

# Solar Habitat in Cities and Villages

# Future urban development with Renewable Energy: towards the global renewable energy habitat

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# The WCRE urban development platform

The direction of modern urbanisation has reached a technological dead-end; the situation is extremely precarious, locally and globally. Global urbanisation has been fuelled by its dependency on cheap fossil fuel powered electrification and gasoline-powered transport systems. Now, as both fuel supplies approach their commercially attainable end, and it becomes apparent that almost three-quarters of man-made carbon emissions are derived from cities' fossil fuel consumption, all stops must be pulled out to go far beyond 'making cities sustainable'. The challenge is no less than to rescue civilisation as we know it, and to avert the worst calamities.

The WCRE states that action needs to recognise several special conditions, namely that

- cities and human settlements in general are open, collective decision-making systems

   i.e. geographic, economic and cultural intensifications of wider societal space, operating both locally and globally. They are not governed by single, or even multiple entities that are easily definable, or controllable. In addition, much of personal energy consumption decisions escape urban management decisions altogether;
- local administrative systems are not geared to effectively dealing with energy management, let alone comprehensive defossilation projects; and
- cities have vastly differing historical, developmental, climatic, economical and political conditions.

For example, the environmental conditions and issues differ greatly across development levels of cities alone. While fossil fuel dependency affects and threatens all cities, from the poorest to the wealthiest, the actual issues experienced locally vary dramatically, as observed by British ecologist, Gordon McGranahan.

- Poorer cities and towns experience problems with local health, basic sustenance and income generation, much of it due to acute levels of energy poverty, i.e. a lack of ready access to locally generated, affordable and renewable power and fuel.
- More developed cities with accelerating urban economies struggle with fossil-fuel induced local air, water and soil pollution.
- The major challenge of cities and towns enjoying increasing wealth and consumption has become a massive and dangerous greenhouse gas emissions surplus, due to massive levels of fossil fuel use.

In its call for comprehensive action, the WCRE supports and promotes all single and united efforts to study, develop strategies for and rectify the mounting greenhouse gas emissions load and fossil/nuclear fuel dependency of the world's growing urban agglomerations. It supports all integrated and transparent urban efficiency measures; prototype and demonstration projects; public transport and energy-conscious land use planning practices; local generation capacity; equitable urban power pricing; decentralisation of power generation and consumption; local renewable energy ordinances and all programs that are suitable to an accelerated reduction in fossil and nuclear fuel consumption; including measures that promise to support urban-unit based carbon trading credit schemes.

While several specific methods and approaches are being pursued, there is no single system or solution that can work for all cities and towns. However, it is important that

- international, national, state and local governments work together to solve the urban energy crisis;
- basic administrative systems on all levels be restructured and/or guided to pursue efficiency and renewable implementation schemes by focusing on key dimensions such as:
  - codes/standards
  - skills broadening
  - o organisational reform
  - education and information
  - $\circ$  incentives and disincentives
  - financial market regulation measures
  - o urban development model practice: transport, built form, infrastructure

In application of such measures on all levels of government, a host of defossilisation measures is needed:

- international, national, state and local actions
- control of corporate consumption and production
- public information and participation programs
- household demand management
- carbon neutralisation programs
- energy pricing and purchasing
- control of power generation
- efficiency standards
- building regulations
- land use planning
- transport planning

# The World Council for Renewable Energy's Solar Habitat framework

The WCRE's general framework emerged from the investigation of a number of initiatives and ideas, including a new generation of international, multi-actor research, development and dissemination initiatives. EUROSOLAR launched the "Eruopean Charter Solar Energy in Architecture and Urban Planning", elaborated by Thomas Herzog. The World Council for Renewable Energy (WCRE) adopted at its First World Renewable Energy Forum in 2002 the Guideline "Renewable Energy and the City". International Energy Agency (IEA) auspiced research and development work advanced a method to pursue city-wide applications as integral to the main planning agenda. These initiatives are now being integrated in the broader 'Solar Habitat' approach by the World Council for Renewable Energy, as a basic policy and planning framework that can apply to all cities and towns.

For application by local institutions, the focus is on the energy supply and technology side, within a comprehensive town planning and design strategy that includes institutional arrangements. The goal is to develop energy technology applications and emissions accounting systems along with performance targets linked to urban development and reform initiatives. Also fundamentally important are land use strategies that are based on a consideration of urban-rural linkages and value land use and transport investment choices with a view to their contribution to long-range energy and resource self-sufficiency goals.

The Solar City planning approach recommended three areas of focus to cities and cityregions, to be advanced simultaneously. These are

- (a) sustainable-energy focused urban planning strategies;
- (b) targets, baseline studies and scenario development;
- (c) and urban energy technology, industry and business development.

The expanded Solar Habitat initiative extends this agenda to rural and peri-urban issues, to opportunities of poverty alleviation, and to guidance in national and regional development strategies that rebalance the rural-urban dynamics for the purpose of sustainable development.

# **Renewable habitat strategies**

It is recommended to identify local planning and development approaches that are conducive to the introduction of renewable energy technologies, within a broadly energy-conscious community development approach. To be addressed are strategy, planning tools, organizational arrangements, legislation and standards, incentive structures, public information and exemplary municipal practice.

By introducing improved ways of adopting renewable energy technologies a municipal renewable energy program is to be designed to contribute to climate-stable practice in the building and property development industry, land-use planning and infrastructure development. It should be framed in ways that help strengthen local governments' efforts to build enlightened community performance and household preferences.

Cities and towns can pursue renewable energy programs through

- direct legislation and standards;
- the provision of incentives and disincentives;
- corporate capital asset practice, power purchasing and pricing;
- institutional reform and improved strategic and general planning practices; and
- community action, industry alliances, information and education.

The guidance provided to participating cities is to investigate each of these in detail and develop advanced means of building improved urban practice approaches.

#### Setting targets

The recommendation is to introduce, enhance and evaluate suitable approaches that help understand the role of renewable energy technologies in the broader urban energy context. It is important to include both renewable energy technology implementation targets as well as maintain a focus on absolute climate-stable carbon dioxide-equivalent emissions measures aiming at a specific future date, such as 2050. The cases of reference are such cities and villages which have already initiated a 100%-Renewable Energy supply and consumption.

Planning methods based on energy technology introduction and emissions accounting methods may deploy backcasting approaches. This involves the development of alternative urban development growth and technology transformation scenarios, then 'back casting' milestones for technology innovation and emissions in order to determine workable reduction rates over time.

# Urban renewable energy technology, systems and industry development

The recommendation is to work with cities in advancing renewable energy technologies and systems, and to help promote the renewable energy industry, in a way that allows it to serve as model for the rest of the national urban system. The emphasis is therefore on market-led approaches of technology system development and deployment, through pricing, investment, electricity purchasing policies, information, model action and other means.

# **Renewable Energy Technology Portfolios**

It is recommended that optional paths are developed, evaluated and implemented, suitable for the informed and broad introduction of renewable energy technology portfolios, and the use by city governments, municipal utilities, businesses, industries and households. Special emphasis is to be placed on micro-generation and distributed low-energy production in buildings, facilities and urban systems. Current, emerging and potentially competing solar and other renewable energy technologies, systems and related urban services are to be assessed for their urban modification and city-wide, systematic introduction in ways that are meaningful to cities' development agendas – physical planning, sustainability objectives, organization, services – and their pursuit of targeted emissions reductions.

Results are expected to include technology, systems and industry development options, suitable for selective and targeted implementation in general and specific action plans – answering the following questions. What can city governments in collaboration with industry and constituent urban communities do to advance the direct use of renewable energy sources? How can these be useful to residential neighborhoods, to industry and transport? How can they support the generation of electricity in quantity, such as through solar, wind, biomass, geothermal and sustainable hydroelectric power? And how can cities contribute to the development and deployment of technology development strategies in industrial and residential consumer-oriented application, such as stand-alone power generators, heat pumps, photovoltaics, solar hot water and solar cooling?

#### **Understanding best practice**

The recommendation is to make accessible and apply useful lessons from current and recent related initiatives domestically and worldwide. This is to be achieved by studying successful practice in integrated urban energy planning, management and projects. The activities include an identification of scope and criteria for evaluation; information gathering and documentation; study and evaluation; analysis and description; case study development; and communication and dissemination. This encompasses technologies, management practices as well as growth strategies. Several main categories of case studies are differentiated: comparable cities, urban precincts and settlement projects but also development policies and programs.

# Learning from action

A stimulating recommendation is to creatively reflect on program experience derived from the participating cities. This will help develop a shared understanding of the barriers to, dynamics and impacts of community, institutional, industrial and technological change, with a view towards the planned and targeted, GHG-emissions targeted phasing in of solar and other renewable energy sources on an urban and regional scale.

This programmatic approach is not only be useful to the individual cities engaged in a renewable energy implementation program, but of value in the application of lessons and methods across the national urban system.

# Urban renewable energy policy and practice examples

In the absence of useful established patterns of practice a search is under way for new means of reconciling local government's sectorial concerns, technological opportunities and shifts in energy markets with global environmental imperatives. There is a number of hopeful local initiatives, focusing squarely on comprehensive local action in municipal and metropolitan conversion to a renewable energy supply base.

# A. Urban programs

Barcelona's Solar Ordinance

An increasing number of cities search for homegrown paths to energy sustainability. One of the most progressive of these is Barcelona. The city has calculated its very favourable solar energy supply potential and in 2000 introduced a regulatory system requiring households and industrial users to provide at least 60% of their hot water requirement utilising solar systems. The scheme is focused, specific and practical, and based on a precise accounting of domestic energy production and utilisation profiles.

B. Professional practice

The European Charter for Solar Energy in Architecture and City Planning

The Charter, signed by 30 eminent architects, and developed by these under the leadership of German architect Thomas Herzog, was released in 1996, at the Fourth European Conference 'Solar Energy in Architecture and City Planning', chaired by then Minister for Construction, Klaus Töpfer and Dr Hermann Scheer. The Charter was advanced in historical contradistinction to the fossil-age Charter of Athens, referred to above. It is comprehensive in attempting to deal with most physical planning challenges in an energy-conscious manner. The Charter focuses on the role of planners, the building site, the design and construction process, buildings in use – and the city as a sustainable planning challenge.

# <u>C. Local policy for Renewable Energy: the new communitarian value</u> The Eurosolar Guide to State Politicians: a state program for renewable energy

The renewable energy technology and policy network of Eurosolar has in 2001 issued a blueprint 'state program', for the use by regional politicians in the implementation of renewable energy. It has ten focal areas or considerations:

- (i) the role model played by state government;
- (ii) the role of local energy agencies;
- (iii) the strengthening of municipal power companies and the reintroduction of energy supply into community hands;
- (iv) the mobilizing of the local public by information, motivation and education;
- (v) the mobilizing of the local handcraft-sector for a redesigning of buildings and city planning structures;
- (vi) recreating the link between cities and their agricultural environment, based on regional fuels and biomass for energy and raw material markets;

- (vii) the orientation of land use planning and building towards renewable energy;
- (viii) clean energy transport and traffic systems;
- (ix) local investment and finance incentives;
- (x) local awards for the exemplary use of renewable energy.

# Definitions

- <u>City:</u> An urbanised area managed and represented by one or several local governments, culturally and communally understood as a city, with specific administrative and political boundaries.
- <u>City region:</u> The general urbanised, ecological and economical area comprising and surrounding one or several urban nuclei, all or any of which may be defined as a city.
- <u>Urban(ized) area:</u> A built-up space of higher density and production and consumption functions that is distinct from rural or undisturbed natural areas.
- Renewable energy:includes solar, wind, hydro, ocean, geothermal, biomass, and other<br/>sources of energy that derive from sun energy, and are thus renewed<br/>indefinitely as a matter of nature. Forms of useable energy include<br/>electricity, hydrogen, fuels, thermal energy and mechanical force. More<br/>broadly speaking, renewable energy is derived from non-fossil and non-<br/>nuclear sources in ways that are replenisable, sustainable and have no<br/>harmful side effects.<br/>The renewability of an energy source also implies that its harvesting,<br/>conversion and use occur in a sustainable manner, ie avoid negative<br/>impacts on the viability and rights of local communities and natural

# References

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Other relevant references:

World Council for Renewable Energy web site: <u>http://www.wcre.org</u>

Solar City web site: http://www.solarcity.org