

# Mobility and Lifestyle – Challenges Towards A Climate Friendly Lifestyle

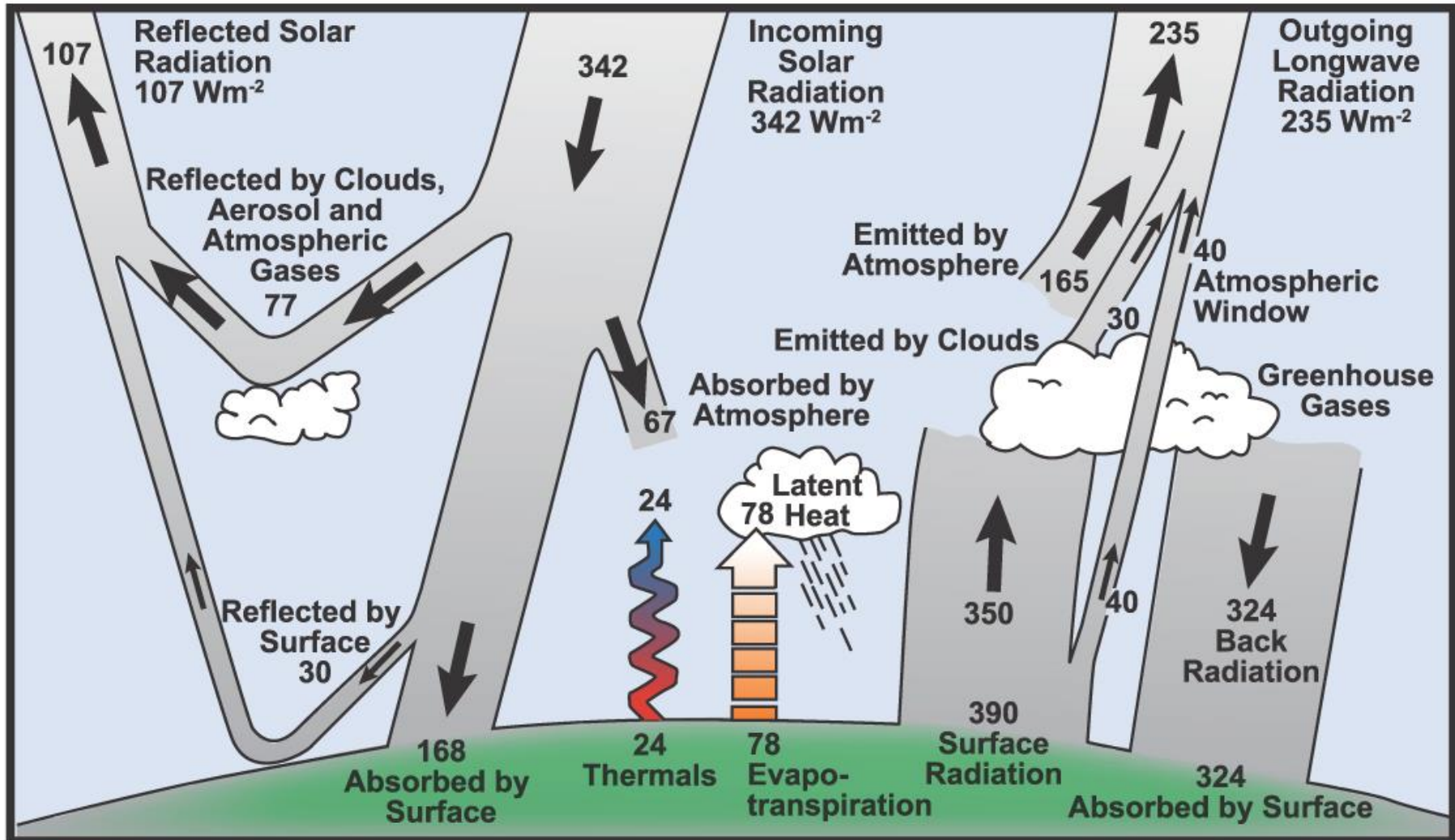
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**Gerfried Jungmeier**

A3PS Conference 2017 “Propulsion Systems:  
Achievements - Challenges - Future Developments“  
November 9 – 10, 2017, Vienna, Austria

# The Energy Balance of Earth is RIGHT!



# The FOUR Factors Influencing Greenhouse Gas Emissions

Future  
Energy System

Lifestyle

$$tCO_{2eq} = \frac{t_{CO_{2eq}}}{GJ_{energy}} * \frac{GJ_{energy}}{Service} * \frac{Service}{P} * P$$

1)

Emission  
factor

(e.g. renewable energy)

2)

Energy-  
efficiency

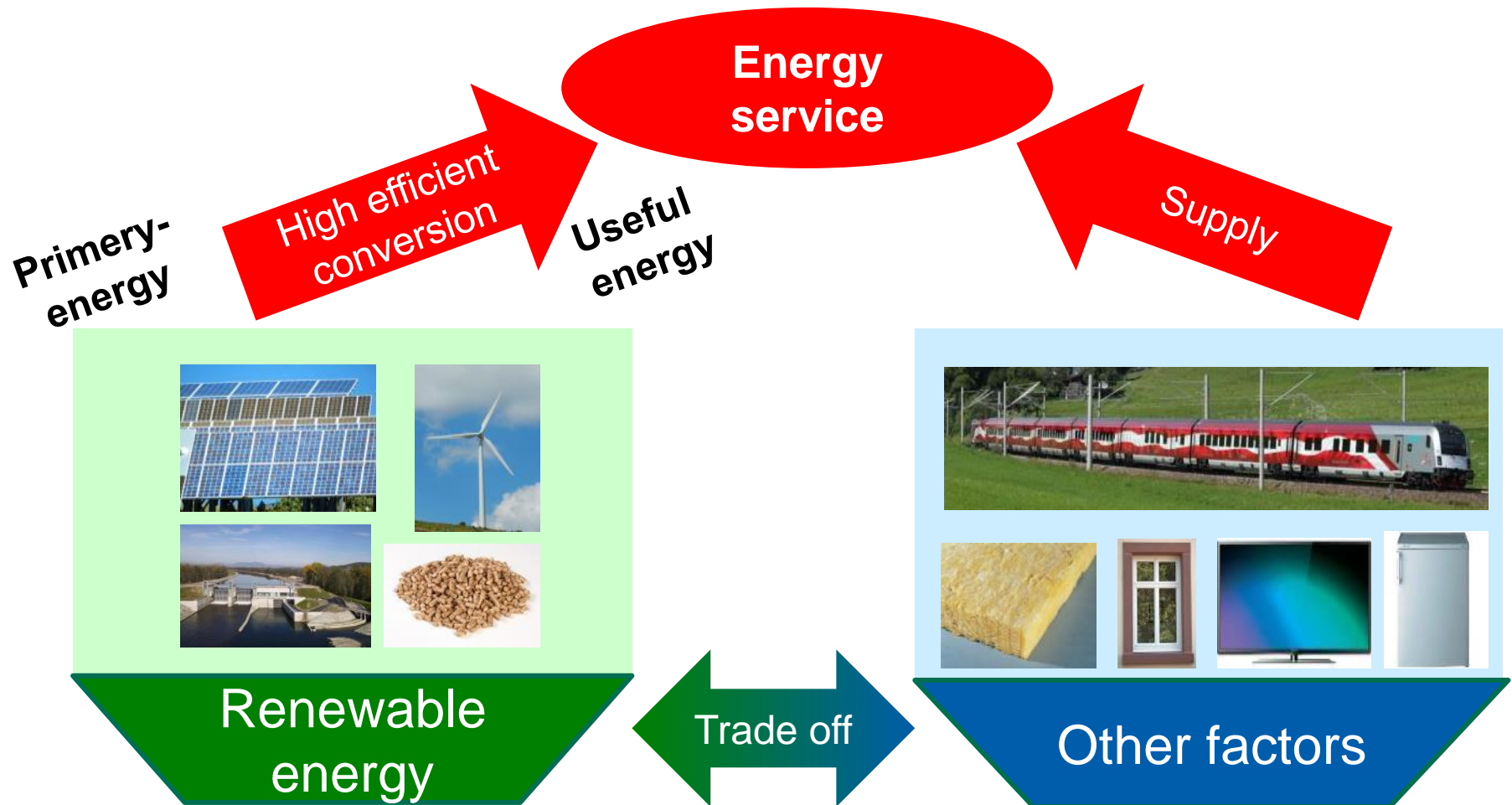
3)

services  
per  
person

4)

number  
of  
people

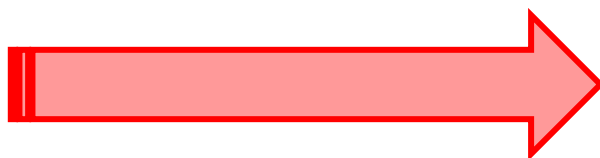
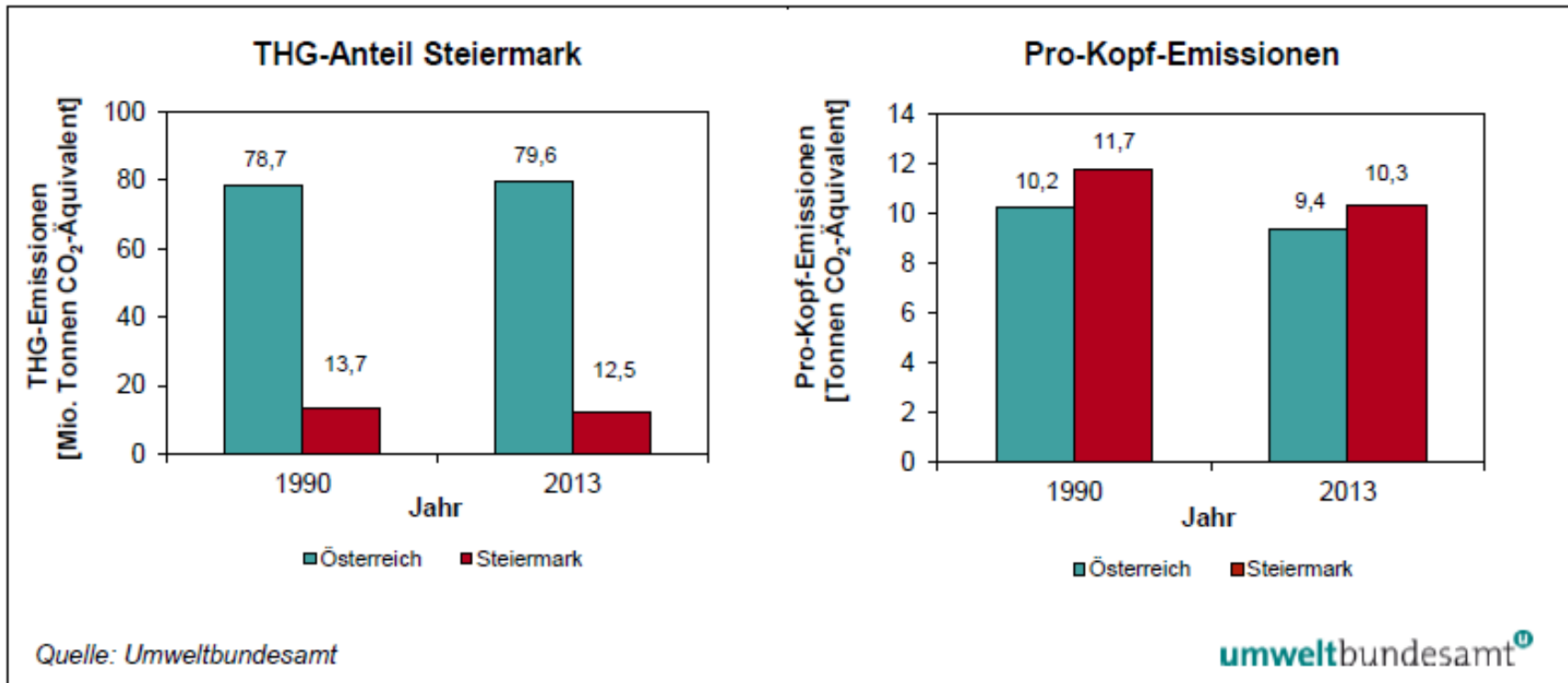
# Characteristics of Future Energy Systems



# Characteristics of Lifestyles



# Greenhouse Gas Emissions in Austria



**national emissions per capita become  
obsolet in a global economy!**

# Statement on the Methodology for An Environmental Assessment

“There is international consensus that the environmental effects of new & innovative products and services can only be analyzed on the basis of

**Life Cycle Assessment (LCA)**

including the production, operation and the end of life treatment of the various facilities”

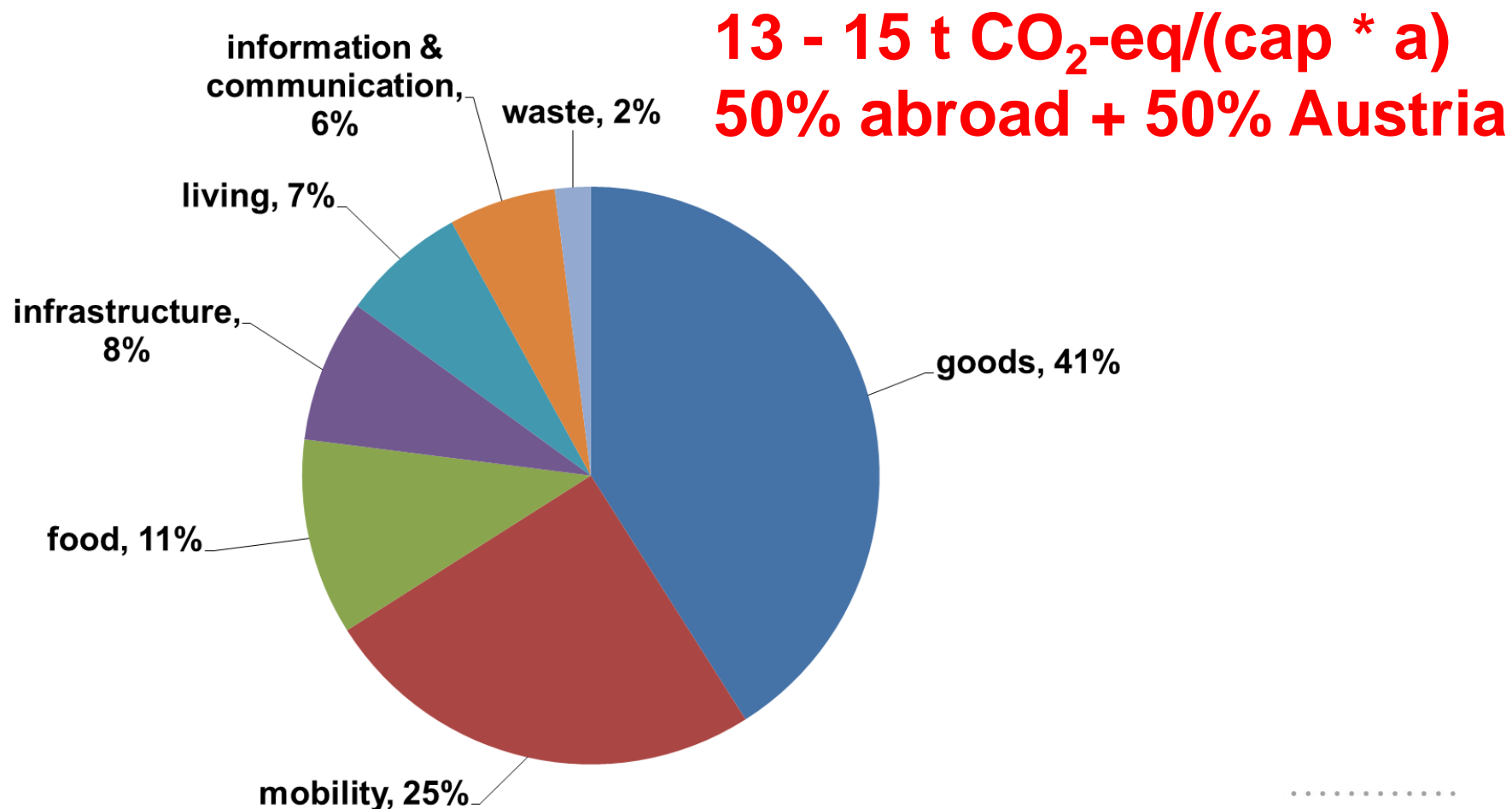
“....and in comparison to conventional products and services”





# Consumption Based GHG Emissions of the Austrians

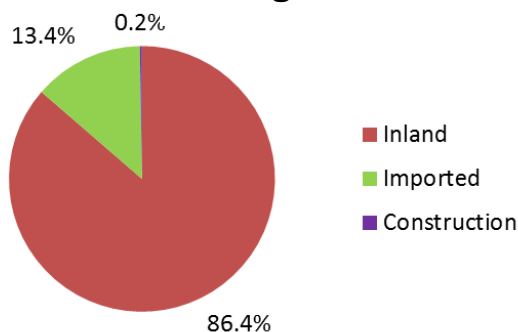
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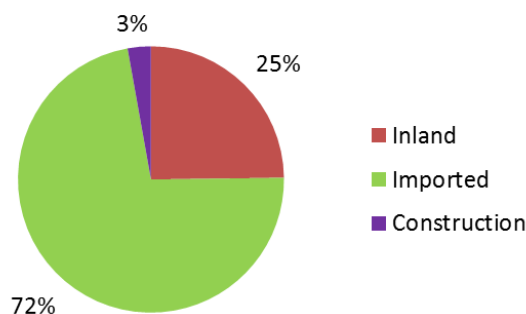
# Share of GHG Consumption based Emissions Austria and Abroad (2012)

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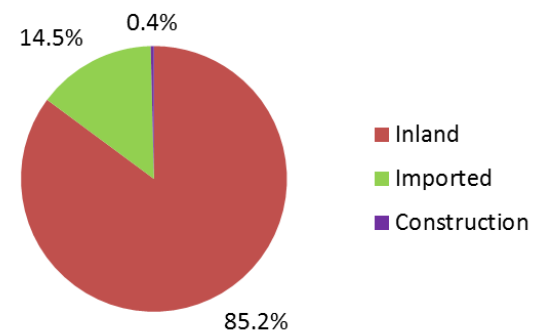
### Living



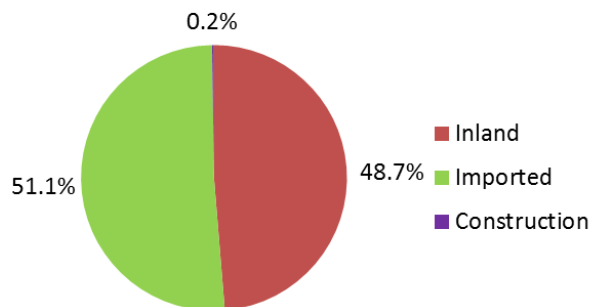
### Communication & information



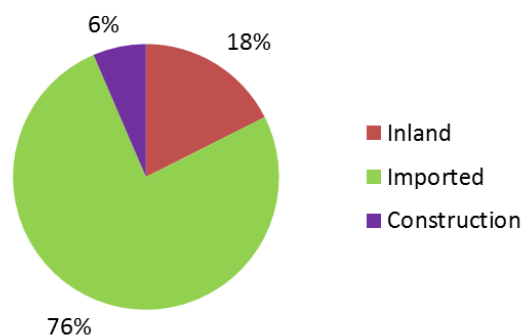
### Mobility



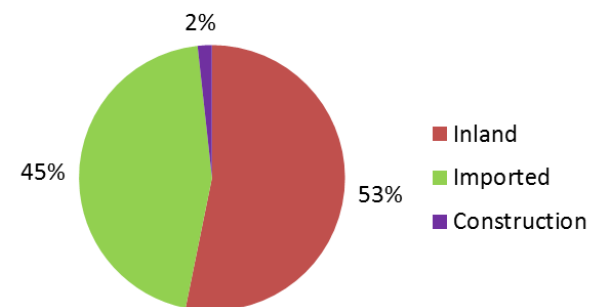
### Food



### Goods



### Infrastructure



# Measuring and Understanding the Climate Impacts of Lifestyles

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.....towards  
Low Carbon Lifestyle = „Paris-Lifestyle©“

**The „Paris Lifestyle“ is an innovative and satisfying „Low Carbon Lifestyle” characterized by having very low greenhouse gas emissions contributing to the Paris Agreement of limiting global warming to below 2° C. The Paris Lifestyle creates new economic opportunities and challenges by stimulating an increasing demand for low Carbon products and services.**



# How much? and Of What?

## Modelling & Quantifying in "Lifestyle 1.0"

Emissions		Summary Output										Go to Switches	
Year	2012												
Summary		Emissions occurring in Austria by Sector								Emissions Abroad		Other Emissions	
	Total	Residential	Energy	Transport	Industry	Agriculture	Forestry	Waste	Total	Imports	Imported Electricity	Construction Dismantling	
<b>Consumption Areas</b>													
Heat	9.24	5.95	1.14	0.10	0.19	0.05	0.52	0	7.95	1.22		0.02	
Electricity	5.82	0	1.40	0.00	0.04	0	0	0	1.44	0.29	3.92	0.16	
Mobility	26.25	0	0.87	22.98	0.54	0.11	0.00	0	24.49	1.64	0.00	0.11	
Mobility - aviation	2.56	0	0	0	0	0	0	0	0	2.56	0	0	
Food	15.38	0	0.64	0.07	1.24	5.38	0	0.00	7.33	7.87		0.03	
Goods	58.07	0	0.39	0.01	5.97	0.00	0.10	0.00	6.59	50.88	0.65	0.06	
Aluminum	3.87	0	0	0	0	0	0	0	0	3.87	0	0	
Cement	3.23	0	0.07	0.00	2.32	0	0.03	0	2.47	0.71	0.10	0.01	
Chemicals													
Electronics	25.02	0	0.02	0.01	0.05	0	0	0.00	0.08	24.65	0.28	0.00	
Fertilizers	0	0	0	0	0	0	0	0	0	0	0	0	
Glass	0.31	0	0.10	0.00	0.05	0.00	0.00	0	0.15	1.16	0.07	0.00	
Paper	2.18	0	0.29	0.00	0.11	0.00	0.03	0.00	0.51	1.61	0.13	0.01	
Plastic	5.61	0	-0.02	0.00	0.00	0.00	0	0.00	-0.03	5.64	0.00	0.00	
Steel	9.86	0	-0.05	0.00	3.37	0.00	0	0.00	3.32	6.40	0.10	0.04	
Textiles	4.51	0	0	0	0	0	0	0	0	4.51	0	0	
Vehicles	3.17	0	-0.04	0.00	0.07	0.00	0.00	0.00	-0.01	3.13	0.00	0	
Wood products	0.31	0	0.03	0.00	0.00	0.00	0.04	0	0.09	0.20	0.04	0.00	
Infrastructure	8.31	1.69	2.32	0.03	0.14	0.00	0.00	0	4.19	0.97	3.00	0.15	
Water & Waste	1.77	0	-0.01	0.00	-0.01	0.00	0	1.82	1.80	-0.03	0	-0.01	
Municipal waste	1.77	0	-0.01	0.00	-0.01	0.00	0	1.82	1.80	-0.03	0	-0.01	
Waste water	0.00	0	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0	0.00	
Other													
<b>Total</b>	<b>127.39</b>	<b>7.65</b>	<b>6.75</b>	<b>23.20</b>	<b>8.11</b>	<b>5.55</b>	<b>0.62</b>	<b>1.83</b>	<b>53.80</b>	<b>65.40</b>	<b>7.57</b>	<b>0.54</b>	
<b>Exports</b>													
Cement	0.24	0	0.00	0.00	0.21	0	0.00	0	0.22	0.01	0.01	0.00	
Electricity	7.80	0	1.88	0.00	0.05	0	0	0	1.94	0.39	5.28	0.22	
Electronics	2.84	0	0.56	0.16	1.69	0	0	0.13	2.56	0	0.29	0.00	
Fertilizers	1.36	0	0.01	0.00	1.26	0.00	0	0.00	1.26	0.07	0.02	0.08	
Food	8.01	0	0.38	0.07	1.42	5.74	0	0.00	7.61	0.30	0.07	0.03	
Glass	0.48	0	0.25	0.00	0.13	0.00	0.00	0	0.38	0.10	0.00	0.00	
Paper	4.53	0	2.08	0.01	0.93	0.01	0.24	0.00	3.73	0.37	0.85	0.05	
Plastic	3.95	0	2.61	0.00	0.54	0.01	0	0.00	3.16	0.56	0.19	0.07	
Steel	12.40	0	-0.12	0.00	11.44	0	0	0.00	11.31	0.86	0.29	0.08	
Textiles	10.82	0	1.06	0.00	0.06	0.00	0	0.00	1.17	9.48	0.10	0.12	
Vehicles	1.82	0	0.22	0.00	0.74	0.00	0.00	0.00	1.08	0.71	0.15	0.01	
Wood products	0.56	0	0.12	0.00	0.00	0.00	0.12	0	0.33	0.15	0.16	0.00	
<b>Official National Inventory</b>		<b>9.38</b>	<b>13.11</b>	<b>21.58</b>	<b>24.95</b>	<b>7.57</b>		<b>2.28</b>	<b>78.86</b>				
<b>Inventory from LCA (bottom-up)</b>		<b>7.65</b>	<b>15.81</b>	<b>23.46</b>	<b>26.57</b>	<b>11.31</b>	<b>0.98</b>	<b>1.96</b>	<b>88.58</b>			<b>1.06</b>	
Difference		-1.73	2.71	1.88	1.62	3.74		-0.33	9.72				
Difference (%)		-18%	21%	9%	6%	49%		-14%	12%				
<b>Switches</b>													
Yes		Correct consumption for material inputs to vehicles											
Yes		Exclude emissions from agricultural vehicles											
Yes		Exclude emissions from aviation in the national inventory											
Yes		Correct emissions from heating for the efficiency of the technology											

Consumption Areas

Exported Emissions

National Inventory  
LCA-based Inv.

Switches

Sectors emissions Austria

Imported Emissions

Emissions For Construction and Dismantling

# Who? and Why?- Classification&Characteristics of Lifestyles

## ■ Examples for Lifestyles

- „Mobile Performers“ (1)
- „Settled“ (3)
- „Underprivileged“ (6)

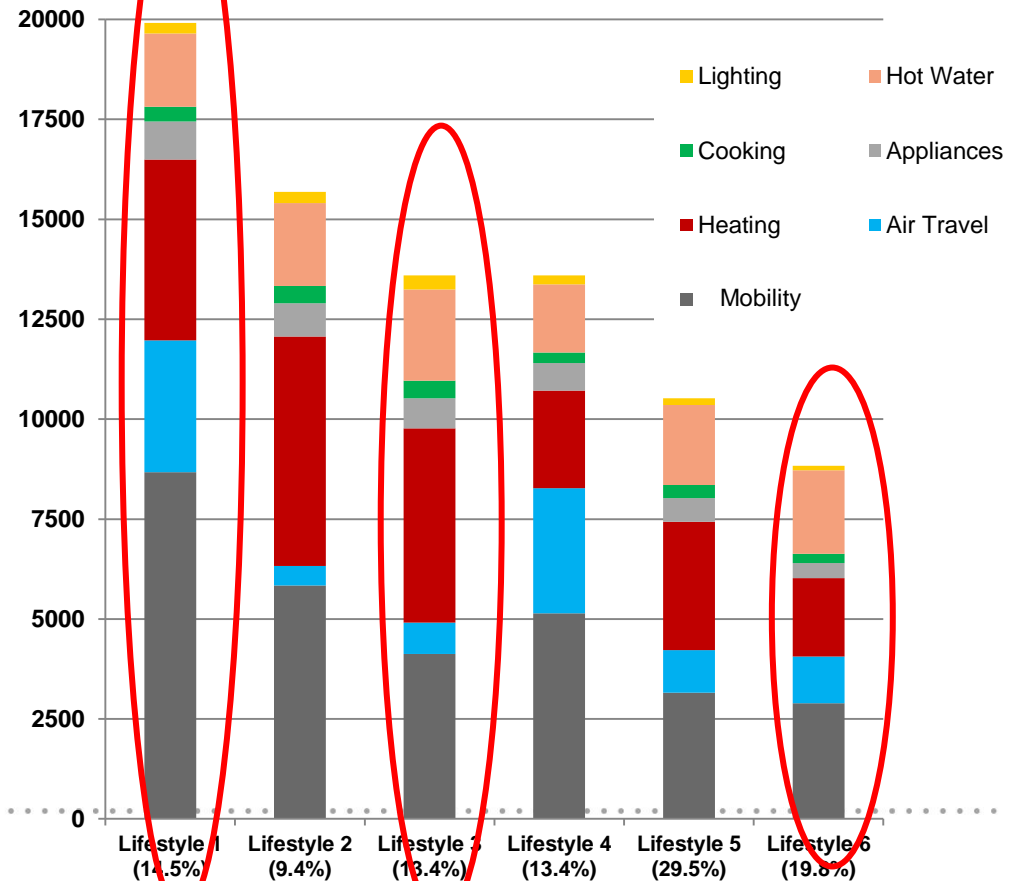
## ■ Characteristics

- Income
- Education
- Age
- Persons per household
- Living area per capita
- Number of cars
- Energy Saving Attitude
- .....

## ■ BUT:

- **Strong differences between areas: mobility/heating/etc.**
- **GHG emissions and energy demand different**

6 Lifestyle Groups in Austria:  
*Direct Energy Demand  
(kWh per capita and year)*



# Our Research on Climate Friendly Lifestyles

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- Analysis and **classification of lifestyle groups** in context of their effects on climate, energy and society
  - Generation of statistically and empirically sound **data for lifestyles** and consumer behavior & acceptance, e.g. questionnaires
  - Analysis and assessment of the main factors of “**Low-Carbon Lifestyles**” by interaction with lifestyle groups
  - Identification of possible **megatrends** towards “Low-Carbon Lifestyles” based on observed behavior changes
  - Extrapolation of **consumption changes** on greenhouse gas emissions
  - **New business opportunities** of innovative products and services for the emerging consumer group of “Low-Carbon Lifestyles”
  - Assistance for **stakeholders** in industry, economy, government and society in the transition to Low-Carbon Lifestyles
  - Assessment and development of lifestyle related **policy instruments**
-

# Conclusions

Innovative & satisfying Low-Carbon Lifestyle = „**Paris Lifestyle**“, fulfilling Paris-Agreement ( $< 2^{\circ} \text{ C}$ )

**Mobility & goods** play significant role in consumption based GHG emissions

„**How much?**“ often more relevant for consumption based GHG emissions than „Of what?“

Assessment of Low-Carbon Lifestyles needs consumption & LCA based GHG approach, and common **lifestyle classification**

**4 main questions** for research on **Low-Carbon Lifestyles**: „Who?“ „How much?“ „Of what?“ „Why?“



# Your Contact

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„Paris  
Lifestyle“

[www.paris-lifestyle.eu](http://www.paris-lifestyle.eu)  
[www.paris-lebensstil.at](http://www.paris-lebensstil.at)

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