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Sharing Urban Best Practices for Sustainable Development in Asia and the Pacific

Eco-cities in Europe: Compact, Mixed-use, Green, Livable New Districts

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Stefan Rau Urban Development Specialist, EASS East Asia Department, Asian Development Bank



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Introduction: Why do we need New Towns, New Districts?

Manage Urban Development, Promote compact development and provide adequate Infrastructure and services

Integrated land-use and infrastructure development, manage land development, balance development with preserving green space for ecosystems and farming. Compact development against sprawl: the global trend in urbanization is higher rates of increase of urban land expansion compared to rates of urban population growth.

Instrument to respond to Rapid Urbanisation – The Mega-Trend

2.7 billion new urban residents will be added between 2011 and 2050 from 50% urban today to 70% urban in little over a generation from now.

(figures: esa.un.org : World Population Propsects 2012. unhabitat.org: UN Habitat 2012: State of the World's Cities 2012)



Introduction: Where do we need New Towns, New Districts?

World Population – Shift of Gravity Centre to Asia and Africa Catching-up Urbanization in Developing & Emerging Regions



Source: http://esa.un.org/unpd/wup/Analytical-Figures/Fig_2.htm





Introduction: For which Cities: New Towns, New Districts?

Large Cities & Megacities & Mega-Regions: most growth.

Small and medium-sized cities will stay home to most global urban residents



Source: Adapted by the author from United Nations Department of Economic and Social Affairs. World Urban Prospects: The 2011 Revision, Highlights New York, 2012. http://esa.un.org/unpd/wpp/Documentation/publications.htm



Urban

Knowledge

HUD People's Republic of China

Case 1: Eco-city Hammarby Sjostad, Stockholm, Sweden



Source of data and images: bygg.stockholm.se/hammarbysjostad, www.hammarbysjostad.se Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental project in Stockholm. Stockholm 2007.







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Hammarby Sjostad: Basic Data and Facts



www.hammarbysjostad.se Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental project in Stockholm. Stockholm 2007.

- Brownfield redevelopment from a polluted industrial site
- Area: 160ha land, 40ha water
- 1990 planning, 2015 completion
- New district for a community with young families
- 11,000 **dwelling units** for 24,000 residents, currently 17,000
- For 10,000 **jobs**, currently 5,200
- public transport (LRT, bus, ferry)
- Publically accessible, attractive waterfronts and green park spaces
- Buildings twice as eco-efficient as normal buildings.
- **Soil** was **decontaminated** before construction began.







Hammarby Sjostad: Basic Data and Facts



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Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental project in Stockholm. Stockholm 2007.

- Land use: brownfield site into attractive residential area
 Transportation: attractive public transport, combined with carpool and safe cycle paths to reduce car use.
 Building materials: healthy, dry and environmentally sound.
- **Energy**: renewable fuels, biogas, reuse of heat coupled with efficient energy consumption in buildings.
- Water & sewage: new technology for water saving and sewage treatment.
- Waste: thoroughly sorted in practical systems, with material and energy recycling maximized.
- Open Space Network: beautiful waterfronts and parks, connected with green bridges





Human scaled spaces and buildings, walkable streets



Source of data and images: bygg.stockholm.se/hammarbysjostad, www.hammarbysjostad.se Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental project in Stockholm. Stockholm 2007.







Human scaled spaces and buildings, attractive waterfronts



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Public transportation: LRT & Ferry & Car-Pooling



Source of data and images: bygg.stockholm.se/hammarbysjostad, www.hammarbysjostad.se Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental

- **LRT** connects conveniently to downtown and other districts
- Sjöstaden has ferry links free to use. The ferry runs 365 days of the year from early in the morning to late at night.
- A carpool open to both residents and those working here has been launched in the area.
- Around 10 % of households have joined the carpool to date, and there are 25–35 carpool cars parked in the area, with the number varying according to demand. Around 75 % of the cars are bifuel cars.
- 80% of all trips public transportation or foot or bicycle





Hammarby Sjostad: Eco-cycle - energy, waste and water



Source of data and images: bygg.stockholm.se/hammarbysjostad, www.hammarbysjostad.se

Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental

project in Stockholm. Stockholm 2007.







Hammarby Sjostad: Solar power and waste to energy





Solar thermal elements producing **hot water** have been installed on many roofs. The panels shown in the picture are sufficient to meet half of the building's annual hot water need.

Photovoltaics. The electricity from a 1m² module produces approximately 100 kWh/year, which corresponds to a domestic electricity need of 3m² residential floor space.

Combustible waste is converted into electricity and district heating in a combined heat and power plant.

Source of data and images: bygg.stockholm.se/hammarbysjostad, www.hammarbysjostad.se





Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental project in Stockholm. Stockholm 2007.

Water efficiency and experimental wastewater treatment





Reduce water consumption by 50% from 200 to 100 liters/person/day. Currently 150 litres/person/day.

Efficient appliances (energy class A: washing machines and dishwashers, low flush toilets and air mixer taps)

Experimental wastewater treatment plant measuring all policy changes.

Stormwater retention and filtration in open spaces and constructed wetlands







Source of data and images: bygg.stockholm.se/hammarbysjostad, www.hammarbysjostad.se Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental

project in Stockholm. Stockholm 2007.

Hammarby Sjostad: Green space and water system



Source of data and images: bygg.stockholm.se/hammarbysjostad, www.hammarbysjostad.se Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental project in Stockholm. Stockholm 2007.

- Integration of open space system with stormwater management
- Natural areas of value protected from development.
- Development of undeveloped public green spaces are to be compensated for in the form of biotopes that benefit biodiversity in the immediate area.
- Open space standard: There shall be at least 15m² of courtyard space and a total of 25–30m² of courtyard space and park area within 300m of every apartment (equiv. 100m²).
- At least 15 % of the courtyard space shall be sunlit for at least 4–5 hours at the spring and autumn equinoxes.





Waste cycle, innovative solid waste management



- Waste collected in **mobile** automated waste disposal system ends up in underground tanks
- **Separated tanks** for: Combustible, domestic waste, and food waste.
- Tanks emptied by vehicle equipped with a vacuum suction,
- Vehicle docking points serve several buildings' waste tanks simultaneously



Source of data and images: bygg.stockholm.se/hammarbysjostad, www.hammarbysjostad.se Fraeme, Lars: Source: Hammarby Sjöstad – a unique environmental project in Stockholm. Stockholm 2007.







Case 2: Eco-District Vauban, Freiburg, Germany



Source: www.freiburg.de/vauban







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Vauban: Car-free, solar district in Freiburg, Germany



Source of data and images: www.freiburg.de/vauban

- Brownfield redevelopment of former military area
- Mixed-use and walkable
- 41 ha, 5,500 residents in 2,500 dwelling units
 - 172 cars per 1,000 residents
- commercial and office space for 600 jobs
- A central market place and a community center.
- Planning: 1996, completion: 2006
- Both a grassroots initiative and also pursued by city council







Vauban: Car-free, solar district in Freiburg, Germany





Source of data and images: www.freiburg.de/vauban

- "Car Free City" Restricted car access and areas totally free of cars, parking structures at periphery, LRT/streetcar, primary mode of transport is foot and bicycle.
- No home or workplace is more than 500m from public transport
- Around 40% of the households agreed to live without their own cars, others park vehicles outside in two parking structures
- Main streets top speed 30Km/h
- Side streets 'communication spaces' top speed of 10Km/h.
- All streets suitable for kids to play.
- Car pooling and cycling popular
- **Covered bicycle racks** at buildings
- car ownership: 172 cars per 1,000 residents (Freiburg: 430 per 1,000)







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Vauban: Car-free, solar district in Freiburg, Germany





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Vauban: Energy-efficient buildings and "Solar City"



Source of data and images: www.freiburg.de/vauban

- Advanced urban and building infrastructures for water and energy conservation
- Energy efficient buildings:
- **'Low-Energy Houses'** (65kWh/m2 and year)
- **'Passive Houses'** standard at least 100 buildings
- 'Zero-Energy Houses' and
- 'Plus-energy houses' producing more energy than they consume
- A **solar-city sub-district** was implemented in which all houses have solar panels on the roof







Vauban: Low-energy building, construction cooperative



- 16 families coordinated, developed, invested and now live together.
- 4 offices, 16 apartments, common spaces.
- multi-use low-energy building.
- Grey water from wash basins and showers are treated by sand filtration system and used for toilet flushing
 Blackwater and organic waste collected in biogas reactor used for
 - cooking.









Case 3: Eco-District French Quarter, Tuebingen, Germany



Source: www.tuebingen.de/franz_viertel Grohe, Manfred. Universitaetsstadt Tuebingen.







Small Blocks and Plots developed by Cooperatives



Data and Image Source: www.tuebingen.de/franz_viertel Grohe, Manfred. Universitaetsstadt Tuebingen.

- Compact, pedestrian-friendly, green urban community
- **mixed-use** urban expansion for 11,000 citizens on 70 ha
- pedestrian sidewalks, paths, **bicycle** lanes & trails
- green parks & plazas
- Human-scaled urban blocks 80x80 m between roads
- Divided blocks into parcels promotes small-scale owner-occupied investments custom designed
- individual house developments by owner-occupier investment groups
- Energy-efficient building "passive house standard"







Construction Cooperatives: owner group planned, occupied



- **Construction cooperatives** are preferred when plots were sold
- Fine-grain mixed of uses realized through dividing building blocks into parcels and cooperatives rather than large developers.
- Cooperatives mostly built residential but also mixed-use, multi-story buildings
- City planning bureau facilitated forming of cooperatives and planning process as needed.

Data and Image Source: www.tuebingen.de/franz_viertel . Universitaetsstadt Tuebingen.
G.-A. Ahrens (2009): Sonderauswertung zur Verkehrserhebung ,Mobilität in Städten – SrV
Sven Ledwoch: The 'French District' Sustainable Urban Neighborhood in Tubingen, Germany.
GIZ, Gesellschaftf fuer Internatinoale Zusammenarbeit GmbH. On UNECE website: http://www.thepep.org/ClearingHouse/docfiles/French_District_Final_Draft_20121018.pdf. Breithaupt, Manfred, GIZ







Tuebingen South, Germany



- 2010: **150 businesses** located with **1,000 jobs**; 50% in service, 20% in skilled trade or production, 10% in retail
- Promoting local economy small owner-operated retailers
 contribute to the local economy as part of decentralized supply
 structures. Being independent
 from multiple shop chains, the
 added value remains "in the
 neighborhood".
 - General "repair shop" stands for a **more sustainable economic activity** as opposed to "single-use disposal" society.

 G.-A. Ahrens (2009): Sonderauswertung zur Verkehrserhebung ,Mobilität in Städten – SrV Sven Ledwoch: The 'French District' Sustainable Urban Neighborhood in Tubingen, Germany. GIZ,
 Gesellschaftf fuer Internatinoale Zusammenarbeit GmbH. On UNECE website: http://www.thepep.org/ClearingHouse/docfiles/French_District_Final_Draft_20121018.pdf. Brigitte Schulz: Die Tübinger Südstadt. In Bauwelt: 1-2: 2012. Photos: Dany Woern.







Sustainable Urban Transport, Living Streets



Data and Image Source: www.tuebingen.de/franz_viertel Grohe, Manfred. Universitaetsstadt Tuebingen.







Sustainable Urban Transport, Living Streets

 Regional connection V_{max}=50km/h
 Local distribution road V_{max}=30km/h
 Access road V_{max}=30km/h
 Living street, traffic calmed
 Living street, closed for motorized transport



Source: Ahrens 2009, Walter 2011

G.-A. Ahrens (2009): Sonderauswertung zur Verkehrserhebung ,Mobilität in Städten – SrV Sven Ledwoch: The 'French District' Sustainable Urban Neighborhood in Tubingen, Germany. GIZ, Gesellschaftf fuer Internatinoale Zusammenarbeit GmbH. On UNECE website: http://www.thepep.org/ClearingHouse/docfiles/French_District_Final_Draft_20121018.pdf.

28 http://www.thepep.org/ClearingHouse/docfiles/French_District_Final_Draft_20121018.pc Brigitte Schulz: Die Tübinger Südstadt. In Bauwelt: 1-2: 2012. Photos: Dany Woern.







Living Streets: More Pedestrians and Cyclists







G.-A. Ahrens (2009): Sonderauswertung zur Verkehrserhebung ,Mobilität in Städten – SrV Sven Ledwoch: The 'French District' Sustainable Urban Neighborhood in Tubingen, Germany. GIZ, Gesellschaftf fuer Internatinoale Zusammenarbeit GmbH. On UNECE website: http://www.thepep.org/ClearingHouse/docfiles/French_District_Final_Draft_20121018.pdf. Brigitte Schulz: Die Tübinger Südstadt. In Bauwelt: 1-2: 2012. Photos: Dany Woern.

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Conclusion: 10 Principles of Eco-cities in Europe: Compact, mixed-use, green, livable new Districts

- **1. Human-scaled, compact:** 5-10 minute walk from home/work to transit, shops, services, work, public park
- 2. Mixed Use: urban vibrancy, culture and business opportunities
- **3.** Transit-based, convenient public transportation and eco-mobility: i.e. buses, car-sharing, rental bikes, delivery services
- 4. Living, human-scaled streets, pedestrian and bicycle friendly: fine-meshed network of beautiful sidewalks and pathways, small urban blocks, pedestrian safety, shops along sidewalk, landscape, lighting, public furniture
- 5. Eco-efficient: land use efficient, energy efficient, water efficient
- 6. Green open space system: ecosystem services, public health, community amenities, increased land value, ecological infrastructure
- 7. Inclusive: Small scale investments organized in private building cooperatives and preferred acceptance of this form of ownership from city government as opposed to proposals from developers
- 8. Public participation and focus-group participation during planning
- **9. Competitive: mixed use with jobs creation** promoting high-tech SME spinoffs and live and work space attractive for highly skilled academics

10. Sustainable investments as demand based inclusive development, balancing supply and demand



