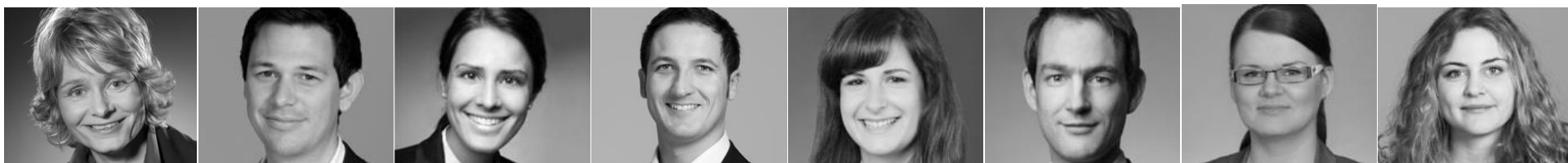


intep

i



# Bridging Building Cultures



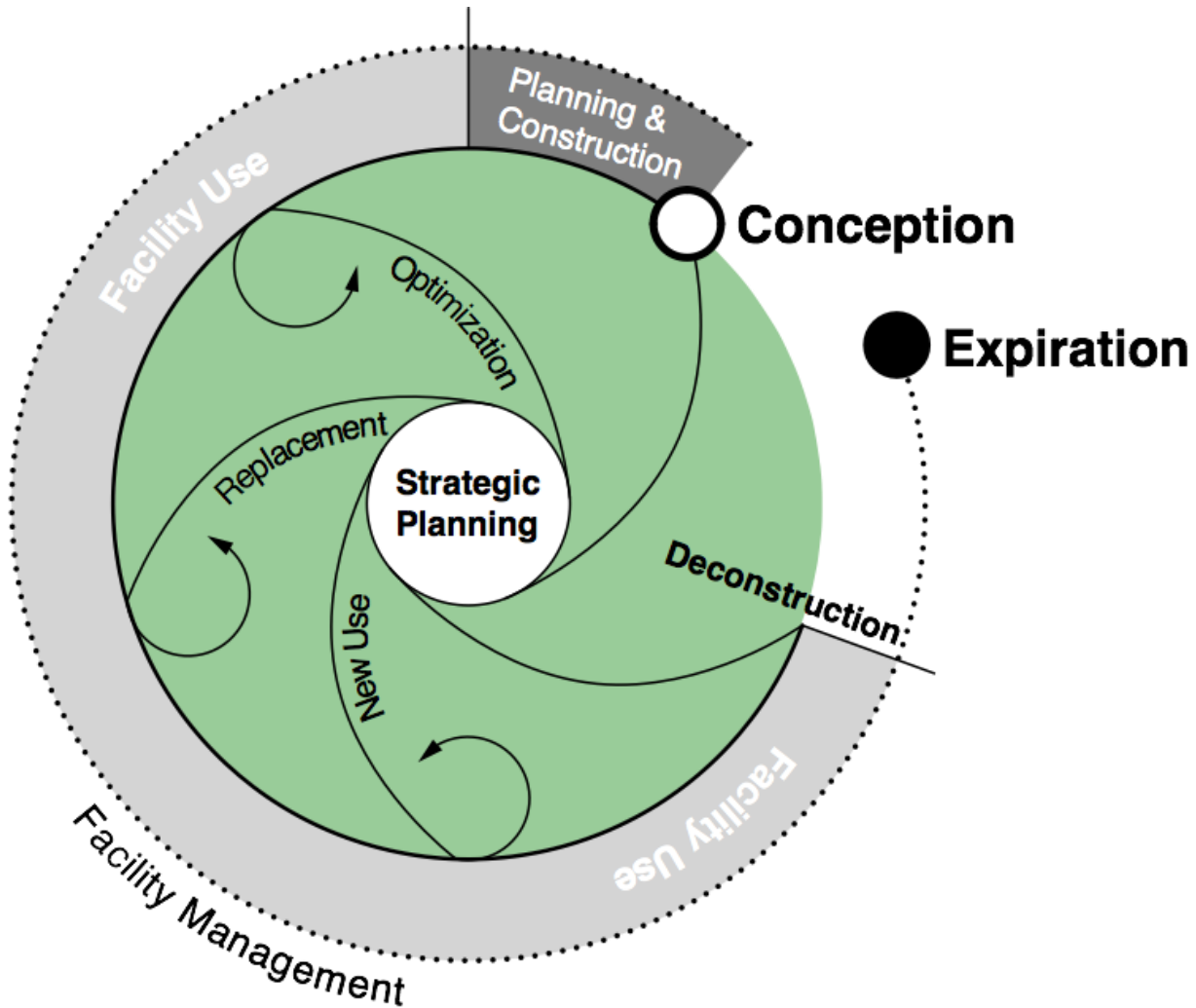


Intep • Integrated Planning

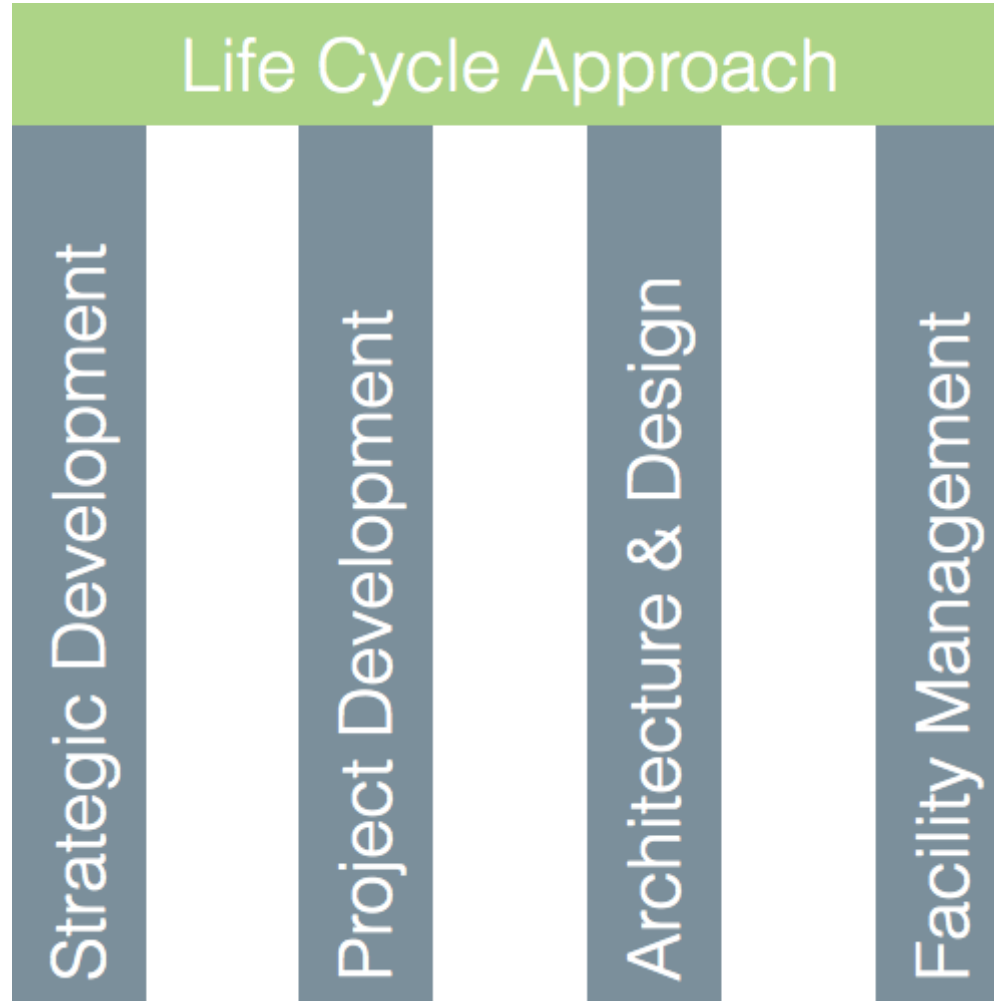
# Optimizing the Whole

A Life Cycle Approach to Real  
Estate

# Intep Services • Life Cycle Expertise



## Intep Services • Life Cycle Expertise



Technology yes, but ...  
Mind

Human

# Swiss-US Energy Innovation Days 2017

## Climate Change

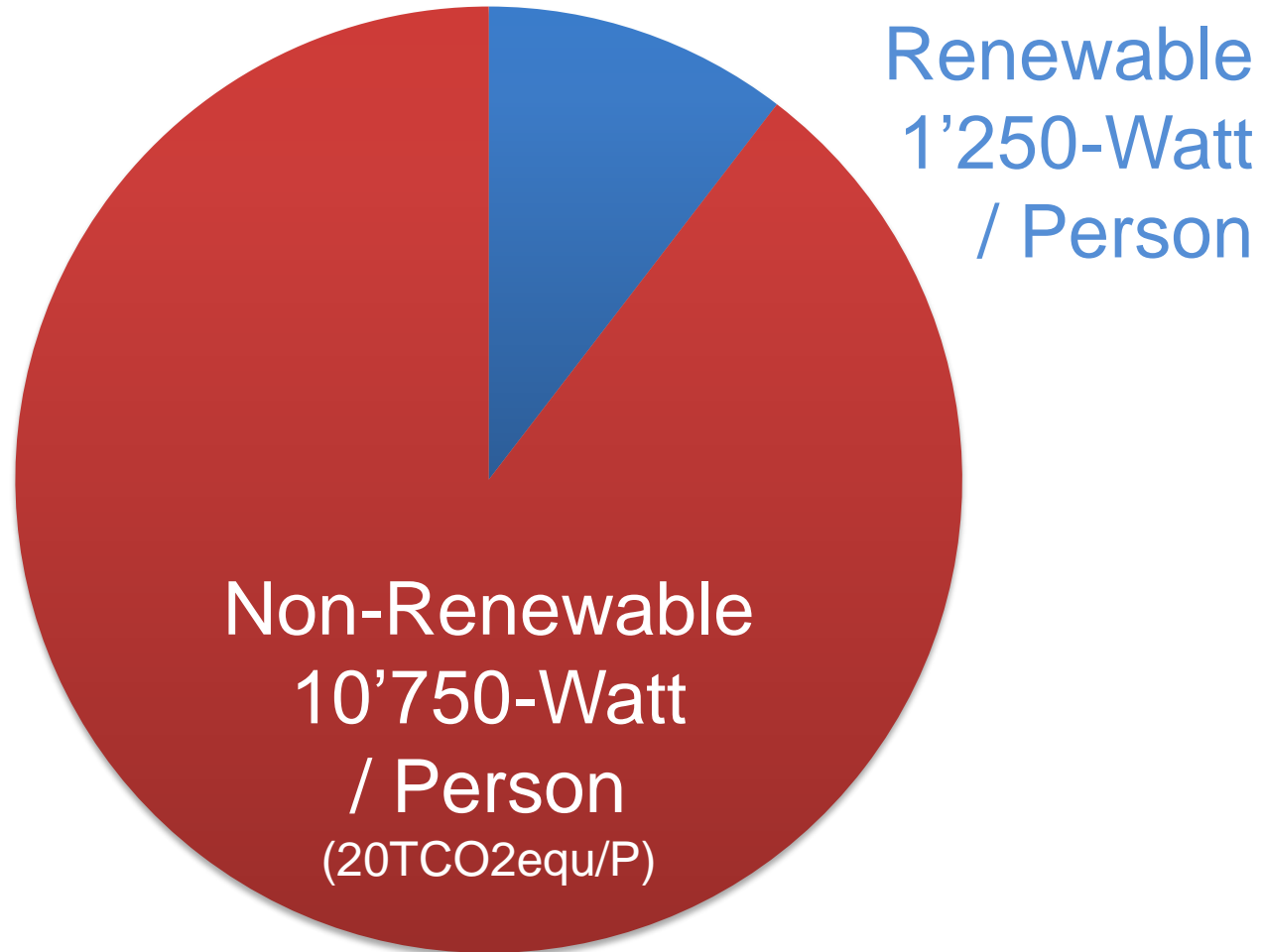
Carbon Neutrality

=

500-Watt/ Person

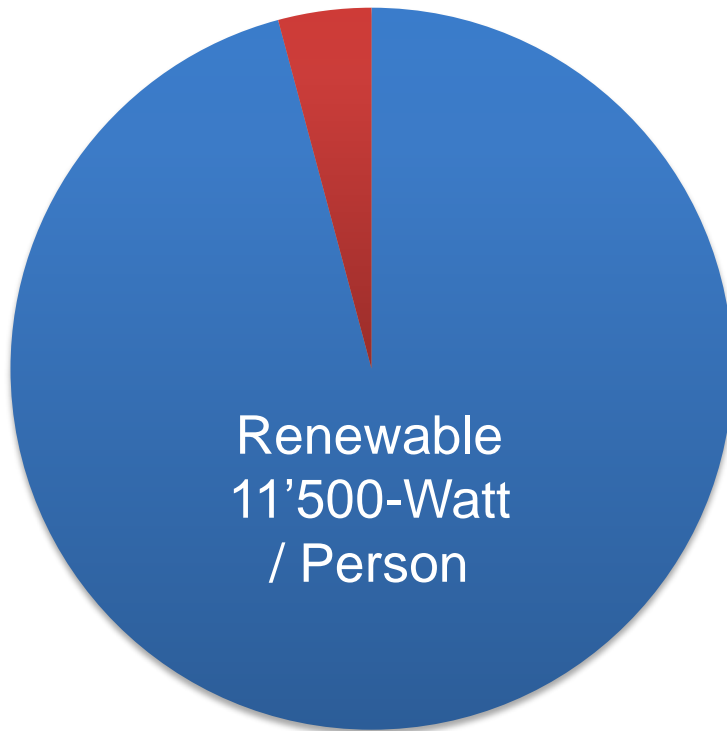
Non-Renewable Source Energy  
(1 Ton CO<sub>2</sub> equ./Person Year)

The Challenge of the US = 12'000-Watt/  
Person



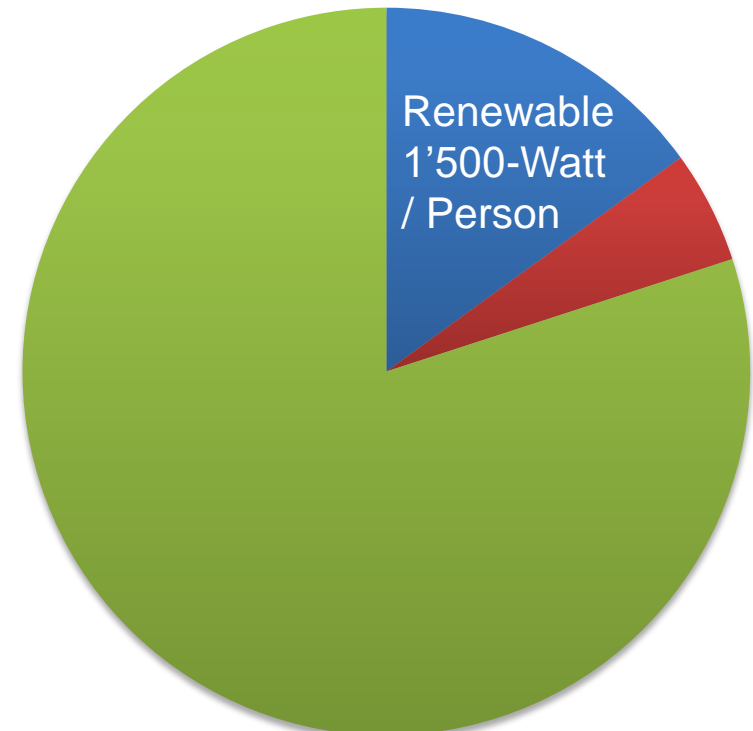


Opportunity for Technology = 2000-Watt Society



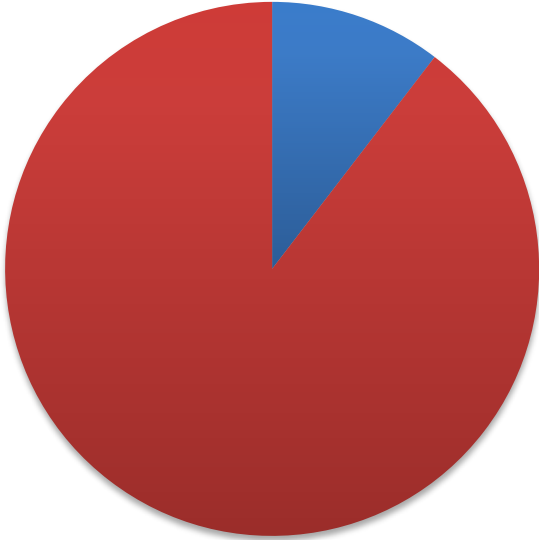
Substitution

vs.

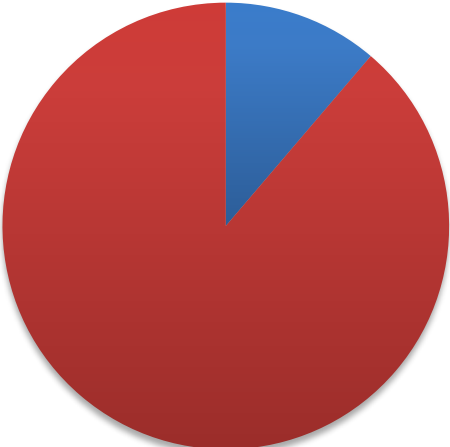


Efficiency

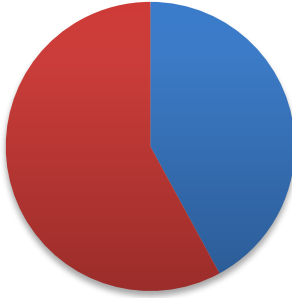
# Opportunity for Technology = 2000-Watt Society



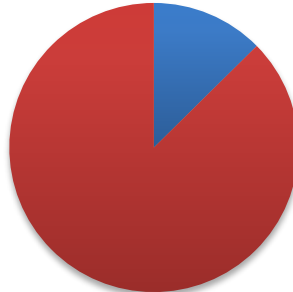
**US**  
12000-Watt



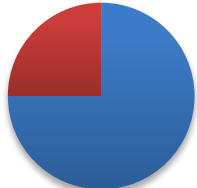
**Minneapolis**  
8100-Watt



**Zurich**  
3500-Watt

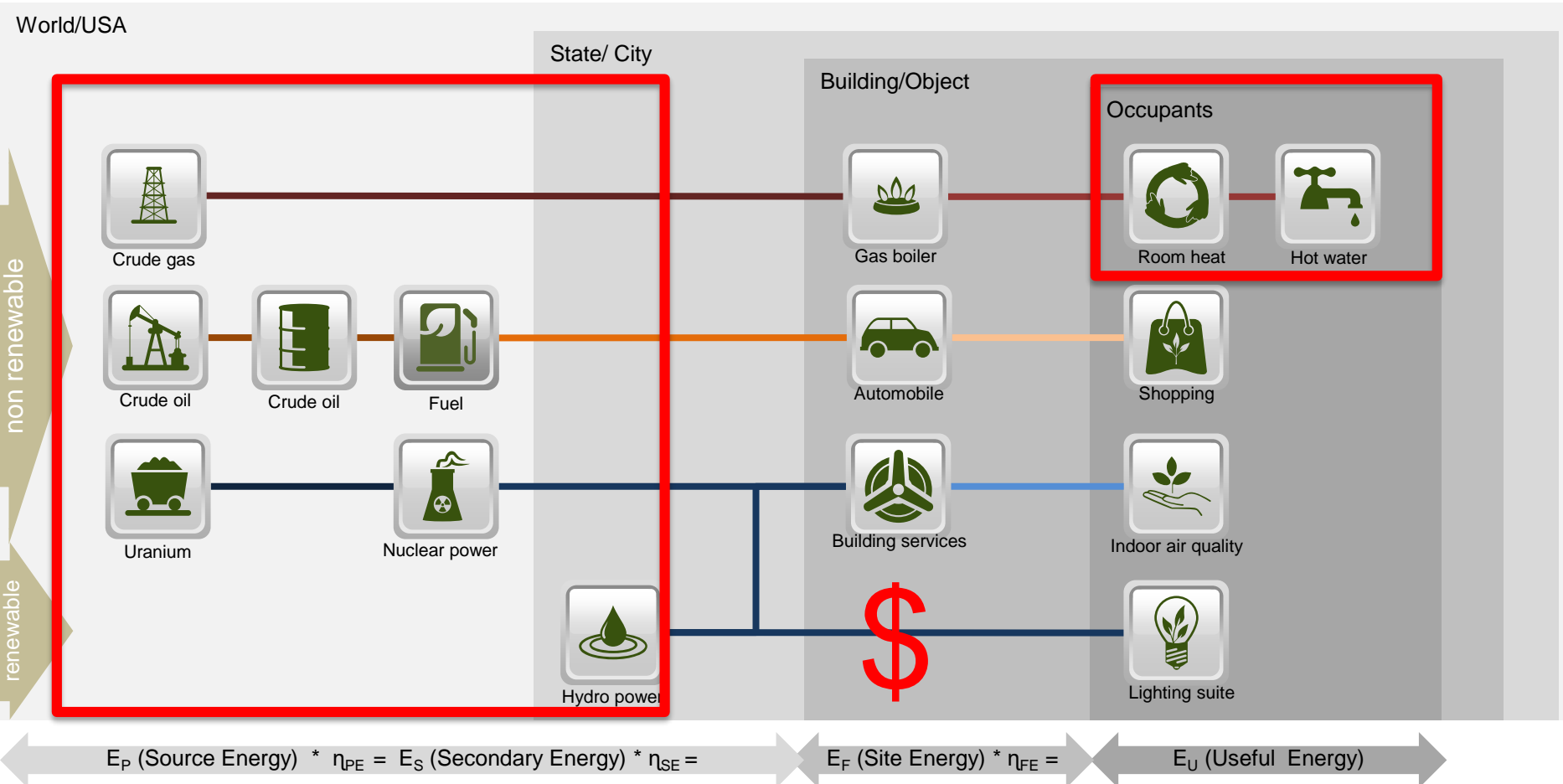


**Munich**  
3500-Watt



**2K-W Society**  
2000-Watt

# Energy Flow

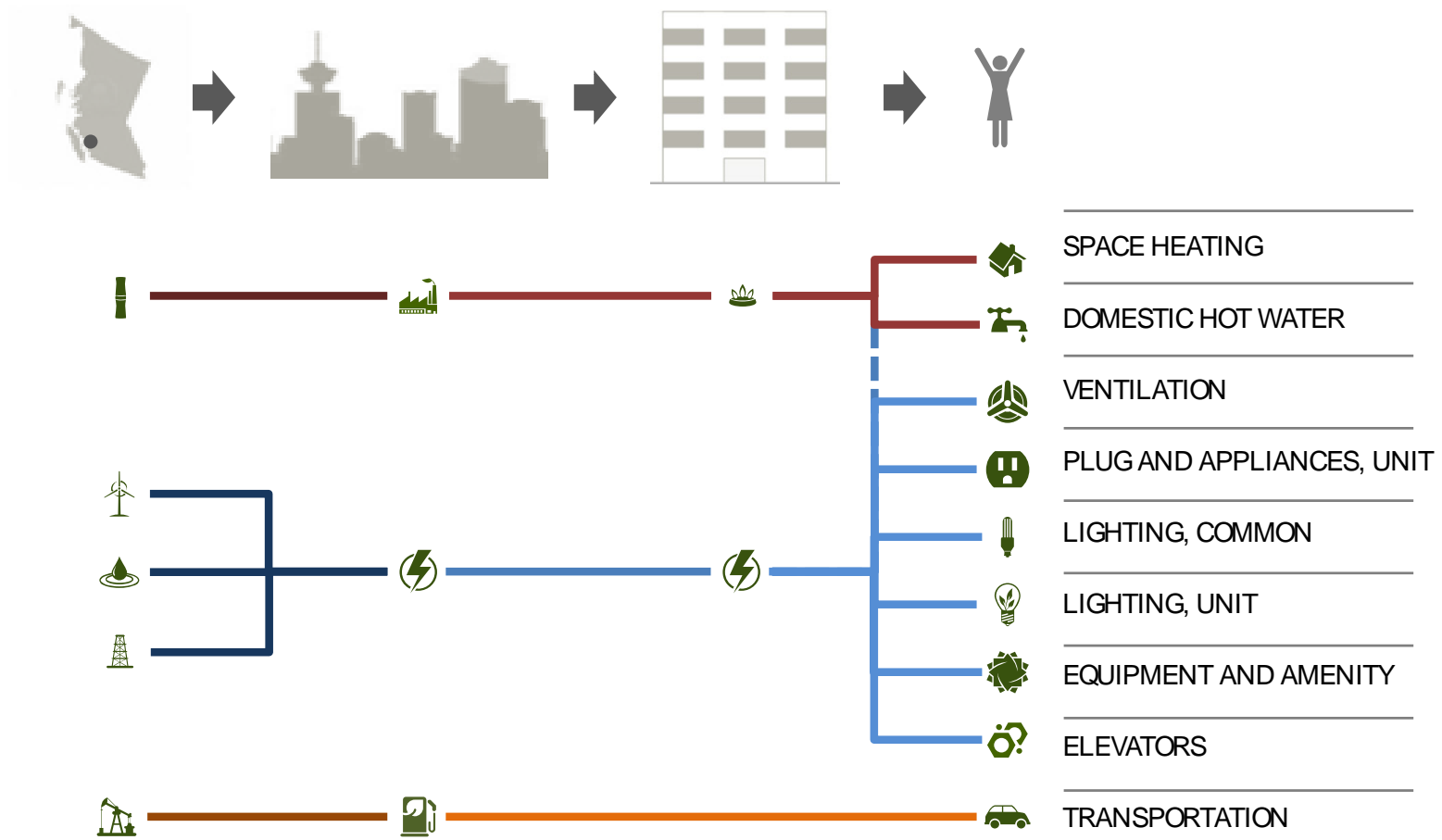


# Learning from the Car Industry

## Manufacturers Cannot Be Responsible for Users



# Energy Flow - Today

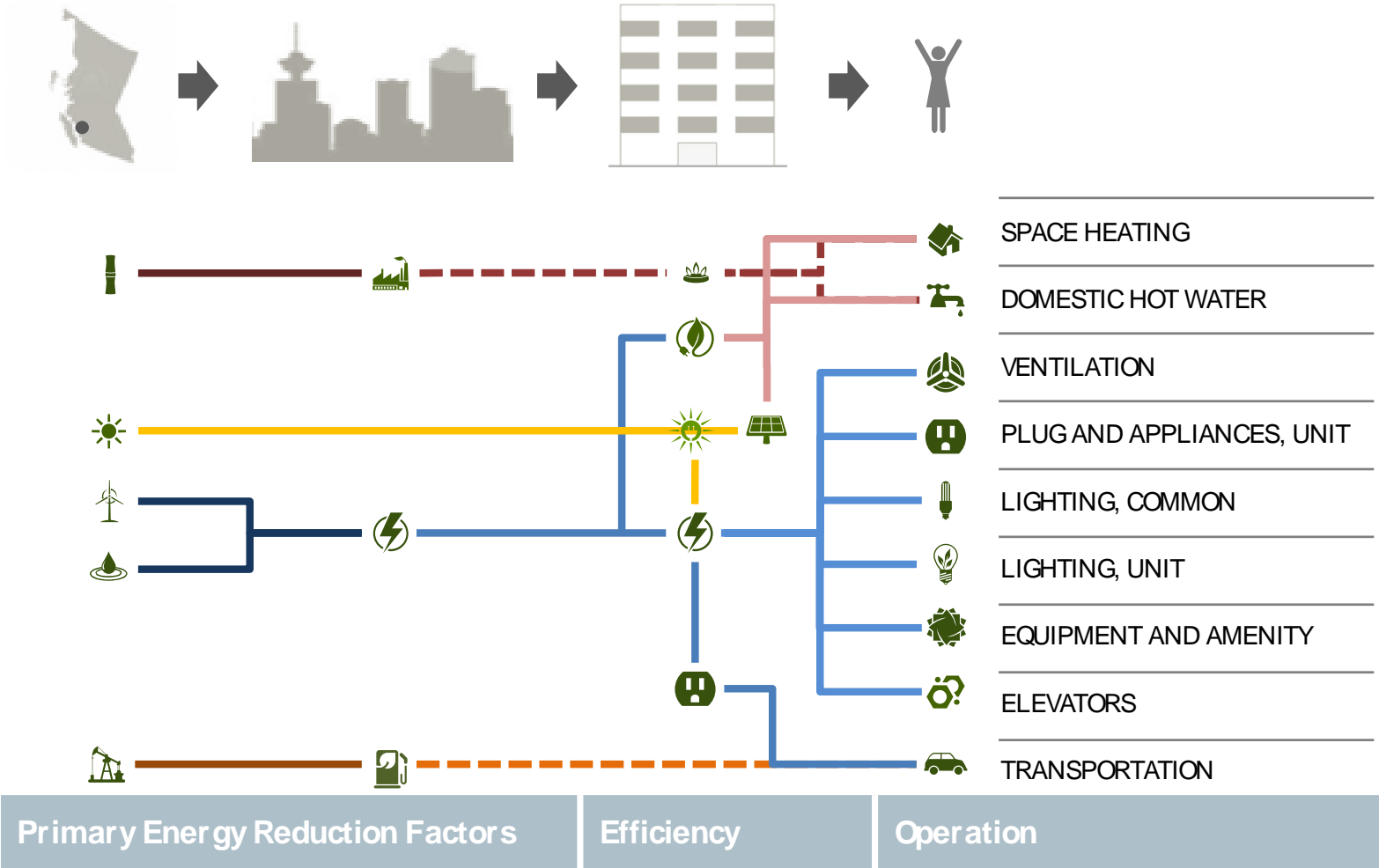


Primary Energy Reduction Factors

Efficiency

Operation

# Energy Flow - Tomorrow





# 2000-Watt Society • Climate Action Plan

## City of Vancouver • Greenest City Action Plan



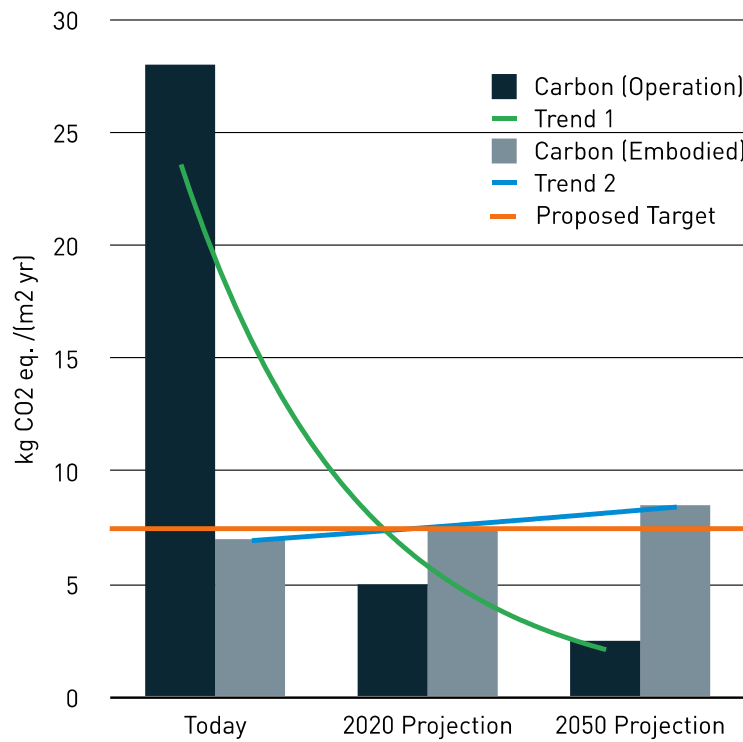


# 2000-Watt Society Guidelines

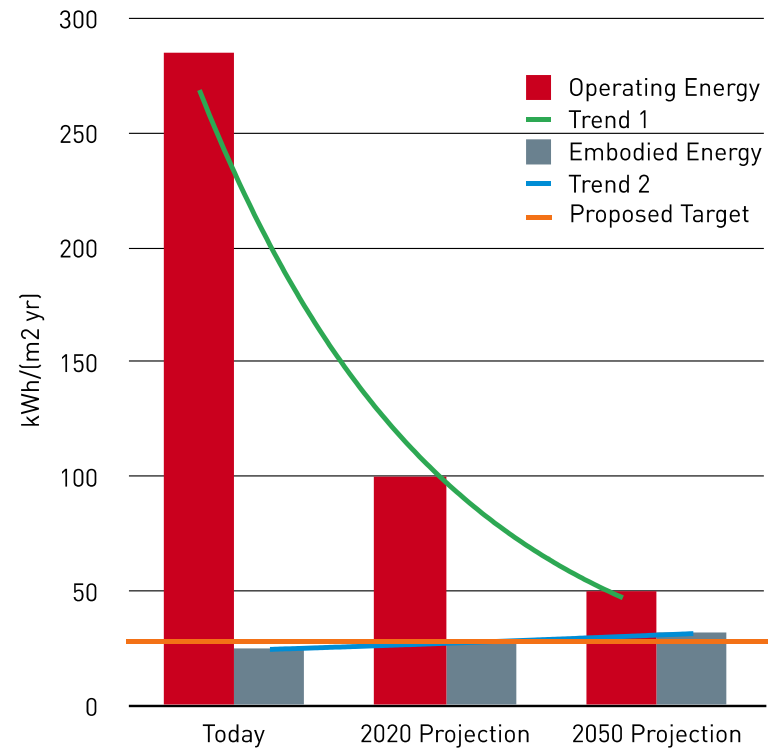
Multi Unit Residential Buildings	Primary Energy (non renewable) [kWh/m <sup>2</sup> /yr]		Greenhouse Gas Emissions [kg/m <sup>2</sup> /yr]	
	2020	2050	2020	2050 (Switzerland)
<b>Reference Value: Embodied Energy</b>	<b>30</b>	<b>30</b>	<b>7.5</b>	<b>7.5 (8.5)</b>
<b>Reference Value: Operating Energy</b>	<b>100</b>	<b>50</b>	<b>5.0</b>	<b>2.5 (2.5)</b>
<i>Target Value: Transportation (from 2000-Watt Society)</i>	-	35	-	(5.5)
<b>Target Value</b>	<b>-</b>	<b>115</b>	<b>-</b>	<b>15.5 (16.5)</b>



# Carbon Impact



Global Warming Potential (kg CO<sub>2</sub> eq./m<sup>2</sup> yr)



Non-Renewable Primary Energy (kWh/m<sup>2</sup> yr)

# 1<sup>st</sup> Certified Passive House • Waldsee BioHaus

Average energy use since 2006: 33kWh/(m<sup>2</sup>yr), or 10,500 Btu/(sf yr)



# Passive Technology • Building Envelope



## Super Insulation

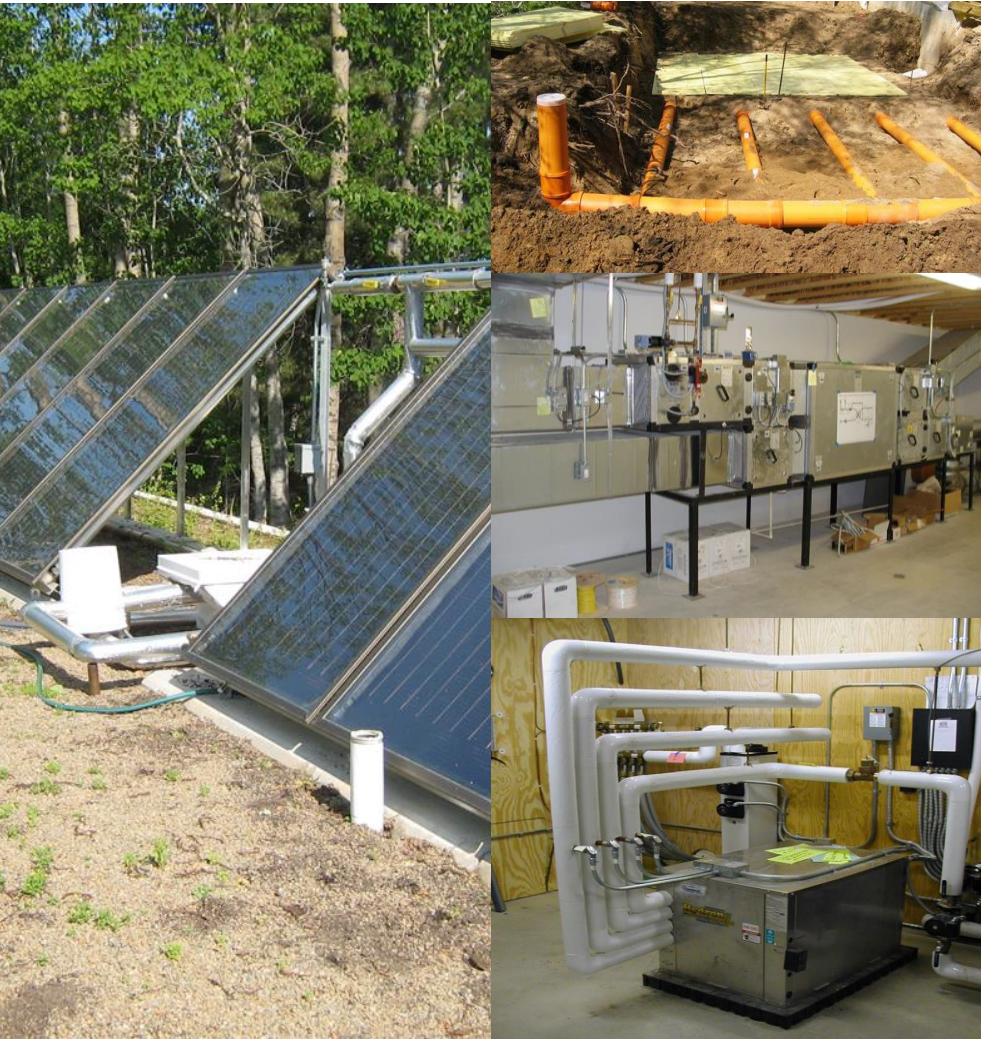
- R-55 Slab
- R-55 Wall below ground
- R-70 Wall above ground
- R-100 Roof
- R-8 Triple-glazed window

## Airtight Shell

- $n_{50} = 0,18 \text{ h}^{-1}$

**“Conservation First”**

# Active Technology • Mechanical Systems



## Ventilation System

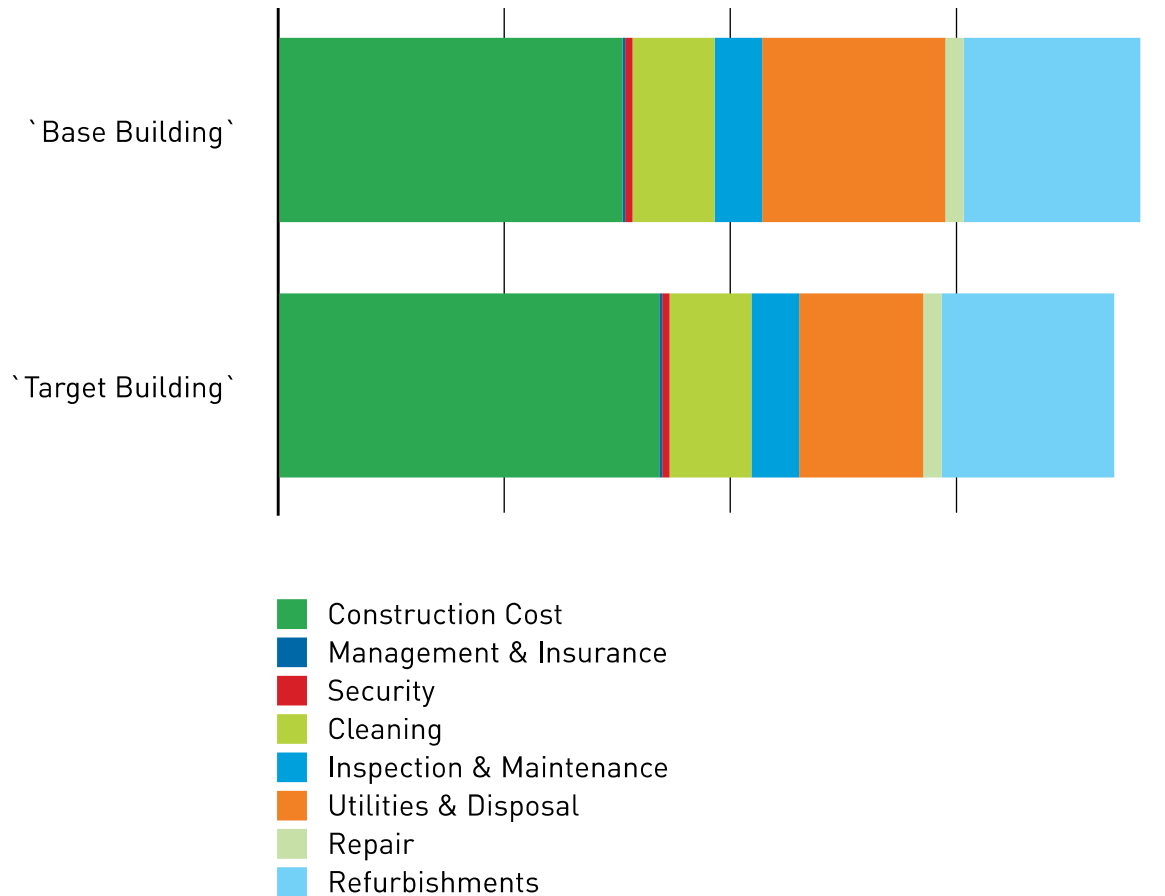
- Passive “Earth Tube” ground-to-air heat exchanger preheats and precools ventilation air
- High system efficiency:  $N_{HR} > 85\%$

## Heating System

- Solar hot water preheater (domestic hot water, space heating)
- Ground-source heat pump (domestic hot water, space heating)

# Life Cycle Costing

Annual annuitized cost comparison:



My Resolve: That we as people have to become  
Worldholder and invest in the world of ours and as  
individuals, family members, professionals,  
worshipers ... and act accordingly as member of  
ones society to solve the problem of climate  
change

Coming by the End of September 2017:

[WorldHolderFootprints.earth](http://WorldHolderFootprints.earth)

... and that government of the people, by the people, for the people, shall not perish from the earth.