

# GOVERNOR'S ENERGY EFFICIENCY WORK GROUP

## “BIG IDEAS” THAT PUT OREGON FIRST

- 1) EPC FOR ALL BUILDINGS, WITH EMBEDDED REDUCTION TARGETS
- 2) PROMOTE GREEN BUILDING OFFSETS AS COMPLIANCE OPTION
- 3) DASHBOARDS FOR ALL BUILDINGS

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### I. Sector overview

An expansive view of the building sector is needed to completely identify and exploit the full range of Green House Gas-reduction opportunities. Such a view needs to consider future building construction (including life-cycle aspects of buildings materials, design, and demolition), use (including on-site power generation and its interface with the electric grid), and location (in terms of urban densities and access to employment and services). There is no silver bullet technology in the building sector because there are so many different energy end uses and GHG relevant features. Hence, a vision for the region's building sector must be seen as a broad effort across a range of technologies and purposes.

Energy used in residential, commercial, and industrial buildings produces approximately 43 percent of U.S. carbon dioxide (CO<sub>2</sub>) emissions. Given the magnitude of this contribution, it is essential that efforts to control global warming include an explicit focus on the building sector. CO<sub>2</sub> emissions from buildings will increase a staggering 86% from today's levels if trends continue. However, with aggressive use of *existing* energy efficiency, building emissions could be reduced by about 40%. This is not without its challenges. Buildings are vastly different from the transport and industry sectors. Buildings are a large number of diffuse emission sources, small in scale, with a long life span and a diverse stakeholder structure.

According to the Joint Center for Housing Studies of Harvard University there will be an additional 12 million new homeowners by 2015. The growth of the immigration stream and the echo boomer (baby boomers' kids) segment will spur housing demand, and subsequently energy consumption.

To provide perspective the following details the average carbon dioxide emissions per year.

- ▶ 4.5 tons per average car
- ▶ 6.2 tons electricity use per US household
- ▶ 21 tons per average US resident

► Residential sector accounts for 21% (313MMTC) of CO2 emissions

Primary Energy Consumption in Residential and Commercial Buildings, 2002 – Pew Center on Global Climate Change Brief Nov 2006

GHG emissions from the building sector in the United States have been increasing at almost 2 percent per year since 1990, and CO2 emissions from residential and commercial buildings are expected to continue to increase at a rate of 1.4 percent annually through 2025. These emissions come principally from the generation and transmission of electricity used in buildings, which account for 76 percent of the sector's total emissions.

Due to the increase in household appliances and equipment that run on electricity, emissions from electricity are expected to grow more rapidly than emissions from fuels used on-site in buildings. In addition to the growth in demand for energy services within individual buildings, the U.S. building stock is also expected to double in the next 30 years.

Central air conditioning is now a standard feature of commercial and institutional buildings as well as 85 percent of homes in the United States, up from 34 percent in 1970. In order to compensate for this increase, more effort must be focused on increasing the efficiency of the buildings as well as providing affordable, low-carbon on-site electricity, and using waste thermal energy. Based on energy usage, opportunities to reduce GHG emissions appear to be most significant for space heating, air conditioning, lighting, and water heating.

Using the NAHB Forecast for Oregon Single Family Housing Starts, an average of 12,000 new homes will be completed in 2008, and around 13,000 in 2008. It is not only new construction that offers mitigation opportunities. A significant reduction can be made in the existing home market. The report by Vista Market Intelligence states that 60% of the overall Metro \$2.6 Billion market planned to undertake a remodeling project.. This is not expected to vary significantly in 2008. This translates into approximately 452,000 households, each spending an average of \$5,645 per remodel. 45,872 of these remodeling projects involved upgrades to windows and doors, 12,032 addressed heating and air-conditioning, 9776 involved electrical upgrades, and 13,536 covered siding and insulation. These statistics offer tremendous mitigation opportunity, enhanced by the prospect of providing an ROI to the project through the offset or voluntary emission reduction (VER) market.

Numerous individuals, corporations, communities, cities, and states are driving the implementation of “green” and carbon-reducing building practices in new residential and commercial development. Affordability, aesthetics, and usefulness have traditionally been major drivers of building construction, occupancy, and renovation. In addition to climatic conditions, the drivers for energy efficiency and low-GHG energy resources depend heavily on local and regional energy supply costs and constraints. Other drivers for low-GHG buildings are clean air, occupant health and productivity, the costs of urban sprawl, and stress on the electric grid that can be relieved by managing electricity demand.

In January 2006, the group Architecture 2030 publicly issued the “2030 Challenge” ([www.architecture2030.org](http://www.architecture2030.org)). Since then, the American Institute of Architects has adopted the “Challenge” calling for architects and others in the buildings industry to reduce GHG emissions in new and renovated buildings 50 percent by 2010 and to make all new buildings “carbon neutral” by 2030. In June 2006, the U.S. Conference of Mayors unanimously passed Resolution #50 urging cities across the country to adopt the “2030 Challenge” for all buildings, and setting benchmarks and timelines to achieve the goals. Portland's Mayor, Tom Potter is a signatory and stated that he was proud to share, with other Mayors, the “vision

for turning the crisis of global warming into an opportunity to transform our economy and leave a healthier planet for our children and grandchildren.”

## II. Opportunities and challenges

### A. Energy Performance Certificate (EPC) for all Buildings

According to the Pew Center’s “Agenda for Climate Action,” emissions can be addressed through labeling and expanded, tightened standards for products and buildings, focusing on those that would result in significant GHG reductions through reduced energy use. By requiring a minimal level of efficiency and providing consumers with information on homes that do better than the minimum, standards and labeling can overcome the obstacles described earlier—insufficient and imperfect information; market distortions; and split incentives—and advance building efficiency.

In this regard, much work has been done in the area of bringing a labeling performance metric to the residential market in the United Kingdom. The new label released for implementation in August of 2007 is called an Energy Performance Certificate (EPC). Energy Performance Certificates, which rate the energy efficiency and carbon (CO<sub>2</sub>) impact of buildings (including residential), are part of the Home Information Packs (HIP) the U.K. Government is promoting.

Energy Performance Certificates describe how energy efficient a home is on a scale of A-G. The most efficient homes - which should have the lowest fuel bills - are in band A. The Certificate also tells you, on a scale of A-G, about the impact the home has on the environment. Better-rated homes should have less impact through carbon dioxide (CO<sub>2</sub>) emissions. The EPC also serves to advise home-buyers on ways of saving energy and cutting carbon emissions from their new homes. The performance level of the EPC should be designed to ratchet up towards a goal (WCI or 2030). This will effectively link new and existing housing stock to defined carbon mitigation goals.

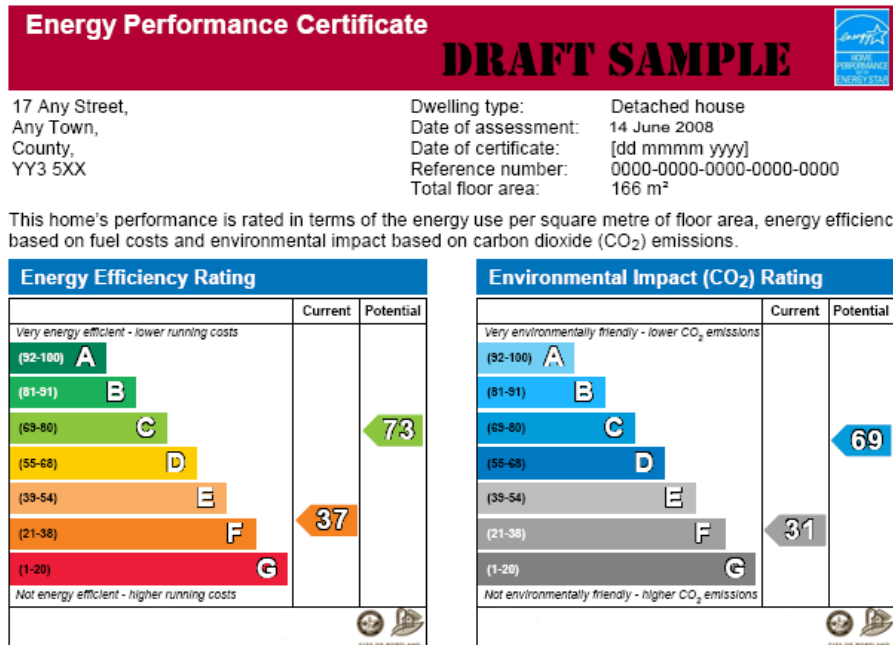
An Earth Advantage, Inc. pilot of such a concept is underway here in the Portland Metro region with the support of the Energy Trust of Oregon, Northwest Energy Efficiency Alliance, The City of Portland (OSD), US DOE and other stakeholders. Providing consumers with such performance information will help drive the housing market (new and existing) in a sustainable direction, link existing housing stock with carbon reduction efforts, and help cut energy waste. The universally understood ‘MPG’ for automobiles needs to be replicated for a homes’ ‘EPC’ performance.

New markets in green financial products are likely to open up. The creation of Energy Performance Certificates rating the energy efficiency/carbon footprint of homes has led to the establishment of the Green Incentive program (1/4% off prime interest rate for the life of the mortgage) by Countrywide supported by Earth Advantage, Inc. Such metrics could spur homeowner insurance offerings and further green mortgage products that factor in energy efficiency into payments, or link the finance market to climate mitigation.

By providing such information on the energy efficiency (EE) and CO<sub>2</sub> rating of homes, the EPC program can help consumers make more informed choices about the homes they buy and directly influence their impact on climate change. Assuming that a massive infusion of funds was procured by the Governor (Berkeley bond model, other), the investment into

upgrading existing housing stock (\$25,000 per home) would be recognized and translated by the EPC. The EPC would be listed next to each home listing on the RMLS online database advising potential buyers of the performance of the home. Prospective tenants would know ahead of time what the impact of their utility bills are slated to be based on the availability of the EPC.

In the 2008 pilot underway the homeowner is incentivized to offer an EPC at time of sale or at any time during home ownership and call upon Earth Advantage, Inc. to conduct an assessment.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills will be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO<sub>2</sub>) emissions. The higher the rating the less impact it has on the environment.

Sample EPC mocked from the United Kingdom's version using RDSAP. See complete certificate attached.

The EPC offers an invaluable tool in the creation of offsets (see below). The EPC offers the baseline from which mitigation enhancements are measured, thus creating the delta that is offered as VERs.

If the provision for offsets in the WCI framework is created, it will not be just the green building programs that position themselves to create the VER market. It is feasible to contemplate that the region's home building associations (HBAs) will actively promote mitigation measures to their constituents, whether green or not.

**B. Voluntary Emission Reductions (offsets) as a Compliance Mechanism**

In line with the 2008 report by the Governor's Climate Change Integration Group, there is an opportunity to carefully consider offsets in the WCI structure so as to "build on Oregon's leadership in green building by ensuring that a whole buildings perspective is accommodated by state, regional, and national climate policies."

The awareness of how Greenhouse Gas (GHG) emissions affect global warming is increasingly being elevated. There is much discussion stemming from the European Union around allowance trading, the flexible mechanisms resulting from the Kyoto Protocol, proposed compliance models on the East and West coasts of the United States, and how the \$30 Billion voluntary carbon trading market is the ‘next big thing.’ We propose that we use the lessons learned in the carbon markets to establish a valuation and trading mechanism for offsets that are fungible, not only between structured markets in the USA, but across the globe. Through the Governor’s backing we can establish a framework that produces high-grade VERs that become highly prized and sought after. Such carbon instruments would find favor in the voluntary market, and indeed, in a portion of the Western Climate Initiative compliance market.

We are pressed to contemplate such a complex, undertaking if we are truly serious about mitigating the effects of global warming on all available fronts.

A recent Carbon Finance conference in New York echoed what is said so often; the voluntary carbon markets are undermined by the lack of:

- A standardized protocol that governs:
  - \* Baselines;
  - \* Definition of what constitutes ‘additionality;’
  - \* Offset measurement and verification procedures (M&VP);
  - \* A registry to track and retire VERs (Voluntary Emission Reductions);
  - \* The deployment of credible verification entities;

The innovative creation by the Kyoto Board of the three flexible mechanisms—Clean Development Mechanism (CDM), Joint Implementation (JI), and Emissions Trading (ET)—offered the signatory Kyoto Protocol Parties the opportunity to reduce emissions or remove carbon emissions in other countries cost effectively. In like manner, the Board was forced to consider issues around environmental integrity, additionality of project activity, and proper tracking and accounting.

The ability of these flexible mechanisms to participate in the European Union Emissions Trading Scheme (EU ETS) is due to the creation of ‘Linking Directives.’ Linking Directives allow CDM’s CERs (Certified Emission Reductions), JI’s ERUs (Emission Reduction Units) and others to link to the Emission Trading Scheme (ETS).

Like many initiatives that are carefully considered and designed, the integration of regulatory and innovative, market driven actions invariably result in success. The regulation provides context within which market action can operate. In many instances, regulatory markets can help create a ‘captive’ market for the private sector to take advantage of. More importantly, the regulatory design sends strong market signals to the private sector on the price of carbon. The key to establishing high quality VERs is the selection of a suitable protocol.

The opportunity for Oregon/WCI to structure the cap and trade framework to allow offset importation (up to a specified limit of 15% - 30%) as a compliance option will stimulate green building like no other single factor. Builders who may not strictly be ‘green’ would consider mitigation features due to the existence of such GHG trading market. It will

offer a lower cost option to the capped entities while they create their own mitigation technologies to address the cap.

Further, the creation of high quality VERs will have national and international suitors vying to purchase them, causing a net revenue gain for our region. The investment community that would have little interest in a purely regulated market will be focused on innovation in offset projects to capitalize on the VER market.

The opportunity to integrate the voluntary market into the compliance structure offers a balance; it offers low cost compliance options while system wide mitigation actions are developed and implemented. The WCI partners gain, the builder gains, the consumer gains, the economy gains, and the environment gains.

If the Lieberman-Warner bill, which prohibits international trading of credits (does not allow international allowances), is executed, the federal cap and trade framework may adopt this same view. This would effectively eliminate the role for domestic offsets too. According to Milo Sjardin, who heads the North American division of New Carbon Finance: "Excluding or limiting the inclusion of international project credits in any U.S. carbon cap-and-trade system will have two important consequences. For the U.S. market, it will rule out a significant source of inexpensive abatement, pushing the carbon price to unnecessary high levels. It will also remove most U.S. demand for international credits, hampering the growth of projects and technology transfer to developing countries." Such favor will hamper the introduction of offsets into the WCI design. If however, the Climate Stewardship and Innovation Act (S. 280 Lieberman-McCain) succeeds, its language addressing the alternative means of compliance "beginning with calendar year 2012, a covered entity may satisfy up to 30 percent of its total allowance submission requirement" is a clear signal that offsets have their role.

The challenge will be to address the issue of double counting. If the mitigation action on the demand side (scope II reduction), that creates the VER, also causes the emission profile of the capped entity (utility) to decrease, then it can be argued that the VER is not a discrete unit that can be sold either into the WCI framework or on the voluntary market. Clearly, if the capped entities claim these offsets as their own, there will be little incentive for the free market to create end-use efficiency projects. The opportunity to create another true value proposition for green building will be lost in this case. There may be the possibility that the capped entities create partnerships with the free market where incentives are offered for scope II reductions while the VER title remains with the capped entity. It is conceivable that in this scenario, these reductions could be viewed as early action credits until the caps are invoked. Another option would be the use of 'set-asides' where some allowances could be distributed to green building project owners on the basis of imputed emission reductions. The GHG Protocol for Project Accounting (Project Protocol) details how to calculate such reductions. While rigor is important for offsets to avoid over-counting, set asides, would be sufficient to have a general sense of how many MWh are saved with a distribution of sufficient allowances (or auction revenues) to achieve that goal. In this case, such rough calculations would have no impact on actual emission reductions, which are set by the cap. Green buildings will, however, make a significant contribution to reducing compliance costs and that value should be recognized and explicitly supported by the WCI structure.

### C. Home 'Dashboards' & Smart Grid Design

Using the analogy of the Prius that offers dynamic feedback on the performance of the vehicle while underway, all homes and buildings should include a performance dashboard. This will

offer current information on energy consumption and associated carbon emissions as compared to a baseline and a goal. It should also connect with the smart grid design so that energy returned to the grid is also monitored. The 2007 “Moving Existing Homes toward Carbon Neutrality” report by ACI provided a list of “Recommended strategies to accelerate technical systems and product innovation.” Government funding of dashboard development was number eight on the list.

The dashboard provides building occupant’s feedback on energy and benchmarking and:

- 1) They must be simple;
- 3) Levels of complexity can vary as required by occupant;
- 4) Display real time results;
- 5) Mass production and good marketing are needed to get costs down;
- 6) They should include all metered energy;
- 7) Occupant education is necessary;
- 8) Monitor ventilation, CO, furnace filter condition, humidity, water use, and the desirability of opening windows for ventilation;
- 9) Could be wireless;
- 10) Break out heating, cooling, water heat, and base loads separately.

Such devices that provide feedback to occupants can also inform professionals and programs.