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Without environmental benchmarking we will never engage the financial markets to green our infrastructure

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INTRODUCTION

→ There is much talk these days of a low-carbon economy, creating green jobs, and a new market in energy efficiency retrofit funding. For all the good intentions, many programs are having trouble getting off the ground. There is a lack of infrastructure but, most importantly, an absence of underlying data, indexes, and benchmarks that are essential for the development of any modern economy or market.

The U.S. Government's recent Recovery Through Retrofit Report sets out a roadmap for developing a home energy efficiency market that will create jobs and save homeowners money while reducing carbon emissions. The U.K. has a similar program called the Green Deal and many other countries are following suit. Critics in the UK are questioning the assumptions in the Green Deal's projections. Similarly, twenty-two U.S. states have passed legislation that will enable them to introduce Property Assessed Clean Energy (PACE) schemes for household energy efficiency retrofitting, but are having difficulty persuading federal lending agencies to support them.

A major issue with these and other national programs is that they are based on enormous amounts of estimation and guesswork. There is very little underlying data to support their calculations and there are none of the indexes and benchmarks that you would expect to find in any mature market.

THE IMPORTANCE OF INDEXES

→ When a government sets out to develop an economic policy, among the first things it usually looks at are indexes. If a government is setting interest rates it will look at inflation, the rate of increase in the Consumer Price Index. If it is taking measures that will affect jobs, the government looks at unemployment indexes. If it is adjusting state benefits or pension fund rates, it will look at the retail or Consumer Price Index.

An index is a convenient way of summarizing and understanding data. It gives a measure of change over time, whether it is the value of the money in our pockets, the rate of employment, or housing prices. Indexes allows us to compare a value today with previous values and give us a sense of the speed and magnitude of change. It is this clarity and simplicity that make indexes so useful and an essential part of how we make decisions about the complex world in which we live.

There are now indexes for almost any value you can think of, from commodity prices, to air quality, to national happiness. These days an investor wouldn't dream of buying a stock before looking at the Dow Jones or another similar index. The bond markets,

foreign exchange, mutual funds, options, and other markets all have their own indexes. Many investors now simply invest in an index as the least risky way of achieving a return.

With buildings accounting for around 40 percent of carbon emissions in developed countries and up to 80 percent in some cities, such as New York, governments around the world are looking for ways to substantially improve the energy efficiency of buildings. Many are proposing programs of subsidies, loans, or investments to retrofit homes and commercial buildings. There are a huge number of buildings needing retrofits. The U.S alone has 130 million single-family homes, in addition to apartments, commercial buildings, and government offices. The cost of retrofitting all of these buildings is potentially enormous - around $2 trillion just to retrofit all U.S. single-family homes.

Governments wouldn't think of embarking on any other major economic policy without having good quality benchmark data, just as investors wouldn't think of putting their money in a stock or bond without consulting an index. Yet here we are, discussing some of the biggest civil projects ever conceived with only the most crude and sparse data. We need to fix this by embarking on a major program of benchmark data gathering.

UNDERLYING DATA

→ Indexes are calculated from underlying data. The Consumer Price Index (CPI) is made up of a selected basket of household goods including things like milk, medicines, clothes, furniture, fuel, and cinema tickets. The data is then fed into a formula, which applies weightings (for instance, fuel is weighted more heavily than cinema tickets). It then calculates the rate of change compared with a baseline, usually the most recent past measurement.

Indexes are totally dependent on this underlying data. The quality of the index or benchmark will only be as good as the quality of the underlying data - its accuracy, completeness, comprehensiveness, and timeliness. There are well established processes for gathering and ensuring the quality of the data used in the CPI, employment indexes, and stock market indexes.

When it comes to the energy efficiency of our buildings, however, we have barely begun to gather the underlying information that will be necessary to create indexes and benchmarks for this new market.

CREATING MARKET CONFIDENCE

→ Under the U.S. PACE energy efficiency retrofitting model, local governments lend homeowners the money to insulate their homes, add solar panels, or realize other energy efficiency measures. Homeowners repay the money over 10 to 15 years through an addition to their property taxes, which is offset by their reduced energy bills. Governments issue municipal bonds to fund the PACE schemes.

PACE has foundered on the issue of whether the debt incurred by homeowners signing up to such schemes would be junior or senior to their mortgage debt. PACE advocates argue that in order to attract funds to the schemes, the debt should be treated like other tax assessments and be paid off first in the event of a default. Yet the government-sponsored lending agencies Fannie Mae and Freddie Mac and have so far refused to back the PACE schemes, citing concerns over the status of the retrofitting debt. One key problem is that neither side has much data to refer to.

It is useful to compare retrofit funding with the development of the stock market. One of the key events was the introduction of the first general index for U.S. stocks in 1896 by Charles Dow. Prior to this, investors preferred bonds that had predictable income, fixed maturity dates, and that were backed by hard assets, such as factories and machinery. By contrast, stocks appeared more ephemeral and although fortunes could be made by picking the right stocks in the economic boom of the time, it was hard to discern useful information hidden among the noise of daily fluctuations in market value. The Dow Jones Industrial Average ushered in much needed transparency by providing a statistical measure of the overall performance of the market and a means of identifying underlying trends. Since then, indexes have become a feature of the evolution of almost every investment market, with the S&P500, FTSE100, Nikkei 225, and other indexes now part of the everyday language of investing.

Like the stock market, the bond market needs data to function. As the markets grew in size and sophistication throughout the twentieth century, bond dealers needed to keep up with and analyze an increasing number of specialized data sources. It was this need that Michael Bloomberg tapped into in the early 1980s when he created the Bloomberg terminal that packaged bond data and analytics and delivered them to a screen on dealers' desktops. The Bloomberg became an essential tool for every bond dealer; easy access to relevant data sources contributed to the massive expansion of the global bond markets and their continued growth ever since.

Indexes and good quality underlying data sources are now part of every financial market and there are many vendors that specialise in providing these sorts of services, including Bloomberg, Thomson Reuters, MSCI, and Factset, among others.

ENERGY EFFICIENCY BENCHMARKS

→ Besides bringing transparency to markets, indexes provide benchmarks against which the performance of individual stocks or investment management strategies can be measured. Benchmarks enable investors to easily monitor the underlying trends of a market and the performance of their particular investments or investment managers. Most importantly, benchmarks give investors the confidence to put their funds into a market.

As governments look to tackle the carbon emissions of their buildings, energy efficiency retrofitting has the potential to become a multi-trillion dollar global market. With PACE, the Green Deal, and other similar schemes providing the mechanisms, investors should be queueing up to finance the projects. They aren't. A key reason for this is that the market currently lacks the transparency and credibility to really take off – two things that benchmark data could help provide.

The first benchmark we need is a measure of current energy usage. Given the size of the carbon footprint of our buildings, it is extraordinary that we have barely begun this process. Measuring our current energy usage is quite possible, actually; we have near universal and auditable data in the form of utility bills. Granted, the bills don't give the full picture of energy use; for example, they don't include the embedded energy of construction, but they give enough information to be useful. By using utility bills, we can relatively quickly and cheaply gather 80 percent of the information we need on 100 percent of buildings, as opposed to the much more expensive and time consuming process of trying to gather 100 percent of the information on just some buildings.

WHAT WILL BENCHMARKS TELL US?

→ Once we measure, we can compare. If we were to benchmark all the buildings across a state, we could start to compare the energy efficiency of various cities, towns, districts, and regions. We could start by asking questions why buildings in one city or district have much higher utility bills compared with others. There might be good reasons for this,

for example, more extreme weather or an exposed location. On the other hand, it could be the result of inadequate building regulations or simply a lack of awareness among occupants. We could also compare the energy consumption of similar buildings in similar locations. If we discover large discrepancies, we can ask why. It could be down to the behaviour of the users of the building – leaving lights or other equipment on unnecessarily, the excessive use of heating or cooling, and so on. We might find there is a need to educate and change the behaviour of these occupants if we want to meet carbon reduction goals and reduce energy bills to pay back retrofitting debt. There are many real-life examples of buildings that are retrofitted to LEED energy efficiency standards but perform worse than a conventional building of the same size because occupants carry on with energy-wasting habits.

BENCHMARKS IN THE BUSINESS WORLD

→ In the business world, benchmarking is a standard tool for improving processes, managing performance, and saving money. Companies routinely compare themselves with their peers and strive to emulate best practices. Many industries have an entire infrastructure to support such benchmarking.

Just as benchmarking helps businesses measure and improve their performance and encourages shareholders to invest, so energy efficiency benchmarking could bring confidence to the retrofit funding market. The benchmarking of building energy consumption will also enable us to compare consumption before and after retrofitting. The PACE and Green Deal proposals assume that retrofitting will reduce homeowners' energy bills enough to comfortably pay back any debts incurred. Periodic benchmarking can provide evidence of the savings, demonstrating that the assumptions were correct, and that payback is on track.

One of the assumptions in any energy efficiency payback calculation is the "rebound effect" - homeowners increasing their energy use because they are making savings through retrofitting. Schemes often use a modest estimation of the rebound effect, such as 15 percent, but some critics suggest it can be as high as 80 percent. Again, this is an area where hard data will help establish the credibility of programs, by indicating whether they are accomplishing their intended goals.

The benchmarking of building energy efficiency will give potential retrofitting investors the information they currently lack. It will help them evaluate the debt they are thinking of buying. It will help them weigh the risks against the potential rewards. The more investors understand a market, the more comfortable they are about providing funds.

As already mentioned, the data to perform benchmarking exercises on homes and other buildings already exists in the form of utility bills (it is worth noting that the same process can be applied to water as well). There is software available that can gather the data and make the necessary calculations. From here, a whole range of benchmarks could be formulated, for buildings of different size, construction, usage, and location. To begin, involvement in benchmarking could be voluntary, with homeowners choosing to provide their utility bills when they sign up for PACE or other schemes.

RECOGNIZING THE NEED FOR DATA

→ Governments and other organizations developing retrofitting programs are beginning to recognize the need for benchmark data. The U.S. Recovery Through Retrofitting Report makes clear the importance of data to the whole national energy efficiency campaign. It begins with providing information to homeowners: "Consumers do not have access to straightforward and reliable information on home energy retrofits that they need to make informed decisions," says the report. Furthermore, one of the barriers that impedes homeowners from making investments in energy efficiency is a "lack of information on the part of home buyers that leads them to undervalue efficiency investments."

The report recommends the development of a national energy performance label for US homes. Such a label will require the collection of benchmark data from across the country. The data that goes towards creating the energy performance label will also be of value to retrofitting program investors, the report adds: "Before we can develop an energy performance label for existing homes, we must establish a standardized home energy performance measure applicable to every home in America. This measure will make it much easier for consumers to understand how much they can save by retrofitting their home. It will also give lenders the information they need to work with homeowners who are looking to invest in home energy improvements."

A PILOT PROGRAM SHOWS THE WAY

→ On November 9, 2010, the U.S. Department of Housing and Urban Development (HUD), which is responsible for pursuing the recommendations of the Recovery Through Retrofitting Report, announced a new pilot program that will offer creditworthy borrowers low-cost loans to make energy-saving improvements to their homes. The pilot, administered by the Federal Housing Administration (FHA) and called FHA PowerSaver, aims to explore innovative ways of leveraging government funds by inviting the private sector to lend homeowners the money to make retrofits, with the government insuring the loans. It is also a primary aim of the pilot to collect the kind of data that will be required if investors are to be attracted to the scheme and for the pilot to be eventually rolled out across the country. HUD says that one of the principal purposes of the pilot program, "is to generate data on key questions that can help make the case for additional mainstream mortgage products to support home energy retrofits, including first mortgage options."

CONCLUSION

→ Zerofootprint recently launched a program of voluntary benchmarking for buildings in North America and elsewhere based on utility bills. In a sample of 600 Toronto schools, we have discovered schools with an energy footprint per square metre 30 times worse than others in the same district. This suggests there is enormous potential for energy efficiency gains through retrofitting and behaviour change. Benchmark data is the key to identifying and unlocking this potential.

Moreover, history has shown that markets tend to grow when investors have enough information on the underlying assets to give them the confidence to buy. If we are to develop a market for energy efficiency bonds and other investments, the more it starts to resemble other financial markets – with quality data sources and appropriate indexes and benchmarks – the more investors are likely to support it. We are going to need enormous financial resources in order to retrofit our homes and offices. Benchmarking the energy efficiency of buildings is a necessary step towards creating the market credibility and confidence that is a prerequisite to large-scale investment.

If we are serious about reducing the carbon emissions of our buildings and gaining all of the associated benefits, such as reduced energy costs and green jobs, then we need to embark on a major programme of data collection with the utmost urgency.

ABOUT US

→ Zerofootprint is a socially responsible enterprise with a mission to apply technology, design, and risk management to the massive reduction of our environmental footprint. We operate both in the for-profit and charitable domains through two entities, Zerofootprint Software and Zerofootprint Foundation, using shared technology.