Minutes
City Council's Community Sustainability
Code Sustainability Sub-Committee
April 17, 2009

Minutes of the meeting of the City Council's Community Sustainability – Code Sustainability Subcommittee held on Friday, April 17, 2009, 9:00 a.m., in the 3rd Floor Conference Room, Tempe City Hall, 31 E. 5th Street, Tempe, Arizona.

Sub-Committee Members Present:
Councilmember Corey Woods

City Staff Present:
Lisa Collins, Deputy Development Services Manager and Committee Liaison
Mary Helen Giustizia, Solid Waste Svcs Dir
Jan Hort, City Clerk
Lisa Lathrop, Administrative Asst. II/City of Tempe
John Osgood, Dep Public Wrks Mgr
Alex W. Smith, Tech Dev Specialist
Mark Vinson, Principal Architect/City of Tempe
Michael Williams, Dep Dev Svcs Mgr

Guests Present:
Kristina Abrams, Architect
Doug Brown, Architekton
Mona Chandra, RSP Architects
Rajat Gupta, ASU
Janet Holston, Asst. Dean, Applied Research, ASU
John Kane, Architekton
Neela Pandy, ASU
Greg Pitz, Logos Solar

Councilmember Woods called the meeting to order at 9:15 a.m.

Lisa Collins stated that for future agendas, staff asks that all handouts be linked to the agenda for easier access. All current and past agendas are available through the City Clerk's website.

Agenda Item 1 – Public Appearances/Call to the Public
None.

Agenda Item 2 – Mapping and Reducing Carbon Emissions from Buildings; A GIS-Based Approach
CarbonEmissionReductionModel.pdf
Mark Vinson introduced Janet Holston, Assistant Dean for Applied Research, ASU.

Ms. Holston introduced Rajat Gupta, Visiting Research Scholar from Oxford University as well as director of the Oxford Institute and Sustainable Development Architecture Unit. Dr. Gupta will present DECoRuM, the model for which he won the Royal Institute of British Architects Award for Outstanding Research, and which has been funded as a proof of concept to help planners and policymakers count, cost, and reduce their domestic carbon emissions on an urban scale. Dr. Gupta is leading an industry-funded project to develop a tool kit for the UK Code for Sustainable Homes, and he is also working on a project to address the potential of brown-source heat pumps in reducing domestic carbon emissions in a changing climate. He has developed the Climate Change Action Plan for the City of Oxford, which was a direct result of this research and he has also chaired a variety of committees including the Westminster Carbon Counting Group and an adaptation working group run by the International Council for Local Environmental Initiatives. He is renowned internationally.

Dr. Rajat Gupta stated that his background is an architect, but he has worked very closely with planners in local communities. He has done research on carbon reduction and carbon counting from both buildings and cities and has discussed with Mr. Vinson about doing work on City of Tempe buildings using the DECoRuM principles. DECoRuM is widely used by a number of local authorities in UK.

- Carbon emissions by sector in the UK, USA and India.
  - UK – the energy usage inside buildings produces about 45% of the nation's CO_2 emissions. Domestic buildings are responsible for 28%.
  - USA – it is about 48%, which doesn't include the embodied energy which will add about 5% more.
  - India – it is about 30%.
  - Globally, the building sector is responsible for about 33% of total emissions, and it is the largest sector of emissions.
- There are two ways by which carbon emissions happen from energy usage inside buildings.
  - Direct (emissions from fuels combustion) and Off-site (emissions from public electricity use and district heat consumption)
  - Globally, the building sector is responsible for 42% of electricity consumption, more than any other sector.
  - Residential sector consumed 37% of all electricity produced in the US.
  - About 80% of all CO_2 attributed to the commercial sector comes from electricity consumption.
- Most of the focus so far has been on new-build.
  - UK has a target of making every new home zero carbon by 2016. Every non-domestic building will be zero carbon by 2019.
  - USA – Architecture 2030 proposes carbon neutrality in buildings by 2030. The focus is primarily on new buildings.
  - In order to reduce emissions, it is necessary to look at the existing sector.
  - The 1% rate of new-build has dropped in the economic downturn and the industry is moving toward retrofitting.
  - UK is looking at heat and energy saving strategies. The main aim is to make every existing home close to zero carbon standards by 2030.
- Setting of boundaries for carbon counting
  - First, count direct emissions because those are controllable. There is always an issue of embodied energy, the energy required to produce and assemble the building. India is expecting to build about 20M homes in ten years and the UK has 25M homes now. That will cause an explosion of embodied energy. In the developed world, that isn't a big issue because the rate of new-build is less. Important to focus on operational energy first.
- Key principles in energy efficiency and carbon intensity.
  - Reduce the demand for energy (heating, cooling, lighting or ventilation).
  - Provide the reduced demand through low carbon and zero carbon technologies (do not use fossil fuel).
  - Decarbonizing the electricity supply.

  - Feedback on actual energy used in buildings through smart metering.
  - Regular post-occupancy evaluation studies of refurbished projects to provide evidence-based lessons for the building community and users.
- EU Directive of Building Energy Performance (EPBD)
  - Introducing energy performance certificates (EPCs) when buildings are let, sold, built or refurbished.
  - Ratings given real vs. behavior.
  - Rental values are determined by building ratings.
  - Future funding of local cities according to rating per capita emissions.
  - Requiring public buildings to display energy certificates (DECs).
  - Requiring inspections for air conditioning systems.
- Environmental Sustainability (National Indicators). In the UK, every local authority is required to report on the carbon emissions of their public and private stock and their future funding depends on it.
  - NI 185 – Percentage CO_2 reduction from their operations
  - NI 186 – Per capita CO_2
  - NI 187 – Tackling fuel poverty – percentage of people receiving income based benefits living in homes with a low energy efficiency rating
  - NI 188 – Planning to adapt to Climate Change
- Carbon emission reduction - 5-step approach
  - Baselining
  - Target-setting
  - Action planning
  - Implementation
  - Verification
- DECoRuM is based on GIS
  - Estimates energy use and emissions.
  - Aggregates those to an urban scale.
  - Evaluates and estimates baseline emissions.
  - Draws various scenarios for emission reductions.
  - Performs a cost/benefit analysis.
  - Can sell credits on market.
  - Real time mapping tool for domestic CO_2 emissions and reductions.
  - Provides a tool to address the barrier of counting and reducing emissions locally.
- Outputs from DECoRuM
  - Energy use – total annual energy use, annual energy use by end use
  - CO_2 emissions – total and annual
  - Fuel costs – total annual running costs, annual running costs by end use
  - Energy rating – SAP rating
- Framework for baseline predictions – estimates energy consumption and CO_2 emissions of individual dwellings as basic component for calculation and aggregates these to an urban scale.
- Data reduction in DECoRuM
  - Data collected for individual dwellings
  - Data derived from age
  - Data derived from build form
  - Data common for all dwellings
  - Data collected by walk-by surveys
- 30 CO_2 reduction strategies, ranging from insulation, to heating systems, to appliances, to lighting, and technologies.
  - Based on predefined factors, it will select dwellings that can realistically handle that system and in those dwellings selected, improvements can be made.

  - Also, can take a specific dwelling and run all the measures. It will predict the savings and provide the capital cost.
  - Can show people where to save rather than mandating.
- Use of the model
  - If a developer and wants to plan a housing development, the planner specifies that the additional emissions that you will add will need to be offset by improvements to the houses so that the net emissions from the city remain the same.
  - One analysis option is an estimation of solar potential of dwellings. Color coded maps show which dwellings can benefit from a solar hot water system. It selects which dwellings could take what system.
  - Better to do a "whole house" package rather than piecemeal.
  - Different packages were examined: package #1 was energy efficiency, package #2 was energy efficiency plus low carbon, package #3 was energy efficiency plus zero carbon, package #4 was everything and package #5 also had green electricity. Each package could get reductions of above 60%, but the key differences are in cost.
- DECoRuM benefits
  - Individual dwellings are represented as the base level of resolution but results can be displayed up to a street, district and city level.
  - Pollution hotspots can be located and targeted.
  - Assessment requires no access to property.
  - A robust data filtering process provides accurate and reliable results.
  - Cost-benefits analysis enables cost comparison of different measures.
  - Helps to estimate the potential for citywide application of solar energy systems.
  - A useful visual aid when encouraging householders to install energy efficiency measures.
- Applications for local government – provides GIS-based toolkit to enable development of a carbon footprinting capacity to:
  - Assess and map current carbon emissions of housing tock.
  - Benchmark baseline emissions against typical and good-practice standards.
  - Identify hotspots of pollution.
  - Establish targets.
  - Evaluate strategies to achieve those targets.
  - Verify and monitor the reductions achieved.
  - Use the results to develop guidelines.

John Kane asked if he has applied this technology to looking at the heat island effect.

Dr. Gupta responded that they have funding for three years and they have studied the urban heat island on a neighborhood level.

Alex Smith asked whether the model was hard-coded into the system and whether he has run CO_2 emissions per income.

Dr. Gupta responded that it is hard-coded in the system. Sometimes it is higher with higher incomes, but there is actually fuel poverty where people use more than 10% of their income to heat their homes, and those fuel-poor homes are very polluting. This model identifies those fuel-poor homes. The UK aims to eliminate fuel-poverty by 2016.

There was a question whether this has comprehensively been employed in London or is this more of a learning tool that is developing.

Dr. Gupta responded that they have partnered with a company in UK that will provide this to anyone in the UK.

There was a question about what Phoenix is using to achieve their goal in ten or fifteen years.

Dr. Gupta did not know. In the UK it is mandated because funding depends on it.

Ms. Holston responded that ASU has wanted the opportunity to pilot this model. When it was done at the ASU campus, it was extremely difficult because there are four or five different heat sources. She had discussed with Mr. Vinson that Neela Pandy will be working jointly on some projects at her Center with Mark Vinson and Bonnie Richardson, so we have the opportunity and the resources to pilot this on a scale of City buildings.

There was a suggestion that Block Grant stimulus money may be able to be used for opportunities.

Councilmember Woods stated that he would work with staff to determine how that money might work together with this.

DIRECTION: Move forward to Councilmember Shekerjian's committee and subcommittee.

Agenda Item 3 – Future Agenda Items

- Update on Water Code
- Bullet list of code suggestions to take to the Community Sustainability Committee

Agenda Item 4 – Future Meeting Dates

Next meeting will be on June 12th at 9:00 a.m.

Agenda Item 5 - Announcements

Suggestion to view the movie "Fuel", now playing at the Harkins' Camelview Five until next Thursday.

Meeting adjourned at 10:15 a.m.

Prepared by: Connie Krosschell
Reviewed by: Lisa Collins

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Jan Hort, City Clerk