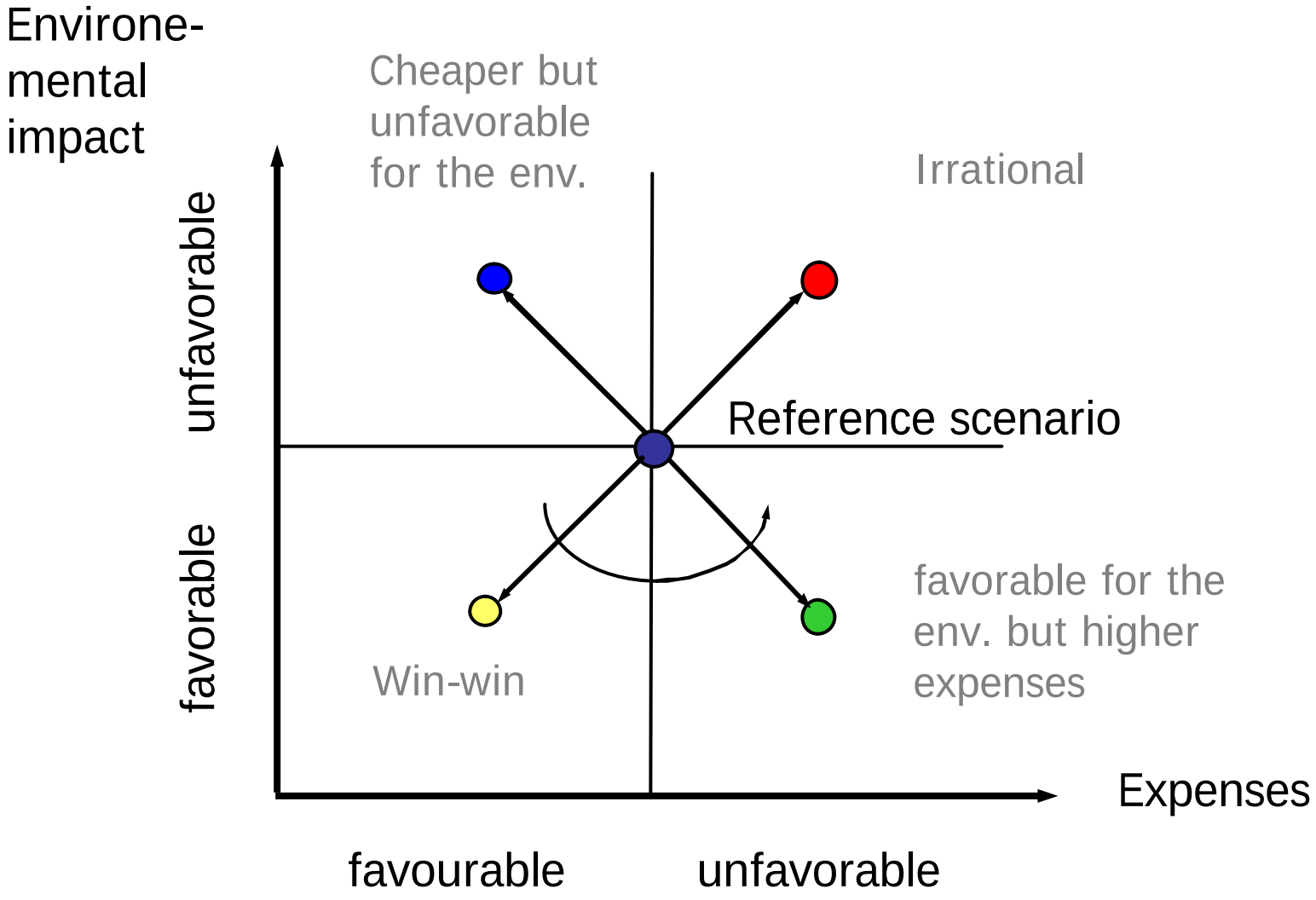
Nutrition: recommendations

5 recommendations for a more environmental friendly food consumption (adapted from Jungbluth, 1999 et 2004)

1. **Reduce meat consumption** → less water consumption, less energy consumption, less land use, less photochemical pollution

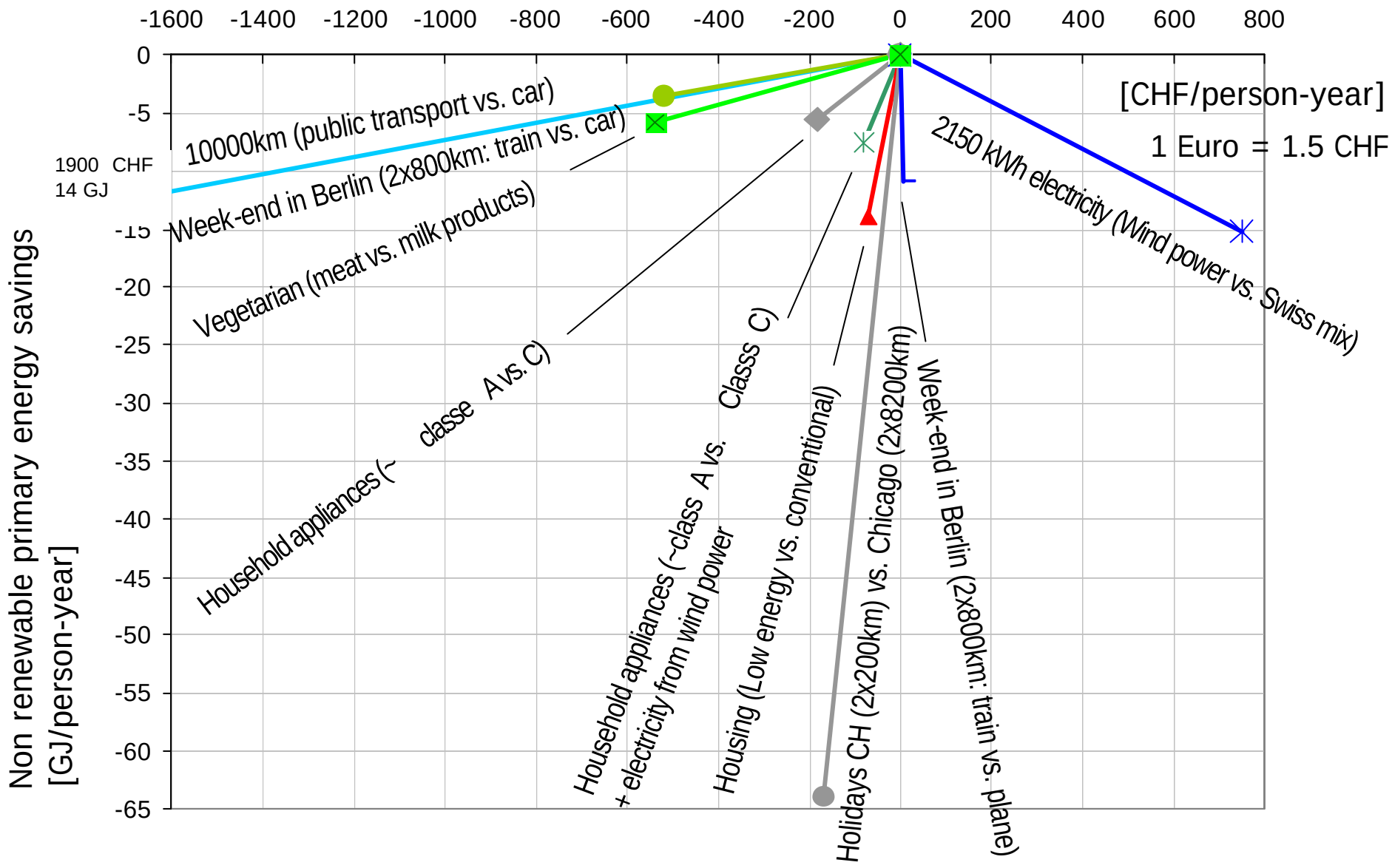
2. **Avoid food transported by air**, choice of products implying short transport distances
3. Buy **seasonal products** (avoid greenhouses)
4. Buy **regional products**
5. Give a preference for products with **light packaging**

Comparative analysis with E2 vectors

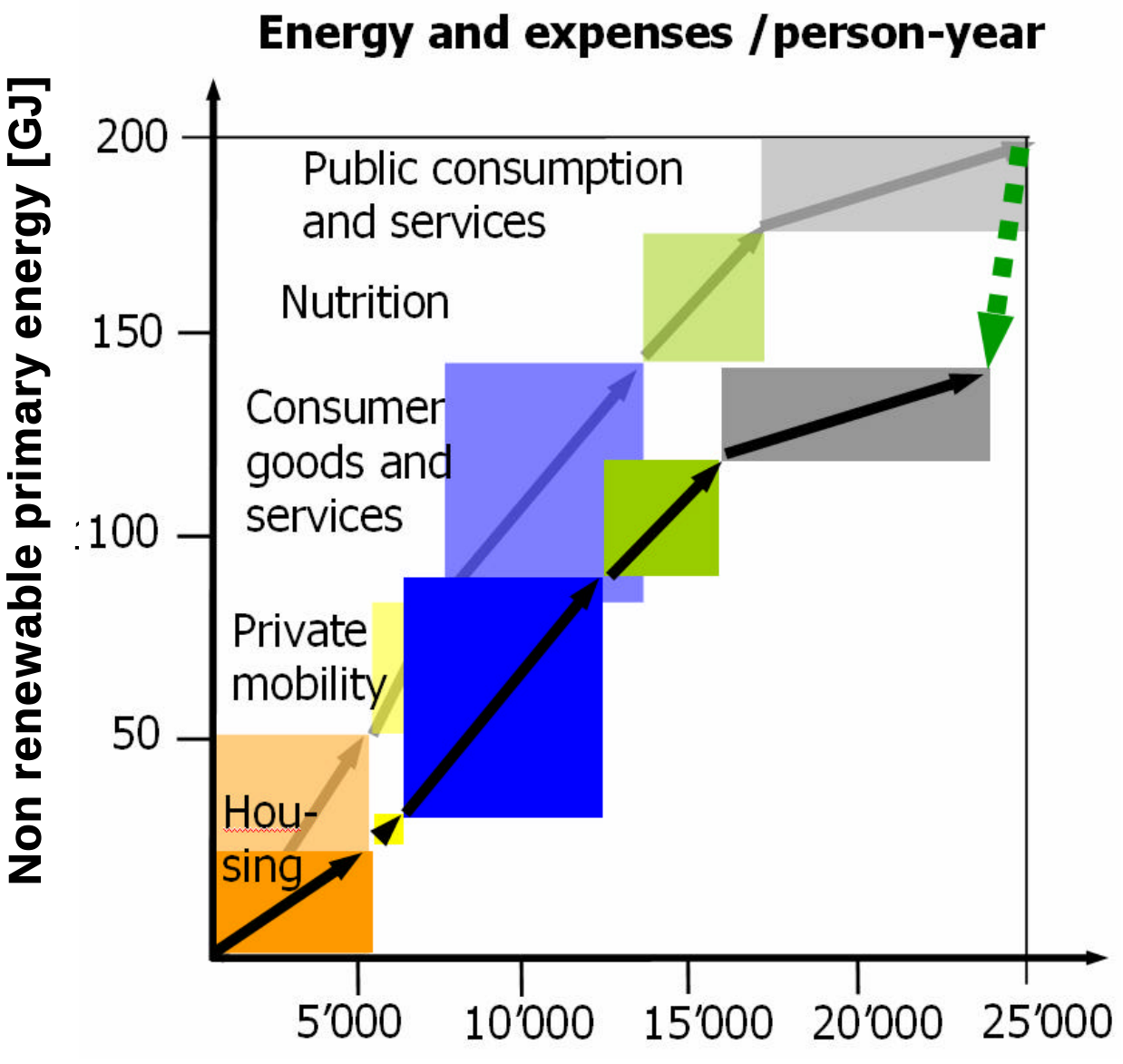


Concept of E2 vectors: Goedkoop M., 2001

Consumer's rose of decision (E2 vectors)



Synthesis of sustainable consumption patterns



Scenarios of sustainable consumption

- Only half of the average meat consumption
- Efficient household appliances (class A(+))
- Public instead of personal transport (10'000km)
- Week-end Berlin by train instead of plane (2*860km)
- Low energy house
- Wind power for electricity
- Room temperature -2°C,

Expenses

1 Euro = 1.5 CHF

Conclusions and outlook

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- Potential energy savings /person / year with proposed scenarios: **-57 GJ** non renew. primary energy **(-28%)**.
- High potential for reduction of the environmental impact.
- Money savings (thanks to energy savings e.g.) can be **reinvested in sustainable products**
  (e.g. low energy house, renewable energy, ...).

→ Prioritizing of consumption patterns and alternatives that can make a **significant difference.**

→ **Communication** of sustainable consumption alternatives utilizing appealing images and positive terms.