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Green Services and Emergence and Recovery from the Global Economic Slowdown in Developing Asian Economies

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Abstract

The global economic slowdown has again highlighted the vulnerability of export-led development models and economies to downturns in export markets. Economic deepening or "rebalancing" with an emphasis on service-sector development should be—and is becoming—one long-term response to the crisis by Asia's emerging economies. In the long run, sustainable economic development will depend in part on achieving a "green" trajectory of service sector development, in which services help green the "product economy."

In the short run, however, can services help address short- and medium-term challenges of emergence and recovery from the crisis—particularly those of at least resuming historic rates of poverty alleviation and inclusive growth? Meeting these challenges will require that export sectors deal successfully with challenging market conditions.

There is a class of closely related business-to-business services which act to green the product economy, and which would improve the competitiveness of export sectors and husband scarce public resources by optimizing the efficiency of infrastructure utilization. These are functional procurement/efficiency services, which transform procurement of environmentally problematic goods and services—such as waste disposal, energy, chemicals, and transport—into performance-based services in which service providers profit by increasing the customer's eco-efficiency. Energy Service Companies (ESCOs) are the best-known of these service models. These services appear to have strong potential among the larger, more sophisticated institutions and commercial and industrial enterprises in developing Asian states, particularly in Asia's more advanced developing economies.

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ACRONYMS

3PL	Third-party logistics
3R	Reduce, reuse, recycle
ASEAN	Association of Southeast Asian Nations
ASEAN+3	ASEAN + People's Republic of China, Japan, and the Republic of Korea
BAU	Business as usual
B2B	Business-to-business
B2C	Business-to-consumer
B2G	Business-to-government
CMS	Chemical management services
CPS	Chemical product services
CSP	Chemical Strategies Partnership
CSR	Corporate Social Responsibility
EE	Energy efficiency
ESCO	Energy services company
FTE	Full-time equivalent
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gas
IMF	International Monetary Fund
IPM	Integrated Pest Management
ISIC	International Standard Industrial Classification
LCA	Life-cycle assessment
MIEEIP	Malaysia Industrial Energy Efficiency Improvement Project
MDB	Multilateral development bank
PPC	Pretoria Portland Cement
PSS	Product-service system
RM	Resource management
SME	Small and medium-sized enterprises
UNDP	United Nations Development Programme
US	United States of America
US EPA	US Environmental Protection Agency

1. LESSONS FROM THE CRISIS: ASIAN VULNERABILITY AND IMPERATIVES FOR "DEEPENING" DOMESTIC ECONOMIES

As of this writing, there is cautious evidence that Asia's developing and emerging economies are leading—not lagging—the global economic recovery. Second quarter 2009 gross domestic product (GDP) figures show a significant turnaround in the People's Republic of China (PRC), the Republic of Korea (hereafter "Korea"), Singapore, and Indonesia, with Japan also emerging into modest positive growth after four quarters of contraction. Throughout the crisis, there has been evidence of partial "decoupling" of the largest emerging Asian economies from Western, and particularly US, economic cycles: the PRC, India, and Indonesia are among a handful of economies that have maintained positive GDP growth throughout the crisis.[1]

However, this positive news should not obscure a key lesson of the crisis: Asia's export-dependent economies—especially smaller open economies—and economic development models are highly vulnerable to demand and finance shocks in the Western economies that remain their key export markets.

This is not a new insight—it figured prominently, for example, in analysis and commentary of the impacts on Asia of the collapse of the "global information technology bubble" in 2001. But it has been reinforced by the current crisis, in which:

- The experiences of Korea, Japan, and Taipei,China—where rates of economic contraction significantly exceeded those of their primary export markets—show that even attaining "developed status" does not reduce the vulnerabilities associated with high export-dependency.
- (a) Rural areas far-removed geographically from export centers and (b) economic sectors not directly part of the export-sector supply chains have both exhibited high vulnerability to export declines. These impacts—particularly social impacts—were a significant focus of the Asian Development Bank conference on the "The Impact of the Global Economic Slowdown on Poverty and Sustainable Development in Asia and the Pacific" for which this paper was originally developed. Earlier-than-expected emergence from negative or significantly reduced positive growth does not diminish the magnitude of costs already incurred or the vulnerability that gave rise to them.

The lesson is not that export of manufacturers should be neglected. The Asian experience generally shows that manufactured exports are critical to generating the economic surplus and foreign currency required for development, and can be a vehicle for progressively building the technological capabilities that allow economies as a whole to progress up the value-added ladder.

The lesson, rather, is that excessive dependency on the export of manufactured goods is not a desirable development endpoint. Robust economic development strategies must seek to increase both domestic final (consumer) demand—an objective fully consistent with inclusive growth strategies that seek broad-based poverty reduction—and aggregate intermediate demand—that is, the web of business-to-business (B2B) and business-to-government (B2G) transactions that support the production of final products and services. This requires

[1] For a useful summary, see *Economist* (2009b).

increasing the scale and essentially "industrial" nature of economic activity outside the export sectors and their immediate upstream value chains.[2]

2. THE KEY ROLE OF SERVICES IN "ECONOMIC DEEPENING"

It is well-understood that such economic deepening requires development of an economy's service sectors. In part, this is axiomatic: there are a very limited number of basic ways to generate economic value-added, and if an economy is seen as being too dependent on the manufacture of products, then it must—in the terminology favored by the International Monetary Fund (IMF) and multilateral development banks (MDBs)—"rebalance" toward services (see box at right).

What are "services"?
Broadly, value-added in an economy is generated by agriculture/aquaculture, extractive activities, manufacturing (all "goods sectors"), and services. In international economic statistics (e.g., as reflected in the World Bank's "World Development Indicators"), "services" correspond to International Standard Industrial Classification divisions 50-99, which includes value-added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services.

Such "prescriptions by axiom" have a checkered history in development macroeconomics. But it is clearly true that services such as transport, logistics, and finance are critical to industrial development; that education and medical services are essential to the formation and maintenance of human capital (and to basic social welfare); that "back-office" services are increasingly seen as a key complement to manufacturing in climbing the value-added ladder (Ghani 2009); and that the integration of rural populations into the formal economy by definition requires growth in services to supply needs that no longer come from the farm.

Further, services are particularly important from the perspective of employment. This is particularly true over the long run: recent research shows that even in economies where labor is in substantial surplus, the overall trend in manufacturing sectors is the substitution of capital for labor. The G7 economies are the current endpoint of this trend; over the G7 as a whole, the ratio of employment share to value-added share in the overall economy is 1.01:1 for services and 0.89:1 for manufacturing.[3]

Finally, upon closer examination, the product-service distinction embedded in traditional economic statistics breaks down. In reality, B2B/B2C offerings are often composed of—and value-added generated by—bundled (and often non-separable) combinations of products and services. New vehicles come with warranties; mobile phone service is often bundled with handsets; and large pieces of capital equipment come with installation services.

Companies view these bundled offerings as a way of capturing a fuller share of the value-added associated with a product (for example, offering computers and network installation/management as a "total IT solution"), as a strategy for competitive advantage, or simply as a standard market practice without which their product would not be competitive (e.g., new vehicle warranties).

[2] Here, "industrial" means that production—whether of extracted raw materials, agricultural production, goods, services, or knowledge—is typified by high degrees of specialization and occurs within the formal sector.

[3] See OECD STAN Indicators Database (2005 ed.), "Value added shares relative to total economy" and "employment shares relative to total economy," G7 group, 2002 data. Available at http://stats.oecd.org/index.aspx.

Such product-service systems (PSS), as they are called, are the rule, not the exception.[4] While PSSs are poorly captured by official economic statistics,[5] one hallmark of advanced economies is the sophistication and density of product-service system offerings. This fact is not lost on Asian policymakers, even if the concept is not well articulated.

For all of these reasons, many Asian states have increasingly recognized the need to focus on development of the service sector as a necessary counterpart to industrial and agricultural development, and ASEAN has made "service integration" a key priority area.[6] The current crisis has only reinforced this understanding and the importance of service-sector development.

In view of the above, a renewed emphasis on and heightened commitment to service-sector development should be—and is already becoming—one longer-term response by Asian states to the vulnerabilities in the region's development strategies exposed by the current crisis.

3. THE ROLE FOR SERVICES IN SHORTER-TERM EMERGENCE AND RECOVERY FROM THE CRISIS

Even focused policy efforts to develop and promote service sectors cannot yield structural economic changes quickly. Service-focused "rebalancing" or "economic deepening" is a long-term process.

The immediate primary concern for Asian states, however, is emergence and recovery from the crisis. Can services contribute to emergence and recovery? More specifically, from the human development perspective, can services help address the core challenges that the crisis presents to—at a minimum—resuming recent historical rates of human development and poverty alleviation?

There are at least two such challenges:

- Asian exporters likely face a prolonged period of heightened competition for diminished markets, particularly in view of a likely permanent "stepwise decrease" in US individual consumption as US households can no longer finance consumption by borrowing against increasing home values.

  While economic deepening in the long run should diversify the economic and employment base, in the near and medium term, continued *general* economic and employment recovery in most Asian economies—particularly as stimulus policies expire—will depend on lead export sectors meeting this challenge.

[4] See US EPA (2009) for a discussion of the concept of and scholarship regarding Product Service Systems.

[5] A basic division in the economic statistics is between "goods-producing sectors" and "services-producing sectors." Output and value-added produced by the former are generally ascribed to goods, irrespective of the service content of the offering. Likewise, service sectors are assumed to produce services, even when the service has a substantial product component (e.g., newspapers).

[6] The ASEAN Economic Community Blueprint adopted at the November 2007 ASEAN Summit sets out concrete steps to be taken to achieve a "free flow of services by 2015 with flexibility." Service integration as a priority area dates from 1995 (www.asean.org, accessed 10 September 2009).

- With some exceptions, most emerging Asian states were less indebted and better able to fund economic stimulus packages than their counterparts in other regions. But these stimulus packages do have real costs, as do the losses in tax revenues caused by the crisis. To some extent in all states—and very significantly in some—the crisis will put pressure on public finances long after general economic recovery. Consequently, the funds available to governments for infrastructure and social investments will be more highly constrained than before the crisis.

For policy engagement in services to be justified in the short term, services must be able to address these challenges in some significant way. This is the first of the key conditions that should be imposed on any near-term service sector policy engagement linked to the crisis.

4. "GREENING" THE SERVICE-SECTOR DEVELOPMENT TRAJECTORY[7]

A second concern that should accompany Asian states' efforts to emphasize service-sector development is the environmental consequences of service-sector growth.

For more than three decades, the advanced industrial economies have been undergoing a services transition, with the service sectors generating an increasing portion of GDP and total employment.[8] Services have also grown in relative importance in Asian and other developing economies as a whole over this period, but not as dramatically (see Figure 1; also Torras 2003). This experience offers clear environmental lessons to Asian states seeking to emphasize, or simply manage, development of their service sectors. Specifically:

[7] This section adapted in part from analysis presented by Stoughton et al. in US EPA (2009).

[8] In the US, for example, the service sector (excluding government) now generates slightly under 70% of GDP. This represents a 40% increase in relative terms since 1950, with the most substantial increases occurring post-1980. In absolute terms, manufacturing employment has declined 6% while service employment has increased 16% over the past decade, with the latter now constituting 80% of total private employment. Similar statistics can be cited even for wealthy economies that are much more oriented to the export of manufactured goods than the US, such as Japan and Germany. Between 1971 and 2001, the percentage of nominal Japanese GDP attributable to manufacturing declined from 43% to 27%, a relative decline of more than one-third, while the percentage attributable to services increased from 52% to 72%. Over the same period, manufacturing employment as a percentage of the total workforce has dropped from 34% to 29.5%, and service employment rose from 47% to 64% of the workforce. In these examples, reductions in "manufacturing intensity" of the economy in part reflect the migration of manufacturing—particularly of light manufactures, apparel, and electronics assembly—to other countries (many in Asia) where labor costs are usually lower. However, it also reflects that services account for an increasing portion of the "basket" of consumption by end consumers—and presumably in B2B markets as well. See Suh (2006) for documentation of this trend in US personal consumption expenditures. Source for US statistics: US Department of Labor, Bureau of Labor Statistics. For comparisons of 1997 to 2006 total annual employment figures for total private employment and private services-producing industries, see Series ID: CEU0500000001 and Series ID: CEU0800000001, respectively, accessible at http://www.bls.gov. Source for Japanese statistics: Government of Japan, National census, Ministry of Public Management, Home Affairs, Posts and Telecommunications SNA, Cabinet office. (Originally cited in Stoughton et al. [2007]).

- While services tend to be less material and energy-intensive per dollar of output than manufactured goods, the "services transition" has by no means decoupled economic growth from growth in material and energy throughput, much less reduced absolute material and energy throughput in these economies.

  There are at least two reasons for this. The first is that the service economy depends fundamentally on the industrial economy. Consider that many of the fastest-growing, most dynamic service sectors in the advanced industrial economies require corresponding growth in the most environmentally problematic products. For example, telecommunications and information services require electronic hardware (and power), while trade, transport, and logistics services require vehicles, fuels, and significant investments in physical infrastructure.[9]

  In short—and contrary to early speculation by a number of "sustainable economy" scholars and thought leaders—the services transition does not drive an environmental Kuznets Curve,[10] whereby after a certain level of wealth or stage of development, economic growth is associated with a cleaner and healthier environment.

- Second, experience indicates that economic growth in the absence of environmental safeguards puts environmental quality at risk. The environmental regulatory systems in most of the advanced industrial economies are heavily oriented around large manufacturing facilities (Salzman 1999). Further, experience shows that service-enterprises are unaware of and in poor compliance with the regulatory requirements that do apply to them. In short, advanced-economy environmental regulatory systems deal poorly with services from both de jure and implementation perspectives.

- Finally, because it is product and services in combination that produce value ("product service systems"), services are important determinants of the environmental performance of the "product sectors."

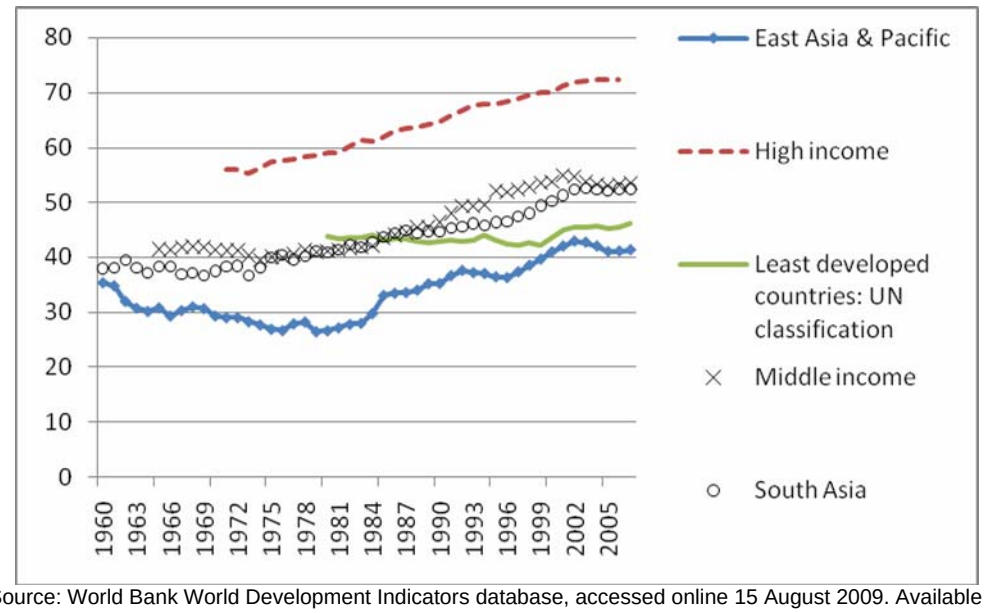
In short, "greening" the trajectory of service-sector development—and using services to green the "product economy"—is critical to the long-term sustainability of economic development in Asia's emerging economies. This means that green, service-led business models must provide more eco-efficient alternatives[11] to the business-as-usual (BAU) means of producing or providing critical economic goods and functions.

[9] See Suh (2006) for a detailed assessment of the greenhouse gas emission intensity of services versus manufactured goods. Suh (2006: 6555) concludes that "a shift to a service-oriented economy is shown to entail a decrease in GHG emission intensity per unit GDP but an increase, by necessity, in overall GHG emissions in absolute terms." Halme et al. (2006) evaluated the sustainability of potentially "green" European household services and found highly mixed results regarding environmental performance. Suh (2004) showed that life-cycle impacts of services are not substantially different from those of products, reflecting the reliance of services on products. For further reference, see Salzman (1999).

[10] The environmental Kuznets Curve is the subject of a large literature. Broadly speaking, this literature indicates that while a service transformation may result in decreasing environmental damage per unit of economic output, it is changes in citizen and public policy values typically associated with rising incomes that achieve absolute improvements in environmental quality. See, for example, Yandle et al. (2004).

[11] "Eco-efficiency" refers to the environmental load entailed in producing a unit of output or value-added. "Environmental load" has a number of potential dimensions—waste and emissions produced, energy and resources consumed, etc.

Figure 1: Value-added from services as a percentage of GDP



Source: World Bank World Development Indicators database, accessed online 15 August 2009. Available at http://publications.worldbank.org/WDI/.

5. POTENTIAL OF GREEN "EFFICIENCY SERVICES" IN RESPONSE TO THE CRISIS

In summary, the crisis has underscored the need for "economic deepening" in emerging Asian economies, a major aspect of which must be increased emphasis on service-sector development. But any services policy engagement in the near term should address key nearer-term social welfare issues of emergence and recovery" and it is critical that service-sector development be viewed and conducted in such a way that it is a mechanism to "green" the overall economy over the longer-term.

Are there services—or more precisely, green service-led business models—with potential to green the overall economies of Asian states, and which help address critical near-term priorities?

5.1 Insights from the "Green Services" Literature

With the exception of the energy services company (ESCO) model (see below), neither emerging Asian economies specifically, nor developing economies generally, have been the focus of formal-sector "green services" research and practice in a broad sense. However, extensive recent research in the US, Europe, and Japan provides not simply an inventory but analysis of the environmental performance of a large set of green service-led business models and cases. Key English-language survey research includes the following:

- In a comparative analysis of the environmental performance of innovative green PSS approaches over BAU, Tukker, Tischner, and Verkuilj examined more than 200 cases compiled under the extensive product service system (PSS) research sponsored by the European Commission as part of the "Competitive and Sustainable Growth Programme" under its Fifth Framework Programme (FP5) of funded research **(**Tukker, Tischner, and Verkuilj 2006).[12]
- Stoughton et al. screened more than 300 "potentially green" Japanese PSS cases, and undertook a detailed environmental and business assessment of 25 of the most promising in an Institute for Global Environmental Strategies research initiative funded by the government of Japan (Stoughton, Horie, and Nakao 2007).
- Halme et al. assessed more than 200 household service cases in six Western European countries thought to offer potentially more sustainable alternatives to BAU. Household services were defined as "services offered to the consumer on the housing premises—namely in their dwelling, in their building or on the building grounds." These included energy services, repair and recycling services, and home delivery of "ecological groceries," among others (Halme et al. 2005).
- For the Environment Directorate of the European Commission, COWI, a northern European consulting group, examined in detail a set of high eco-potential PSSs (European Commission—DG Environment/COWI 2008).
- For the US EPA, Stoughton et al. identified 10 green service-led business models of particularly high sustainability potential and characterized both their US market status and environmental performance (US EPA 2009).

A strong theme to emerge from this large body of research—especially Tukker, Tischner, and Verkuijl (2006), Stoughton et al, (2007), the US EPA(2009), and COWI (2008)—is that, as a class, "functional results" models have the strongest potential to achieve dramatic (defined as greater than a factor of four) eco-efficiency improvements over BAU approaches to the delivery of economic goods and functions.

By the strictest definition, "functional results" business models are those in which a service provider is engaged to deliver a result to a customer, without reference to a specific technological system (Tukker, Tischner, and Verkuijl 2006). That is, the customer does not specify the precise means or technology by which the result is achieved, but leaves this to the provider. Tukker , Tischner, and Verkuijl cite, for example, the example of Integrated Pest Management (IPM) services, in which, instead of selling pesticides, IPM providers assess a fee in return for which they promise to keep farmer's losses to an agreed minimum. Here, the choice of means of pest control is up to the provider.

[12] PSS research funded under FP5 included initiatives on: MEPPS (Methodology Development and Evaluation of PSSs; Homeservices; HiCS (Highly Customerised Solutions); ProSecCo (Product Service Co-design) and Innopse (Innovation Studio and Exemplary Developments for Product Services.) The FP5 archive is available at http://www.cordis.lu/fp5/home.html.

Also supported was SusProNet, a network to serve as a platform for experience exchange among PSS research initiatives and experts. Summaries of the PSS initiatives under FP5 and many of their results are archived at http://www.suspronet.org. The successor to SusProNet was SCORE! (Sustainable Consumption Research Exchange; http://www.score-network.org), which was supported by the EU 6th Framework Program (FP6) and was intended to act "as one of the EU`s central support structures for the UN`s 10 Year Framework of Programs for Sustainable Consumption and Production (SCP)."

5.2 The Promise of Functional Procurement/Efficiency Services Models

As Stoughton et al. (US EPA 2009) point out, however, this is a difficult standard to meet, as results provision is seldom fully detached from a specific technological system. Instead, they center their definition of functional procurement and efficiency services not on the decoupling of "results" from a specific technological system, but on the decoupling of the service provider's profit from the volume of an environmentally problematic good or service sold. They note that significant eco-efficiency improvements over BAU consistently arise when a service provider's profit is instead tied to results achieved.

Traditionally, when a business or institution procures environmentally problematic goods and services such as chemicals, energy, pesticides, distribution, or waste disposal, the supplier derives its profit from the *volume* of chemicals sold, energy supplied, freight hauled, or waste removed.

Suppliers thus have little incentive to help customers reduce their demand for these goods and services. Further, because supply contracts are negotiated on a unit and cost volume basis, with substantial volume discounts, the customer's marginal costs of consumption decrease as consumption volume increases. From an environmental perspective, this is an unfortunate and perverse economic incentive.

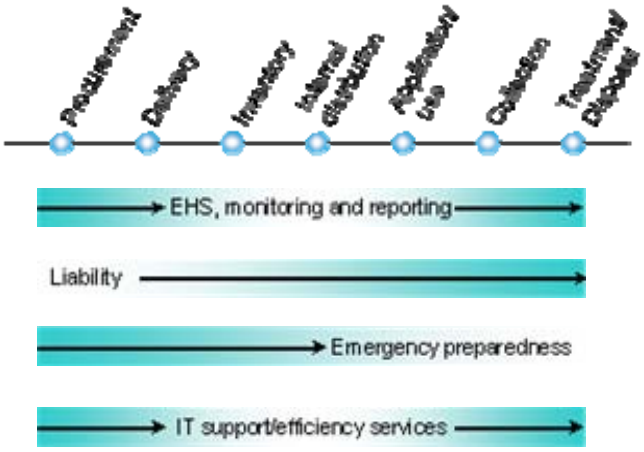
However, functional procurement/efficiency services business models can transform the procurement of these environmentally problematic goods and services into performance-based service arrangements in which the provider is incentivized to reduce the customer's consumption of the good or service in question—e.g., by retaining as profit some of the cost-savings achieved for the customer via efficiency gains. These arrangements are implemented via performance contracts that embody these incentives. This common "greening" mechanism and profit model presents a common value proposition to the customer: reduced total costs and increased quality, compliance, and/or responsiveness.

The concept begs a key question: How can the service provider find efficiency gains that the customer cannot? Experience shows that there are at least three reasons:

- *Specialized expertise.* A competent provider brings specialized expertise that a customer often lacks.
- *Focus:* Customers are typically focused on their core products and operations; energy efficiency, waste and chemical management, and other targets of functional procurement/efficiency services models are rarely core concerns. A service provider, by contrast, is paid to deal specifically with these issues and incentivized to find efficiency improvements.
- *Scale:* A provider's business is made up of a number of customers, and this provides economies of scale—for example, for the development of specialized IT platforms that support the service they provide. These IT platforms are the source of significant efficiencies and improved data for management, but their development will rarely make sense for a single customer to undertake alone.

As detailed in the table below, a number of such models exist, of which the energy service company (ESCO) model is the best-known: In the US, Japan, Korea, and Europe, these different models range from emergent to business as usual (BAU). But all are well past the proof-of-concept phase, and all have demonstrated the consistent ability to achieve very significant increases in eco-efficiency while profiting both customers and suppliers.

Table 1: Functional Procurement/Efficiency Services Business Models

Business Model	Environmental gains*
Chemical Management Services (CMS) CMS is a "strategic, long-term relationship in which a customer contracts with a service provider to supply and manage the customer's chemicals and related services." (Chemical Strategies Partnership 2004). "Chemical management" may include any of the elements of the chemical lifecycle—that is the activities that are required to procure and manage chemicals with the customer's facility, as illustrated below: **The Chemical Lifecycle**  Source: Chemical Strategies Partnership (2004). Under a CMS contract, the provider's compensation is tied primarily to quantity and quality of services delivered, not chemical volume. CMS contracts feature substantial incentives or requirements for reduction in the customer's total chemical costs (i.e. the total costs of chemical purchase *and* chemical management) **Primary customer sectors:** Chemical-intensive manufacturers (e.g., auto, electronics, aerospace); aircraft maintenance.	**Improved Environmental Data:** 100% of CMS customers reported improved environmental data. **Reduced Total Amount of Chemicals Being Applied:** Over 50% of CMS customers reported reductions in total chemicals being applied. **Increased Recycling/Reusing of Chemicals:** Over 45% of CMS customers reported increased chemical reuse/recycling. **Technological Process Efficiencies & Chemical substitutions** Over 30% of CMS customers reported increased process efficiencies; approximately the same number reported beneficial chemical substitutions. (Data from the Chemical Strategies Partnership's *2004 CMS Industry Report* for the US CMS Industry.) A study assessing CMS (sometimes called Chemical Product Services, or "CPS") in the European Union found that "CPS generally allows a reduction of chemical use of 5 to 30% depending on the type of chemical and industrial application. Most experts indicate that reduction of the use of chemicals often goes along with reductions in energy use and the generation of waste and emissions. These reductions differ strongly from cases to case. A screening LCA [lifecycle assessment] for car body painting indicates that the reduction on environmental impact categories varies from 15 to 25% . . . In a screening LCA for metal cleaning, the reduction on environmental impact categories varies from 5 to 70%." (Kortman et al. 2006).
Energy Services Companies (ESCOs) An ESCO provides energy efficiency-related and other value-added services. Typically, ESCO projects undertake to improve the energy efficiency of a facility, campus, or structure with a combination of equipment upgrades and control and practice changes. A key feature of the model is that ESCOs assume *performance risk* for their project or product—that is, their compensation and profits are tied to the energy efficiency improvements, and thus to savings in purchased energy costs actually obtained by the client. ESCOs often provide bundled financing or finance guarantees for projects. In the former, the loan and interest are paid for out of the savings stream generated by the project. **Primary customer sectors:** Manufacturing facilities, institutions, offices, including government.	**Reduced Energy Consumption:** According to a review of the US ESCO industry completed by the Berkeley National Laboratory (Hopper et al. 2007), ESCO projects on average reduce energy consumption by 23%, or 47 kWh/m^2/yr. Using US EPA's Emissions & Generation Resource Integrated Database, this corresponds to average reductions of 67.42 lbs of CO_2/ m^2/yr, 0.34 lbs of NOx/m^2/year, and 0.15 lbs of SO_2/ m^2/year based on the average US generation mix. **Reduced Water Consumption:** A small percentage of ESCO projects also reduce water consumption.

Business Model	Environmental gains*
Resource Management Contracting (RM) RM is a performance-based approach to waste management. It centers on an innovative contractual partnership between a waste-generating organization and a qualified waste contractor in which compensation structures and other contract features support and incentivize waste minimization and recycling. **Primary customer sectors:** Manufacturing facilities, commercial organizations (institutions, hospitals, offices, schools, retailers, etc.).	**Increased Reuse, Recycling, and Overall Waste Minimization:** RM moves waste management up the 3R hierarchy, and better implements the principle that disposal should be the waste management option of last resort. For example, General Motors, which pioneered the model, realized an average reduction of 20% in overall waste generation, a 65% increase in recycling, and a 60% decrease in disposal tonnage across 50 North American plants.
Third Party Logistics (3PL) Also referred to as logistics outsourcing or contract logistics, 3PL focuses on improving resource utilization and process efficiency in order to reduce costs and improve service. 3PL providers deliver comprehensive logistics-related services, including delivery, storage, supply/ distribution information systems, etc. "Green 3PL" specifically incentivizes improvements in the overall fuel efficiency of logistics processes. **Primary customer sectors:** Manufacturers, retailers, government.	**Reduced Energy Consumption:** The logistics efficiency improvements achieved by 3PL tend to improve logistics energy efficiency, even without specific "green" contract incentives. In the case of automobiles, these incidental gains are estimated at 0.5–2% of *lifecycle* CO_2 emissions (including use phase). With green contract incentives and metrics, these environmental performance gains are expected to increase substantially; this has been the general experience in Japan.
Analogous business models exist for pest management (particularly in structural contexts) and water efficiency. **Fuller briefings of each model and references to reports, case studies and information portals are available in EPA (2009). See also European Commission—DG Environment/COWI (2008).** Source: US EPA (2009).	

Research and experience indicates that, as a class, these performance-based functional procurement/efficiency services models have high potential to achieve very significant eco-efficiency improvements across a set of critical economic functions and sectors. Together, these functions and sectors constitute much of the critical "environmental footprint" of the economy as a whole (and of many individual industrial and commercial facilities).

These gains are structural, not accidental; they flow directly from core contract structures and the value proposition these models embody. The gains are high-value and high-leverage as these models act high on the "3R" hierarchy, functioning as *reducing* agents that shrink the size of the material and energy cycle required to service a given level of economic activity.

5.3 Potential Benefits of "Efficiency Services" Models

Successful adoption of these models would provide a number of benefits for emerging Asian economies. They would:

- Improve the competitiveness of key export and domestic production sectors by reducing total unit costs of production via significant energy, water, and resource efficiency improvements (that is, via "eco-efficiency gains") *rather than via wage suppression and capital-for-labor substitution*.
- Such gains have the added benefit of improving balance-of-payments when these resources are imported, and particularly when their costs are subsidized.

- Help position Asian exporters as part of a green, carbon-efficient supply chain. This is especially important now that carbon emission mandates apply or are coming into force in all major developed-economy markets, and large customer firms in these markets are increasingly expected to "push" these mandates up the supply chain—or to look to their suppliers to achieve lifecycle carbon reductions.
- At high levels of adoption, significantly improve the efficiency with which the economy utilizes the goods and services delivered by key infrastructure (such as energy, water, and transport). For example, the energy efficiency gains delivered by ESCOs increase the value-added that a given quantity of electricity can produce. The result would be to minimize future capacity investment needs relative to economic output *and thereby increase the relative resources available for social investment*.
- In some cases, provide significant direct employment benefits, and in all cases, develop a pool of "systems optimization specialists" skills—a key type of human capacity. The development of domestic providers of these services would provide a profit-driven mechanism for continuous, indigenous eco-efficiency gains in Asian economies.

These benefits directly address both the short-term economic/social welfare challenges and the long-term needs for green service-sector development identified above. However, while significant and important, these benefits are *potential.* To conclude that this set of service-led business models is a high-value focus of policy engagement—particularly given the additional demands on governments caused by the economic crisis—there must be significant evidence that their business potential in at least a key subset of emerging Asian economies is high.

5.4 Potential in Asia?

A dose of realism is clearly in order. While each efficiency services model is unique, some basic, common conditions for success are known (see Table 2 below). Taken together, these conditions for success indicate strongly that the potential customer base for these models are the larger, more sophisticated institutions and commercial and industrial enterprises in developing Asian states, particularly in Asian's more advanced developing economies. Because these services require sufficient scale and the ability to engage in sophisticated contracting and operations benchmarking, small- and medium-sized enterprises (SMEs) are often not suitable customers.

Table 2: Conditions for Achieving Business Success and Full Eco-efficiency Potential

Success factor	Notes and commentary
Minimum efficient scale	While these models have the effect of divorcing provider profit from the volume of environmentally problematic good or service consumed (energy, water, waste disposal, chemicals), they do require that a customer's operations entail sufficient volume of these goods or services such that the efficiency gains the provider achieves for the customer result in cost savings sufficient to offset the cost of the provider's services. Thus, there is a minimum efficient scale for many of these models. (The CMS provider sector in the US, for example, uses a general rule-of-thumb that US$1 million in customer chemical "buy" per year is the threshold for a viable CMS program. ESCOs, by contrast, are often able to serve SMEs, as their projects often do not require ongoing on-site staffing.)
Customer capability	These models require performance-based contracts that benchmark performance against a prior cost baseline. This baseline typically measures the *total cost* of the good or service in question. (For example in the US, experience shows that each dollar of chemical purchased by a manufacturer incurs US$0.50—$2 in additional management, compliance, and disposal costs.) Total-cost base-lining and performance contracting pose challenges for many potential customers, and impair capability to develop requests for proposals (RFPs), evaluate provider proposals, and implement programs.
Support in law for performance contracting	Governments and public institutions are key potential customer sectors for a number of these models (ESCOs, RM, structural pest control). However, public procurement rules do not always support performance-based contracting. Even for private sector clients, accounting, tax, and audit rules must accommodate performance-based contracting mechanisms for these models to be successful.
Sufficient provider technical capability	Providers must have sufficient technical capability to identify efficiency improvements in a wide range of customer operations and to implement these improvements while pricing and managing performance-based contracts.
Sufficient provider independence	Again, these business models decouple the provider's profit from the volume of the environmentally problematic good or service involved. If the provider is engaged in the production of this good or service, the provider may not be fully committed to identifying and exploiting efficiency improvement opportunities that reduce the customer's use or disposal rates. This is a potential issue, for example, for chemical manufacturers engaging in CMS, for utilities with ESCO business units, and for landfill or incinerator owners operating as RM providers. Manufacturers of efficiency equipment that are operating as efficiency services providers may have similar conflicts of interest, viewing their services unit primarily as a channel for sales of their own equipment.
Market awareness	Competitors' actions and a demonstrated track record are strong drivers to adoption in B2B markets. Conversely, when adoption rates in a geographic or sectoral market are low or near zero, this is itself a barrier, particularly when the performance-based contracting concept is unfamiliar.
Significant resource and environmental compliance costs	As noted above, these models require that the efficiency gains the provider achieves in the customer's operations achieve sufficient cost savings to pay for the provider's services. The scale of customer operations is one factor in the scale of cost savings achieved (see above). A second key factor is the cost(s) attached to the good or service in question. For example, if energy costs are low, the energy efficiency gains an ESCO can achieve will result in little cost savings to the customer. If waste disposal costs are low (e.g., if landfills are cheap or unregulated, or waste regulations are unenforced), the business case for an RM program becomes significantly less attractive to a prospective customer. Thus, the higher the costs that result from eco-inefficiency or the more binding environmental regulations are, the more customer appeal these services have. Conversely, resource subsidies and under-developed environmental regulatory systems or inadequate enforcement diminish their appeal.

Sources: Hansen et al. (2009); US EPA (2009); CSP (2004); Stoughton and Votta (2003); Painuly et al. (2003).

The ESCO experience as a proxy. The benefits and strong potential of the ESCO business model have been recognized for some time, as well its potential in the advanced developing and transition economies. Indeed, the top 15 ESCO sectors (by value of projects) include

Brazil, the PRC, Poland, South Africa, and India (2002 survey data; Ürge-Vorsatz et al. 2007). Consequently, significant efforts have been made to promote the model in developing and transition economies—including Malaysia, Thailand, Egypt, Hungary, Czech Republic, India, and Poland, among others.[13] Among Asia's advanced economies, both Korea and Japan have engaged in significant efforts to promote the ESCO sector over the past decade (Painuly et al. 2003; Hansen et al. 2009). The first Asian ESCO conference was held in Bangkok, Thailand, in October 2005.

There is a significant literature of lessons learned from ESCO promotion (see Hansen et al. 2009; Ürge-Vorsatz et al. 2007; Pailusky et al. 2003; Taylor 2009). Most of this literature speaks, in ESCO-specific terms, directly to the "conditions for success" identified above.

The experience of the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP) is indicative of these challenges. Initiated in 1999, the (originally) four-year, US$20 million project was co-funded by the Global Environment Facility (GEF), UNDP, the Government of Malaysia, and the Malaysian private sector. In its ESCO support component, the project was intended to address the following key constraints to wider adoption of the ESCO model in Malaysia (Van den Akker 2008)[14]:

- Macro-constraints: absence of legal and institutional framework for energy performance contracting, subsidized energy pricing, lack of financing vehicles for energy efficiency projects.
- Micro-constraints (energy services provider sector) included insufficient competency in producing bankable project proposals; low finance literacy and poor ability to secure financing packages for clients; and insufficient performance contracting skills, particularly as related to risk evaluation and mitigation.

To address these constraints, MIEEIP included, capacity-building workshops and seminars for local providers, soft loans, tax benefits, support to the creation of a national ESCO association and design of an ESCO accreditation scheme and an energy performance contracting model, the Master Energy Services Agreement.

The program's final evaluation noted that despite these achievements, the ESCO sector in Malaysia had some way to go:

- "Many ESCOs have a "poor image", aggravated by the fact that also equipment suppliers identify themselves as ESCOs (as a means to market the equipment they sell);
- "The fact that only 1 out of 4 planned ESCO demonstration projects were carried out has failed to impress the industrial community of the ESCOs' professional capability;
- "While ESCOs are capable of undertaking energy audits (consultancy), they seem less interested in taking up the challenge of performance contracting, supposedly because of the absence of Government regulations on energy efficiency (Energy Management Regulations have been proposed, but approval is still pending) and finance mechanisms (e.g., soft loans);
- "Many companies are still hesitant to pursue energy savings, because the current fuel cost does not reflect the real energy production cost;

[13] Compiled from multiple sources. See especially Ürge-Vorsatz et al. (2007) and Hansen et al. (2009).

[14] See also the MIEEIP website: http://www.ptm.org.my/mieeip/indexabout.html.

- "Most companies are financially capable to carry out EE projects. If interested, they would prefer to do the EE project on their own rather than do it with an ESCO and share the energy savings with the ESCO" (Van den Akker 2008: 25).

The ESCO experience also highlights the importance of business culture as a factor in market acceptance. One basic expression of "business culture" is the extent to which third-party technical services are a first or last resort of management. More subtly, business culture conditions management "comfort levels" with performance-based contracting models and the close interaction of suppliers with production operations. In broad terms, many Asian enterprises tend to look "in house." In part, this reflects the quality of third-party technical services available, but it also is a manifestation of business culture. This is highlighted, for example, in an examination of CMS practices of Japanese manufacturers operating in North America (Stoughton et al. 2007).

These findings should not be taken as a critique of the overall potential of the ESCO model in emerging Asian economies. Growth in the ESCO sector worldwide and within Asia over the past decade (Hansen et al. 2009; Urge-Vorsatz et al. 2007) shows that this potential exists. But these findings do show that the "success factors" outlined above are critical, and that policy and programmatic interventions to foster them must be carefully crafted. Positively, these findings highlight the significant well of experience to draw on in promoting the ESCO sector within Asia—and, as argued below, this experience should be directly applicable to other functional procurement/efficiency services models.

Evidence for applicability of other functional procurement/efficiency services models. Beyond ESCOs there is substantial evidence that other efficiency services models have significant viability in Asia's emerging economies:

- With substantial variation between states, 3PL as a sector is on a significant growth trend in the region, including the PRC, India, and the ASEAN states (Frost & Sullivan 2006; Wang et al. 2008). To date, however—as in the US[15] and unlike Japan—there has been little emphasis on "green 3PL"—that is, in coupling the efficiency focus of 3PL providers with explicit green goals and GHG emissions benchmarking which would allow customers to claim documented environmental performance improvements in their supply-chain operations. Thus, the challenge is not primarily in promoting the 3PL model, but in introducing "green goals" and environmental performance base-lining and tracking capabilities into 3PL offerings.

  (As noted in Table 2 above, even absent an explicit environmental focus, 3PL does achieve non-trivial environmental performance improvements via its focus on increasing the overall efficiency of the logistics system, e.g., by reducing vehicle-km—and thus fuel use—by optimizing loading and routing.[16])

[15] According to a 2006 survey, only 18% of US 3PL providers are pursuing strategies to "go green" by utilizing renewable energy sources. Of that group, 69% have re-routed transportation routes in order to save on fuel costs, 15% are using hybrid vehicles, and 15% have researched solar power options (http://www.sdcexec.com). The numbers are likely to be substantially lower in emerging Asian economies.

[16] A comprehensive assessment by Facanha and Horvath (2005) estimated the environmental effects that 3PL has had on the US automotive industry and extrapolated those effects to the manufacturing industry. The results are reported as reductions per item manufactured over the lifetime of the item, and the ranges given are dependent on the level of involvement of the 3PL provider. They found that for automobiles, lifecycle energy use is decreased by 0.4%-1.9%, global warming potential (CO_2, CH_4, N_2O, and CFCs) by 0.5%-2.0%, and fatalities by 0.8%-3.3%; for other manufactured products, they found that lifecycle energy use is decreased by 0.4%-1.7%, global warming potential (CO_2, CH_4, N_2O, and CFCs) by 0.4%-1.9%, and fatalities by 0.7%-2.9%. These effects are significant, as the figures cited are for total lifecycle performance and include the use phase of the product.

- CMS is viewed by many of its advocates and practitioners as the most complicated of the functional procurement/efficiency services models, in part due to the complexity of base-lining chemical costs, but mostly because it is the model most tightly integrated with the customer's core manufacturing operations. Yet, a small group of US manufacturers—particularly in the auto sector—has successfully "ported" their CMS programs into their facilities in the PRC (Johnson 2009).

  Among the region's advanced economies, Korea's Ministry of Knowledge Economy is currently engaged in significant CMS promotion/pilot activities, and full-service CMS is offered by some regional companies—for example, Nagase FineChem Singapore (Pte) Ltd.—and "partial CMS" by many more.

  This research did not uncover examples of resource management (RM) in the Asian context (though it is the policy of General Motors, which pioneered the model, "to consider the technical and economic potential of Resource Management in all new GM plants worldwide."17However, experience with the model indicates that it should be characterized by substantially fewer barriers in the context of emerging Asian economies than either ESCOs or CMS, as (1) financing is not typically a significant feature of RM programs, (2) it is not so closely integrated with customer operations as CMS, and (3) the day-to-day on-site support it involves is not generally skill-intensive, but rather focused on collection and sorting/segregation. (Expertise is required to identify waste reduction opportunities, to manage disposal, and to identify markets for materials reclaimed from the waste stream.)

  The potential of RM in the context of advanced emerging economies is borne out, for example, by the experience of Pretoria Portland Cement (PPC), which recently launched an environmentally and financially successful RM program at its Hercules Plant in Pretoria, South Africa (Pillay 2009). PPC (http://www.ppc.co.za) is a major Southern Africa regional cement and allied products manufacturer. While the PPC program meets all criteria for an RM program as defined in this report, the term RM is not in universal use, and it is possible that RM activity in Asia was overlooked for this reason.

  Indeed, RM is in part a formal, point-of-origin version of the segregation and materials recovery that takes place informally at points of waste transfer and disposal—particularly landfills—across Asia's emerging economies. These informal scavenging and recovery activities typically entail very high health and safety risks to those who engage in them. RM provides a vehicle to formalize extraction of value-added from the waste stream, increase waste recovery rates, and provide employment for relatively low-skilled workers under conditions in which occupational health and safety can be prioritized.

Summarizing the discussions above, there are strong reasons to believe that the larger, more sophisticated institutions and commercial and industrial enterprises in the emerging Asian economies, particularly in the region's more advanced developing economies, are fertile markets for functional procurement/efficiency services beyond ESCOs.

[17] http://www.gm.com/corporate/responsibility/environment/plants/conserving_resources/resource_mgt.jsp, accessed 4 September 2009.

6. VALIDATING AND REALIZING THE POTENTIAL OF EFFICIENCY SERVICES MODELS

In summary, there are strong grounds to believe that functional procurement/efficiency services models:

- Have a good potential customer base among the larger, more sophisticated institutions and commercial and industrial enterprises in developing Asian states, particularly in Asia's more advanced developing economies
- Can help address key social welfares issues of "emergence and recovery," specifically by (1) supporting exporter competitiveness, which will be critical to general economic and employment recovery in the short to medium term; and (2) increasing efficiency of utilization of infrastructure and key resources, thus reducing future capacity investment needs relative to economic output and thereby increasing the relative resources available for social investment.
- Support not just "economic deepening," or "rebalancing," but the essential sustainability goal that service-sector development occurs in such a way as to green the overall economy.

How can emerging Asian states validate and begin to realize this potential?

6.1 The Need for Policy Intervention

Achieving the full eco-efficiency and economic benefits of these green services business models requires that:

- The models reach their full market potential—the more expeditiously this happens, the sooner the benefits will be achieved; and
- The greenest versions of these models are the ones that grow.

Wealthy economy experience (the US, EU, Japan, and Korea) with functional procurement/efficiency services strongly indicates that the policy engagement is frequently required on both points. For example, studies and practical experience have shown that:

- Poor market information and lack of a performance track record are typical barriers to market adoption for new models and for existing models trying to enter new customer sectors. The US EPA's 2009 survey research indicates, for example, that these are significant issues for further adoption of the CMS, RM, and performance-based integrated pest management models in the US. As the report notes, "absent supported pilots, case studies, and/or similar policy engagement, the efforts of individual provider companies alone tend to overcome these barriers only slowly." (US EPA 2009: 93). Korea and Japan's experiences in promoting the ESCO model illustrate similar needs.
- A number of these models have "less green" variants, in which the basic economic incentive mechanisms that drive environmental gains are attenuated or absent. For example, the experience with CMS in the US is that "leveraged purchasing" programs (which focus on reducing unit costs of chemicals purchased) compete with "full service" CMS in the marketplace, but do not incorporate the economic incentives that drive eco-efficiency improvements. While 3PL tends to have intrinsic fuel efficiency benefits, policy intervention is driving the development of "green 3PL" (e.g., in Japan and Korea).

As the sketch of the developing-country ESCO experience, and the particular experience of the MIEEIP, shows, the need for policy intervention is likely to be stronger in the developing-country context for a number of reasons, including overall lower utilization of third-party

technical services, overall capabilities of third-party technical services providers, and the novelty of performance-based contracting.

6.2 Considering the Full Family of Functional Procurement/Efficiency Services Models

As described above, functional procurement/efficiency services models constitute a closely related green services "family": they have a common value proposition/profit model, a common "greening mechanism," and a number of common critical factors for success.

In addition, the institutional profiles of potential customers strongly overlap for a number of these models. (For example, many ESCO customers also fit the profile of potential RM or CMS customers.) Because acceptance of the performance-based contracting model is a key barrier to adoption of these models, successful customer experience with one model is likely to increase receptivity to others.

Together, all of these considerations argue for considering the full family of these models when considering policy engagement.

6.3 Acting Where the Opportunities are Greatest

This is not, however, to suggest that each or any Asian state should engage in efforts to promote the whole set of these models simultaneously. Instead, any policy engagement should be preceded by stock-taking. What is the status of the various models in-country? Is the model non-existent? Embryonic? Or does it have a significant presence? Based on experience or principle, what are the key barriers to adoption? The potential customer base? "First-order" answers to these questions should be sufficient in most cases to indicate the model or models for which short- and medium-term business potential is highest. Such answers could be obtained by an expert who knows the models, in consultation with other experts familiar with both the national business culture and key economic sectors.

It may well turn out that resource management (RM) and 3PL "greening" efforts are identified as the best intervention options. As discussed above, 3PL already has a significant presence in much of Asia and is on a growth trajectory. The task of policy intervention is thus "greening" a model already finding business success, not overcoming fundamental market barriers.

Furthermore, many of the barriers to adoption of the ESCO and CMS models are considerably reduced in the case of RM. RM programs typically entail substantially less capital investment than ESCO projects and are less deeply integrated with core customer operations than CMS. And while RM does require significant expertise, day-to-day on-site technical support can often be relatively low-skilled.

6.4 Framework for Policy Engagement

Once the target models are identified, what should the nature of policy engagement be? To answer this question, it is useful to consider the following:

- In general, policies for green business promotion can be designed to act in one or more of the following ways. They may: (1) reinforce drivers, the factors that lead customers to adopt the model and providers to offer it; (2) reduce barriers; and/or (3) strengthen the determinants of "green" performance.

- Policy engagement should thus begin with an assessment of the barriers, drivers, and determinants of environmental performance that pertain to a particular model in a particular national economic context, paying attention to both supply- and demand-side issues. The most critical barriers, drivers, and determinants of environmental performance should become targets for policy intervention.
- The suite of "green business promotion" policy interventions available to address these targets are generally well captured by the experience of ESCO promotion. As indicated in the table below, they combine explicitly environmental interventions with the tools and approaches used for industry or business sector development.

Table 3: Common Policy Interventions for Green Business Promotion*

Category	Examples
Direct support, assistance, and training	Supported pilots, provider training and capacity-building, financial incentives (e.g., tax credits for customers using the model, provision of credit lines for ESCO projects), etc.
Dissemination of information and tools	Development and dissemination of market information, case studies, and benchmarking data; education of key potential customer groups and providers in the "total cost" principles upon which the value propositions of these models are based; and development and dissemination of tools to help potential customers and providers evaluate the business case for adopting the model; development of standard contract templates; etc.
Development of green standards and leadership programs	Voluntary or official standard setting can be important to define what constitutes the preferred "green" version of a business model, and the government's role as a convener or standard-setter can be critical. Where "sustainability leadership" or "CSR leadership" programs exist to recognize—and in some cases provide regulatory benefits to—"green leaders," these may be expanded to reward adoption of functional procurement/efficiency services that conform to "green standards."
Statutory and regulatory changes	As a practical matter, statutory and regulatory changes are not generally the tool of first resort for green business promotion. However, they can be important when key barriers are regulatory, or certain types of regulatory flexibility would be a significant incentive to accelerate adoption of a particular model. An example of the former includes changing public procurement rules to permit energy performance contracts (as has been done in the US, Japan, Korea, and elsewhere).

*categories modeled after US EPA (2009).

6.5 Leadership by Example

In combination, this policy intervention framework and set of potential policy interventions will result in highly customized intervention "packages" specific to both a particular model and the national economic context. However, experience shows that both public- and private-sector "leadership by example" is critical in catalyzing broader market adoption. In particular,

- Government and public institutions need to be key early adopters of these models, including performance-based energy efficiency and waste management services.
- Pilot efforts should aim to persuade leading industrial firms to commit to high-visibility pilots as customers of these services. Where these pilots involve expatriate providers, they would be paired with local firms to build local technical capacity.

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