Introduction to Panel 6
The role of financing to improve industrial efficiency, global perspective

Panel leader: **Patrick D'Addario**
Institute for Industrial Productivity
USA
Patrick.DAddario@iipnetwork.org

Panel leader: **Ye Yanfei**
China Bank Regulatory Commission
China
yeyanfei@cbrc.gov.cn

Introduction

Were there any doubt that the issues to be addressed in mobilizing sufficient capital to finance a significant portion of financially viable industrial energy efficiency projects are multifarious and complex, the submissions for this panel would lay them to rest. The issues to be resolved in financing are well known. Robert Taylor's succinct enumeration in "Next Steps for EE Financing in China," is paraphrased below.

- Projects are small and scattered. This makes it more difficult for financial institutions to efficiently identify and close energy efficiency projects, and drives up transaction costs.
- Project benefits may appear less tangible. Operating cost savings calculations of project developers may often look riskier to potential project sponsors, compared with concrete new production assets.
- Energy efficiency projects are viewed by most enterprises as lower priority than "core business" investments. Management attention is often focused on growth of sales, capture of market share and strategic core business targets. Investment in higher production efficiency, often is considered less important.
- Technical content is diverse. Different technical solutions exist for hundreds of types of inefficient energy applications in different economic sectors. Packaging of even generic solutions for specific applications is an art that often requires considerable specialized experience.

Notwithstanding the complexity of these problems, any solution must affordably bring industrial energy efficiency technical and financial know-how to bear at the point of the transaction to give the bank and the enterprise the ability to evaluate the risks and the benefits of the transaction. "Affordably" inevitably means programmatically; one-off solutions are expensive. Hence, a number of the papers being presented focus on White Certificate Programs, making them a major theme of the panel. In White Certificate Programs, major energy companies are required to meet government-mandated savings targets either through their own efforts or by purchasing others' energy savings, in the form of certificates. This is a top-down approach, driven by the energy company's need to produce energy savings. Such programs affect companies unevenly, and some, not at all, since the savings mandate may be met with major savings from a relatively small number of customers. Small and medium companies may never be reached.

Energy Service Companies (ESCO), on the other hand, are widely seen as a mechanism to deliver technical and financial know-how on a distributed basis. Particularly where ESCOs operate under shared savings arrangement under which they assume full technical and financial responsibility for the project, their incentive is to save as much energy as possible. Their ability to do fully-financed turnkey projects allows them to finance projects companies unwilling to use own capital or without access to bank financing. Thus the ESCO bottom-up industrial energy efficiency approach is promoted by many governments as a means of extending energy efficiency to a larger number of companies. ESCOs are the second major theme of the papers.

Bounding the Problem

While financing and finance practitioners are decidedly transactional, government-imposed savings requirements and the above-referenced need for programmatic approaches have

made mobilization of private sector EE finance a matter of public policy. Voita et al. (6-148-12) give us a macro view of the evolution of public policy attempts to mobilize private investment for energy efficiency. Basing their analysis on an International Partnership for Energy Efficiency Cooperation (IPEEC) paper, Voita and his co-authors discuss the evolution of EE financial mechanisms to overcome their original shortcomings in promoting the widespread adoption of industrial energy efficiency. The paper focuses significantly on India, where a variety of recent and imminent public sector financial initiatives aim to incentivize private market players, drawing on what has been learned from previous public sector attempts to promote industrial energy efficiency.

While also focused on India, deLucia and Desai's (6-019-12) discussion of the role of energy efficiency improvement could hardly be more transactional, focusing on the important effects of extremely small energy efficiency investments on energy poverty, in both environmental and social terms. They elaborate an ESCO model to operate at the "Bottom of the Pyramid" (BOP) – the more than three billion people still dependent on traditional unprocessed solid fuels (biomass, coal) and the micro- and small-scale enterprises (MSMEs) they engage in. Such ESCOs can tap the huge potentials in increasing energy efficiency and reducing climate pollutants in "ecosystems of energy poverty" by enabling the transition to modern energy and then, using them more efficiently, principally in the "productive" sphere. The ESCOs' MSME clients, by and large from the informal sector, require various elements of technical and financial intermediation for their transformation via cleaner, more efficient energy use. In emphasizing the need for simultaneous technical and financial intermediation for successful energy efficiency interventions, the paper introduces a central theme in energy efficiency finance, dealt with, in one way or another, by virtually all of the papers.

European Public Sector Funding Approaches

WHITE CERTIFICATES AND PUBLIC-PRIVATE PARTNERSHIPS

The papers in the second session treat various aspects of two approaches to wedding technical and financial expertise. The first approach, is the establishment of tradable efficiency certificates to meet nationally-mandated efficiency targets. It is a macro approach to the problem, inasmuch as the energy distribution companies responsible for meeting the efficiency targets are, if not national entities, major players in the energy sector. Importantly, they have both the technical capacity to design and execute energy efficiency programs and the financial capacity to support the adoption of those programs by their customers.

Di Santo et al. (6-058-12) argue that the Italian white certificate (WhC) scheme is one of the most complete examples of a baseline and trade incentive scheme to promote energy efficiency measures by final energy users and, therefore, an important model for Europe. It is also likely to be of interest to the Chinese as they design their White Certificate pilot program under the 12th Five Year Plan. The mechanism obliges energy network distributors (electricity and natural gas) to reach yearly energy saving targets certified by the presentation of a corresponding number of WhC acquired either through their own programs with their customers or from ESCOs or companies with an energy manager. The paper evaluates changes in the seven-year program to increase the quantity of WhCs in the market and discusses how these changes will affect ESCOs and create opportunities to promote industrial EE. The theme of the ESCO as a potential vehicle for the coordinated delivery of technical and financial services is one that is repeated throughout the panel. Italy is not alone in wanting to encourage and strengthen the operation of ESCOs. Both China and India have important ESCO financing programs as elements of their industrial energy efficiency programs.

Rivière-Kaluc et al. (6-104-12) describe a second model in which the public sector supports the coordinated delivery of industrial energy efficiency financial and technical know-how. It is a public–private partnership between ADEME, the French government applied research financing agency for energy, environment, and sustainable development, and TOTAL, the major French private energy company. The program was established to accelerate the development and market implementation of innovative technologies that make industrial utilities and processes more energy-efficient. With a commitment of €115 million over five years, the ADEME-TOTAL program is assisting external companies (mainly equipment manufacturers) to bring new and reliable energy-efficient technologies to market by reducing investment risk through financing research and development projects which can go from pilot plants to full-scale installations on industrial sites. Crosscutting technologies are targeted in utilities as well as in cross-functional unit operations. Like the White Certificate model, this program has the advantage of a major national energy company promoting industrial energy efficiency. Being even more centralized than the White Certificates Program, it also suffers from the apparent limitations of any single company, however large and however dedicated, to promote energy efficiency in the enormously large and complex industrial sector. While energy utilities, in theory, penetrate to virtually all industrial users, the fact that it is the distribution companies which have the energy savings obligation means that there is no direct driver for industries to evaluate their efficiency potential.

Fouquet and Nysten (6-117-12) write about the on-going debate in Germany on how to implement the 2011 European Commission Directive on energy efficiency. Specifically, this will mean establishing national targets and deciding on measures to achieve those targets. The Directive establishes two mandatory obligations problematic for German industry: an "energy savings obligation," which would cap energy sales, and energy audit obligations for large enterprises. These obligations go beyond current German law, which largely relies on information obligations and market dynamics. The paper discusses how such alternatives as white certificates and an energy efficiency fund into which companies would have to contribute may bridge the gap between the European EE directive and German government EE policy. A white certificate scheme in which savings would be mandated for the industries themselves, rather than for their energy suppliers, could be an interesting outcome of the discussion.

Sicard and Escaduro, in their poster (6-129-12) discuss the French White Certificates Scheme obligating energy suppliers to meet energy saving objectives, determined by their market position. They describe the two mechanisms to get certificates:

the standardization of replicable generic actions applied to many end-users; and the constitution of specific actions, either extra-large or atypical. The poster focuses on the process by which EDF develops "forms" assigning energy saving to the generic actions, and specifically on how a manufacturer of an efficient burner technology was able to work with EDF to demonstrate that it produced more energy savings than attributed to it by its form.

Other Public Funding Approaches

TAX INCENTIVES, GUARANTEES, AND LOCALIZED PROGRAMS

Ryan et al. (6-169-12) evaluate tax policies to encourage increased investment in energy efficient equipment by companies in the Netherlands, the United Kingdom, and in Ireland. Utilizing effectiveness and efficiency evaluation criteria, they conclude that such policies, while not first-best, are quite effective in encouraging greater market uptake of energy efficient equipment at quite low cost to the public purse. They argue that these programs have led to increased awareness of energy efficiency in industry and have leveraged private finance, multiplier effects that offset observed free-ridership and overlap with other programs.

Nair and Diddi (6-150-12) return to the question of a *distributed* solution to the question of the coordinated delivery of technical and financial and technical know-how, writing about the potential for energy service companies (ESCOs) to accelerate the adoption rate of energy efficiency investment measures owing to their technical competence in energy issues and their potential to bear the financial risks associated with energy efficiency measures. They ascribe their failure to reach this potential, to date, to lack of credibility, high transaction costs, lack of baseline data, insufficient information and awareness about energy performance contracting and financing issues. They describe the Government of India's establishment of a Partial Risk Guarantee Fund for energy efficiency (PRGFEE) as an attempt to overcome financial institution resistance to funding ESCOS by providing guarantees to cover up to 50 % of debt in an energy efficiency project. The PRGFEE has not begun operations over a year after its funding, illustrating one of the pitfalls of public programs aiming to stimulate private sector activity. Originally the guarantee was to be administered by an experienced financial firm selected through competitive solicitation. Dissenting voices argued that it should be administered by the Bureau of Energy Efficiency. As of this writing, the stalemate continues.

Chittum (6-111-12) describes the ecosystem of industrial energy efficiency programs in the United States, explaining that the vast majority are deployed by energy utilities and state-level entities, rather than by the federal government. She draws on a recent study by the American Council for an Energy-Efficient Economy (ACEEE) that identified the various funders of these programs and the amounts that they spent on industrial energy efficiency programs in 2010 to demonstrate that utilities ($737 MM), state agencies ($74 MM), and non-profit entities ($39 MM) each individually outspent the federal government ($29 MM), which contributed only 3.3 % of the total. The paper describes in detail the various types of programs offered by each type of entity. While it is tempting to treat the US sub-national programs as a special case, it is important to remember that many state in the US are the size of countries. 88 % of the industrial EE spending in the US was by utilities, usually as the result of portfolio standard or other state-mandated energy savings scheme. In fact, Connecticut, Pennsylvania, and Nevada have their own White Certificate Programs and other states have them in the works.

ESCO and Balance Sheet Funding of Biofuels

Rochas et al. (6-073-12) take us from policy considerations to look at the actual dynamics of an ESCO operation. They present a case study of an energy service company (ESCO) providing energy delivery and energy efficiency services to an industrial plant in Latvia. ESCO-1 is an ESCO that was founded as a partnership between an ESCO and an industrial partner, in which the latter is majority shareholder. ESCO-1 assumed responsibility for the energy supply at the industrial plant utilizing a combination of energy delivery contracting (EDC) and energy performance contracting (EPC) to implement energy efficiency measures. The paper shows the importance of human factors for successful ESCO operation in the industrial sector, particularly in the start-up phase. The analysis quantifies the ESCO's success to show that the scheme is a win-win solution, in particular for risk-sharing and raising of capital.

Siteur (6-037-12) describes the remarkably widespread privately-financed deployment of biogas in starch mills, breweries and palm oil mills in over the past decade. As a result, industrial biogas became a mainstream technical option to enhance productivity and competitiveness, particularly for cassava-based starch mills. While 10 years ago financing was difficult to obtain for these projects, currently several local banks are providing financing. The paper concludes that government technical and financial support to renewable energy, in particular the ability to sell excess electricity to the grid, created an environment in which a strong industrial sector was able to drive rapid industrial biogas development, supported by private investment.

China's Assault on Energy Intensity

To meet its goal of a 16 % reduction in energy intensity under the 12th Five Year Plan (FYP), the Chinese government is extending the energy efficiency requirements imposed on the 1,000 largest companies that resulted in a 19 % reduction of energy intensity under the 11th FYP to the top 10,000 companies (actually, some 17,000). The government's extension of existing incentives to smaller companies and institution of tax holidays and other incentives to ESCOs (as well as its White Certificate pilot program) stem, in part, from the recognition that the next 10,000 (and most assuredly the next 17,000) companies do not have necessarily have the internal financial resources, access to bank financing, or technical know-how of the top 1,000.

Romankiewicz et al. (6-156-12) evaluate the Government of China energy efficiency incentive policies for industry, under the 11th FYP. From 2006–2010, the Central Government of China distributed 133 billion Chinese Yuan (CNY) (€16 billion) of subsidies and rewards for promoting energy conservation and pollution reduction. Conceding the important role of the incentives in China's meeting its 11th FYP en-

ergy intensity goal, the paper explores the cost-effectiveness of the incentive policies and whether the investments would have been made regardless. The paper reviews Chinese industrial energy consumption and the barriers for industrial energy efficiency, focusing on financial barriers and how they differ for self-finance and third party-finance and between large and small enterprises. Case studies illustrate the impact of the incentives on investment decisions. For many of the next 17,000, we can foresee that the collaborative efforts of provincial officials, ESCOS, and financial institutions will be required to overcome the financial and technical hurdles faced by the smaller companies.

Chandler et al. (6-061-12) consider one option for injecting additional capital into the Chinese industrial efficiency market. They weigh the benefits and drawbacks of developing a "secondary market" mechanism for financing energy-efficiency projects in China. They argue that just as the secondary market successfully promoted home sales and growth of the housing industry in the United States, a secondary market for efficiency projects could promote the rapid adoption of efficiency technologies and growth of the energy service industry in China. It would do so by addressing the liquidity needs of energy service finance providers and making more capital available to project developers. They explain that an effective Chinese secondary energy efficiency market would likely require strong regulation and oversight, outlining the rationale for government intervention and proposing behavioural/financial experiments to test the concept.

Likewise, Hendrix and Cheung (6-044-12) introduce innovative credit risk analysis techniques for the assessment of the financial strength and viability of industrial small and medium enterprises (SME) seeking finance for green technologies. Such an approach could be used by financial institutions and vendors to extend financing to companies who would simply not have access to financing when evaluated utilizing classic credit evaluation procedures. By applying the techniques to an actual SME, they demonstrate the viability of prudent actionable measures to increase the availability of energy efficiency finance for industrial SMEs in China. They propose a qualitative and quantitative framework for credit risk analysis, funding structure, and credit risk management for the financing of Chinese industrial energy efficiency (EE) projects for small and medium enterprises (SMEs), in order to allow underwriters to obviate or attenuate their reliance on audited financial statements and lessen dependence on the financial sophistication of entrepreneurs and owners when making credit decisions.