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Real value in a changing world

Green buildings, climate change, energy security and the current economic crisis

Sizing the Issue/Opportunity

In a recent research report published by DB Advisors, a subsidiary of Deutsche Bank, the confluence of three key drivers in the energy and environmental sustainability discussion were examined:

1. The environmental impact of climate change
2. Energy security
3. The financial crisis

DB Advisors asserts that these three drivers are in-fact interlinked in that the fossil fuels which impact the environment through carbon emissions are the same fuels that are less secure in the context of long term supply. The financial link enters the picture as energy efficiency stimulus packages and investment in renewable or clean energy infrastructure is considered. The intertwined nature of these drivers suggests that addressing energy security and the environmental impacts of climate change are not mutually exclusive goals.

Green infrastructure economic stimulus can address all three drivers through projects such as:

1. Energy efficient buildings – these projects tend to have an attractive payback and are labor intensive and thus create jobs. They can also be implemented immediately which buys time for more lengthy solutions such as the below, to be fully deployed.
2. Electric power grid – a modern power grid is essential to enable renewable power at scale
3. Renewable power – a key to a long term shift away from fossil fuels

One of the biggest opportunities for a more energy efficient world is to transform the building sector. Buildings account for over 40% of the world's energy use and the resulting carbon emissions are substantially more than those in the transportation sector. New buildings that will use more energy than necessary are being built every day and millions of today's inefficient buildings will remain standing in 2050. We must start now to aggressively reduce energy use in new and existing buildings.

Energy efficient buildings represent one of the primary opportunities to reduce electrical consumption and resulting carbon emissions and to create new jobs. The building sector is responsible annually for:

- 50% of total U.S. energy consumption
- 40% of total U.S. greenhouse gas emissions
- 75% of total U.S. electrical consumption

The opportunity to reduce existing building energy consumption through energy efficiency measures in the U.S. is huge due to large amounts of aging infrastructure. 72% of existing buildings were built before 1990. Over 90% of the buildings that will exist in the year 2020 are already built today. Existing buildings outnumber new buildings by a ratio of over 100 to 1. So, while much of the public focus has been on new buildings that are built to newer, high-performance standards, the real opportunity lies in the retrofitting of existing buildings. These retrofit opportunities are appealing in that they:

- Reduce energy consumption and lower ongoing building operating expenses
- Have an attractive economic return on investment
- Reduce the associated greenhouse gas emissions
- Are labor intensive and thus create jobs

Much of the focus for building improvements at the federal level has been on improving the performance of the public building stock which is an important but insufficient step. The public building sector accounts for only 7% of the U.S. building stock. Therefore, the primary opportunity to impact energy consumption in the building industry is through a focus on existing private commercial buildings.

The business case for investments in building retrofits is very strong. Studies by several agencies including the EPA consistently show that energy consumption reductions in existing buildings ranging from 25% to 40% are achievable with attractive economic payback periods of 3-5 years. Studies show that green buildings generate an average increase of 7.5% in building value, a 6.6% improvement in return on investment and lower vacancy rates than other existing buildings. A recent study of the GSA's (General Services Administration) green federal buildings shows energy use down 26% and occupant satisfaction up 27% compared to commercial office benchmark data. The top third of these buildings had an impressive 45% drop in energy consumption accompanied by a 53% reduction in maintenance costs and 39% less water use. Studies also show that high-performance buildings or green buildings yield other benefits for owners and occupants including:

- Attractiveness to new tenants
- Reduced turnover and absenteeism
- Improved ability to attract and retain employees
- Ability to meet shareholder and customer expectations regarding environmental programs
- Ability to meet emerging environmental reporting requirements

The potential market for green building retrofits has the potential to grow to over $15 billion by 2014 according to a new report by McGraw-Hill Construction, up from an estimate of $3 billion in 2009. Other estimates by Johnson Controls place the market at about $18 billion per year. A new study by Pike Research, "Energy Efficiency Retrofits for Commercial and Public Buildings", estimates the total potential market for major green renovations in the commercial sector to be $400 billion.

There are some very notable examples of building owners who are capitalizing on these opportunities with perhaps the most notable being the Empire State Building. This pre-World War II era building is becoming the new icon for green buildings and is demonstrating that a well-developed integrated design approach can turn a 1930's building into a

modern green building. The investments in green retrofits at the Empire State Building will generate $4.4 million in annual energy savings, a 38% reduction with a payback of just over three years. A similar project for Adobe Systems in California generated an average payback of 9.5 months generating $1.2 million in annual savings and a return on investment of 121%.

The highly compelling nature of energy efficiency raises the question of why the economy has not already captured this potential. Multiple persistent barriers continue to exist. Energy efficiency measures typically require a substantial upfront investment in exchange for savings that accrue over many years. Additionally, the overall efficiency potential is highly fragmented and spread over millions of locations and billions of devices used in residential, commercial and industrial settings. This dispersion ensures that efficiency is the highest priority for virtually no one. There continues to be several structural obstacles that significantly inhibit the rate of even financially attractive investments including:

- Access to capital – many owners do not currently have the ability to finance the upfront costs of the energy retrofits
- A lack of transparency - about energy use and expense resulting in a limited focus on energy costs by all of those in the building value chain
- Building codes and standards - that are inconsistent and do not require the implementation of the latest technologies
- Complexity and fragmentation - in the building value chain which inhibits a holistic approach to building design and use
- Split incentives - between building owners and users which mean that the returns on energy efficiency investments do not go to those making the investment
- Insufficient awareness and understanding - of energy efficiency among building professionals

Many of these obstacles can be removed or diminished through Federal Government action as describeb in the final section of this paper.

Other Benefits

Other benefits from a focus on green building retrofits include increased energy security and job creation. U.S. energy security is enhanced in that we can essentially "buy time" for other measures such as renewable energy, and electric vehicles (that will truly reduce dependence on foreign oil) to gain traction while minimizing the ongoing impact of buildings on total electrical consumption and greenhouse gas emissions. Additionally, green building retrofits can have a substantial impact on jobs. The GSA has identified over 50 different trades and professions that will participate in the accomplishment of their green building retrofit program. The industry overall can lead to the creation of high-quality jobs for electricians, plumbers, heating and air conditioning installers, roofers, insulation workers, construction managers, building inspectors, carpenters along with professional trades such as design engineers and architects. Studies by the Economic Policy Institute, National Renewable Energy Laboratory, Apollo Alliance and the Political Economy Research Institute (PERI) have produced estimates of job creation ranging from 180,000 to 360,000 for building retrofits alone not including the potential for over 2 million more jobs resulting from investments in new clean energy technology.

How the Federal Government Can Help

The building industry requires coordinated, intensive action to transform the sector through a mix of measures including:

- Increased energy awareness
- Improved building energy codes
- Standard labeling and reporting mechanisms
- Financing alternatives
- Expanded use of new technologies

Combined, these measures will provide the changes needed to reduce energy consumption in buildings; however, these changes will not occur through market forces alone. Specifically, Federal Government action is required in at least three key areas as described below.

1. **Strengthen codes** – policy makers should incorporate strict energy efficiency standards into new building codes and consider building retrofit thresholds that will trigger higher code standard compliance in existing buildings. Government authorities should set and enforce high building energy standards and make it clear that these standards will increase over time. These building codes and equipment efficiency requirements should define maximum acceptable consumption for each building subsector and region and should apply to the actual performance of the building rather than the design intent.

2. **Create Standard Measurement, Reporting and Labeling Programs** – enforcement of code and standards based upon actual building consumption will require a standard way to measure and report actual consumption. Furthermore, information on energy performance must be made public if it is to influence the market. Standard reporting and labeling provides transparency, stimulates market adoption and provides a basis for regulation. Studies show that the energy efficiency of refrigerators in the U.S. increased by over 25% in a very short period of time after the EPA began to require standard performance labels. Unless building owners and users know about the energy consumption of buildings and the related services that they use, they cannot make energy-related choices and cannot measure progress.

3. **Provide Financing Assistance/Options** – the first cost of energy retrofit projects is a significant obstacle for many owners with limited access to capital. The government can help through subsidies for low-cost loans, tax incentives or other financing mechanisms.

   One emerging financing alternative is through tax-lien financing also known as PACE (Property Assessed Clean Energy) Bonds. The PACE bond market, in combination with federal loan guarantees has the potential to dramatically accelerate the energy retrofit market for commercial buildings. A PACE bond or lien is a debt instrument where the proceeds are lent to commercial and residential property owners to finance energy retrofits and who then repay their loans over 15-20 years via annual assessments on their property tax bill.

   The key innovation of PACE finance involves materially lengthening the repayment period for energy retrofits and structuring the loan repayments as annual property tax surcharges. These innovations result in large benefits to property owners (positive cash flow in the first year on energy retrofits), municipalities (no fiscal burden combined with large job creation), existing mortgage holders (borrower cash flow improves and the property value increases) and to PACE bond holders (virtually no-risk on investment as the PACE lien is senior to mortgage debt). This financing also removes the "split-incentive" barrier in buildings with net lease agreements since property taxes qualify as a pass through expense to tenants. Thus, tenants who will reap the benefits of lower utility costs are also paying their share of the cost of the upgrades. Federal standards combined with federal backing of these loan programs could dramatically stimulate the retrofit market.

Urgent action is needed because of the timescales involved in the building sector. Buildings, unlike cars, last for decades. While our nations car fleet can be renewed in a dozen or so years or even accelerated through programs like "cash for clunkers", buildings being constructed now will remain well beyond mid-century. Energy efficiency offers a vast, low-cost energy resource for the U.S. economy that can help to meet future energy needs while the nation concurrently develops new no- and low-carbon energy sources. Research by McKinsey & Company indicates that the United States could reduce annual energy consumption by 23% by the year 2020 through the deployment of energy efficiency measures in the building sector. Clearly the building sector and the real estate industry can play a significant role in reducing overall energy consumption and in achieving U.S. energy independence.

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