Decarbonised Society begins with cities and communities

Dipl.Ing. Stefan Schurig
Director Climate Energy and Cities
Member of the Executive Board
“Agropolis”

- Navigable river
- Market gardening and milk production
- Firewood and lumber production
- Crop farming without fallow
- Crop farming, fallow and pasture
- Three-field system
- Livestock farming

© copyright Herbie Girardet/Rick Lawrence
CITIES ARE KEY IN THIS POLITICAL MOMENTUM

70% GHG Emissions

60% Global Energy Consumption

70% Global Waste

70% GDP

Source: UN-Habitat
Thesis #1: current energy markets are subject of a transformation from a vertical structure into a horizontal structure.
Subsidies for lignite coal and coal mining in Germany

Subsidies for
Coal mining
1950 to 2007: approx 160-180 bln euro

Phasing out of coal mining
(aid and adaptation allowance under the Coal Funding Law)
2008 to 2018: 21.6 bln euro

Mining damage, groundwater pumping,
Opencast mining remediation
annually: approx 0.5 bln euro

In addition: Relocation of around 300,000 people to date and destruction of approximately 100 km² landscape

Sources: BMWi, MfNE NRW, BEE.
0.4 kV

Big Power Plants

110/220/380 kV

Industry

Source: EnergyWeb@2010, www.bpa.gov
See trend research, Market participants - Renewable energy installations for electricity generation (in German), as of August 2011
Power sources in Germany

Non-renewables total: 89,452 MW

Source: Carbon Brief/ https://www.carbonbrief.org/how-germany-generates-its-electricity
Power sources in Germany

Renewables total: 101,701 MW

Source: Carbon Brief/https://www.carbonbrief.org/how-germany-generates-its-electricity

VOICE OF FUTURE GENERATIONS

World Future Council
SAFETY LESSON NO. 3
PREPARED BY
THE CALIFORNIA
STATE AUTOMOBILE ASSOCIATION

More Dangerous than Dynamite!
You would not play with Dynamite. Crossing streets in the middle of the block is far more dangerous.
“Petropolis”
Challenges
Explosive expansion of Mexico City, Mexico

- 1973 - Urban growth is concentrated in the center of the city
- 2000 - Now expands dramatically into surrounding rural areas

Growth of a Mega city
Urban sprawl instead of density
Unreliable infrastructure
Waste and soil degradation
Pollution, urban health and liveability
CITIES EXPOSED TO THE RISK OF HURRICANES

Source: WBGU 2007
Climate change and resilience
Traditional urban development pathways

Inputs
- Water
- Food
- Energy
- Goods

Outputs
- Organic Wastes (landfill, sea, dumping)
- Emissions (CO2, NO2)
- Inorganic Wastes (landfill)

Hinterland has a global reach
Development pathways of regenerative cities
Regenerating System

Regenerative Design
Humans intentionally participate as nature - actively co-evolving the whole system

Restorative Design
Humans doing things to nature - assisting the evolution of sub-systems

Sustainable Design
Neutral - ‘100% less bad’ (McDonough)

Green High Performance Design
Relative improvement (environmental rating tools, etc.)

Conventional Practice
‘One step better than breaking the law’ (Croxton)
• cities 'regenerate' the same amount of resources they absorb

• positively enhance rather than undermine the ecosystems

• address the relationship between cities and their hinterland.

• opportunities in financial, technological, policy and business practices

• ensuring that national and local policies are not contradicting each other but integrative, compatible and complementary - this may require a new national institution which monitors regenerative urbanisation progress.

• ensuring that the results are measurable and comparable
Regenerative City

Communication
- Spatial Planning
  - Energy
  - Transport and Mobility

Social Inclusion
- Water Management
- Waste Management and Zero Waste

Governance
- Investments in the Urban Economy
- Food and Agriculture
- Energy Efficiency and Buildings

Vision

Process

Structure

Sector
Thesis #1: current energy markets are subject of a transformation from a vertical structure into a horizontal structure.

Thesis #2: Clear targets for this transformation facilitate cooperation and communication.
1) demonstrates and communicates political will, commitment, leadership and vision

2) catalyzes change by streamlining and providing an official mandate for action (mobilization of stakeholders)

3) helps ensure a more efficient utilization and channeling of technical, administrative, as well as financial resources

4) creates investment security
Ibrahima Djitté
Mayor of Dlodobou, Senegal

Lean Brown
Mayor of Auckland

Cheryl Jones
EBM, city of Vaxjö

Megan Howell
Office of Mayor of Auckland

George Ferguson
Mayor of Bristol City Council, UK

Simon Corbell
Deputy Chief Minister ACT Legislative Assembly, Australia

Gregor Robertson
Mayor of Vancouver

Simon Richardson
Mayor, Byron Shire Council

Jens Kerstan
Senator for Environment and Energy City of Hamburg

Ilmar Reepalu
Mayor of Malmo

Steve Skadron
Mayor of Aspen

VOICE OF FUTURE GENERATIONS
<table>
<thead>
<tr>
<th>Category</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cities &amp; Communities</td>
<td>Frankfurt am Main, Germany</td>
</tr>
<tr>
<td></td>
<td>San Francisco, California</td>
</tr>
<tr>
<td>Regions &amp; States</td>
<td>Fukushima Prefecture, Japan</td>
</tr>
<tr>
<td></td>
<td>Rhein-Hunsrück District, Germany</td>
</tr>
<tr>
<td>National Governments</td>
<td>Cape Verde</td>
</tr>
<tr>
<td></td>
<td>Denmark</td>
</tr>
<tr>
<td>Island Governments</td>
<td>Tuvalu</td>
</tr>
<tr>
<td></td>
<td>El Hierro, Spain</td>
</tr>
</tbody>
</table>
**Countries with a 100% RE target**
Denmark, Sweden, Cape Verde, Costa Rica, Iceland

**Small-Island States with 100% RE target**
Islands of Tuvalu, Tokelau, Vanuatu, Maldives, Cook Islands, Samoa, Papua New Guinea...

**Regions with a 100% RE target**
Scotland, Upper Austria, Fukushima Prefecture/ Japan, Jeju Province/ Korea, Kasese/ Uganda...

**Cities with 100% RE target**
Frankfurt, Munich, Vancouver, San Francisco, Copenhagen, Malmö, Sydney, Masdar City…
Political image

Field of activity of regional energy company

Contribution to sustainable regional development

Value Creation

Independence from fossil resources

Achievement of local climate protection

Regional marketing and image for the region

N = 32  high  relatively  average  rare  non

Source: Peter Moser, Kassel
100% Vancouver
KASESE - UGANDA

- 100% RE target set by mayor in 2012 to increase access to energy (only 7.6% had access to electricity)
- Today renewables are estimated to be supplying 26.8% of the total 146,000 household in the Kasese district with energy
- Solar for lighting and biogas for cooking
- The number of businesses has increased from 5 to 55 since 2012 – at least 1,650 people have been trained in the process.
- Growth in tourist industry as camps and lodges get access to electricity
EAST HAMPTON - US

• 100% RE electricity by 2020 and energy by 2030

• 100% RE target set in 2014 by Town Board (inspired by storm Sandy that caused major blackouts)

• Energy Efficiency Measures save local residents and businesses $12 million annually

• Reduce energy imports which utility charges customers $26 million annually these days

• „Keep money in the community“ is the main driver

• 100% RE strategy based on solar and wind technology
SAMSO: THE ENERGY SELF-SUFFICIENT ISLAND

The first island to become completely energy self-sufficient in 10 years?

11 ONSHORE WIND TURBINES

1 turbine generates enough electricity to power 630 houses.

The turbines transmit electricity to the mainland when more electricity than the island can consume is generated.

OFFSHORE WIND TURBINES

10 103m high offshore wind turbines constructed in 2003 produce more energy than the island uses for transport.

3 x STRAW FIRED PLANTS

- Tranebjerg Heats 263 households
- Ballen / Brundy Heats 232 households
- Onsbjerg Heats 76 households

SAMSO: ISLAND FACTS

- Area: 114 km²
- Population: 4,000
- Investment: DKK 368 million

SOLAR PLANT

One of the heating plants receives heat from 2500 m² of solar panels. This is combined with a 900 KW wood chip fired boiler.

EXCESS ENERGY

Excess electricity produced from offshore wind farms is invested in new energy projects.

11 1MW onshore wind turbines generate 28,000 MWh, that's more electricity than the island's total consumption and the equivalent of 690,000 gallons of oil.

VOICE OF FUTURE GENERATIONS
Thesis #1: current energy markets are subject of a transformation from a vertical structure into a horizontal structure.

Thesis #2: Clear targets for this transformation facilitate cooperation and communication

Thesis #3: only a people centered approach will help to overcome barriers and increase acceptance
Socio-political acceptance
- Of technologies and policies
- By the public
- By key stakeholders
- By policy makers

Community acceptance
- Procedural justice
- Distributional justice
- Trust

Market acceptance
- Consumers
- Investors
- Intra-firm

Source: Rolf Wüstenhagen, Maarten Wolsinkb, Mary Jean Bürer, 2007
ACTIVATE LOCAL RESOURCE POTENTIAL
Mobilize Local Resources; Identify Programs for Support and Assistance; Perform Preliminary Assessments

DEVELOP THE 100% RE BLUEPRINT
Define the 100% RE Target; Develop a 100% Renewable Energy Scenario; Estimate the Potential Economic, Environmental and Social Benefits

ENGAGE IN NETWORKS
Form and Engage in Local and Regional Networks; Participate in International Networks

FORMALIZE AIMS AND FUNCTIONS
Fix Binding Targets; Set Comprehensive Legal and Regulatory Frameworks; Establish Relevant Institutionalized Bodies

IDENTIFY FINANCIAL RESOURCES
Introduce Innovative and Alternative Financing Mechanisms; Implement New Mechanisms to Internalize Externalities; Establish Stable, Long-Term Support Schemes

PROMOTE KNOWLEDGE GENERATION AND CAPACITY BUILDING
Generate and Disseminate Specific Knowledge; Make Knowledge and Data Accessible; Promote Capacity Building and Training
SUPPORT DECENTRALIZATION AND INCLUSION

Ensure Accountability and Transparency; Promote Inclusive Communication and Outreach; Empower a Decentralized and Diversified Energy Transition; Safeguard a Socially Just Transition

FOSTER VERTICAL AND HORIZONTAL COOPERATION

Further Vertical Cooperation; Cultivate Horizontal Cooperation

PROMOTE ENERGY CONSERVATION AND EFFICIENCY

Change Human Behaviour; Retrofit Existing Built-Environments; Upgrade Infrastructures and Support New Technologies

INCREASE AND INTEGRATE RE ACROSS SECTORS

Increase Renewable Electricity Generation; Tackle the Built Environment Challenge (heating/cooling); Tackle the Mobility and Transport Challenges; Modernize the Grid and Other Infrastructure
A GOVERNANCE ISSUE: LOCAL VS NATIONAL

• “MISMATCH” BETWEEN NATIONAL AND LOCAL GOVERNMENTS
  Competition, incompatibility, inconsistency, lack of collaboration and cohesiveness
Urban SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable