Building eco-cities

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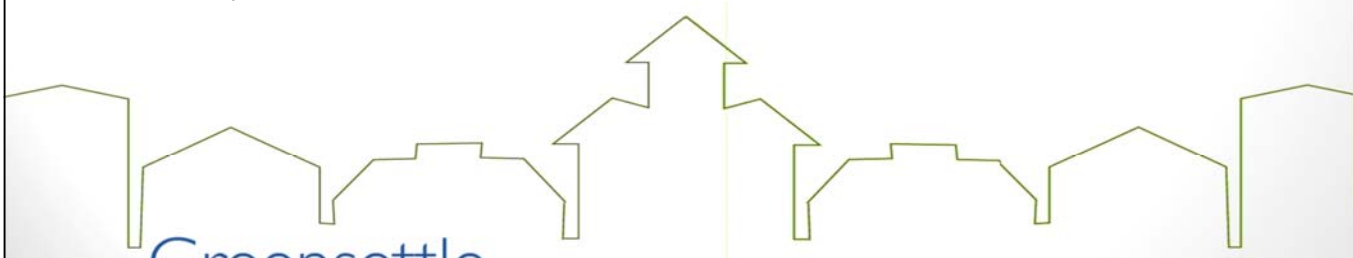
Objectives of GREENSETTLE

- To encourage the development of green cities and settlements in remote border areas
- To contribute to the long-term spatial development of the area
- Proposing a balanced progress of economical and social requirements
- Tackle environmental challenges and promote the use of environmental technologies
- In this project, the general framework and a sustainable planning method for municipality development is described through the concept of eco-cities



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Urbanization and resource efficiency

- Urbanization, inefficiency in resource use and climate change have created environmental stress
- Societies need to adapt cross-cutting sustainable solutions to overcome limitation provided by the scarcity of resources and the challenges of climate changes impacts
- Since resources are the main drivers of economic activities, a resource efficient built environment will positively contribute
  - to energy security,
  - to the reduction of greenhouse gas emissions and
  - to pollution of soil and water bodies, as well as
  - to the conservation of non-renewable resources

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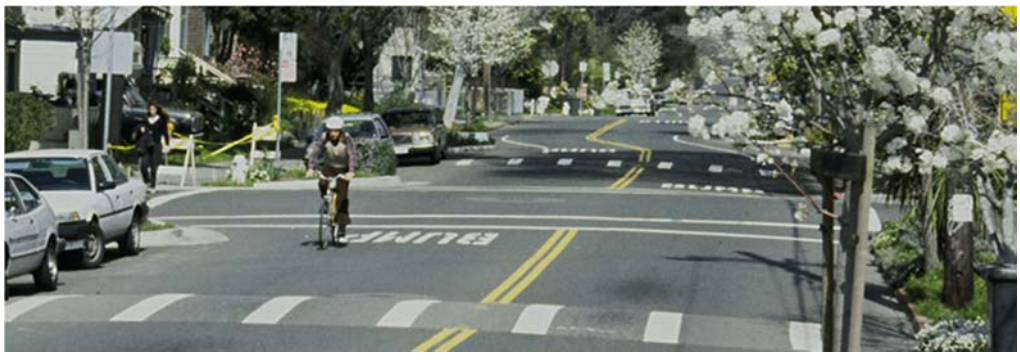
The concept of eco-cities

- Eco-cities date back to 1975
- A group of visionary architects and activists created Urban Ecology
  - Mission: urban planning, public participation, balance with nature
  - In 1985 redesigned a street in Berkeley California – Milvia "slow street" – safe for bicyclists and to walk



- Further, defined a common framework of eco-cities
  - low carbon, resource efficient and socially inclusive

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The common framework of eco-cities

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Climate change and poverty - Different problems, same solution?

- UN long-term vision: eradicate poverty and inequality, consume sustainably, combat climate change, respect planetary boundaries
- By 2030, the world will need at least 50 % more food, 45 % more energy and 30 % more water
- At the same time we need to cut CO_2 emissions by half
  - Can eco-cities be the answer to both?

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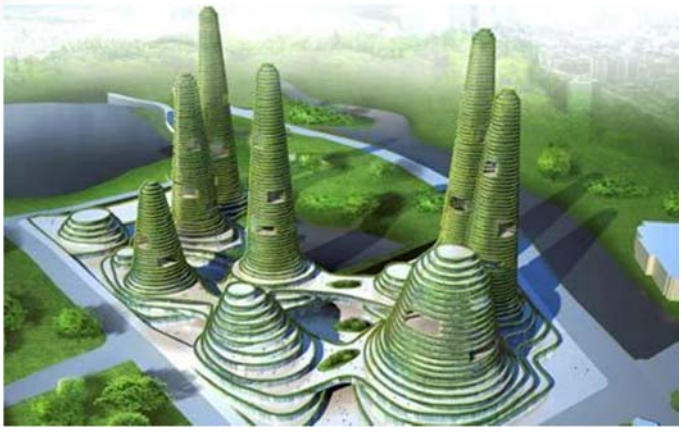
Eco-cities: attractive and green?



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Good attempts

- Eco-villages (e.g. Övertorneå)
  - Small size, self-sustained, devoted inhabitants, sometimes low-tech
    - Brilliant ideas, cannot support population of 9 billion
- Partial Ecocities (e.g. Kempele ekokortteli)
  - Energy self-sustained, carbon neutral… or … water purification idea or… innovative waste solutions, etc.
    - Good start, tend to be showcase, provide motivation
    - But how to continue?
- ”Fancy Ecocities” (e.g. Masdar eco-city)
  - Impressive architectural solutions, plenty of green areas, high-tech, futuristic
    - Tend to require immense amounts of investments
    - Tend to design cities to be built “from scratch”

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Lesson nro. 1:
Energy-Water-Air-Waste boundary

- In nature, the biogeochemical cycles are closed
- The interaction of the biogeochemical cycles and human activity can be considered as the functioning of the Global Earth System
- From a regional level to a city, town, village, neighbourhood level and, ultimately, to a building, the borders between these urban units create boundaries of interactions
- In our research, we focused on describing the Energy-Air-Water-Waste boundary and the selection of environmental sound technologies
- Within the concept of an eco-city, the key activity is to control material, energy and waste flows across these boundaries

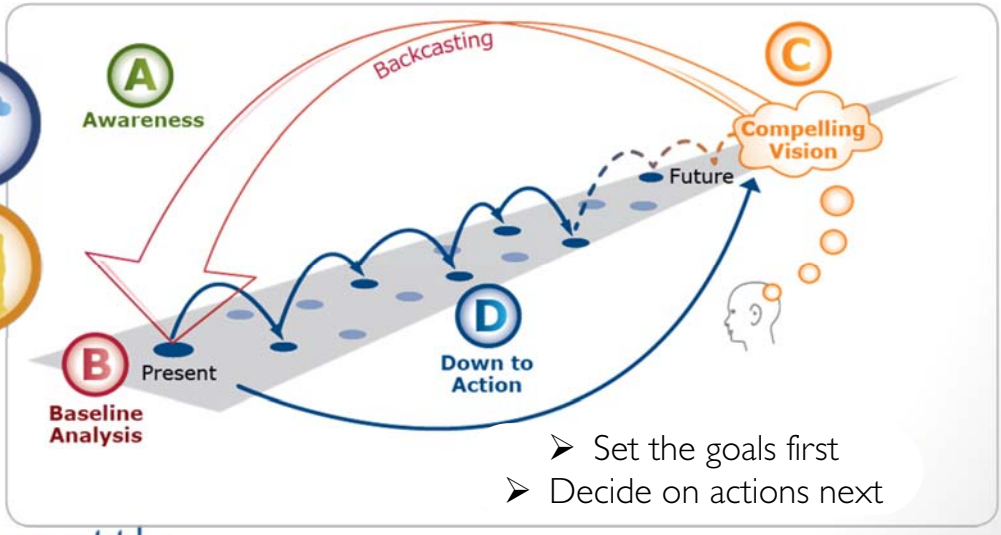
Lesson nro. 2:
Synergies!

- The concept implies that the value and performance of two elements combined will be greater than the sum of separate parts
- We often find that environmental solutions of different sectors are considered in isolation
  - E.g. waste management, water treatment and energy solutions and policies should be considered in concept
- We would also like to challenge the concept of waste
  - Both the wasteful way of current well-fare societies and the linear way value chains are functioning
  - We also support the concept of industrial ecology, where industries are in synergy to utilize each others' by-product streams
- The concept of "more from less" is away to provide more well-fare from diminishing resources to an ever growing population

Lesson nro. 3:

Begin with the end in mind

- The Natural Step framework's ABCD tool was used as a tool
- The framework introduced a set of sustainability principles
- The ABCD method encourages generating targets to reach for



- Set the goals first
- Decide on actions next

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Set of actions towards developing eco-cities

Energy solutions

- Energy saving plans for municiapl buildings
- Reduce energy losses and pollution
- Decentralized systems
- Utilze local resoruces (renewables, wastes)
- Energy saving street lighting
- Smart grids

Waste management

- Raise awareness for waste prevention and minimization
- Encoruse re-use and repair
- Separate collection of recyclables
- Recycling of organics
- Identify priority waste streams
- Optimized waste collection system

Water services

- Rainwater harvest
- Improve water and sanitation infra
- Water efficeint taps and nozzels
- Greywater recycling
- Wastewater sludge utilizaiton for buiogas proudction
- Living machines

Transportation

- Encourage waligina nd cycling
- Public transport infra
- Improved traffic flow
- Biofuel run buses – synergy with waste management!
- Infra to supprot use of electric cars
- Transport ICT

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Set of actions towards developing eco-cities

City planning

- Prevent urban sprawl
- Densification of infrsa
- Plan for mixed uses
- Better proximity to urban functions
- Integrate service development
- UBI systems

Buildings

- Energy efficency
- Utilize district heat
- Passive houses
- Utilize renewables
- Smart houses

Human well-being

- Access to services
- Diverse jobs
- Education on all levels
- Heathcare
- Social services
- Support entrepre-neurship

Community well-being

- Participatory planning
- Equality and diversity
- Plans for recreational aspects
- Places to meet and interact
- Safety
- Fun!

So, how far we are from eco-cities?

- Very far…
- But then again:
  - "All great achievements in human history began as a vision before becoming a reality"
- From the UN report:

  "In 2030, a child born in 2012 will turn 18. Will we have done enough in the intervening years to give her the sustainable, fair and resilient future that all of our children deserve?"
- Perhaps we should just decide that we want to have eco-cities in 2030 and the question then should be: what needs to be done to achieve this goal?
  - "Cities and local communities have a major role to play in advancing a real sustainable development agenda on the ground"

Summary

- Environmental technologies such as sustainable energy systems, water treatment technologies, air pollution control and waste management have a key role to achieve resource efficiency in cities
- Resource efficiency can be rephrased as minimization of negative environmental impacts, from using less energy-water-air-waste resources in order to improve economic activities and wellbeing
- In this respect, resource efficiency can be achieved by optimizing the energy-water-air-waste networks and realizing synergies between these networks
- There are still many open questions on how cities could be developed
- The main concern in this work is how to best apply environmental technologies under the process of sustainable development

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KAEEC
Karelia Energy Efficiency Centre

Centre for Economic Development, Transport and the Environment

Thank you!

Kainuu

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

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