NEW TRENDS, CHANGING DYNAMICS

Student Observations

A number of issues such as climate change, energy efficiency, renewable energy and energy prices have dominated debates on energy. Students from the Energy and Environment Concentration of the School of International and Public Affairs of Columbia University had summer internships in various sectors of the energy industry. They shared their observations on emerging trends in the energy industry with the Journal.

FIVE DRIVERS OF CHANGE IN ENERGY POLICIES

Ajith Das: Two decades ago, the Leadership in Energy and Environmental Design (LEED) rating system, introduced by the U.S. Green Building Council, set a precedent for green building practices in the United States. Fast-forward to today, the energy market has undergone tremendous changes and is still evolving. Five major drivers of change are listed below.

Policies: The year 2014 was a landmark year in terms of policies rolled out at the city, state and federal level to reduce energy consumption and thereby carbon emissions. Policies included stimulating investments, encouraging knowledge sharing and setting higher statutory requirements on efficiency of end user devices - to name a few. Measurement of policy impact is essential to understanding which polices are more effective. However, the overlapping nature of policy implementation has made it difficult to evaluate individual policy effects.

Technology: Transformative technologies are one of the main drivers of change in the energy efficiency market. Learning curves of these technologies are quite steep, contributing to increased demand and production. Many new technologies (including Solar Photo-Voltaic, LEDs etc.) that were not economically viable five years ago make a lot more financial sense today.

Data: Progress in technology and policies have called for a complementary growth of data acquisition. Benchmarking of energy usage is the first step towards any energy saving measure, without which it will be impossible to

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quantify the savings. Ultra-modern Building Automation Systems (BAS) with high-resolution feedback and device level monitoring have equipped end users to monitor and control for operational inefficiencies.

Investments: Even though there has been a modest improvement in the levels of investment in the last couple of years, financing still remains the biggest barrier for the energy efficiency market. Government efforts to stimulate investments through initiatives like Property Assessed Clean Energy (PACE) funds have been widely well received. However, without significant growth in investments, the industry objectives of tapping "high hanging fruit" will be rendered inconceivable.

People: None of the above trends would have been possible if not for the increased awareness among people. In the residential and industrial sector there have been widespread behavioral changes focusing on the shift towards sustainable green models. Most of the industrial firms have energy teams and even C-level executives dedicated to the goal of reducing carbon footprint.

COMPANIES HAVE A LONG WAY TO GO

Lia Cairone: Climate change is now a concern to everyday people. As world leaders prepare to negotiate a new climate agreement at the United Nations Framework Convention on Climate Change (UNFCCC) meetings in December and politicians debate about policies to combat dangerous climate change, public agencies and private corporations are grappling with how they too can contribute to reductions in greenhouse gas (GHG) emissions. This summer, I worked as an Environmental Defense Fund Climate Corps Fellow to develop a comprehensive greenhouse gas inventory and tracking tool for the Massachusetts Water Resources Authority (MWRA).

Properly tracking greenhouse gas emissions trends within an organization is the first step on the path to managing emissions and developing a strategic plan for reductions. This can be a challenge for many companies that lack the expertise in-house, and GHG accounting practices, although partly standardized, can be complex. Because most companies are not mandated to report, many fail to track their emissions, and others track and report at varying degrees of detail. In the case of the MWRA, I used the Local Government Operations Protocol to guide most of the reporting, but there were organization-specific challenges, including fugitive methane and nitrous oxide emissions from wastewater treatment, which complicated the effort. Research by the Water Research Foundation and the New York State Energy Research and Development Authority (NYSERDA) suggests that methods for greenhouse gas emissions accounting in wastewater treatment need to be improved.[1] Current approaches, as in many

sectors, are top-down and allow for wide margins of error. Other challenges to building an accurate historical inventory include a need for quality central data record keeping.

Building an accurate inventory is only the first step to developing a mitigation strategy. Indirect GHG emissions, also called Scope 3 emissions, are always voluntary to report, but often provide the richest opportunities for emissions reductions. The MWRA had to weigh the costs, benefits and feasibility of tracking scope 3 emissions such as those produced by the chemicals procured to treat water and wastewater, including liquid oxygen, which is energy and carbon-intensive. Transportation of goods is another area where data is lacking. If companies are not mandated to report on their emissions activities, the information is unavailable, and organizations are unable to put pressure on their supply chain partners to produce at lower carbon-intensity.

Organizations with the means are investing in renewable energy and energy efficiency projects to lower their emissions. But one of the most interesting findings at MWRA was that procuring electricity in the deregulated Massachusetts market from low-carbon producers was the quickest, easiest, most impactful and likely cheapest way to decrease emissions. When electricity providers transparently share their company's greenhouse gas emissions factors and average energy-mix information, purchasers have the power to make cleaner decisions about their energy consumption. Companies are evolving to integrate climate change mitigation into their culture, but to be effective, the effort requires support in the form of financial resources, technical experts, and most importantly, the engagement of senior management.

SLOWING ECONOMY HAS LITTLE IMPACT ON POWER PRICES

Shirin Jamshidi: Over the summer, I worked at the Credit Agricole's North America Project Finance and Investment Banking group. My various responsibilities provided me with the opportunity to observe the trends in the power and energy sector. One of these trends is the rise of natural gas power plants in those states with the Renewable Energy Portfolio Standards (REPS). Because of the intermittency of renewable energy sources, the grid in these states requires a firm source of power. Given all the alternatives, natural gas is the most viable option.

A number of natural gas power plant developers are following REPS as the emerging markets for building power plants. In addition, analysis of the financial and operational performance of a number of wind projects indicate that the projects typically underperform their P50 estimates while still meeting their loan obligations. This observation could either be negative or positive depending on the observer.

For the financial industry, this underperformance is a yellow flag because it means the wind farm could have a problem meeting financial obligations. I say yellow and not red because in most cases the underperformance is not significant enough to severely impact the project's financials. For the developers, this underperformance could mean that some of the weaker performing projects that they think may not be viable could still be considered, because there is a level of tolerance in the finance community to expect some level of underperformance from the wind projects.

Lastly, I worked on a research project about the power price fluctuations during the recession, observing power prices from 2007 to 2011 and whether prices were impacted by the slow economy. Comparing prices across markets in the Northeast and Texas and analyzing the fluctuations across different seasons, my conclusion is that while the economic downturn created uncertainty in the investment community, due to severe weather fluctuations during these years and very high and very low temperatures, power prices were not severely impacted by the slow economy.

STATE PROGRAMS SHOULD BE MORE USER-FRIENDLY

Janis Kreilis: In the spring, I spent four months interning at a startup called Sealed, working on their marketing, web presence and content creation. Sealed offers homeowners guaranteed savings on their energy bills if they sign up to do a home energy assessment with one of the Sealed specialists and then carry out a home improvement project, which can include a number of things, ranging from oil-to-gas conversions, insulation and air sealing, among others.

The company works with several programs in the state of New York that support energy efficiency improvements in households, which can reduce the costs of improvements through rebates or zero-down, cheap financing options to homeowners. Based on data available to them, Sealed has developed algorithms to estimate the level of savings and ensure that the total savings exceed the monthly loan payment, i.e., making the savings pay for themselves.

Apart from the exciting experience that working in any startup brings, I have witnessed the rather sorry state of the efficiency industry to date. To begin with, energy efficiency is already a more complex business than, say, solar panels, as it does not measure energy created but energy use avoided. In addition, the support programs designed by the state do work, but they are not designed in a user-friendly way, which makes accessing the state's money difficult. Homeowners themselves are not well informed about these opportunities and more often than not do not even know that their old houses can be made more comfortable with a few rather minor improvements.

I have also seen that the few companies that try to make a business out of this opportunity do so in an old-fashioned way, without emphasizing the efforts of educating the consumers or marketing their brand in any specific way. Of course, all of these factors make for an industry ripe for disruption, which is what Sealed hopes to do with its simple product, easy-to-understand messaging and customer-friendly attitude.

ROCKY ROAD AHEAD FOR ELECTRICTY ACCESS IN MYANMAR

Cait O'Donnell: Myanmar has one of the lowest electrification rates in the world. The electrification rate is estimated at 30 percent, and large parts of rural Myanmar have little or no electricity access. [2] During my internship with World Wide Fund for Nature (WWF) in Myanmar, I worked with the Energy Team to understand where opportunities and challenges exist for expanding Myanmar's electricity access and for leapfrogging to renewable energy technologies. With the ultimate goal of increasing access to sustainable energy in Myanmar, our key objectives were to collect and analyze data related to household energy access and to advocate for a greater share of renewable energy in the national energy mix.

For energy policy stakeholders in Myanmar, the National Electrification Plan (NEP) is a major focal point for debate. The NEP, a joint initiative by the World Bank, the United Nations and the Myanmar government, aims to electrify 100 percent of Myanmar's households by 2030 and calls for an ambitious extension of the national grid system.3 Discussions around the NEP's approach underscore Myanmar's challenges in the power sector, which include high demand growth rates, weak and ageing infrastructure, low electrification rates, non-cost reflective tariffs and large investments required for infrastructure.

Our team grappled with problems of availability and quality of household energy access data, which has also been a barrier in the development of the NEP. Publicly available, nationally representative data is much needed as Myanmar emerges from nearly fifty years of military rule. Until the 2014 census, Myanmar's most recent national survey was in 1983.[4] General elections in Myanmar are scheduled for November 2015. UN Secretary-General Ban Ki-moon has called the upcoming elections "a milestone in Myanmar's transition to democracy."[5] This will be the nation's first general election since a nominally civilian government was introduced in 2011.6 Stakeholders in Myanmar's energy sector are eagerly waiting to see how election results will shape the NEP and its implementation and, hopefully, shift the nation towards sustainable and equitable energy access. ♔

Notes

[1] Toolbox for Water Utility Energy and Greenhouse Gas (GHG) Emission Management, Water Research Foundation, NYSERDA, 2013

[2] "Powering Up Myanmar: More Than 7 Million New Electricity Connections Needed by 2030." October 8, 2014. http://www.worldbank.org/en/news/feature/2014/10/08/powering-up-myanmar-more-than-7-million-new-electricity-connections-needed-by-2030.

[3] World Bank. 2014. Myanmar - Development of a Myanmar national electrification plan towards universal access 2015-2030. Washington, DC; World Bank Group. http://documents.worldbank.org/curated/en/2014/09/20252603/myanmar-development-myanmar-national-electrification-plan-towards-universal-access-2015-2030

[4] "The 2014 Myanmar Population and Housing Census." Myanmar Information Management Unit. http://themimu.info/census-data.

[5] "Upcoming Elections Represent Milestone in Myanmar's Democratic Transition – Ban." UN News Center. September 29, 2015. http://www.un.org/apps/news/story.asp?NewsID=52047#.VgvwVPlViko.

[6] "Myanmar's 2015 General Elections Explained." BBC News. July 20, 2015. http://www.bbc.com/news/world-asia-33547036

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