Examining the Investment Landscape of Sustainable Energy within APEC
EXECUTIVE SUMMARY

This report offers a detailed analysis of the investment landscape for sustainable energy as a sector of the broader environmental goods and services (EGS) landscape across APEC. Its objective was to identify key inhibitors and facilitators to investment flows so as to provide policy makers with critical information for improving the APEC policy framework for sustainable energy. Simply put, getting this right is critical for all APEC economies. It is not dramatic to say our future depends on it.

This report presents disappointing findings. Despite conducive policy initiatives in all APEC economies progress toward a sustainable energy future is at best flat. Current levels of investments in sustainable energy are insufficient to meet increasing energy demands. Unfortunately, many economies have been drawn back to non-sustainable fossil fuel energy sources. While the challenge for APEC economies is clear, solutions are not.

The APEC Business community is anxious and ready to fully engage. It wants progress. Now. But confusion over competing objectives for energy security and energy affordability deflect focus from sustainable energy and climate change concerns. Policy initiatives are supply-side biased. Policies push sustainable energy into the energy mix, rather than stimulating demand to pull sustainable energy into the market. Business lack clear price signals to inform investment decisions. Regulatory uncertainty discourages investments with long return horizons. Inertia in the form of myopia, misperception, and dulled motivation, at the economy, firm, and consumer levels creates real resistance to change, and bias solution-seeking to incremental improvements of known technologies rather than disruptive breakthrough innovations needed.

There is no appropriate single set of common sustainable energy solutions for all APEC economies. The unique natural energy endowments, stages of economic development, industrial and scientific capabilities, and energy needs of APEC economies require different approaches. Lamentably, this has led to “go it alone” approaches. The consequences for APEC are dire. Climate change and a sustainable energy future are collective action problems. Markets need to be enlarged, standards coordinated, ideas and best practices shared, innovative challenges engaged, trade facilitated, carbon must be priced and traded, trust enhanced so that economies can become interdependent for energy security, and competition stimulated to ensure viable technologies quickly emerge. Economies cannot do this themselves. Business wants and needs an APEC framework for sustainable energy that encourages coordinated action and sets the terms by which everyone operates, while simultaneously allowing and encouraging the innovation and entrepreneurship so desperately needed to secure a sustainable energy future.
EXECUTIVE SUMMARY

Our research included the following:

• In depth interviews with 180 APEC business executives, private equity investors, government officials, and thought leaders. We specifically sought input from individuals directly involved in actual investment decisions in sustainable energy
• A targeted analysis of 5 lead developing (Chile, China, Peru, Thailand, the Philippines) and 9 developed economies (Australia, Canada, Chinese Taipei, Hong Kong, Japan, Korea, New Zealand, Singapore, United States) for purpose of identifying transferable best practices and pathfinder approaches
• A comprehensive line-by-line analysis of EGS and potential EGS-related provisions in 44 Free Trade Agreements;
• An analysis and synthesis of energy studies, supplemented with interview results, resulting in a catalog of each individual APEC economy’s energy policies and practices.

Key Findings

Disappointingly little progress has been made within the APEC region in moving toward a sustainable energy future. With few exceptions, investments in sustainable energy across APEC economies has remained flat. Despite aspirational goals virtually all APEC economies are becoming more dependent on fossil fuel energy sources. Between 2007-2008, investments in sustainable energy increased 7 percent; growth in fossil fuel increased 63 percent.

Despite readily available financial resources earmarked for investment in sustainable energy, conducive policy incentives, and a healthy stream of new, innovative ideas, relatively little investment in sustainable energy projects is being made. $14 trillion is the required capital needed to meet APEC’s energy demand by 2030. Only $4 trillion has been invested. Every year of delay costs $500 billion.

Businesses report a reluctance to invest in sustainable energy in the current investment environment because of low expectations for reasonable returns on investment. Executives cite an absence of transparent energy prices, regulatory uncertainty, small potential market sizes with limited opportunities to achieve scale, high capital costs and long payback periods as the main reasons for not investing in sustainable energy projects.
Energy affordability and energy security concerns trump environmental and inclusive growth concerns. APEC economies are focused on ensuring adequate supplies of cheap energy, now and for the near future. In most economies this has meant a focus on supply-side solutions. These concerns outweigh concerns for climate change and inclusive growth.

The APEC sustainable energy investment landscape is characterized by independent, uncoordinated, and isolated actions. The resulting uncoordinated range of domestic policies, government mandates, price guarantees, and incentives creates unintentional cross-border externalities that distort energy prices. Differing local standards and technologies limit market sizes and trade opportunities.

Differences in natural energy resources, stages of economic development, and industrial sectors mean there can be no single sustainable energy solution for APEC economies. The differences cause economies to act independently with short-term goals in mind and often to the detriment of the economy and the APEC region as a whole. Economies enact myopic domestic policies and do not consider the consequences of those policies on sustainable energy investment.

There is a general lack of awareness as to the seriousness of the need for change. Myopia and distorted perceptions plague stakeholders across the sustainable energy value chain. Politicians are politically expedient; lacking the courage to enact unpopular but necessary policies. Regulatory uncertainty and a lack of transparency in prices bias business towards making short-term investments.

Progress on the adoption of energy efficiency measures is slow. Subsidies and artificially low energy prices, weak or absent measurements mechanisms, low minimum standards, and with energy costs comprising a small percent of business or family budgets, all combine to create dull incentives for the adoption of energy efficient goods. Without adequate pricing and measurement, consumers find it difficult to quantify savings and tend to see only upfront costs.

The lack of proper global energy prices and effective measurement mechanisms are cited by business and investors are important impediments to progress in sustainable energy. Without effective measurement mechanisms for carbon and energy usage, it is impossible for the market to set proper energy prices. Without proper prices demand does not effectively influence energy consumption behavior nor does it pull investment into sustainable energy R&D and energy generation. Subsidies to fossil fuel energy and unpriced carbon distort energy prices.
Regulatory uncertainty discourages investment in sustainable energy. Business executives and investors were in rare consensus that governments must provide regulatory certainty in energy policy incentives. The long return horizons required for sustainable energy technology investments increase business concerns that governments will not honor their commitments over the long term.

The lack of trade infrastructure is limiting investment in EGS. Free Trade Agreements have the mechanisms necessary to address trade liberalization for EGS, but are quiet on the matter. Free trade agreements are silent on the topic of EGS. A real opportunity exists to use FTAs to increase market sizes, thereby promoting investment.

There continues to be a bias toward fossil fuel energy solutions. Existing energy infrastructure, established scientific and business capabilities, and existing government policies, create a bias for further investment in traditional and clean-fossil fuel energy sources. Policy incentives are biased toward supply-side solutions that encourage investments in fossil fuels rather than sustainable energy solutions.

The lack of storage technology is the single largest inhibitor of sustainable energy development. Nobel prize-level recognition and rewards need to be offered to solve this technology challenge. Without a breakthrough on storage, sustainable energy development is doomed to be only an “alternative” energy source.

The critical choke point in the R&D of sustainable energy is moving innovative ideas to the commercialization stage. The critical point in sustainable energy innovation is in obtaining second and third stage financing to bring ideas to market. Our research found that funds are readily accessible to bring ideas through to the pilot stage. But regulatory risks concerns and expectations of low returns discourage further investment. Additionally, since energy is regulated, opportunities for software industry or pharmaceutical industry type returns are limited. These concerns further dull risk-taking.
EXECUTIVE SUMMARY

Action Agenda

This report argues for a strong role for APEC in creating a investment framework to set a clear direction for a sustainable energy future and to encourage and coordinate cross-economy collective action. The alternative of continued isolated and independent approaches is scary to contemplate. But the framework must allow and encourage independent, individual, innovative and entrepreneurial activities that will provide the disruptive technological leaps so badly needed. Transformative and revolutionary change is needed to break away from the inertia that holds economies to fossil fuel energy sources. Solutions must grow from public-private partnerships.

1. **Accelerate and intensify APEC’s EGS ongoing effort.** We urge APEC to move aggressively to define EGS, create harmonized standards, establish a certification and labeling agency, create exchanges for sharing basic research and best practices, and set ambitious energy efficiency goals for each economy.

2. **Establish a separate and coordinated sustainable energy investment framework.** Similar to APEC security framework, we urge APEC to create an investment framework that will address market access and integration, facilitate trade, coordinate energy policies across economies, enhance trust between economies, and stimulate competition.

3. **Build the trade infrastructure for sustainable energy.** We urge APEC to establish a taskforce to formulate model measures for sustainable energy within FTAs.

4. **Make energy prices transparent.** Recognizing the intractability and magnitude of carbon accounting, economies within APEC must take meaningful steps to establish a price on carbon. APEC should not wait for other global institutions to take the lead. APEC is in a unique position to lead the world to a sustainable energy future.

5. **Establish regulatory certainty.** Transparency in energy policies and predictability of energy regulation is essential to reduce investment uncertainty.

6. **Strengthen and stimulate demand-side of sustainable energy.** Measurement and incentives are critical to creating the awareness. Without strong pull, investments will not flow.

7. **Create a framework for cross-border, business-government dialogues.** We urge APEC to encourage public private partnerships to bring together those whose incentives for change are aligned so that they reach implementable solutions.
Examining the Investment Landscape of Sustainable Energy within APEC

Yokohama, Japan
November 2010
Cathy Kim, United States, Team Lead
Researcher for Australia, China & New Zealand

Ketan Bakhshi, India
Researcher for Hong Kong & South China

Matthew Basco, United States
Researcher for Singapore

Luke Cheng, United States
Researcher for Japan

Spencer Cooke, United States
Researcher for Chinese Taipei

Ismael Correa, Chile
Researcher for Japan

Jyoti Gaur, United States
Researcher for Singapore

Raja Shekar Pakkala, India
Researcher for Canada & Hong Kong

Jacqueline Panganiban, Philippines
Researcher for Philippines & Thailand

Binna Park, Rep. of Korea
Researcher for China & Rep. of Korea

Gabriel Tse, United States
Researcher for United States

Min (Grace) Xu, China
Researcher for Chile

Carl Voigt, New Zealand
Faculty Advisor
The USC Marshall ABAC Research Team would like to express its gratitude to several individuals and organizations for their support of our research project. First, we would like to thank John W.H. Denton, Chair of the Sustainable Development Working Group for his guidance and support in the formation of this study.

We are especially grateful to Geoff Brennan, ABAC Australia, for his guidance in formulating this project, and Lynn Turk, Senior Advisor – National Center for APEC, for his direct involvement in the completion of this report. We also thank the ABAC Secretariats, who were such a tremendous help in coordinating interviews.

Additionally, we would like to thank the following individuals who generously contributed time and insight to the development of this study:

Claudia Ayala          David Dodwell           Henry Lau             Koichi Tanaka
Andrew Baek            Richard Drobnick        Alvyn Lim             Kornluck Tantisaeree
Vivienne Blanlot       Jorge Ferrando         Alicia MacLean        Danai Thaitakoo
Tomás Campos           Victor Fung            Matías Orchard        Catherine Wang
Pei-Hsuan Chu          Enrique Escobar Gattas  Thana Pasathiti       Shiiing-Wu Wang
Fiona Cooper Clarke    Cynthia Griffin        Jason Sazaki          Manfred Wilhelmy
Michael Coombs         Alejandro E. Gonzalez  Dennis Schorr
The USC Marshall ABAC Research Team would like to express its gratitude to representatives from the following institutions listed below (in alphabetical order), who have contributed their time and expertise to our research.

ABB
Agribusiness Consulting & Management
Albatross Innovations
AMECO Solar
Amonix
APT Consulting Group Ltd
ARB Technologies
Australian CleanTech
Baker Hostetler
Bangkok Solar
Bank Of China International
Bay Oil
Biosolids Reduction Technologies
Bluglass
Brazilian Ethanol
British Chamber of Commerce
Business Environment Council, Hong Kong
California Environmental Protection Agency
Canadian Electricity Association
Centro de Transferencia Tecnologica CTT
Chant Oil Co., Ltd.
Chilean Ambassador to Japan
Chilean-German Chamber of Commerce
China Chamber of International Commerce
China Enterprise News
China Great Wall Securities
China Industrial Development Bank
China Light & Power Holdings
China Post and Capital Fund
Civic Exchange
CleanTech Ventures Asia
Cooper Clarke Consulting
Cragon Equity Partners
Cygnus Power
Daesung Industrial Gases Co. Ltd
Daily Life Renewable Energy
Deuman
Doa Partners
Dura-Foam Solar Center
Ecotech
Electricas A.G. Empresas
Emerald Capital Asia Ltd
Empresas Copec
Endesa Chile
Energy Efficiency Conservation Authority
Energy for Environment Foundation, Thailand
Energy Management Association, New Zealand
Energy Management Authority, Singapore
Energy Regulation Committee, Philippines
Energy Resource Management, Hong Kong
Enermix
Enfinity
Enfoca Inversiones
Environmental Protection Agency, Taiwan
Environmental Technology Engineering Co., Ltd
Ernst and Young, Singapore
Exelon Utilities
Exxon Mobil
Far-East Biotech Co. Ltd.
Federation of Electric Power Companies, Japan
Figueroa & Valenzuela
Fluor
Forum Synergies Private Equity
Advisors To Our Work (contd.)

General Electric
GreenArc
Helio Micro Utility
Honda
Hong Kong Environment Bureau
Hong Kong General Chamber of Commerce
Hydro-Québec TransÉnergie
HydroTasmania
Inkia Energy
Instituto Peruano Economia
Instituto Políticas Publicas Expansiva UDP
Intec
Interlink Capital Strategies
International Green Economy Association, China
Intersoft KK
IUT
Japan Business Federation
Japan Foods Corporation
Japan International Cooperation Agency
JASE-W
JB City Gas
KeangNam Enterprises
Korea Energy Economic Institute
K-Power
Los Angeles Department of Water & Power
Ministry of Economic Development, New Zealand
Ministry of Energy, Chile
Ministry of Energy, Thailand
Ministry of Foreign Affairs, Chile
Mitsubishi UFJ
Mongolia Energy Corporation
Mott MacDonald
National Cheng Kung University
Newport Ltd
Northeast Electric Ltd
Ocean International
Owens Corning
Papop Co., Ltd
Peru LNG
Pohang Iron and Steel Company (POSCO)
Prima
Proteus Environment Technologies
RAND Corporation
RENA GmbH solar
RESET Ltd
Romero Group
Santander
Sembcorp
Shanghai Electric Wind
Siemens Ltd., China
SK Energy
Soham Energy
Solgenix
Southern California Edison
SRL Plasma
Sudamericana de Fibras F.A.
Sun Valley Solar Inc
SunTech
Sustainable Energy Association, Singapore
Swire Group
Tokyo Gas
Toshiba
Tsing Capital
Tyco
United Nations University, Japan
United Nations, Chile
Universidad Adolfo Ibanez
Universidad de Concepción
US Department of Energy
US Embassy, Korea
US Embassy, Philippines
US Embassy, Thailand
US Renewables Group
V Stone
Virginia Power
Viterum Consulting
Walmart
William J. Clinton Foundation
Wind Prospect
Winston & Strawn
Wise Wise
World Resources Institute, China
YourEncore
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Project Brief</td>
</tr>
<tr>
<td>18</td>
<td>Objective</td>
</tr>
<tr>
<td>03</td>
<td>Scope</td>
</tr>
<tr>
<td>22</td>
<td>Limitations</td>
</tr>
<tr>
<td>23</td>
<td>Key Findings</td>
</tr>
<tr>
<td>29</td>
<td>Introduction</td>
</tr>
<tr>
<td>46</td>
<td>The APEC Framework</td>
</tr>
<tr>
<td>46</td>
<td>Demand</td>
</tr>
<tr>
<td>74</td>
<td>R&amp;D</td>
</tr>
<tr>
<td>100</td>
<td>Supply</td>
</tr>
<tr>
<td>126</td>
<td>Trade</td>
</tr>
<tr>
<td>151</td>
<td>Case Studies: Tale of Two Companies</td>
</tr>
<tr>
<td>171</td>
<td>Conclusions</td>
</tr>
<tr>
<td>176</td>
<td>Action Items</td>
</tr>
<tr>
<td>181</td>
<td>Appendix</td>
</tr>
</tbody>
</table>
Environmental Goods and Services

APEC defines environmental goods and services (EGS) as a sector that involves solving, limiting or preventing environmental problems. EGS companies may manufacture goods and/or provide services related to water or air pollution, waste management, recycling, renewable energy, monitoring, analysis and assessment, or other goods and services related to the environment.
APEC & the EGS Framework

APEC suggests that EGS are instrumental in eliminating preventable diseases, enhancing quality of life, protecting natural resources and attracting in-bound investment. Sustainability, security, efficiency, and climate control are all associated with the growth and success of the EGS sector.

APEC EGS Framework

- **Government Programmes**
- **Tech Transfer**
- **Investment**
- **Training Program**
- **Multilateral (WTO) Liberalization, Plurilateral (APEC) support for Multilateral Liberalization & Facilitation**
- **Public Education**

**R&D**
- More Innovate EGS

**SUPPLY**
- Better quality EGS at lower cost

**TRADE**
- More Competitive EGS

**DEMAND**
- Strong EGS demand will spur greater investment in R&D and Supply of EGS
Examining the Flow of Investment in Sustainable Energy

The analytical approach which this study adopted was to “follow the money in EGS.” That is, we attempted to identify past and present patterns of investments in EGS with the intended goal of understanding what specific products, services, and technologies are being invested in, and why. Additionally, we wanted to identify what impediments may exist that are either slowing or preventing further investments. More importantly, by studying actual and intended investment behavior, we sought to offer recommendations for improvements in the EGS investment landscape within and across economies.

Sources of Money
- Government
- Venture Capital
- Banks

EGS Investment
- Renewables
- Energy Efficiency

Money Created
- Money Saved
- Profits
Defining Sustainable Energy

Within EGS, we focused our research on the energy sector. In addition to the fact that APEC’s growing needs for energy grow exponentially every day, the issues in energy epitomize the salient issues in EGS generally. Although this project sought the voice of numerous stakeholders from industry, government, and academia, our focus was an examination of the investment landscape in sustainable energy within APEC.

For purposes of our study and this report, we use the term “sustainable energy” to include the following:
Sustainable Energy in the APEC EGS Framework

Within the energy sector we adopted a broad approach studying issues across all four areas of the APEC EGS framework of R&D, Supply, Trade, and Demand. This included analyzing EGS investments by energy providers and manufacturers of energy efficient products and technology, cross-border foreign direct investment (FDI) in EGS, and cross-border access to EGS talent.
Project Objectives

The primary objective of this research project was to capture the voice of the APEC business community on the subject of sustainable energy, broadly, and the sustainable energy investment landscape within APEC, specifically. Our process consisted of the following:

Analyzing the Sustainable Energy Investment Landscape: We interviewed those responsible for making investments in sustainable energy. This included private equity firms, venture capitalists and investment bankers specializing in sustainable energies, sustainable energy entrepreneurs, corporations with sustainable energy products and services, public utilities, energy departments, and related government agencies. Our objectives were as follows:

Determine the key financial, legal, regulatory, and political incentives or disincentives in deciding whether or not to invest in sustainable energy.

• Identify major barriers and impediments to growth of sustainable energy. Determine whether the main impediments are trade barriers, misaligned investment or profit incentives, low market maturation, lack of human capital and/or knowledge transfers, inertia, bureaucracy, or inadequate global political benefits.

• Discover best practices that encourage investment in sustainable energy.

• Identify and refine the role APEC can play to encourage within and across border development of the sustainable energy sector.
Project Objectives

Examining Barriers and Impediments to the Access of Sustainable Energy Services:

We interviewed executives responsible for acquiring sustainable energy-specialized talent. This included interviews with executives in firms and research organizations involved in sustainable energy.

• Identify major barriers and impediments to the access of sustainable energy services from other economies.

• Examine within economy challenges in developing and accessing sustainable energy specialized talent.

Comparative Catalog of Energy-related Issues and Policies Among APEC Economies:

• Identify EGS or sustainable energy-specific provisions in Free Trade Agreements, Regional Trade Agreements, and specialized inter-economy MOUs.

• Document domestic initiatives, policies, and programs for facilitating sustainable energy growth.
Capturing the Voice of APEC Stakeholders

We focused on select APEC economies that represent the lead developing and developed economies in energy EGS. These economies were selected in consultation with the Sustainable Development Working Group Chair.

14 Economies
Australia
Canada
Chile
China
Chinese Taipei
Hong Kong
Japan
New Zealand
Peru
Philippines
Singapore
South Korea
Thailand
United States

183 Total Interviews
(May - Oct’10)
136 In-person
47 Phone & Email
30 Survey
We interviewed policy markers, energy providers (utilities, renewable energy companies), technology companies, investors and service providers, among others.

We attempted to catalogue all APEC economies’ free trade agreements. The team identified 44 ratified or pending agreements and focused on those agreements containing language pertaining environmental issues.
Research Limitations

Our research findings are subject to the following limitations:

• This report was designed and created to capture the voice of a variety of stakeholders from select APEC economies and not all APEC economies. Rather, the research concentrated on those economies that were considered to be the leading developed and developing ones in EGS.

• This report contains evaluations and assessments based on the qualitative parts of our research. Thus these assessments were not based on quantitative analytics, but rather what businesses told us during our interviews.

• We attempted to catalogue all APEC economies’ free trade agreements. The team identified 44 ratified or pending agreements and focused on those containing language pertaining environmental issues.

• Generalizations of our research should be made with caution. Our field research was largely conducted with businesses, investors and policymakers, and our data sample represents views apart from those of just businesses leaders.
**Overall Key Findings**

Disappointingly little progress has been made within the APEC region in moving toward a sustainable energy future. With few exceptions, investments in sustainable energy across APEC economies has remained flat. Despite aspirational goals, virtually all APEC economies are becoming more dependent on fossil fuel energy sources. Between 2007-2008, investments in sustainable energy increased 7 percent; growth in fossil fuel increased 63 percent.

Despite available financial resources earmarked for sustainable energy, conducive policy incentives, and a healthy stream innovative ideas, relatively little investment in made in sustainable energy projects. $14 trillion is the capital required to meet APEC’s energy demand by 2030. Only $4 trillion has been invested so far. Every year of delay costs $500 billion.

Businesses report a reluctance to invest in sustainable energy in the current environment due to low expectations on returns on investment. Executives cite an absence of transparent energy prices, regulatory uncertainty, small potential market sizes with limited opportunities to achieve scale, high capital costs and long payback periods as the main reasons for not investing in sustainable energy projects.

Energy affordability and energy security concerns trump environmental and inclusive growth concerns. APEC economies are focused on ensuring adequate supplies of cheap energy, now, and for the near future. In most economies this has meant a focus on supply-side solutions. These concerns outweigh concerns for climate change and inclusive growth.

The APEC sustainable energy investment landscape is characterized by independent, uncoordinated, and isolated actions. APEC economies have adopted “go it alone” approaches for energy security and sustainability. The resulting uncoordinated range of domestic policies, mandates, price guarantees, and incentives creates unintentional cross-border externalities that distort energy prices. Differing local standards and technologies limit market sizes and trade opportunities.
Overall Key Findings

Differences in natural energy resources, stages of economic development, and industrial sectors mean there can be no single sustainable energy solution for APEC economies. The differences cause economies to act independently with short-term goals in mind and often to the detriment of the economy and the APEC region as a whole. Economies enact myopic domestic policies and do not consider the consequences of those policies on sustainable energy investment.

There is a general lack of awareness as to the seriousness of the need for change. Myopia and distorted perceptions plague all stakeholders and are present at all stages of the sustainable energy value chain. Politicians are politically expedient; often lacking the courage to enact unpopular but necessary policies. Regulatory uncertainty and an absence of transparent energy prices biases business toward making less radical shorter-term investment opportunities.

Progress on the adoption of energy efficiency measures is slow. Subsidies and artificially low energy prices, weak or absent measurements mechanisms, low minimum standards, and with energy costs compromising only a small percent of business or family budgets, all combine to create dull incentives for the adoption of energy efficient goods. Without adequate pricing and measurement consumers find it difficult to quantify savings and tend to see only upfront costs.
Key Findings in Demand

The lack of real global energy prices, and effective measurement mechanisms, are cited by business and investors as the single most important impediment to progress in sustainable energy. Without effective measurement mechanisms for carbon and energy usage, it is impossible for the market to set real energy prices. Without real prices, demand does not effectively influence energy consumption behavior nor does it pull investment into sustainable energy R&D and energy generation. Subsidies to fossil fuel energy and unpriced carbon distort energy prices.

Regulatory uncertainty discourages investment in sustainable energy. Business executives and investors were in rare consensus that governments must provide regulatory certainty in energy policy incentives. The long return horizons required for sustainable energy technology investments increase business concerns that governments will not honor their commitments over the long term.

Small market sizes discourage market entry. The absence of an EGS trade infrastructure, and intentional and unintentional NTBs, limits market to domestic market size. Too often this was reported to be too small to warrant market entry.

Education to change consumer behavior is critical to EGS demand. Education is necessary to create awareness. Without awareness, demand will not reach a sufficient size to pull investment through supply, trade and R&D. Awareness, however, must be coupled with the ability to of consumers to measure and understand energy and carbon footprints. Awareness should also include incentives to the end consumer for the consumption of energy produced form sustainable sources.
Key Findings in Trade

Many APEC economies want to adopt and adapt sustainable energy technologies developed in other economies. They lack the resources and expertise to develop their own sustainable energy technologies. These economies need an APEC framework for sustainable energy trade to move their economies to a sustainable future. They also want clear direction as to which standards to adopt and how to prepare their economies for continued development without being subject to the market distortions created by myopic domestic policies.

The lack of trade infrastructure is limiting investment in EGS. Free Trade Agreements have the mechanisms necessary to address trade liberalization for EGS but are silent on the matter. A real opportunity exists to use FTAs to increase market sizes, thereby promoting investment.

Intentional or unintentional protectionism pervades the APEC sustainable energy landscape. Uncoordinated, patchwork domestic sustainable energy policies have intentionally or unintentionally introduced NTBs and unnecessarily raised transaction costs for foreign enterprises.

The lack of an EGS definition inhibits trade and investment. The absence of a definition not only impedes trade, but it hinders valuation of the market for sustainable energy and EGS.
Key Findings in R&D

The critical choke point in R&D of sustainable energy is moving innovative ideas to the commercialization stage. The critical point in sustainable energy innovation is in obtaining second and third stage financing to bring ideas to market. Our research found that funds are readily accessible to bring ideas through to the pilot stage. But regulatory risks concerns and expectations of low returns discourage further investment. Additionally, since energy is regulated, opportunities for software or pharmaceutical industry-type returns are limited and risk-taking is dulled.

Sustainable energy policy incentives tend to favor large existing enterprises and MNCs, and unintentionally disadvantage SMEs. SMEs are critical to the innovation process in sustainable energy. They are more capable of incubating disruptive break-through technologies. But policy incentives favor larger incumbents. SMEs struggle with the complexities of accessing funding, negotiating government bureaucracy, and cannot benefit from tax credits.

Energy security concerns have led to unnecessary duplicative and repetitive R&D. Domestic concerns for energy diversity and security, and the absence of exchanges for the sharing and transferring of ideas, has resulted in significant levels of duplicative basic science research.
Seeking Solutions for a Sustainable Energy Future

The current level of investment is insufficient to bridge the gap between growing energy demand and energy supply. Failure to increase investment in sustainable energy promotes a status quo that is environmentally unsustainable. Progress cannot afford the luxury of negotiated solutions and incremental improvements. Failure to break the inertia of inaction and failure to provide a coordinated and certain investment framework risks cascading energy crises within APEC.

A sustainable energy future:

- Cannot be left to governments to define. Governments are notoriously unsuccessful at picking winning technologies.
- Must break the inertia of a fossil fuel past and provide opportunities for divergent and disruptive energy innovations.
- Requires integration of markets to provide scale opportunities for sustainable technologies and infrastructure for inclusive growth.
- Necessitates Nobel-caliber breakthrough in energy storage technology.
- Is defined by coordinated and collective action within and between economies and businesses.
Introduction
"Never has the world so needed leadership, imagination and creative thinking, yet never has it been so lacking, with trying to [burn their way into the future, a strategy which continues to leverage today’s energy needs on the prosperity of future generations.]"

A status quo in energy policy is not a status quo for the energy security, economic prosperity, or environmental sustainability of APEC economies; the status quo is an accelerating decline toward a global energy crisis—a crisis with consequences that transcend borders, trade lines, value chains, and populations. But there is hope. Economies and businesses are equipped with the sustainable energy solutions necessary to avert crises, and moreover, to catalyze a new global industry that could create a new era of economic and social prosperity.

At present, this bright future remains an aspiration that is quickly losing focus and promise. Businesses stand at attention, waiting to invest in sustainable energy technologies, but market distortions stymie deployment. Distorted energy prices and uncertain sustainable energy policies make the return on investment for sustainable energy unpredictable, rendering necessary technologies commercially unviable. To address price and policy uncertainties, economies must overcome infrastructure and behavior inertia that results from the legacy and influence of fossil fuels.

Simply put, we are not moving fast enough. Actual progress in sustainable energy lags the needed and aspirational goals of economies. Cynics might argue that there is much discussion and public posturing but little real progress. The current slow pace of investment in sustainable energy threatens sustained economic growth, energy security, and environmental sustainability. The time for action is now. Every failed discussion, every suboptimal compromise, every year of delay adds costs, adds complexity, and adds inertia to a world headed toward an energy crisis.
The Energy Gap

Increasing energy demands fueled by economic growth and the challenges of addressing climate change combine to create the energy crisis APEC economies now face. Domestic demands for affordable energy to address societal concerns and to promote economic competitiveness exacerbate the problem. There is consensus among researchers and analysts that every year of delay in addressing this energy investment gap puts a sustainable energy future further out of reach.

**APEC Energy Production & Net Energy Imports**
(excludes Russia before 1992; net imports include drawdown)

$15 Trillion required to meet APEC’s 2030 energy demand

$4 Trillion current worldwide investment

$500 Billion more is needed for every year of delay

Source: APEC Energy Demand and Supply Outlook, 4th Edition
Progress Towards Clean and Renewable Energy – A Very Mixed Report Card

“World nuclear generation stagnates”

“Fossil fuel production up despite recession”

“Coal use rises dramatically despite impacts on climate and health”

“Vehicle production rises, but few cars are ‘green’”

“Global warming anticipated to cause future food shortages”
The World Continues to Default to Fossil Fuel-Based Energy

Domestic concerns for energy security and energy affordability trump concerns for environmental concerns. Despite stated aspirational goals to dramatically increase the proportion of clean and sustainable energy within energy-mix portfolios, fossil fuel based energy sources continue to dominate—and in some economies, the percentage has increased. Artificially low subsidized energy prices, heavy sunk investments in fossil fuel based energy generation and transmission and delivery infrastructure for traditional energy bias R&D and supply investment decisions.

“Business as usual is environmentally unsustainable.”
- APEC Energy Demand and Supply Outlook 2009

Fossil fuel dependence risks climate and environmental devastation.
• Declines in global food production
• Rising sea levels
• More intense weather events
• Reductions in biodiversity
• Adverse health impacts

Source: APEC Energy Demand and Supply Outlook 2009

New energy production is anchored to a dirty past and sustainable energy production remains an aspiration rather than a reality.
Sustainable Energy Investments Are Flat

The unity of inaction paints a discouraging picture. While some economies (e.g., New Zealand, the Philippines, Canada, and Korea) have higher percentages from sustainable energy, the disappointing conclusion to be drawn is that there has been little progress.

![Sustainable Energy Percentage Share of Total Energy Consumption](source: World Bank World Development Indicators)
Sustainable Energy Investments Are Flat

Throughput our interviews three broad recurring themes emerged across the value chain:

- There is an almost endless supply of proposed innovative technological solutions.
- There is plenty of accessible financing.
- There are conducive government policy incentives.

The pull of these positives, however, fails to overcome the gravity of the status quo:

- **Limitations of the Balance Sheet**
  Expected returns on investment (ROI) are not high enough to encourage businesses to commit to investments in sustainable energy.

- **Undoing Existing Inertia**
  Even if ROIs were appropriate, institutional, organizational, and behavioral inertia hold economies, firms, and individuals to the status quo.
Balance Sheet Realities Are Discouraging Investment in Sustainable Energy

Executives did not list access to finance, lack of government incentives, or the supply of innovative ideas as reasons for the limited levels of investment in sustainable energy. Rather almost all executives interviewed were quick to point to poor anticipated ROI on sustainable energy projects. Real doubts about whether governments would honor current sustainable energy commitments over the long, distorted energy market prices, small market sizes, and high technology specific capital expenditures, were also listed as determining factors which discouraged investment in sustainable energy projects.

There Are...

<table>
<thead>
<tr>
<th>Plenty of Accessible Funds</th>
<th>Conducive Government Policy Incentives</th>
<th>Conducive Government Policy Incentives</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Venture capital</td>
<td>• Wind</td>
<td>• Subsidies</td>
</tr>
<tr>
<td>• Private equity</td>
<td>• Solar</td>
<td>• Tax credits</td>
</tr>
<tr>
<td>• Government grants</td>
<td>• Bio-fuel</td>
<td>• Price</td>
</tr>
<tr>
<td></td>
<td>• Hydro</td>
<td>• Guarantees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Price</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Low interest loans</td>
</tr>
</tbody>
</table>

But, firms are not investing fast enough because...

<table>
<thead>
<tr>
<th>Limitations of the Balance Sheet: ROI Dilemma</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Small and few revenue streams due to small market size</td>
</tr>
<tr>
<td>• High sunk capital expenditures</td>
</tr>
<tr>
<td>• Long expected payback periods</td>
</tr>
<tr>
<td>• Uncertainty as to commitments of governments to price guarantees, subsidies, tax credits, low interest loans</td>
</tr>
<tr>
<td>• Absence of clear market price signals</td>
</tr>
</tbody>
</table>

The best energy alternative is not necessarily the best investment alternative.
Businesses Lack Confidence that Governments Will Keep the Commitments to Sustainable Energy Over the Long Run

The single most repeated reason given by businesses for the lack of investment in sustainable energy projects was a lack of confidence in politicians. Executives expressed real fears that future concerns for energy affordability, and other domestic social priorities, would lead to changes (or discontinuance) in energy policies, such as feed-in-tariffs, subsidies, tax credits, etc., after irreversible technology-specific investments had been made. Many were quick to point to Spain’s changes in energy policies as a case in point. Many sustainable energy technologies are still maturing, which forces investors to weigh technological and market uncertainly. These are normal business risks that executives reported they are willing to take. But because government-mandated policies are so important to stimulating demand and supply of sustainable energy, political uncertainty concerns from changing government policies dominated the investment decisions.

Fears that government policies and mandates will change eliminate the chance for businesses to break even.
The True Value of Sustainable Energy Is Not Reflected in Energy Prices

Local price regulation of energy sources and electricity distort global prices for sustainable energy. Prices, based on traditional fossil fuel sources, do not account for social and environmental externalities. Businesses are obscured from real price signals necessary for investment in long-term projects.

Cost to produce fossil fuel energies
Cost to produce sustainable energies

Unpriced Externalities
Government Subsidies

Cost Seen By Customers: Price of SE >> Price of FE

Source: Adapted from IEA Energy Subsidies Report
Inertia Slows Transformation to a Sustainable Energy World

Institutional, organizational, and behavior inertia hold economies, firms and individuals to the status quo. Progress toward a sustainable energy future will not come from more funds, improved government incentives, and/or better ideas alone. It will come when the forces of inertia which are impeding the investment landscape are reduced and removed.

**Distorted Perceptions and Myopia:** The most significant sources of inertia which impede the investment landscape are distorted perception and myopia.

**Myopia plagues all stakeholders and is present in all stages of the sustainable energy value chain**

**Government policy makers:** Political expediency, incentives for re-election, the immediate need for affordable energy, and lack of political voice for the generations that will bear the future costs of the status quo contribute to a short-term focus.

**Businesses:** Firms lack real motivation to change because, on average, energy costs typically account for only a small fraction (3-5%) of total costs, and because real time measurement of energy use is not usually available.

**Families:** Energy costs are a small part of the family’s budgets, energy bills are received after usage, and lifetime costs of appliances are not easily calculated. This leads to myopic decision making.

**Businesses & consumers are isolated from real energy prices**

Businesses, investors, and consumers have distorted perceptions of real price for energy because of subsidies, government mandates and ineffective carbon pricing.

**Absence of effective measurement mechanisms**

The absence of effective measurement mechanisms for carbon accounting, other environmental and social costs, and externalities contributes to distorted perception and myopic behavior.
Inertia Slows Transformation to a Sustainable Energy World

**Dulled Motivation:** The absence of clear prices and transparent and timely measurements prevent firms, economies, and consumers from internalizing the costs of inaction. When the benefits of change are poorly understood, direct costs of change from old to new technologies outweigh anticipated benefits. Additionally, firms respond less aggressively to government incentives and mandates than they do to market prices.

**Ambiguous Creative Responses:** Real ambiguity exists in the investment landscape as to the best new technologies, the speed with which change is needed, what climate change targets should be, and how to price fossil fuels. In such an environment, it is exceptionally difficult to not only identify the right direction to follow, but also to convince others to follow.

**Collection Action Problems:** At its core, climate change and the move to sustainable energy are collective action problems. There are real incentives to shrink and benefit from the commitments of others. Progress can readily be held up by the willingness of the slowest economy, slowest firm, and slowest family to make substantial change.

**Existing Physical Infrastructure is Biased Toward Fossil Fuel Energy Sources:** Transmission and distribution systems, immature measurement devices, and insufficient storage technologies do not allow for variable energy generation or efficient consumption.

**Energy Policies Reflect Reliance on Fossil Fuels and Often Fail to Set a Course to Sustainability:** Subsidized fossil fuels and electricity prevent sustainable energy sources from becoming cost competitive.
Inertia Slows Transformation to a Sustainable Energy World

**Political Interests Prevent Progress:** Short-term political thinking, special interest agendas, and re-election concerns stall or countermand the objectives of a visionary energy policy.

**Consumer Behavior does not Reflect the True Cost of Energy:** Electricity subsidies, incentive systems, lack of visibility in energy consumption, and failure to price externalities cause consumers to use too much, too often, and discourages efficient use or conservation.

**Industrial Legacies Slow Policy Changes for more Sustainable Practices:** Economies that rely on manufacturing and heavy industry bias their energy policies to focus on short-term economic rather than social or environmental costs.

**No one wants to bear the cost of change:** Businesses and government disagree on who should pay for R&D, transmission, and distribution.

**Rhetoric is not met with action:** For all that is being said about the need for sustainable energy, little is being done. Support without action is inaction.
Differences Across APEC Economies Require Different Sustainable Energy Approaches. Some Economies Need and Want to Follow.

Research and interviews suggest that APEC economies are so substantially different that there can be no single sustainable energy solution within APEC.

APEC economies are different when it comes to sustainable energy. They...

... are at different stages of economic development.

... are endowed with different natural energy resources.

... are differentially dependent on imported energy supplies.

... have different industries and urban areas.

... have different energy needs.

... have made different investments in sustainable energy technologies.

... are at different stages of energy efficiency.

Two important implications emerge from these differences...

Some economies lack the needed resources, human, and technological and financial, to develop their own sustainable energy industries. These economies need, and want, to adopt and adapt solutions pioneered in other economies. Without adequate trade infrastructure, these economies are disadvantaged.

Differences naturally drive economies to seek individual solutions. However, the interdependent and interconnectedness of climate change and economic development necessitate coordinated action.
The Sustainable Energy Landscape in APEC Can Be Characterized as Domestically-Focused, Independent and Isolated

Our interviews and research concluded that the sustainable energy landscape within APEC is best described as a collection of economies working independently of, and sometimes at odds with, each other. “Go-it-alone” initiatives dominate the landscape. Efforts to build an APEC framework for coordinated collective actions need to be accelerated.

APEC is characterized by:

- Collection of isolated economies seeking sustainable energy solution independently.
- Focus on energy affordability and energy security first, with environmental concerns a distant consideration.
- Policy incentives focused mostly on supply-side solutions; which has typically meant a focus on more fossil.
- Reactive, uncoordinated, patchwork policies made with domestic focus.
- An urgency of ensuring energy supply security now has pushed concerns for climate change and energy efficiency to the future.
- Competition for scarce supplies for fossil fuels rather than cooperation.
- Energy solutions that focus first on exploiting national energy endowments, which are typical coal and oil solutions.
- Efforts to stimulate sustainable energy technologies domestically.
- Energy efficiency standards made in isolation.

Consequences of Isolated Independent Actions:

- Cross-border externalities-price distortions.
- Smaller potential markets.
- Duplicative R&D effort.
- Different standards.
- Protectionism and unintended NTBs.
- Fewer opportunities for trade and economic specialization.

More of the same – domestically focused independent efforts by economies to make progress toward a sustainable energy future – is not sufficient.
To achieve necessary progress in sustainable energy investment, executives and investors emphasized a need for a careful balance between government-led coordinated action and business-led innovation and entrepreneurship. Business asked for a framework to coordinate the actions of all participants—but a framework that facilitates independent and collective action toward a common goal. Importantly, businesses asked for coordinated cross-border government leadership to eliminate unintended externalities and suboptimal market performances.

**Framework for Coordinated Actions**
- Coordinated meaningful energy targets
- Implemented carbon accounting
- Efficient carbon trading markets
- Transparent energy prices
- Harmonized technical and product standards
- Integrated trade infrastructure for EGS
- Collaborative regulatory environments with multilateral policies
- Shared best practices and basic science breakthroughs

**Opportunities for Progress**
- Cross-border regulatory certainty lowers investment uncertainty
- Larger markets for EGS – scale economies and lower prices
- Productive innovative cross-border competition—more innovative solutions
- Trust, specialization, and mutual interdependence among economies, energy security and inclusive growth

An APEC framework for coordinated action is critical. But the framework must not constrain vital innovative and entrepreneurial activities essential to the development breakthrough solutions.
A Sustainable Future Depends on the Coordination of Differences

**Sustainability requires energy and economic diversity** Diverse energy demands require *diverse energy technologies* developed by businesses from different economies that participate throughout the sustainable energy value chain.

**Pathfinders should take the initiative**: Economies and businesses cannot settle for negotiated solutions. *Lead* economies must be willing and able to deploy sustainable energy solutions that others can duplicate or *follow*. Developing economies should seize opportunities to *leapfrog* fossil fuel technologies into sustainable energy futures.

**Divergence and Disruption are necessary for innovation**. Economies need momentum to overcome the inertia of the status quo. Development of diverse energy technologies can produce *breakthrough* solutions that chart new courses to a sustainable future.

**Governments are bad at picking winners**. Governments cannot idolize one form of energy at the expense of others. Over commitment can lead to underdevelopment of better alternatives, and myopic policies can create *cross-border externalities* that disrupt global markets.

**Markets can allocate resources to the best alternatives**. *Market integration* is necessary for the proliferation of innovative and successful sustainable energy technologies throughout APEC.

Different solutions for different economies must move in the same direction – a secure and sustainable future requires a coordinated plan of action.
The single most critical component in the value chain is demand. However, demand currently fails to adequately pull investment into the research and development and supply of sustainable energy. Government policies focus predominantly on supply-side solutions, and leave demand-side issues largely unaddressed.

Business executives, investors, and academics across APEC economies suggested real progress toward a sustainable energy future cannot occur without transparent energy prices. They indicated that current energy prices are too cheap and should include the cost of externalities related to fossil fuel energy generation. They recognized, however, that carbon measurement is a technological hurdle that must be overcome before a comprehensive carbon accounting regime can be implemented. Measurement alone is insufficient to stimulate demand. Awareness campaigns and end-consumer incentives must also help pull demand for sustainable energy.

Current demand for sustainable energy is influenced by short-term concern for energy affordability and fossil fuel energy security. This bias toward fossil fuels results in myopic government policies that fail to provide the necessary certainty to encourage investments in sustainable energy. When policy makers discount future consequences of fossil fuel dependence it translates into policies that force businesses to discount sustainable energy investments to a present value that fails to compare to fossil fuel investment alternatives.
Demand: An Effective Investment Landscape Needs “Proper” Demand to Kick Start the Virtuous Cycle

Demand is critical because it pulls investment across the sustainable energy value chain; it spurs innovation in research and development, provides scale efficiencies that make supply more affordable, and encourages the trade of sustainable energy technologies within and across borders. Proper demand is necessary to create a sustainable energy market that allows economies to achieve energy security in a way that also creates new business opportunities and minimizes negative environmental effects.

Furthermore, demand must be moved from “distorted” demand to “proper” demand in order to spur the virtuous cycle of a favorable and attractive investment landscape. With proper demand, willingness to pay and sufficient volumes are created. With integrated markets, economies of scale are met, costs and prices of goods and services are lowered and the businesses and consumers’ willingness to pay is increased. This makes firms’ investment in new technologies feasible, and even profitable.
The Market Is Unwilling to Pay

Complexities within markets distort energy prices, lower users’ willingness to pay for energy, and dull demand for renewable sources of energy. The diagram below maps the complexities within markets that distort energy prices and lower willingness to pay for energy, and stifle demand for sustainable sources of energy.

The market’s unwillingness to pay is caused by an unclear and complicated dynamic relationship between pricing, measurement and policy.
Market Prices Are Distorted

Based on current energy prices, fossil fuel energy is perceived as cheaper and more efficient, putting sustainable energy at a disadvantage. The high capital costs and limited scale of sustainable energy sources have them these fuels the energy matrix last.

Under the current market structure, demand for sustainable energy lags behind fossil fuel energies unless costs fall below the market price for energy.
Users Do Not See the True Price of Fossil Fuel Energy Due to Subsidies and Poor Carbon Accounting

Consumers think of low energy prices as actual prices. Heavy subsidies and a lack of carbon accounting make fossil fuel energy the affordable and attractive choice over renewable energy.

Current energy prices are artificial. Due to significant price differences between sustainable and fossil-based energy, there is a general preference for fossil-based energy.
Global Subsidies in Fossil Fuels Far Outstrip Those in Renewables

Governments subsidize fossil fuels through tax credits and direct subsidies in sums that dwarf sustainable energy credits. The gulf between fossil fuel and sustainable energy subsidies widens rather than narrows. These conflicting government actions only serve to entrench inertia and traditional fuels.

Reducing government subsidies in fossil fuels and increasing those in sustainable energies will reduce price discrepancy and increase sustainable energy demand.

“The global direct subsidy for fossil fuels is around 10 times the subsidy for renewable”
- CEO, Energy Finance Research Firm

Source: Bloomberg New Energy Finance
Artificial Energy Prices Discourage Investment in Sustainable Energy

Without “proper” global energy prices, firms lack clear and credible targets.

A major Peruvian alternative energy producer has chosen to delay investment in high-value production of sugarcane based ethanol despite superior technology, available funds and available land. U.S. produced ethanol is cheaper because U.S. subsidies to corn based ethanol producers have distorted global market prices.

Heavy government subsidies in China to stimulate investment in sustainable energy are being challenged at the World Trade Organization. Challengers argue that these incentives have allowed Chinese firms to produce goods at below fair market prices. U.S. unions complain that U.S. firms are not making new investments and jobs are being lost.

Subsidies and tariffs help an economy to develop a sustainable energy industry. However, economies must recognize when to act to prevent market price distortions.
Low Energy Prices Do Not Incentivize Users to Change Consumption Pattern

On average, energy costs account for a mere 3-5% of user budgets. Low energy costs cause users to overlook improving efficiency, and in many cases, the cost of improvement outweighs the benefit. As a result, there is little incentive for users to change behavior.

“Pricing drives consumer choice and it’s how the government drives consumer behavior.”
- Executive, Advocacy group, New Zealand

“Spending the time to change my employees’ electricity usage is not relevant because the bill isn’t that high. Instead, I try and make them more aware of saving costs related to paper or other more expensive costs.”
- President, SME, Japan

Although considered to be the “5th Fuel”, energy efficiency’s potential positive impacts, when improved upon collectively, are underestimated and therefore neglected.
Awareness, by Itself, Fails to Create Strong Demand

Awareness comes when users understand and are able to measure their energy consumption. Awareness by itself, however, is a soft driver. Aware users must be able to see the benefit of cost saving from sustainable energy goods/services to change their behavior. Social responsibility by firms and individuals, while important, is insufficient to create changes in buying behavior. Economic incentives must be aligned with the change in behavior.

Education + Measurement = Awareness

Awareness + Benefit = ΔBehavior

Change in user behavior is critical to creating demand for sustainable energy. Educating users, providing them with ways to measure consumption and incentivizing them will bring about behavioral change.
Lack of Effective Measurement Distorts Demand for Sustainable Energy

The absence of effective measurement mechanisms allows for misperceptions to continue and dulls the incentive for change. Without measurement, externalities cannot be priced. In user markets, where energy is billed after usage, users lack timely and useful information to effect change.

<table>
<thead>
<tr>
<th>ISSUE</th>
<th>CONSEQUENCE</th>
</tr>
</thead>
</table>
| **Externalities (e.g., carbon, social, and cross-border impact) are not accurately measured**  
  - Universally agreed upon standards for carbon accounting do not exist (lack infrastructure and measurements).  
  - Carbon monitoring can be expensive, bureaucratic and typically inaccurate. | **Externalities are not priced or priced inaccurately.**  
  - Externalities are difficult to effectively measure.  
  - Progress on pricing of externalities has been mixed. |
| **Users lack transparency in energy usage** | **Consumers are unable to make informed decisions about energy use and thus use remains higher than necessary.** |
| **Users are concerned with the upfront costs versus lifetime costs**  
  - Users lack awareness of financial and social benefits to make informed decisions in appliance and equipment purchase. | **Lack of awareness reduces demand for energy efficient goods & services.** |
Myopia Plagues Stakeholders Across the Sustainable Energy Value Chain

Short-term decision making biases affect government policy makers and energy consumers. Policy makers lack credible forces to make them take the long view. The relative small impact energy has on business and family budgets means consumers are prone to make myopic decisions.

- **Govt.**
  - Political expediency
  - Incentives for re-election
  - Children and future generations don’t vote
  - Provision for affordable energy, NOW

- **Business**
  - Energy is only a small percentage of total costs (3-5%)
  - Real time measurement of energy use not typically available

- **Families**
  - Energy is small part of family budgets
  - Energy bills are received 45 days after usage
  - Lifetime costs of appliances not easily calculated

- **Renters**
  - Split incentives
  - Landlords seek total upfront cost minimizing investment not lifetime cost minimizing investments
  - Tenants prefer low cost appliances, buildings, etc. but they don’t make the investment decisions

Without accurate measurement, users cannot assess long-term consequences when making decisions.
The Relationship Between Governments and Markets

4 Critical Facts that Make Sustainable Energy an Intractable Problem

1. **Markets** geared towards economic results do not produce the desired sustainable outcome.

2. **Governments** and society at large do not have the luxury to wait for markets to incorporate information and work out inefficiencies. However, governments must use markets to accomplish social and economic objectives.

3. Picking industrial winners nearly always fails; **Governments** must influence markets without dictating outcomes.

4. **Governments** have been unable to decide upon a clear and ambitious environmental goal.

The unclear future direction of sustainable energy markets has led to high uncertainty and a lack of investor confidence. Governments and markets must work together to resolve this.
The Visible Hand Is Required to Assist the Invisible Hand

Because market mechanisms do not work to produce clear pricing signals, governments must influence market behavior with policy. However, real challenges are faced by governments in creating transparent, effective and coordinated policies to influence energy markets. Problems begin with setting appropriate targets for achieving climate changes and meeting domestic concerns, and proceed to challenges of formulating consistent energy policies that influence markets in intended ways.

Sustainable Energy Investment Framework

**TARGET**
Clear, ambitious

**3C POLICY**
Clear, certain, comprehensive

**PRICING**
Carbon accounting

**STANDARDS**
Market improvement

**INCENTIVES**
Consumer Action

**ENFORCEMENT**

"It is more important than ever that participants send a strong, indicative and ambitious signal that can guide energy investment and policy decisions globally."

- IEA Chief at COP15 (via Wall Street Journal)

"The role of the government is as a facilitator, enabler and lawmaker."

- Former Executive Committee Member, Large Energy Infrastructure Company

Since markets are not naturally moving toward the use of sustainable energy goods and services, the government needs to help create demand to pull investment into sustainable energy.
Creating Clear, Comprehensive, and Certain Energy Policies Has Not Been an Easy Task!

Cross-Border Externalities

Patchwork Energy Policy

- Unclear environmental goals
- Decision-making myopia
- Conflicting priorities
- Special interest lobbying
- Lack of political will

BARRIERS

Comprehensive
Clear
Certain

3C Policy

Achieving a 3C Policy is a challenging task. The current government profile produces disjointed patchwork domestic energy policies and cross-border externalities. In effect, governments are sending confusing signals to the market. Additionally, some policies (tax breaks, subsidies) are biased towards bigger companies.
Governments must influence the business environment by deciding on ambitious targets that direct individual policy frameworks and encourage investment in sustainable energy.
Markets for Sustainable Energy Are New and Small
By definition, markets for new untested technologies will be small, especially new renewable energy technologies. However, in order to be competitive with lower priced fossil fuel based energy, new technologies must achieve scale economies quickly to lower prices. But this is difficult where market access is limited by unintended barriers in the form of technical requirements, labeling, etc. In some cases, anticipated small market size can discourage further investment in promising technologies.

“The solutions and the technology are there. What is lacking is the ability to scale up.”

- Executive Director, UN Global Compact  (via NY Times)

Integration of markets for new sustainable energy goods and services is critical to allow scale economies which lowers costs and prices, in turn creating increased demand.
Small Markets Have a Paralyzing Impact on Investment Decisions Within Firms

Minimum efficient scale often requires a large share of domestic markets which are not achievable and hence investments are not made. An ability to access multiple markets simultaneously at low transactions costs changes the investment decision logic. Tariffs and NTBs, such as inharmonious standards, inhibit market integration and result in numerous small markets.

Reducing trade barriers will increase investment decisions in sustainable energy since businesses will be able to earn a faster ROI.
What Businesses Want

**Targets & 3C Policy – Govt. Influence in Setting a Framework**

75% of survey respondents listed the need for targets and clear, comprehensive and certain policy as necessary to set a direction for investment.

**Pricing that Makes Comparison Fair**

Reduction in the subsidy gap between sustainable energy and fossil fuels as well as the inclusion of a fair cost of carbon.

**Incentives Founded on Clear Awareness and Measurements**

Government promotion of standards and incentives allows business to market their goods and services to an aware demand base.

**Regional Standards to Grow Market Size**

Common standards will make markets more accessible, grow the market size and cut transaction costs.
Best Practices

MEASUREMENT
China and various states in the US have begun installation of smart grids and smart meters. This will enable consumers to measure their electricity usage as well as the costs associated with such usage.

EDUCATION
Chinese Taipei has created awareness through a green store program with 7-Eleven and Family Mart that visually promotes awareness in EGS. If products are certified by the EPA with a low carbon footprint, they may be placed in a segregated left-side product aisle and consumers are taught, “Left is right, and right is wrong”.

GOV’T. LED DEMAND
Australia’s Government creates demand by requiring all its buildings to meet NABERS environmental standards.

PRICING
Nova Scotia, one of Canada’s provinces rich in coal resources, has put legal carbon constraints in place to move carefully and economically away from its heavy coal use. “There is money to be made under the legal carbon constraints. It’s an advantage no one has. When you have clarity and certainty of law, investment decisions can be made.”

MARKET SIZE
New Zealand adopts Australian standards to grow market from 4 million to 26 million.

EFFICIENCY
The 2008 installed base of one product line from a large energy company saved an estimated 170 terawatt-hours of electric power, equivalent to taking more than 35 million European cars off the road for a year.

POLICY
Many economies cited Germany’s energy policies as their model to achieve energy sustainability while stimulating business.
ENERGY EFFICIENCY
The issues we have listed in demand - pricing, awareness, measurements, and market aggregation – exist largely because business leaders and government have performed impressively in regard to fossil fuel development. They have created affordable energy and distributed it so effectively that many people no longer consider energy an issue. They have constructed infrastructures that make fossil fuel energy easily distributed and locally accessible. These decision variables are what sustainable energies must match to build demand. While it will take time to achieve results because consumers are entrenched in a fossil fuel market, energy efficiency highlights a solution that is less sticky and can produce significant results immediately.

The simplest idea that outlines the importance of energy efficiency is, “a kilowatt saved is a kilowatt earned.” This means that the less energy that economies require to function, the less reliant they are on any single energy source. This directly translates into a reduced commitment to fossil fuels, willingness to explore innovative sustainable energies, and energy security.

The investment barriers that exist for sustainable energy across APEC’s virtuous cycle are comparatively, but not completely, reduced in the energy efficiency realm, particularly on the demand side. In the US. alone, energy efficiency measures are estimated to produce $1.2 trillion in savings from $520 billion in investment.

R&D: New technologies exist as exhibited in LED lighting and energy efficient home appliances. However, even older technologies such as insulation methods and double paned windows have not been implemented across the APEC region and could contribute significant energy reduction.

Supply: Producers of existing technologies already have profitable domestic markets. The issue remains that newer technologies are more expensive and still need incentives to counter high costs.

Trade: Electrical standards are largely consistent across economies and energy efficiency goods and services are energy agnostic. In other words, energy efficiency provides savings regardless of whether the energy is produced by fossil fuels or sustainable energies.

Demand: Although energy efficiency can require costly retrofits across large projects, there are many steps that consumers and individual businesses may take with small investments and shorter payback periods.
Energy Efficiency = Energy Security + Economic Development + Climate Change

ENERGY SECURITY
Reduced reliance on imported energy sources.

ECONOMIC DEVELOPMENT
Buffer against all rising energy prices.

CLIMATE CHANGE
Highest potential near-term to mitigate CO₂ emission.

Energy efficiency must be viewed as an unique opportunity to improve security, economic development and climate change.
Energy Efficiency: The 5th Fuel

Energy efficiency has been described as the “5th Fuel” (behind fossil fuels, renewables, clean, and clean fossil fuels). Several interviewees felt this was an area with quick and tremendous impact that business could attack first to address sustainable energy issues.

The American Council for an Energy–Efficient Economy estimates that energy efficiency can save $168.6B, reduce greenhouse gases by 262 million tons, and create 220,000 jobs by the year 2020. Energy efficiency reduces the gap between supply and demand and can be adopted by every economy.

“Turning off lights when leaving [the] room is common sense, not energy efficiency.”
- President, Energy Efficiency Firm

The EU and other parts of the world have started implementing energy efficiency standards and goals. APEC will fall behind if it does not recognize the opportunity in energy efficiency.
Energy Efficiency = Energy Security + Economic Development + Climate Change

“Energy saved is energy generated” and efficiency should be considered as a source of sustainable energy. Barriers, however, prevent efficiency from achieving its potential. Governments should adopt from research by APEC, IEA and ARUP to reduce barriers that hold back investment.

The cost of the [efficiency] solution is less than 15 percent of the capital required to build a conventional fossil fuel power plant to produce this much power... The payback period is 18 months.

- Press Release, Large Energy Infrastructure Company

Energy efficiency must be viewed as a unique opportunity to improve security, economic development and climate change.
Energy Efficiency Is Hindered by Market Barriers & Market Failures

- **Low Priority of Energy Issues**: Energy Costs (~3-5%) are low relative to other costs and are ignored.
- **Access to Capital**: Domestic and small business users face higher financing costs than large companies.
- **Incomplete Markets**: Efficiency is a secondary attribute to other product features.

**MARKET BARRIERS**

- **Split Incentives**: Split Incentives push participants towards different goals. Ex: landlord (min. cost) – tenant (max. efficiency).
- **Unpriced Externalities**: Externalities like carbon emission costs are not factored into company accounting.
- **Insufficient Information**: Consumers are poorly informed and have misconceptions, especially about the price of efficiency.

**MARKET FAILURES**
### Issues in the Investment Landscape Are Addressed by Energy Efficiency

<table>
<thead>
<tr>
<th>Business Issue</th>
<th>Effect of Energy Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Businesses do not want to invest because of the high level of uncertainty created by government policy.</td>
<td>Unlike investing in a plant, capital costs are lower and results are immediate and certain. Paybacks have been seen in as low as 18 months.</td>
</tr>
<tr>
<td>Energy prices are too low.</td>
<td>No matter what the market charges, using less energy saves money. As prices rise as expected, even greater savings make energy efficiency attractive.</td>
</tr>
<tr>
<td>Energy security comes first and environmental concerns are last.</td>
<td>Energy efficiency reduces the rate of consumption, effectively providing greater supply and security in the future.</td>
</tr>
<tr>
<td>Markets are not big enough.</td>
<td>Energy efficiency goods and services can be easily aggregated across economic markets.</td>
</tr>
</tbody>
</table>
Corporate Commitments to Sustainable Energy Policies

Global firms that implement sustainable energy policies in order to cut costs have found unexpected benefits in scale, particularly in global operations.

A large mass market retailer was interested in energy efficiency from a cost perspective - energy is the second largest operating expense and reducing cost is essential. Disparate costs between economies made LED lighting uneconomical in its home economy but not in another economy which has electricity prices that are 2-3x more expensive. Interestingly, as scale of LED purchases has brought costs down on the LED lights, the retailer has found that prices are now cheap enough to be implemented in their home economy. The company has set goals to be 20-35% more energy efficient by 2012 and to have a 2% GHG reduction by 2012. Such leadership is a powerful example showing that sustainable energy measures can have a positive impact on financial results.

“People need to focus on life cycle costs rather than short term (installation or purchase) costs. Even though these products have more upfront costs, the payback on them are ridiculous – 2 years. It is like forcing people to save money.”

- VP Construction Development, Mass Market Retailer

Commitments to sustainable energy policy by global firms have revealed new opportunities. Businesses are finding true financial gains when they implement a sustainable energy policy.
INTRODUCTION: R&D

The potential for sustainable energy to create new jobs, new industries, and new wealth motivates increasing investment in the research of new technologies that support a sustainable energy future. Despite the pomp and circumstance of initial investment, few projects mature beyond their infancy. The price and volume mandates of returns on investment stymie the development of commercialized technologies, effectively leaving the sustainable energy landscape fallow. Commercialized innovations are predominantly improvements to existing fossil fuel technologies or more mature renewable technologies such as wind and solar. Unclear prices and uncertain government policy make return on investment unpredictable and render many new innovations economically unviable to commercialize.

A vicious cycle that prohibits innovations from coming to the market consists of three main factors:

- Myopic Policies
- Fragmented Markets
- Perpetuating Inertia

Our research highlighted a couple of catalysts that can help APEC economies break out of this cycle and facilitate the introduction and commercialization of innovations:

- Creating sustainable R&D ecosystems.
- Encouraging economies to contribute to all parts of the R&D value chain

These catalysts will create an environment that will maximize use of research funds and resources. By leveraging the diversity, expertise and resource of each economy, many more opportunities for real innovations and commercialization will help these new breakthrough technologies to succeed.
Sustainable Energy Attracts Increasing Investment in Research for Innovative Technologies, but Few Projects Reach Commercialized Development

Global corporate investment in the supply of sustainable energy reached a high in 2008, but corporate investments were affected by the world economic downtown in 2009. Fortunately, government increased investments in this sector, raising 2009’s total sustainable energy R&D investments.

“"The money is there. It's the other things [like laws, government policies] that stand in the way.”
- Executive, Utility Company

“The major economies’ ‘green stimulus’ included $27.1 billion – although only a small part of this was actually spent during 2009.”
- Global Trends in Sustainable Energy Investment 2010, Bloomberg

Investors are confident that investment in sustainable energy will continue to grow, especially with aid from government incentives.
Insufficient Transmission and Distribution Infrastructure Limits the Supply of Energy

Economies have different needs, motivations, factor endowments, industrial capabilities, and talent availability. Economy differences define what businesses will innovate and where they will focus in the R&D value chain.

There is no single sustainable energy solution.
Current APEC Initiatives Are a Good Start, but Not Enough

What ABAC economies are doing:

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>...the Research and Development Tax Concession is... which allows companies to deduct up to 125% of qualifying expenditure incurred on R&amp;D activities... A 175% Incremental (Premium) Tax Concession and R&amp;D Tax Offset are also available in certain circumstances</td>
</tr>
<tr>
<td>Canada</td>
<td>In the 2009 Budget, the government provided nearly US$988 million for a Clean Energy Fund to support the research, development and demonstration of clean energy technologies.</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>The government will invest about US$930 million in seven core technologies...to improve the energy efficiency of the most energy-intensive appliances, and green home appliances.</td>
</tr>
<tr>
<td>New Zealand</td>
<td>In 2008, central government funding for energy research and development, through the Foundation for Research, Science and Technology, was US$13.6 million. ...It also funded the National Energy Research Institute through a US$1.1 million grant.</td>
</tr>
<tr>
<td>Singapore</td>
<td>SERIS will invest US$100 million in solar energy research (SERIS 2009).</td>
</tr>
<tr>
<td>United States</td>
<td>Manufacturers of renewable energy technologies are also eligible for tax credits under the Recovery Act to offset investments in new or expanded manufacturing capacity.</td>
</tr>
</tbody>
</table>

Source: Adapted from APEC Energy Overview 2009

Research that leads to commercialized innovations can redefine the energy landscape.
Divergent and disruptive innovations are needed to overcome the inertia of traditional fossil fuels and can provide diverse solutions for different energy needs. Innovations will also create opportunities for economies to pursue pathfinder approaches that others can follow and can lead to leapfrog opportunities for developing economies that wish to jump over fossil fuels, ahead to a cleaner future.

Research that leads to commercialized innovations can redefine the energy landscape.
Differences Generate R&D Breakthroughs and Momentum for a Diverse and Sustainable Energy Future

Development requires investors to evaluate consumer willingness to pay and potential market size for innovations. Myopic government policies often render innovations economically unviable due to energy price distortions and uncertainty of government commitments to sustainable energy.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Research</th>
<th>Development</th>
<th>Commercialization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Idea creation &amp; refinement</td>
<td>Prototyping, technology demonstration and commercialization</td>
<td>Technology commercialization and deployment</td>
</tr>
<tr>
<td>Investment decision criteria</td>
<td>Technical feasibility</td>
<td>Return on investment (ROI)</td>
<td>Deployment capability</td>
</tr>
<tr>
<td>Challenges</td>
<td>Resource &amp; talent availability</td>
<td>Government influence on price</td>
<td>Commercial partnership</td>
</tr>
<tr>
<td></td>
<td>Market size</td>
<td></td>
<td>Government partnership</td>
</tr>
<tr>
<td>Funding per project</td>
<td>$</td>
<td>$$$$</td>
<td>$$$$$$$$$$$$$$$</td>
</tr>
<tr>
<td>Opportunities</td>
<td>Many</td>
<td>Few</td>
<td>Rare</td>
</tr>
</tbody>
</table>


Commercial potential dissipates with price and volume uncertainty.
Myopic Policies Create a Cycle of Dependence on Fossil Fuels and Stymies Innovation Breakthroughs

Myopic domestic policies distort global energy prices and create an uncertain investment environment for investors seeking to commercialize new innovations in sustainable energy research. Distorted pricing and restricted market access present challenges to investor balance sheets that can prevent SMEs from competing. Larger firms are able to mitigate some of the uncertainty risks, which allows them to compete in a research and development environment defined by incumbent technologies. Incumbent innovations influence continued myopic policy that limit opportunities for divergent and disruptive technologies.

Breaking this cycle of myopic policies is vital to the creation of true innovations.
**Myopic Policies Distort Prices and Increase Investment Risk Due to Uncertainty**

- **Domestic energy policies create unintended cross-border externalities.** Subsidies and regulated prices for specific sources of energy can distort global pricing and discourage R&D across borders.

- **Governments are not successful at selecting technology winners.** Overinvesting in one form of energy for the sake of others can cause promising technologies to be overlooked and prevent the benefits of diversification.

- **Protectionist measures only exacerbate market distortions.** Economies interested in growing specific industries create barriers to trade that prevent specialization and sharing of knowledge and technology.

- **Patchwork policies create unintended market distortions.** Businesses distrust governments long term commitments to sustainable energy policies such as subsidies, tax credits, and low interest loans. This discourages investment in capital intensive, long-payback projects.

- **Energy security concerns lead to duplication of basic research.** Economies pursue the same technologies because of concerns for energy security. This inhibits specialization and leads to duplicative efforts.

Clear, certain and comprehensive policies are necessary to increase the likelihood of investment in R&D.
Industry Protectionism and Unpriced Externalities Prevent Sustainable Energy from Reaching Attractive Consumer Price Levels

Energy prices are distorted by industry protectionism measures from subsidies and tax incentives that protect existing industries. Sustainable energies are already disadvantaged by higher production costs and are further hampered by the higher incentives toward fossil fuels.

Cross industry externalities can limit investment in R&D of sustainable energies, since it makes sustainable energy costs even more unattractive.

Heavily subsidized energy from fossil fuels discourages businesses from investing in R&D for sustainable energies.
Consumers Use the Cheapest Energy – Unilateral Policies Can Create Market Distortions that Destroy Comparative Advantages Across Borders

Domestic energy policies can create unintended cross-border externalities that discourage R&D investments in global economies. Economy specific advantages (e.g. factor endowment, labor costs) can be negated by international unilateral policies and regulations that hinder the competitiveness of domestic industries.

A major Peruvian alternative energy producer has chosen to delay investment in high volume production of sugarcane based ethanol. Despite superior technology, available funds and available land, the firm decided NOT to invest. US subsidies to corn based ethanol producers have distorted total market prices.

Myopic unilateral policies can create cross-border externalities that discourage investment in otherwise profitable sustainable energy projects.
Energy Security Concerns Lead to Duplicated Efforts

Energy security concerns drive economies to incentivize R&D research in many renewable technologies, which results in duplicative basic research.

<table>
<thead>
<tr>
<th></th>
<th>Wind</th>
<th>Solar</th>
<th>Biomass</th>
<th>Hydro</th>
<th>Geothermal</th>
<th>Ethanol</th>
<th>Nuclear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>South Korea</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>US</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**The good**: Duplicative R&D efforts can fuel market competition, accelerating the pace of technology development.

**The bad**: The resulted duplicative R&D leads to redundant efforts and standard adoption issues, wasting not only valuable resources, but also the time needed for a sustainable energy technology to be commercialized.

Source: APEC Energy Overview 2009

While competitiveness is needed to stimulate and motivate R&D activities, sharing of basic research breakthroughs would enhance R&D development and significantly reduce the required time and efforts in R&D.
Myopic Policies Limit Market Access and Constrain Business Opportunities

Regulations can lead to market fragmentation. Different standards, NTBs, Tariffs, and inconsistent certifications restrict trade, shrink markets, and limit opportunities for technological deployment.

Demand is not leading the way. Absence of clear prices, measureable energy consumption and carbon creation, and misaligned incentives lead to anemic demand for sustainable energy. If there is no demand, there will not be commercialized deployment of new innovations.

Regulated markets decrease profit opportunities for newcomers. Unlike other high potential industries, like the internet and telecommunications, where free markets can create instant success and high rewards, energy products are considered a merit good, and governments set prices, potentially suppressing revenue streams. This dulls the incentives for entrepreneurs to engage in “out of the box” R&D, and to take truly innovative risks. Empirical research informs us that truly disruptive breakthrough innovations rarely come from industry incumbents.

Talent pool is limited. Regulations that limit market access also prevent the sharing of knowledge and technology needed to encourage R&D across economies.

Research that leads to commercialized innovations can redefine the energy landscape.
Energy prices are low and payback periods are too long for sustainable energy projects to provide acceptable ROI. This leads to problems with anticipated ROI in terms of length and size of return.

In order to resolve the problems with anticipated ROI, our interviewees reported that government subsides, tax credits, research grants, infrastructure development and price guarantees are necessary to encourage R&D investment.

Our interviewees reported that they are not biased toward more investment in hydrocarbon based energy projects. Once the ROI problem is resolved, businesses will be more likely to invest in sustainable energy R&D.

“No, a project is a project. They’re not that different from a financing point of view … they are pretty much the same [to us].”

- Senior Manager, Energy Company, Korea

The desirable ROI through government assistance is necessary to encourage R&D investment.
Investors Do Not Invest Enough Because They Perceive Sustainable Energy to Have a Limited Upside and Longer Payback Periods

The longer payback periods for sustainable energy projects are made even more unattractive from the perception of limited upside potential due to regulation.

The preferred investment opportunity has an extremely high upside potential and a short payback period.

But sustainable energy projects have longer payback periods and limited upside potential due to low energy prices.

Investors see sustainable energy R&D as an unattractive investment opportunity because high investment costs and regulated prices lead to longer payback periods. These indicators signal a lack of special investment opportunities and limits R&D investments.
Differences Generate R&D Breakthroughs and Momentum for a Diverse and Sustainable Energy Future

Fragmented markets decrease smaller companies chances of success. Larger firms are able to access larger markets and have diversified product and service offerings that can offset more risky sustainable energy projects. SMEs do not have the same advantages.

Market structure hinders the development of innovating SMEs. The resource and commercialization advantages of multi-national corporations can make R&D seem like an insurmountable challenge for developing economies and small medium enterprises.

Incumbents’ technologies dominate R&D. The market access and risk mitigation advantages of large incumbents unintentionally concentrates R&D around existing, proven technologies.

Intellectual property protection is vital. Although IP issues vary across economies, IP protection and enforcement do impact sustainable energy investment and commercialization, especially for SMEs with less resources to spend on expensive litigation. If IP enforcement is too cost prohibitive, SMEs will fail to compete, again limiting R&D to proven technologies.

“IP costs are a huge part of our budget, 30% of it. It causes me great concern.”

- CEO, Small Energy Product Company

Because advantages in risk mitigating portfolios affect the ability to deploy in global markets, larger firms are better positioned to engage in sustainable energy R&D than SMEs.
R&D Efforts for Small Companies Are Large Undertakings

Large R&D investment is especially difficult for smaller companies due to insufficient resources, human capital and market access.

<table>
<thead>
<tr>
<th></th>
<th>Idea source</th>
<th>Resources</th>
<th>Talent</th>
<th>Market Access</th>
<th>Investment Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Multinational Corporation (MNC)</td>
<td>Many R&amp;D ideas from all over the world.</td>
<td>Funded by income of broad product portfolio. Have commercialization resources.</td>
<td>Best specialist from around the world.</td>
<td>Deploys &amp; commercializes innovation to global markets.</td>
<td>Likely – have better chance to recover investment costs.</td>
</tr>
<tr>
<td>Small Medium Enterprise (SME)</td>
<td>Few R&amp;D ideas from local regions and experience.</td>
<td>Limited R&amp;D funds, infrastructure and ability to commercialize innovation.</td>
<td>Regional talent might not be trained for R&amp;D.</td>
<td>Regional markets only.</td>
<td>Unlikely – due to inability to recover costs.</td>
</tr>
</tbody>
</table>

A large auto manufacturer has made a strong investment in every possible area of alternative energy they come across. The belief is that every region of the world will have conditions that are better suited for some technologies than others, so there will be a market for the majority of their development efforts.

Developing economies and small and medium enterprises are often discouraged from investing in R&D due to the financial risk of competition from developed countries and multinational corporations. Large companies tend to improve their existing portfolios, and thus, unintentionally concentrate sustainable energy R&D around existing technologies.
Our team discovered that there are no significant sustainable energy IP protection issues. Opportunities for strong IP protection and enforcement has the potential to spur innovation as seen in the pharmaceutical industry.

The pharmaceutical industry is similar to the sustainable energy industry:
1. Investment in R&D is very costly
2. The process of innovation is risky and outcome is uncertain

To resolve these two major issues, the pharmaceutical industry has adopted strong IP protection and enforcement practices.

The strong and comprehensive IP laws mitigate the huge costs and economic risks of modern research and has spurred new innovations and creativity.

Policymakers must carefully consider how to set effective IP policies to increase the confidence and certainty investors require.
What APEC Can Do: Create Catalysts for Investment Flow in R&D

From our research, there are certain catalysts that can increase the anticipated ROI and participation in the R&D value chain. These catalysts are:

- **Creation of sustainable R&D ecosystems** – business environments that have access to rich talent pools, operational infrastructure, supportive policies, and partnership opportunities can foster innovation and accelerate the development of sustainable energy breakthroughs.

- **Encourage developing economies and small enterprises to participate in the R&D value chain** – providing the tools and opportunities for developing economies and small enterprises to participate in research and development in smaller more manageable sections would increase the likelihood of success. Because each economy and company has its own unique skill sets and resources, creating an environment that allows each to leverage its unique advantages can help develop true innovation breakthroughs.
Catalyst #1: Creating Sustainable R&D Ecosystems

Governments are not equipped to pick winning technologies. However, governments can influence successful development by creating business environments that foster talent for technology-agnostic innovation, encourage commercialization partnerships, and provide infrastructural support.

**Recommended self-sustainable R&D Ecosystem:**
- Gov’t sets overarching 3C policies and provides incentives that facilitate growth in the sustainable energy industry.
- Government provides research grants to develop specific technologies and industries. These grants only provide a short term benefit for the grant recipients, and no investments are made to upgrade the economy’s infrastructure and talent pool.
- Government provides opportunities for researchers and commercial partners to connect and commercialize innovations.

**Traditional government mandated linear non-sustaining R&D:**
- Government dictated R&D
- Industry falters once government support and funding are removed.
  - [Solar Industry – 1980’s US]
  - [Subsidized biodiesel – US]
- Wasted funds, talent and time.

Rather than spending funds and resources on government chosen technology projects, the same amount of funds can be used to develop and upgrade the economy’s infrastructure and talent pool, and create a investment friendly environment that stimulates market-driven research and development. This will create a self-sustaining R&D ecosystem that will lead to a growing sustainable energy industry.
Best Practices: Singapore Created a Sustainable Ecosystem for R&D Investment

Singapore is a hot bed for sustainable energy R&D due to its technology agnostic investment policies and incentives that encourage innovative firms.

<table>
<thead>
<tr>
<th>Incentives</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax incentives</td>
<td>✓</td>
</tr>
<tr>
<td>Education Programs</td>
<td>✓</td>
</tr>
<tr>
<td>3C Policies</td>
<td>✓</td>
</tr>
<tr>
<td>Talent Development</td>
<td>✓</td>
</tr>
<tr>
<td>Commercial partnerships</td>
<td>✓</td>
</tr>
<tr>
<td>Easier Access to Capital</td>
<td>✓</td>
</tr>
<tr>
<td>Technology Agnostic</td>
<td>✓</td>
</tr>
</tbody>
</table>

“Singapore wants to maintain inclusion and take a leadership position [in sustainable energy goods and services.] To do so, [it] tries to attract R&D. It uses tax incentives, education policies, and government projects to encourage corporations to use Singapore as a research center and regional hub. It’s already attracted the largest solar panel company in the world, and two of the world’s leading wind turbine producers...It attracts many types of energy because it has little vested interested in specific energy sources due to limitations on factor endowments.”

- Officer, Energy Authority

Hard asset (factor endowment) constrained economies can create a sustainable ecosystem that utilizes their soft assets (people, 3C policies, finances) and attract foreign investment.
Best Practices: California, USA Incentivizes Energy Efficiency for Utility Companies

Decoupling, a regulatory tool that separates utilities’ profits from sales, incentivizes energy efficiency for utility companies. Decoupling provides stability in revenue expectations by setting preset prices and usage for electricity. Utilities that engage in energy efficiency programs have the potential to increase sales revenue while simultaneously reducing energy use through this regulatory tool.

<table>
<thead>
<tr>
<th>Incentives</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax incentives</td>
<td>✔</td>
</tr>
<tr>
<td>Education Programs</td>
<td>✔</td>
</tr>
<tr>
<td>3C Policies</td>
<td>✔</td>
</tr>
<tr>
<td>Easier Access to Capital</td>
<td>✔</td>
</tr>
<tr>
<td>Technology Agnostic</td>
<td>✔</td>
</tr>
<tr>
<td>True Energy Prices</td>
<td>✔</td>
</tr>
<tr>
<td>Policies Guaranteeing ROI</td>
<td>✔</td>
</tr>
</tbody>
</table>

“Conventional utilities make money based on how much energy they sell, so it is not in their best interest to be energy efficient and sell less energy. However, California is a “decoupled” state – and has a structure that penalizes for excess energy usage and rewards for energy saved. It also has a payment structure that guarantees return on investment (over time) for infrastructure upgrades. This really motivates utility to invest in upgrades for more efficient equipment and renewable energy sources rather than selling more energy”

- Expert, Utility Company

The right policies and incentives can create new markets that encourage innovations in sustainable energy R&D.
Catalyst #2: Encourage Developing Economies and Small Enterprises to Participate in the R&D Value Chain

Developing economies and small enterprises face additional hurdles for investment in R&D because of competition from developed economies and multinational corporations. Opportunities exist for SMEs and developing economies to participate in specific portions of the value chain where they have a competitive advantage and pursue commercial partnerships for remaining areas of the value chain.
Best Practice: Korea Became a Prominent Player in Nuclear Power Plant Industry

After 40 years of investment in nuclear technologies, South Korea has evolved from a technology importer to becoming a premier supplier of nuclear power technology.

<table>
<thead>
<tr>
<th>Resources</th>
<th>Before</th>
<th>Action</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor Endowments</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Talent (Researchers)</td>
<td>X</td>
<td>Import and invest</td>
<td>✓</td>
</tr>
<tr>
<td>Technology</td>
<td>X</td>
<td>Import and develop</td>
<td>✓</td>
</tr>
</tbody>
</table>

Issues

| Energy Security    | ✓      | X                     |

“The United Arab Emirates had chosen a South Korean-led consortium for a $20 billion contract to create the first nuclear power reactors in the Middle East. The Korean consortium beat out a General Electric-Hitachi team and a French consortium that included Électricité de France and Areva. [Under the deal announced in Abu Dhabi on Sunday,] Korea Electric Power will lead a group [that includes Westinghouse, the American subsidiary of Toshiba,] in designing, building and helping to operate four 1,400-megawatt nuclear power plants for the Emirates Nuclear Energy Corporation.”

- NY Times 12/27/2009

South Korea placed strategic investments in R&D to change its energy portfolio, strengthen its talent pool, and become a technology leader in nuclear energy technologies.
Stories of Hope: Innovations by Small Medium Enterprises – Waste to Biofuels

Small companies can exploit weaknesses in current energy supply chains through innovative technologies. By seeking alternative sources to create useable energy, a company has created a renewable bio-fuel that is actually cost effective without government subsidies.

**Traditional bio-fuel manufacturing process**

Feedstock (Plants)
- Corn
- Sugar Cane

Conversion Process
- Heat
- Fermentation
- Chemical

Biofuel
- Bioethanol
- Biodiesel

*Current feedstocks are taken from valuable food supplies.*

**Innovative bio-fuel manufacturing process**

Feedstock (Waste)
- Sewage

Conversion Process
- Chemical

Biofuel
- Biodiesel

*New feedstock is taken from waste material.*

A startup company has developed a process that can economically convert sewage waste into commercial grade renewable diesel fuel. This technology can be easily adopted by current infrastructure. The company is developing a large scale test facility in one of the largest wastewater plants in California, and is ready to expand to plants around the world.

Small companies have speed and innovation advantages that can help them leapfrog existing processes.
There Is No Single Technology, Investment, or Development Solution that Fits All Economies

Sustainable energy R&D investment is based on the unique endowments and resources of each economy. Varying considerations motivated by unilateralism often result in duplicative and less-than-optimal R&D investment.

Economies should make investments based on existing resources and policies: factor endowments, human capital, infrastructure, regulations and existing technologies.
Energy security and environmental sustainability depend on a greater supply of sustainable energy. The practice of “business as usual” involves unacceptable economic and social costs. The current energy investment landscape, however, limits the ability of companies to sufficiently deploy sustainable energy solutions. Businesses indicate that numerous barriers exist that inhibit necessary investment in sustainable energy projects. These barriers fall under concerns for affordability and the bias to fossil fuels within the energy industry:

- Artificially low prices for fossil fuels.
- Minimum efficient scale has not been reached.
- High capital and long payback periods.
- Myopic investments decisions regarding energy efficiency.
- Inadequate infrastructure.
- Insufficient storage capability.
- Lack of awareness for sustainable energy technologies.
- Small and fragmented market sizes.

These barriers result from myopic policy that is concerned with short-term affordability of energy and is heavily biased toward fossil fuels. Investment in sustainable energy can overcome these barriers if APEC economies commit to a long-term, collaborative investment framework for sustainable energy. This framework should involve:

- Financial incentives: low interest loans, subsidies, tax breaks.
- Clear, consistent and comprehensive policy.
- National targets for emissions and sustainable energy production.
- Incentives for grid access.
- Mechanisms to foster knowledge.
- Clear and widespread standards and certifications.
Investment in Sustainable Energy Is Growing

Global investment in the supply of sustainable energy reached a high in 2008, however, the industry was affected by the world economic downtown in 2009.

Investors are confident that investment in sustainable energy will continue to grow, especially with aid from government incentives.

Source: New Energy Finance, Bloomberg
Asia Is Leading the Growth

Investment in North America, Europe and South America have all been affected by the economic downturn. However, Asia and Oceania increased investment dramatically in 2009 despite the turbulent economic environment.

“Chinese financial investment in clean energy reached nearly $33.7 billion, almost double America’s $17 billion primarily due to domestic policy support.”

- New Energy Finance, 2009

Financial New Investment by Region, 2004-2009, $ Billions

Source: Bloomberg New Energy Finance

Fueled by strong investment by the People’s Republic of China, Asia is leading investment in sustainable energy.
Wind Is the Dominant Sustainable Energy Source

Wind energy accounted for the highest proportion of energy within the sustainable energy supply mix. Wind also took the lead in investments within sustainable energy for APEC economies in 2009 because it is relatively mature and thus presents a lower risk to investors.

Proven technologies such as wind are increasing their contributing share of supply and investment within sustainable energy.
Investment Growth Is Not Sufficient to Increase the Share of Sustainable Energy Sources for APEC Economies

Despite the growth of investment in sustainable energy, coal and oil remain the top energy sources for APEC economies. The need to increase the proportion of sustainable energy is understood by most economies; however, investment has been hindered by a number of concerns.

The share of sustainable energy sources remains low but can be spurred by government support and technological improvements.
Why Is Sustainable Energy Supply Important?

The development of sustainable energy sources provides economies with an opportunity to gain a competitive advantage in this rapidly growing industry.

The sustainable energy supply addresses energy security, economic growth and environmental protection and creates a virtuous circle for national competitive advantage.

Competitive Advantage Enabler

- Minimization of energy supply risk and diversification of energy sources.
- Creation of jobs and securitization of affordable electricity increases living standards.
- Reduction of the impact of polluting activities and environmental degradation.

The development of sustainable energy sources provides economies with an opportunity to gain a competitive advantage in this rapidly growing industry.
Investment in Sustainable Energy Is Shaped by Concerns of Affordability

The concerns of economies – energy security, economic growth and environmental health – are trumped by issues of affordability for investors. Affordability takes precedence over all other considerations when choosing investment opportunities because investors are concerned with a return on investment.

“[An economy] may develop and lead in some green and clean technologies but these are exported to secure high prices for the technology. Despite having an indigenous capability [economy] still uses the cheap and dirty forms of energy since it is affordable.”

- Executive, Utility Company

Sustainable energy deployment requires projects to be more affordable. This can be achieved through scale, subsidies, tax breaks, or other financial incentives.
Investment in Sustainable Energy is Held Back by Uncertainty

Investment opportunities are also impacted by uncertainty of risk for sustainable energy projects. These risks include: market risks and the inconsistency of energy usage, fluctuations in energy prices, changes in regulation, construction/installation risks, demand risks, etc.

“We need more certainty in the market which will allow investment decisions to be made. Long term investment horizon decisions need to be taken today and people need to be able to plan.”

- Executive, Utility Company

Sustainable energies present a high level of uncertainty, which skew investors to seek investments in fossil fuel technologies.
Energy Value Chain for Suppliers

The energy value chain for suppliers provides a framework for how concerns of affordability and the bias to fossil fuels impact investment in the supply of sustainable energy.

- **Investment**:

  - **Exploration**
    
    Exploration and extraction of raw energy materials used to produce energy.

  - **Manufacturing**
    
    Manufacturing takes raw energy materials used to produce usable parts for generation.

  - **Generation**
    
    Generation is the process of creating electricity from other sources of energy.

  - **T&D**
    
    Transmission & Distribution is the flow of electricity from generation to the grid.

  - **Efficient Goods**
    
    Efficient goods are products or appliances that consume less energy.

  - **Services**
    
    Services provide support and advancement of energy goods.
Sustainable Energy Investment Is Inhibited by Affordability Concerns and a Bias Towards Fossil Fuels

Affordability concerns and a bias towards fossil fuels have impeded the investment in the supply of sustainable energy. These issues affect investment along the supply value chain and prevents sustainable energy investment needed to bridge the energy supply gap.

“Consumers are sensitive to energy prices and this is true for both developed and developing countries. Any rise in prices will be objected to by the consumers. The high cost of green technologies is a big obstacle.”

- Environmental Director, Utility Company
Affordability Concerns Affect the Supply of Sustainable Energy

Affordability issues for investors stem from the high capital costs of sustainable energy technologies. This leads to long payback periods, difficulty in reaching scale, and decisions to invest in the more economically affordable fossil fuel technologies.

Businesses are driven by: Affordability: is what consumers seek

Affordability must be addressed in order for sustainable energy to be pushed by business and adopted by consumers.
Supply of Sustainable Energy Is Hindered by Concerns for ROI

The upfront costs for sustainable energy are not affordable for investors at current levels of scale and development. High investment costs for sustainable energy projects result in long payback periods which leave investors weary of entering into these investment opportunities.

“...energy investments are large and long term – if you build a dam or a coal plant, the return is in a much longer time schedule.”
- Director, Investment Fund

With CFL lighting, price point was the barrier, so the government subsidized it... and gave people the opportunity to experience the technology, to like it and then to buy it [which] created economies of scale and costs decreased to make it competitive.”
- Manager, Government Agency

Consistent and long term policy will create a secure investment landscape for investment in sustainable energy supply.

Source: Energy Information Administration, Annual Energy Outlook 2010
Low Fossil Fuel Prices Make Sustainable Energy Unattractive

Sustainable energy costs are not currently competitive with fossil fuels even when negative externalities are accounted for. Historical support of fossil fuels through subsidies and infrastructure support has decreased the cost of fossil fuels to a level that has distorted its true price for consumers. The artificially low price of fossil fuels dissuades investment in sustainable energy due to long payback periods that are not economically competitive under the current pricing structure.

“Energy prices must be realistic and reflect the cost to produce them...the price of electricity is too cheap...this discourages any attempts to enter the green energy market because it is simply not worth it.”

- Executive, Natural Gas Distributor

### Cost to produce sustainable energies vs. fossil fuel energies

<table>
<thead>
<tr>
<th>Energy Type</th>
<th>Cost to produce</th>
<th>Unpriced Externalities</th>
<th>Government Subsidies</th>
<th>Cost Seen By Customers: Price of SE &gt;&gt; Price of FE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Energy (SE)</td>
<td>$46B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fossil Fuel Energy (FE)</td>
<td>$557B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted from IEA Energy Subsidies Report

Financial incentives and price supports will make sustainable energy technologies a more attractive investment opportunity.
Energy Efficiency Is an Untapped Source of Energy

Businesses view energy efficiency as a low cost resource due to the amount of potential energy that can be extracted from inefficiencies of production and use. Despite this, investment in energy efficiency is stunted because of large upfront costs, fragmented markets and the difficulty in evaluating and measuring savings.

A 2007 McKinsey report showed that the potential cost savings in the energy efficiency market is $1.2 trillion in the United States alone. The initial investment required is $520 billion, proving that the cost savings is large for this market.

Removing costs and market barriers will harness the high economic potential of energy efficiency.
Financial Incentives Can Alleviate Concerns for Affordability

Sustainable energy generation and energy efficiency are not attractive investment opportunities due to high upfront costs and artificially low prices for fossil fuels. Therefore, financial incentives are needed to make investment economically feasible and to support sustainable energy targets, exploration of clean energy sources and grid access.

Incentives take many different forms:

<table>
<thead>
<tr>
<th>Subsidies:</th>
<th>Some have a direct impact on costs or prices, like grants and tax exemptions. Others affect prices or costs indirectly, such as regulations that skew the market in favor of a particular fuel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Tax Credits/Breaks</td>
<td></td>
</tr>
<tr>
<td>-Grants</td>
<td></td>
</tr>
<tr>
<td>Low Interest Loans</td>
<td>Asset financing for sustainable projects should be offered low interest loans to encourage investment.</td>
</tr>
<tr>
<td>Feed-in Tariffs</td>
<td>Obligation for electric grid utilities to buy electricity for an agreed upon price from a sustainable energy project.</td>
</tr>
</tbody>
</table>

**Drawbacks of Financial Incentives:** A US union has accused China of violating WTO rules because much of its "support for clean energy, often in the form of cheap land grants and low-cost loans from state-run banks, has benefited its export industries, rather than focusing on the domestic adoption of solar power and wind energy.”

Opportunities within the sustainable energy industry are large and economies must balance promotion of this industry with concerns of protectionism.
Government Financial Incentives Send the Wrong Signals

Currently, financial incentives in the energy sector are skewed towards fossil fuels. This is extremely problematic given that sustainable energy requires additional financial incentives to be competitive with fossil fuels.

Fossil Fuels received 12 times more subsidies worldwide than sustainable energy sources in 2008.

* Billions of US dollars, 2008
Source: Morales, Bloomberg, 2009

Comprehensive energy policy should address affordability and bias toward fossil fuels.
Inertia for the Status Quo...

Established infrastructure systems, ease of storage and transportation, known technology, knowledge capabilities and the large market size create inertia bias to fossil fuels that is difficult to compete with.

“We are stuck in policies that have always supported traditional energy. You begin to be so accustomed to these policies. You don’t even realize that there is an issue.”

- Executive, Multinational Company

After more than 100 years modern societies are geared towards the intensive use of fossil fuel energies.

Financial incentives, mechanisms to foster knowledge, and infrastructure investment are required to increase the supply of sustainable energy sources.
Insufficient Transmission and Distribution Infrastructure Limits the Supply of Energy

The ability to connect sustainable energy generation to the end consumer is impeding the development of these projects. The requirement for large areas of land away from urban centers for sustainable energy projects compounds the risks associated with the construction of transmission and distribution infrastructure.

“When choosing ideas for new investments in sustainability, the most important factor is how easily it can be adapted to existing infrastructure.”
- President, Biofuel Company

“Transmission is the main barrier of development for renewable energy.”
- Manager, Government Agency

Governments need to provide or incentivize sustainable energy infrastructure.
Who Is Responsible for Infrastructure?

Because the risks of large scale transmission and distribution projects are high, construction of these projects is low and there is no consensus of who is responsible for construction. Many businesses state that the government is responsible for facilitation and execution of infrastructure due to the risks and large scale nature of the projects. Alternatively, others believe that there is an opportunity for generation firms to work together with government and transmission companies to construct distribution infrastructure through leasing opportunities.

Governments can partner with firms to build the necessary infrastructure or create the incentives to foster private investments.

“Transmission is absolutely an issue. South Australia has the best wind resource but how can it be economically feasible to connect it 1000km away from any sensible grid? We need help to do that.”
- Executive, Sustainable Energy Consultancy

“Governments can partner with firms to build the necessary infrastructure or create the incentives to foster private investments.”

“Governments can partner with firms to build the necessary infrastructure or create the incentives to foster private investments.”
- Executive, Financial Bank

“Business Responsibility

“You can have a coordinated approach by a group of developers to jointly pay for grid extensions.”
- Executive, Utility Company

“Government Responsibility

“The businesses have done their part by investing but transmission is the duty of the government.”
- Executive, Financial Bank
Supply Variability Increases the Cost of Sustainable Energy

Infrastructure improvement by itself cannot solve the lack of affordable and efficient storage technologies. Adequate storage capability is an inherent problem for sustainable energy sources and poses disruption risk that requires additional backup costs for distribution and transmission. This inhibits the adoption of sustainable energy projects as the primary energy supply for many economies.

“A major problem with renewable energy is storage, we need a solution to make it become economically viable.”

- Policy Professor, Academic Institution

Fossil fuels can be stored to avoid interruptions, making it a more attractive energy source.
Market Integration Increases Attractiveness of Industry

Lack of harmonized standards and certifications fragment markets for sustainable energy. This prevents minimum efficient scale and increases transactions costs. Decreasing the costs associated with sustainable energy will make investment more attractive for investors who favor the large markets and low costs of fossil fuels.

“We need to have an international agreement of a turned down feature to 1 watt, or 1/10 of watt (which Japan is doing). Doing this will provide the energy for all of Africa and we can solve Africa’s energy needs. The barrier is the underlying agreed upon standard and there needs to be an agreement to work on it.”

- Manager, Government Agency

Harmonized standards and certifications will increase the market size for sustainable energy technologies, making investment in supply more attractive.
Lack of Knowledge Hinders Supply of Sustainable Energy Sources

Investors are unaware of funding and investment opportunities within the sustainable energy industry because of complex governmental bureaucracy and lack of awareness. Due to the nascent nature of the industry, many opportunities are overlooked in favor of established and known fossil fuel opportunities.

“Had a project for an industrial cogeneration project for a copper plant, the payback was about 12 months. I asked, Why haven’t you done this before? He said he didn’t know this was an option. Education is needed. It is slowly growing.”

- Manager, Government Agency

“...green projects are “more complex than what my team is accustomed to dealing with”, ...we need an assigned team to manage the finances, educate banks, educate all entities involved, come up with reports, deal with the government, etc.”

- Executive, Investment Company

Mechanisms are needed to increase awareness for sustainable energy opportunities.
Sustainable Energy Projects Require Skilled Labor and Expertise

Concerns for the lack of sustainable energy professionals hinder the supply of sustainable energy projects and investment opportunities. Sustainable energy projects require skilled professionals because it is an emerging industry and the expertise needed to propel the industry must be fostered.

“We have manufacturers that produce high technology equipment, and there are some places where you don’t have a high number of people that are readily available to do this type of work.”

- Executive, Manufacturer

Mechanisms to foster knowledge transfer are essential to ensure the adequate supply of human capital needed to deploy sustainable energy projects.
Economies Encourage the Supply of Sustainable Energy Through a Wide Range of Policies, Incentives and Mechanisms

Through our interviews and research, we have gathered examples of how economies are addressing the issues that inhibit investment in supply. Economies have instituted a wide variety of programs, policy and financial incentives to reduce the upfront costs of sustainable energy projects, incentivize the construction of transmission and distribution infrastructure, increase knowledge for sustainable energy professionals, and create certainty through long term policy.

**Infrastructure**

Australia incentivizes infrastructure development through its SENE program, which encourages clusters of generators to build transmission and distribution systems together private generators and government financial support.

China offers coupled incentives for generation and infrastructure through the Financial Subsidy Fund, which offers a subsidy of 50% for generation and transmission and distribution for PV solar power projects.

**Financial Incentives**

Thailand utilizes four main energy saving initiatives: a revolving fund for energy efficiency and renewable energy, Energy Service Company (ESCO) venture capital funds, tax incentives for energy saving, and demand-side management (DSM) bidding.

Singapore has instituted, the Grant for Energy Efficiency Technologies (GREET)—a scheme to help companies offset part of the cost of implementing energy efficiency measures.

**Stated Goals**

The Mexican Government developed a long-term policy vision called Visión 2030 to create a long term policy on sustainable energy.

The Chilean Government created the Interministerial Biofuels Commission to bring concrete actions, plans, policies and the development of the value chain to all ministries of state and public institutions, as well as to undertake other activities.

**Foster Knowledge**

New Zealand has set up the Energy Efficiency and Conservation Authority (EECA) to encourage, support, and promote energy efficiency, energy conservation, and the use of renewable sources of energy.

APEC EGS information exchange provides information about research studies, ongoing projects, regulations, and general information about EGS.

Korea will launch the Global Green Growth Institute to provide support for green growth strategies and policies.
What Businesses Want

 Businesses understand the complex nature of energy policy and that problems associated with sustainable energy cannot be solved in one step. However, the urgency to address these issues is growing and businesses hope that policymakers can institute policy, programs and incentives to achieve price parity to address issues of affordability and to break the existing inertia towards fossil fuels.
The issue of energy depletion and environmental concerns are shared problems with shared consequences. This makes trade essential since it is a concerted effort towards interdependence between and among economies. Integration of sustainable energy markets is critical to solving these shared problems. Trade enables economies to use multilateral solutions to address these pressing problems and without trade, sustainable goods and services stand a very slim chance at success. Without trade, markets will remain fragmented and will not be able to take advantage of the benefits set forth below.

- **Technology diffusion between “Lead” and “Need” economies:** Technology and skill will be easily available to those economies in need of them, possibly making their own local markets more sophisticated. This is an issue of market access to those economies in need of technology.
- **Multilateralism:** Making the global environment more conducive to trade affects both unilateral policies and multilateral cooperation.
- **Market Size:** Trade enables market integration. With larger markets, producers will more easily reach minimum efficient scales.
- **Commercialization** - Opening up markets allows for vaster and stronger commercial exchanges, especially between fledgling businesses and investment partners.
- **Contestability:** Open markets create a competitive environment and foster innovation, benefiting the market in terms of prices and options.
- **Specialization:** With a flourishing market, players in the supply chain will find ways to become more innovative and efficient to remain competitive. This drives an industry to continuous growth and development.

Currently, trade in sustainable energies is underperforming, causing barriers to market size and access. The industry has not been able to enjoy the above benefits that would, in effect, lead to attractive ROIs and payback periods. Looking at the current trade landscape, built upon information gathered from the interviews, the 2 major issues impeding trade are:

**Economies’ bias towards unilaterally focused policies causing intentional and unintentional protectionism**
- Energy plans and policies are unilaterally focused, making multilateral trade difficult.
- High tariffs discourage trade and create supply chain risks.
- Non-tariff measures and barriers severely impede trade in sustainable energies.
The infrastructure for trade in sustainable goods and services is lacking

- FTAs are silent on the subject matter of EGS. The research on FTAs was broadened to include the general topic of EGS since they do not specifically address the topic of sustainable energy.
- The lack of common international standards limits the size of markets and increases the time and cost to trade with economies.
- The absence of an accepted harmonized EGS definition impedes trade.
- There is a pressing need for inclusive growth of developing economies in the sustainable energies industry.

The data and voice of interviewees suggests several actions that may alleviate the above issues. We recognize that so far most, if not all, of these have been addressed and are being worked on by specific APEC Groups. However, the team would like to highlight these opportunities again to emphasize their importance and relevance to the trade of sustainable goods and services.

- Organize and host an APEC-sponsored forum for economies, specifically focusing on sustainable energies, inviting knowledgeable and influential business leaders, policymakers and academics.
- Take the lead in creating a comprehensive and harmonized APEC definition for sustainable goods and services
- Create an APEC label for sustainable goods and services to be recognized as a stamp of endorsement in participating economies
- Create a common certification process and authority for sustainable goods and services.
- Establish special rapid temporary work visa programs for skilled workers essential to sustainable goods and services.
- Create an APEC repository for the collection, dissemination and cataloging of sustainable energy technology and knowledge.
- Create a task force to gather, evaluate and disseminate best practices for incentives, consumer awareness, and worker training programs.

The research suggested that an action plan to incorporate all these recommendations could be crafted and most successfully addressed through FTAs among economies. APEC has the ability to play an active role in the liberalization of markets and facilitation of trade by crafting an action plan including the above recommendations.
Opportunity: Sustainable Energy Market Is Expanding but Trade Remains Low

The APEC EGS market has increased about 4 fold from 2003 to 2006. In APEC, trade amounts to 34% of the region’s EGS market. However, in Europe, trade amounts to 65% of the region’s EGS market. Despite the growth of the market, the trade volume in the APEC region remains relatively low.

*Note: Due to the limitation on the availability of exclusive data pertaining to sustainable energy related trade, EGS trade data has been used as a proxy representation of sustainability energy related trade.*

---

**Market Size and Trade Differences between APEC and Europe**

---

Europe serves as a model example of sustainable energy trade levels. The trade gap in APEC calls for a push for additional sustainable energy trade in the region.

---

*Source: Environmental Priorities and Trade Policy for Environmental Goods: A Reality Check, ICTSD, 2006*
The Trade Gap Is Not Specific to One Economy

The following chart shows us the 2006 Year economy-wise breakup of EGS market and imports with the exception of Asia, whose market size and imports are combined.

*Note: Due to the limitation on the availability of exclusive data pertaining to sustainable energy related trade, EGS trade data has been used as a proxy representation of sustainability energy related trade.*

![Trade gaps in all APEC economies](chart.png)

Source: *Environmental Priorities and Trade Policy for Environmental Goods: A Reality Check*, ICTSD, 2006

Every economy stands to gain from increased trade in EGS.
A Snapshot of What Needs to be Traded

Sustainable energy goods and services are a portfolio of goods and services that include raw energy sources, power generation equipment, Smart Grid Technologies, energy efficient electric products, eco-friendly transportation, and ‘green’ consulting services. These goods are part of a well connected energy eco-system and are interdependent.

Trading a broad range of goods and services is absolutely essential for promoting sustainable energy in the APEC region.
The Benefits of Trade: A Call to Trade in the APEC Region

The benefits of trade are largely unrealized within APEC. Qualitative scores suggest there is room to improve.

<table>
<thead>
<tr>
<th>TRADE BENEFIT</th>
<th>IMPORTANCE</th>
<th>STATUS IN APEC</th>
<th>QUAL. SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TECHNOLOGY DIFFUSION</td>
<td>The flow of knowledge and resources between lead and need economies increases chance for improvement.</td>
<td>There exist industry experts and technology leaders in &quot;lead economies&quot;, and takers in &quot;need economies&quot;.</td>
<td>FAIR</td>
</tr>
<tr>
<td>MULTILATERALISM</td>
<td>Recognizing the benefits of cross-border collaboration encourages unilateral agreements to become more multilateral, making business more attractive.</td>
<td>There are bilateral and multilateral agreements between APEC economies, but there are no explicit and specific EG provisions.</td>
<td>POOR</td>
</tr>
<tr>
<td>MARKET SIZE</td>
<td>Market integration increases demand volume and the likelihood of reaching minimum efficient scale and profitability.</td>
<td>Aside from China, markets are fragmented and not large enough to meet minimum efficient sales for production.</td>
<td>POOR</td>
</tr>
<tr>
<td>COMMERCIALIZATION</td>
<td>Cross-border trade creates a bigger exchange for strategic and financial partners to help bring goods and services to the wider market.</td>
<td>The investment chasm - funds exist however there is a lack of successful pairings between investors and business projects. Potentially successful businesses fail very early on.</td>
<td>POOR</td>
</tr>
<tr>
<td>CONTESTABILITY</td>
<td>Trade opens up markets and more opportunity for competition, driving dominant companies to be more innovative and efficient.</td>
<td>Generally, there is a good amount of innovation within the APEC region however it is the potential for more contestability that is an untapped opportunity to develop the industry.</td>
<td>FAIR</td>
</tr>
<tr>
<td>SPECIALIZATION</td>
<td>The industry benefits by attracting players who will drive expertise, competition and sophistication in the different parts of the supply chain, uplifting the entire industry.</td>
<td>Competitive clusters in the bigger-scaled, lucrative industries which are higher up in the value chain, tend to be concentrated in the &quot;lead economies&quot;.</td>
<td>FAIR</td>
</tr>
</tbody>
</table>
Businesses, as Well as Economies, Stand to Gain from Increased Trade

In conjunction with healthy conditions in R&D, Supply and Demand, these Trade benefits lead to an attractive business and investment landscape.

THE MULTI-BILLION DOLLAR QUESTION: Where is the holdup?

- Favorable ROIs
- Favorable Payback Periods
- Competitive Pricing
- Innovation
- Product & Service Options
Unilateralism Is Holding Up Multilateral Solutions to a Multilateral Problem

PROTECTIONISM

INTENTIONAL AND UNINTENTIONAL PROTECTIONISM
- Unilaterally-focused energy plans and policies
- High tariffs
- Non-tariff measures and barriers

LACK OF TRADE INFRASTRUCTURE
- General absence of EGS provisions in FTAs
- Lack of “EGS” definition
- Pressing need for inclusive growth of developing economies
- Lack of common international standards

Protectionism and lack of infrastructure impede trade.
The Lack of Trade Costs Money and Hurts Quality of Life

Intentional and unintentional protectionism, and the lack of trade infrastructure constrains trade in EGS.

Maintaining the trade status quo leads to a poor investment landscape and suboptimal quality of life.
Unilaterally Focused Energy Policies Are Not Conducive to Multilateral Trade Cooperation

There are various complicated reasons as to why current energy policies are unilaterally focused:

- Factor endowment differences
- Legacy effects
- Energy and national security concerns

Naturally, economies maximize the benefits of their policies to their own interest. These reasons lead economies to pursue different energy policies and make establishing and maintaining cross border partnerships difficult.

Thailand’s energy policy has encouraged biomass sources by programs such as the Adder Rate Policy due its large and flourishing agricultural sector.

Japan’s Eco-point system allows consumers to be rewarded when they buy energy efficient appliances — BUT only for Japanese brands.

Argentina’s discontinuation of natural gas supply to Chile due to energy security issues caused Chile to scramble for sources.

Domestic policies primarily focus on the improvement of local industries, taking advantage of factor endowments and ensuring energy security. Consequently, they are not very conducive to multilateral cooperation across economies.
High Tariffs and Local Content Requirements Discourage Trade and Create Supply Chain Risks

High tariffs and local content requirements force companies to make suboptimal supply chain decisions that increase transaction costs and business risks.

**High Tariffs**

The U.S subsidizes domestic producers and imposes a 33% tariff on imported ethanol. This domestic policy, which was intended to encourage local industry, has had negative effects in global pricing and other economies’ comparative advantage to compete in the U.S.

**Differential Tariffs**

China has differential tariffs for wind turbine manufacturing materials: 3% for components, 8% for subassemblies, and 17% for complete assemblies. Additionally it mandates a certain percentage of components be produced locally or procured from local manufacturers.

Businesses’ supply chain decisions are greatly influenced by high and differential tariffs, affecting their decision to engage in cross-border trade.
Non-Tariff Measures and Barriers Severely Impede Sustainable Energy Trade

Domestic policies aimed at encouraging domestic sustainable goods and services can create non-tariff barriers, including:

- Regulatory measures and non-transparent bureaucratic systems
- Local content requirements
- Technology transfers
- Economy, regional, and local level certifications
- Preferential aid to domestic companies

“When the solar panel market was opened in Korea the government started subsidizing through FIT (feed-in-tariffs). The government later realized that it was all foreign companies who received the subsidies. The government introduced a NTB through certification process mandating all solar panel companies to get certified under the Korean standards, which would take them about 6 months. As a result, this bought all domestic companies 6 months to catch up.“

- Executive, Solar Panel Manufacturer

Canada uses local content requirements to support its local wind turbine industry. Quebec regulators, for example, set requirements for achieving 40 percent local content of the total costs of the first 200 MW, 50 percent for the next 100 MW, and 60 percent for the remaining 700 MW. The government also requires that turbine nacelles be assembled locally and that all energy project bidders obtain a statement from a turbine manufacturer guaranteeing that it will set up assembly facilities in the region.

In China, there is no common certification language. There is wide interpretation at the local level since enforcement and implementation is left at the discretion of local officials. Companies have to travel to multiple cities to demonstrate technologies, incurring costs of $50k - $100k per exhibition.

Numerous non-tariff barriers make cross-border trade time consuming and costly, discouraging businesses from international expansion.
Trade Agreements Are Silent on EGS, but Several Address Environmental Protection Issues

EGS related trade in APEC is in its nascent stage. As of 2010, APEC has only a few bilateral and multilateral trade agreements that address the promotion and diffusion of EGS. The Trans-Pacific Strategic Economic Partnership Agreement and the North America Free Trade Agreement are examples of trade agreements with Environmental Cooperation Agreements.

Our research identified 19 trade agreements that contain environment provisions. These provisions are heterogeneous in their placement and content. In most of the agreements, the parties do not undertake commitments. The absence of a stand-alone environmental agreement at the WTO and a universally adopted model to point to when developing environmental provisions are hindering the growth of EGS focused trade agreements.

Environmental Cooperation Agreements (ECAs) are the most common vehicles to extensively address environmental concerns. Most of them set cooperation mechanisms to encourage and facilitate the protection of the environment, but not EGS trade explicitly.

Trade agreements paint a picture of silence on the matter of EGS. However, they also paint a picture of opportunity and challenge, to create a model measure for future agreements.
Lack of an Acceptable Definition of Sustainable Energy Goods Hinders Trade

The lack of a universally accepted definition of sustainable energy goods has slowed down agreement on product coverage in negotiations on those goods. The key issues are:

**Defining and classifying goods:** Disagreement over which products should be classified as sustainable energy goods.

**The dual-use problem:** Concern that firms can import, at a lower cost, products that have multiple uses, such as pipes that can serve non-environmental purposes.

**Relativity and evolving technology:** How to deal with the relativity of sustainable energy products (what is sustainable today may not be sustainable tomorrow), especially in the context of changing technology.

**Split Incentives:** Many developing countries have other objectives, such as safeguarding sensitive industries and building domestic capacity, which may discourage them from pursuing all-out liberalization in sustainable energy goods.

Source: Liberalization of Trade in Environmental Goods for Climate Change Mitigation, ICTSD, 2008

Agreeing on a harmonized and widely-accepted definition for sustainable energy goods and services has been an uphill battle. However, if actually achieved, it will make exponential improvements to trade liberalization.
Lack of Common International Standards Limit the Market Size and Increases Costs of Trade

Inconsistent standards limit market size, making it difficult for firms to achieve the minimum efficient scale necessary to justify investment in sustainable energy goods. Inconsistent standards also lead to repetitive, costly, and time consuming certification processes.

There are a few reasons for the lack of common standards:
• The standards evolved over time and old standards tend to remain in the market.
• Economies use standards as a protectionist measure to restrict import of outside goods.
• The existence of multiple standard developing bodies.
• Monopolistic businesses pushing their standards.
• Government agencies at regional and local levels interpret standards in their own way.
• The infrastructure is not common among economies. A uniform product does not suit all the economies.

“We have been selling our photovoltaic products in Europe for 4 years now and every time we export, our models [must] be approved by the bank as a “bankable model” adhering to certain standards. We spend a lot of time and money in third party consulting and insurance costs just to find out that our model gets rejected when it can be used locally and [in] other Asian countries. We make the necessary adjustments to continue doing business but it is very costly. Now, our strategy is just to focus on other Asian countries such as Indonesia, Philippines and India”

- Executive, Solar Panel Manufacturer

To effectively and efficiently achieve market integration and access among economies, common standards must be accepted and implemented.
Sustainable Energy Trade Is Dominated by a Few Economies

Despite having the potential to compete in the sustainable energy market, developing economies are at a disadvantage to the developed economies in establishing market reputation.

The US, Germany and Japan are the three dominant players in the sustainable energy industry and have long held solid reputations in delivering high quality goods and services. According to an OECD study, competitive advantage in the industry is based on four factors: technological innovation, quality and service performance, marketing and export strategies, and flexibility in production. The competitive advantages of these economies are making it difficult for new players to be recognized as worthy competitors even when products and services produced are comparable in quality and sometimes offered at lower prices. Despite gaining traction in the market, this has been the case for exports from economies such as China, Thailand, and Chile.

“We don’t import a lot from Asia as we have concerns about the quality of technology from there. However, I think these economies might be a better provider in the future, especially since prices are relatively cheap.”

- Executive, Energy Department

“More strict regulation on the import environmental goods in the developed countries will be the trade barrier to the exporting-developing countries. That will cause high-costly investment in developing countries.”

- Executive, Energy Efficiency Consultancy

Source: ICTSD Environment Priorities and Trade Policy

Market access is essential to economies that are in need of technology from those economies leading in the field. The need of inclusive growth affects all economies and is facilitated through opening up markets.
FTAs: Introducing FTAs is the easiest and most crucial step. Defining sustainable energy goods & services, establishing institutional arrangements, and enforcing commitments are the difficult aspects in developing FTAs.

NTMs and NTBs: Economies introduce NTMs and NTBs to protect their domestic companies. NTMs and NTBs might also arise out of regulatory or bureaucratic processes. Eliminating non-tariff measures is difficult as they are not easy to identify and also evolve and diversify rapidly. Also, NTMs are in some cases are legitimate policy goals.

Lack of common standards: These create fragmented markets and hinder firms from achieving economies of scale. Economies adopt different standards because of their existing infrastructure or to protect their domestic companies from foreign suppliers.
Insight into FTAs: FTAs Paint a Picture of Silence and Opportunity

Trade agreements are a powerful tool to encourage trade in a specific sector. Currently, trade agreements within APEC do not address EGS directly. At best, they mention a concern for the environment, state the signatories’ best intentions to foster environmental protection, but use vague language on how relevant issues should be tackled. The reality is EGS policies remain very much in the realm of domestic policy-making than in international trade policy-making.

Common Issues in Trade Agreements:

**Declaration of Best Intentions**
Most trade agreements will mention “Commitment to Environmental Protection” in the preamble without addressing environmental issues much further or going into specifics.

**Little Focus and Effectiveness**
Some trade agreements have separate sections or separate documents referenced that deal with environmental issues or sustainable goods and services. However, these documents usually fail to generate an effective approach for the successful diffusion of EGS.

**Common Language**
A common clause found in trade agreements is “The Parties recognize that it is inappropriate to encourage investment by relaxing domestic health, safety or environmental measures.” This is found in most agreements whether specific policies regarding environmental issues have been outlined or not.

Potential Building Blocks
A number of clauses in trade agreements can have a definite impact on EGS. Technological Transfer, Intellectual Property, Tariff Reduction, and Movement of Labor are all enablers of trade relevant to EGS.

Trade agreements contain several building blocks necessary for the successful trade of EGS.
A case study of the ECA agreed among the parties in the Trans-Pacific Strategic Economic Partnership, Brunei Darussalam, Chile, New Zealand and Singapore:

The agreement supports the signatories’ commitment to encourage sustainable development. The parties recognize “that environment and trade policies should be mutually supportive, with a view to achieving sustainable development.”

The agreement also recognizes “the existence of differences in the Parties’ respective natural endowments, climatic, geographical, social, cultural and legal conditions and economic, technological and infrastructural capabilities.”

Yet, it still endeavors to “have its environmental laws... practices in harmony with its international commitments” and prevent “inappropriate use... for trade protectionist measures.”

Originally signed in 2005 by the 4 economies mentioned above, there are current negotiations to expand the agreement to include the U.S., Australia, Peru and Vietnam.

The Environmental Cooperation Agreement attached to the Trans-Pacific Strategic Economic Partnership is a step in the right direction.

However, there are still opportunities for the ECA to be refined to become the ideal trade agreement for EGS. The vague language in the ECA reflects the first pass attempt in creating the world’s first EGS based trade agreement, but as the economies work together, the ambiguity can be replaced with set goals and provisions from their preliminary discussions. The goal is to include EGS provisions similar to any other business provisions in trade agreements. In the meantime, special EGS provisions must be made to accelerate the process.

The ECA is the first step towards a policy and trade infrastructure that could be used to facilitate trade in sustainable goods and services market. Additionally, there are currently no agreements that could be used as a model provision for other agreements in EGS.
Insight into FTAs: The Goal for Businesses Engaged in Cross-Border Trade

The Goal:
Treat sustainable energy business like all other business that engage in cross border trade

If the sustainable energy industry has the same risks and opportunities as all other businesses, the sustainable energy sector will have an exponentially better chance at success.

In the future, treatment of the sustainable energy industry should be similar to all other businesses to facilitate trade. However, Special and accelerated provisions are needed now to help APEC to reach that goal.
What APEC Can Do: A Call to Action, Capturing the Voice of Business

APEC is already working on much of what businesses want, but more could happen sooner through the adoption of EGS-specific trade provisions in FTAs. Below is a list of what businesses thought what could be done to improve the trade environment. The team recognizes that so far most, if not all, of these have been addressed and are being worked on by the APEC and APEC groups such as the Market Access Group, Energy Working Group, Sustainability Working Group and Committee for Trade and Investment. Businesses feel, however, that progress is not being made fast enough.

Organize and host an **APEC-sponsored forum** for economies, specifically focusing on sustainable energies, inviting knowledgeable and influential business leaders, policymakers and academics.

Take the lead in creating a comprehensive and harmonized **APEC definition** for EGS.

Create an **APEC repository** for the collection, dissemination and cataloging of sustainable energy technology and knowledge.

Create a **task force** to gather, evaluate and disseminate best practices for incentive, consumer.

Create an **APEC label** for EGS to be recognized as a stamp of endorsement in participating economies.

Create a **common certification** process and authority for EGS.

Establish special rapid temporary **work visa programs** for skilled workers essential to EGS.

“The company is hindered in doing business in/with a country where there are no trade agreements. There is good impact where Australia does have FTAs. The US is the source of competition and the US has more FTAs. Here’s a message to APEC about FTAs — bring it on. We want more FTAs. They help to bring awareness in the country.”

- Executive, Environmental Consultancy

If APEC can focus on these efforts, APEC will be able to facilitate more expedient and streamlined free trade agreements.
Creating a proper and effective trade infrastructure is not a simple task. APEC, however, has the power to execute an action plan that can unlock protectionism and the lack of trade infrastructure.
Best Practices: Economies Step in the Right Direction to Liberalize Trade

Economies are recognizing that addressing issues of energy security and environment require a coordinated, multilateral effort. Below are some examples of what economies, on a unilateral level, have done to take steps in the right direction to facilitate trade.

Chile’s Trade Agreements
Chile claims to have more bilateral or regional trade agreements than any other economy. By 2008, it had signed trade agreements with 58 partners.

In the energy sector, Chile has formed alliances with major international institutions such as the International Energy Agency, the International Atomic Energy Agency, the APEC region and the International Renewable Energy Agency.

In addition, Chile has signed several non-binding cooperation agreements with other institutions that provide some assistance on energy efficiency.

Singapore’s Taxes
For its Renewable Energy Policy, Singapore is keeping corporate rates competitive to continue to attract a good share of foreign investment. The current corporate tax rate is capped at 18%, and from 2010 corporate rates will be reduced to 17% to help maintain Singapore’s competitiveness. Singapore has concluded more than 50 bilateral comprehensive tax treaties to help Singapore companies minimize their tax.

Indonesia’s Financing Roadmap
As an initiative to integrate climate change issues into development planning, the government launched the Indonesia Climate Change Trust Fund. Through the ICCTF, the government of Indonesia can utilize not only government budgets, but also bilateral and multilateral financial agreements, public–private partnerships, mandatory and voluntary international carbon markets, and the Global Environmental Fund and other funds to implement a policy framework for climate change.

Source: APEC Energy Overview 2009
Best Practices: Economies Step in the Right Direction to Liberalize Trade

There are vast opportunities to help promote the sustainable energy goods and services market. Initiatives in labeling, certification and coordination are valuable to the industry because they help bridge the gap between education and investment chasms.

**ENERGY STAR LABELING** - ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy formed to protect the environment through energy efficient products and practices. It saved enough energy in 2009 alone to avoid greenhouse gas emissions equivalent to those from 30 million cars — all while saving the population nearly $17 billion on their utility bills.

There are nearly 3,000 manufacturers using the ENERGY STAR to label and differentiate more than 40,000 individual product models. Also, there are more than 1,500 retail partners bringing ENERGY STAR qualified products and educational information to their customers. In addition to its global presence and acceptance, the fact that Energy Star acts as one recognized, centralized body contributes substantially to its success.

**FSC Certification** - The Forest Stewardship Council is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world’s forests. It is represented in more than 50 countries around the world.

The FSC logo is a branded trust mark that identifies responsible forest management in the market place. It empowers consumers to make responsible purchasing decisions on forest products.

**CTI Private Financing Advisory Network** - The Private Financing Advisory Network (PFAN) is a multilateral, public-private partnership initiated by the Climate Technology Initiative (CTI) in cooperation with the UNFCCC Expert Group on Technology Transfer. PFAN operates to bridge the gap between investments and clean energy businesses.

PFAN identifies promising clean energy projects at an early stage and provides mentoring for development of a business plan, investment pitch, and growth strategy, significantly enhancing the possibility of financial closure.

It serves as an exchange and repository for sustainable projects.

These programs have proven track records in facilitating multilateral partnerships in the realm of sustainable energy goods and services. They could serve as a prototype for potential adoption.

CASE STUDIES: A TALE OF TWO COMPANIES
INTRODUCTION: A TALE OF TWO COMPANIES

Multinationals and SMEs face uniquely different landscapes within sustainable energy. To illustrate these issues we constructed two stylized companies. We used real information, anecdotes and real quotes, shared with us by executives from companies in different APEC economies, who operate in different parts of the sustainable energy value chain. The case studies presented here are stylized stories of real issues discussed large multinationals and small and medium enterprises operating in Europe, APEC and other parts of the world. These case studies highlight, in a generalized way, the real problems faced by large multinationals and small SMEs in the sustainable energy landscape. To this end, we introduce a small business that is trying to take a new technology to the domestic market and compare the viewpoint of a large multinational corporation that develops, refines and markets large-scale technologies around the world.

Our small company struggles to access the resources and capabilities needed to commercialize its technology. As a small company, it has no significant ability to influence regulations.

Our large multinational faces challenges selling its technology across borders. It responds to trade barriers in numerous ways, from lobbying efforts to highly-structured contracts.

Both of our companies face the problem of distorted energy prices and insufficient energy use measurement and reporting.
Our two stylized companies differ not only in size and resources, but also in scope. Our large multinational corporation, “Big Co.,” engages in several activities that “Small Co.” does not. Big Co. operates over the entire value chain, while Small Co. plays only a limited role. Big Co. moves personnel across borders and lobbies governments for regulatory changes, which Small Co. is unable to do.

### Small Co.
- Revenues: Less than $10M
- Employees: < 100
- Economies in which it operates: 1 - 2
- Active in R&D, manufacturing, consulting
- Operates locally
- Executive make-up: executives are owners
- Home Economy: developed (i.e. Japan, U.S., Germany)
- Not involved in government lobbying

### Big Co.
- Revenues: $100M +
- Employees: 10,000 +
- Economies in which it operates: 8+
- Active in R&D, generation, transmission, energy-efficient product manufacturing
- Operates globally, within and beyond APEC
- Executive make-up: executives are moved for overseas appointments
- Home Economy: developed (i.e. Japan, U.S., Germany)
- Heavily involved in government lobbying
- Executives, engineers, consultants move across multiple economies
### Issues and Opportunities at a Glance

#### Common Issues
- Underpriced energy
- Lack of information
- Split incentives
- Lack of consumer financing

<table>
<thead>
<tr>
<th>Small Co. Issues</th>
<th>Big Co. Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot reach minimum efficient scale</td>
<td>Local content requirements</td>
</tr>
<tr>
<td>Patent filings are expensive and time-consuming</td>
<td>Minority control of joint venture</td>
</tr>
<tr>
<td>Cannot afford to defend IP</td>
<td>Intellectual property theft</td>
</tr>
<tr>
<td>Lack skills needed to expand</td>
<td>Labor mobility restrictions</td>
</tr>
<tr>
<td>Unable to lobby government for special treatment</td>
<td>Financial repatriation restrictions</td>
</tr>
<tr>
<td>Undiversified – increasing risk of failure</td>
<td>Localized technical standards</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Small Co. Opportunities</th>
<th>Big Co. Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconstrained by investments in fossil fuel technologies</td>
<td>Able to buy in bulk, reducing costs to viable levels</td>
</tr>
<tr>
<td></td>
<td>Invests in sustainability to enhance its brand image</td>
</tr>
</tbody>
</table>
Small Co. Cannot Access Capital Markets

**Issue:** Small Co. is not large enough or old enough to access the capital markets. It must go to banks for funding. Banks are reluctant to lend significant funds to Small Co. because it has few assets, no track record, and is heavily dependent upon continued and stable government subsidies for its survival. Small Co. can only take out small short-term loans at high interest rates.

**Consequence:** This limits the potential of Small Co. to grow and achieve economies of scale.

“Actually, smaller projects are a bit difficult to fund. There is a lack of capital in this area. It’s very difficult for banks to understand projects. If and when banks do grant loans, they are very short term and high interest.”

- Owner, Biofuel Company

Small Co. Cannot Help Clients Finance Projects

**Issue:** Small Co. has difficulty competing against larger firms who can provide long-term, low-interest financing for clients.

**Consequence:** Clients repeatedly choose a package of inferior technology and superior financing over Small Co.’s offerings.

“We had the best technology and the best price. The client’s budget is insufficient to close the deal. They need financial backing.”

- Owner, Technology Company
Small Co. Cannot Afford Patent Filings

**Issue**: Small Co. has developed several new technologies and would like to patent them. The process of applying for patents is lengthy and confusing. Small Co. cannot afford to apply for patents on all of its technologies or in all of the economies in which it plans on doing business.

**Consequence**: Small Co. gives up on some very promising technologies.

Small Co. Cannot Afford to Defend Patents

**Issue**: Small Co. learns that another company has infringed on its patents. It cannot afford to sue that company for patent infringement.

**Consequence**: Small Co. has a reduced incentive to invest in further research and development.

“It’s hard to get patents. In order to get patents you have to get through a lot of red tape. It must be done by an attorney who doesn’t know the technology. So, it required many iterations of the application to get approved. Each iteration required more payments to the attorney. I modified my technology to apply to the medical field and tried to apply for a patent but I gave up because it was too costly to keep applying.”

- Owner, Technology Company

“I found out that someone once used my technology without paying me. But, enforcing my IPR was too expensive and the firm was too small, so I let it go.”

- Owner, Technology Company
Small Co. Lacks Critical Skills and Resources

**Issue:** Small Co. was founded by engineers. The founders are talented at developing new technologies, but lack many of the skills and resources required to successfully commercialize these innovations. Some of the skills that Small Co. does not have are marketing, legal expertise, foreign language fluency, financial modeling and fundraising abilities.

**Consequence:** Small Co. struggles to reach the market successfully.

---

Small Co. Cannot Lobby Government for Assistance

**Issue:** Small Co. faces barriers put in place by the government at the behest of dominant incumbent firms from the oil, gas and coal industries. It lacks the funds and connections needed to fight these policies. Firms that offer competing renewable energy technologies successfully lobby the government for subsidies. Small Co.’s niche does not have the funds to lobby for similar hand-outs.

**Consequence:** Promising disruptive innovations are stifled. Fossil fuels maintain their dominant position in the market.

---

“We don’t have the resources to spend exploring new markets. A lot of things are done under the table. We have the best technology, but not the channels to work under the table.”

- Owner, Technology Company

The strong wind sector, led by giants “Big Co,” and “Huge Co.,” have lobbied for special government incentives for their sector. However, these incentives do not always cover other energy sources.

- Owner, Biofuel Company
Big Co. Faces Local Content Requirements that Inhibit Economies of Scale

**Issue:** Big Co. would like to sell its Green Power Generator in Economy B. Economy B, seeking energy security and economic growth, attempts to jump-start a renewable energy technology cluster. It requires that 50% of the parts in any generators installed in Economy B must be sourced locally.

**Response:** Big Co. explores the possibility of setting up factories and training local workers. However, such activities involve a number of risks, including intellectual property theft, restrictions on repatriation of profits, and the risk that assets in Economy B might be nationalized without compensation.

**Consequence:** Local investment requirements lead to multiple smaller plants limiting achievement of scale economies in production which result in higher prices, further limiting demand.

“Countries are making it difficult to import equipment. Apart from import duties and VAT, they are enforcing strict rules on local content requirement. Some cases even require 50% to 60% local content in the imported products.”

- Executive, Manufacturer
Big Co. Faces Minority-Control-of-Joint-Venture Restrictions that Inhibit Investment

**Issue:** Big Co. builds a plant in Economy B to manufacture 50% of the parts for its Green Power Generators. Economy B enacts a law that foreign companies are not allowed to have a controlling stake in any companies operating in Economy B.

**Response:** Big Technology Co. must find an investor in Economy B who is willing to invest in the plant. It faces substantial risks in establishing a joint venture. Any co-investor might make decisions that disadvantage Big Co. Big Co.’s intellectual property will be at risk when components are manufactured on foreign soil.

**Consequence:** Investments in research and development are discouraged by the prospect of intellectual property theft and the reduction in potential return on investment. Product quality improvements and cost reductions are delayed.

“China forces foreign companies to form joint ventures in the energy sector. Once the Chinese firms gain enough expertise to handle the company they overtake the whole company. So there is a huge ‘Lack of Trust’ issue with JV by foreign firms.”

- Executive, Manufacturer

“‘In Mexico, it is almost a hindrance. JVs limited to 49% control. The company would not want to do this is a country with an unknown partner. They tried it once in the Philippines, where they did not have company control and the PH company acted in its own benefit and not to theirs, so the company walked away. NOW they prefer to just sell the technology, stand back. Most countries do not want a totally foreign owned company in their country.’”

- Executive, Manufacturer
**Issue:**** Economy B prevents Big Co. from repatriating more than 20% of its profits in any given year. Furthermore, Economy A taxes Big Co.’s funds as they are brought back into Economy A. This issue of double taxation discourages Big Co. from making further investments outside of Economy A.

**Response:** In order to return assets to Economy A, Energy Technology Co. is forced to buy commodities from Economy B and sell them in Economy A, paying import tariffs and taxes on the sales.

**Consequence:** International trade and investment is inhibited. Competition is stifled. Economies of scale are not achieved. Prices of renewable energy products remain high.

“Dividend tax policy is of particular concern – how profits to investors will be taxed in local economies and also when repatriated.”

- Executive, Energy Technology Firm
Big Co. Responds to the Threat of Intellectual Property Theft by Bundling Service with Hardware Sales

**Issue:** Big Co. fears that its competitors will reverse-engineer its Green Power Generator and steal its intellectual property. This fear is elevated by local content requirements and non-control of joint venture requirements.

**Response:** Big Co. decides not to sell its latest products in Economy B. Big Co. avoids transferring critical technologies and training local workers for certain positions. It bundles generator sales with long-term service and maintenance contracts to prevent its customers from seeking parts or services from outside vendors.

**Consequence:** Economies of scale are not achieved. Overall project costs for installation and operation are increased. R&D investment is discouraged. Labor mobility restrictions inhibit fulfillment of service contracts. Breakdowns and subsequent power outages are prolonged.

“If we didn’t provide these services, and our clients had to search for individual parts, they would shop around for the lowest price and this would incentivize reverse engineering of our products. So we make these long-term contracts cheap for them so that they do not shop around”

- Executive, Energy Technology Firm
Big Co. Faces Localized Standards that Inhibit Economies of Scale

**Issue:** Big Co. invests money in redesigning its Green Power Generator to conform to the specific technical standards of each economy. These non-value-added costs are passed on to consumers in the final selling price of the Green Power Generator.

**Response:** Big Co. lobbies the governments of Economies B, C and D to adopt regional or international standards, or to agree to mutual recognition of each other’s standards so that Big Co. can spend less money on redesigns. It declines to invest in redesigns for certain smaller economies.

**Consequence:** Competition is inhibited and prices for renewable energy products remain high. This discourages investment in renewable energy, preventing the achievement of economies of scale, leading to higher prices.

“An economy should have a wide range of standards to accept, not just one, because all the companies are just trying to make a product of equal quality. We would like to see regional-level localization rather than country-level localization.”

- Executive, Energy Technology Firm
Big Co. Faces Labor Mobility Restrictions that Delay Emergency Repairs

**Issue:** On rare occasions, Green Power Generators require complex repairs, and highly-skilled technicians need to be brought in from Economy A. Delays in obtaining work visas delay repairs.

**Response:** Big Co. hires specialists to handle the paperwork for visas and work permits. It is forced to continue operating damaged equipment in order to provide basic power needs for communities.

**Consequence:** Breakdowns and power outages are prolonged. Equipment suffers further damage, increasing repair costs. Municipalities choose more stable, fossil fuel-based power plants for future energy needs.

“It can take several months to get a work visa. The cost of delays can be millions of dollars a day.”

- Executive, Energy Technology Firm
Both Companies Face Underpriced Fossil Fuels that Delay Adoption of Renewable Energy

**Issue:** Meaningful energy prices do not exist. Social costs are not factored into the price of fossil fuels. Subsidies for fossil fuels outweigh those for renewable. Government policies determine which energy technologies are profitable and which are not, increasing risks for renewable energy investments.

**Response:** Companies invest in R&D to make renewable technologies more affordable. They lobby governments to subsidize renewable energy purchases or to tax fossil fuel consumption. Small companies fail when renewable energy subsidies fall. Big companies continue to sell older fossil-fuel-based technologies.

**Consequence:** Utility companies continue to build oil, gas and coal-fired power plants rather than investing in sustainable energy technologies.

“**With petrol prices below $1/liter, there is no potential for this (renewable technology) now. The problem is gas is too cheap.**”

- Owner, Biofuel Company

“The problem is that fossil fuels are too cheap. We would like to see the social costs of fossil fuels included in the price. Otherwise, utility companies will continue to build coal-fired plants”

- Executive, Manufacturer
Both Companies Face an Information Shortage that Inhibits Sales of Energy-Efficient Products

**Issue:** Consumers do not take the potential energy cost savings into account because appliance-level data on energy costs is not available. “They don’t evaluate total cost,” says an executive at Big Co.

**Response:** Companies try to communicate the value of energy-efficient goods to consumers with “Energy Star” labels. Companies lobby for subsidies and tax rebates for efficient goods.

**Consequence:** Demand for energy-efficient goods is lower than it potentially could be. With limited market size, ROI projections are lower, resulting in lower levels of investment. Lower volumes of demand limit gains from economies of scale, leading to higher prices and further decreasing demand.

“People need to focus on life cycle costs rather than short term (installation or purchase) costs.”
- VP International Store Design & Construction, Retail

“Consumers don’t evaluate total cost”
- Executive, Energy Manufacturer
Both Companies Face Split Incentives that Inhibit Investment in Energy-Efficient Technologies

**Issue:** The party that pays for investments in energy efficiency is not the party that gains from the investment. This is a common dilemma in real estate: if landlords make the investment, tenants reap the rewards. This discourages landlords from making such investments.

**Response:** Companies have lobbied governments for tax rebates and subsidies for energy-efficient technologies. Different leasing and rental models tie the rewards of reduced operating costs to the cost of investing in efficiency.

**Consequence:** Demand for energy-efficient goods is lower than it potentially could be. With limited market size, ROI projections are lower, resulting in lower levels of investment. Lower volumes of demand limit gains from economies of scale, leading to higher prices and further decreasing demand.

“There is a disconnect between landlords and tenants on whether to retrofit a green space, especially on single-tenant long-term NNN leases. In these cases, the landlord will absorb capital costs while the tenant will reap the benefits of lower operating costs. Multi-tenant full service leases have more incentive for the landlord given the potential for operating expense savings.”

- Investment Manager, Real Estate
Both Companies Face a Shortage of Financing for Consumer-Level Investments In Efficient Appliances

**Issue:** Capital costs associated with replacing inefficient goods are prohibitive. Consumers often lack the resources to invest in energy-efficient goods, even if the investment would lead to significant savings over the long-term. Large transaction costs prevent consumers from replacing old, inefficient goods.

**Response:** Companies have lobbied governments for tax rebates and subsidies for energy-efficient technologies in order to lower the initial cost of purchasing energy-efficient goods. Some government subsidize all of the activities related to replacing old, inefficient goods.

**Consequence:** Demand for energy-efficient goods is lower than it potentially could be. With limited market size, ROI projections are lower, resulting in lower levels of investment. Lower volumes of demand limit gains from economies of scale, leading to higher prices and further decreasing demand.

"By doing survey on efficiency of old refrigerators and offering money for trade ins (to see what barriers were to new refrigerators), [government] offered free pick up, and money for trading in the refrigerator."

- Manager, Government Agency
**Big Co. Can Buy in Sufficient Quantity to Single-Handedly Create Markets**

*Opportunity*: As a consumer, Big Co. can have a big impact. It purchases in such large quantities that it can single-handedly create sufficient demand for specific goods to make them viable in new markets.

“LED parking lot lights are highly efficient but their cost results in very lengthy paybacks in the US. However, Puerto Rico has electricity prices that are 2-3x more expensive than the US, so these US made products are being exported and installed in 300+ stores in South America. Our company is starting a roll out plan based on the highest electricity cost then working down from there. Large quantities purchased has lowered prices (bulk pricing and driving up overall demand) so much that these lights are almost cheap enough to be implemented in the US now.”

- VP International Store Design & Construction, Retail
Big Co. Invests in Sustainability to Enhance its Public Image

**Opportunity:** Big Co. invests in sustainability as part of its public relations efforts. Big Co. can afford to make significant investments in sustainability because it can reap significant rewards by advertising itself as a socially-responsible company.

*“It’s a matter of economics. Frito Lay uses solar power to make Sun Chips because it’s Great PR.”*  
- Energy Lawyer, International Law Firm

*“Based on discussions about the different property types, sustainable elements are a differentiator for tenants, particularly those with corporate mandates to occupy green space (Fortune 500 companies, top tier law firms, and the GSA, for example).”*  
- Investment Manager, Commercial Real Estate
Small Co. Can Develop Disruptive Technologies Without Concern for Cannibalizing Older Core Business

Small Co. can commit to new technologies without concern for cannibalization of older technologies. Schumpeter described this process as “creative destruction,” because the creation of value from new innovations destroys the monopoly power of the dominant incumbent technologies.

“We use profits to finance our investment, so it is important to have the core business do well.”

- Executive, Energy Technology Firm
If there is one single conclusion to draw from this report, it is the necessity of coordinated action to encourage investment in the research and development, supply, trade, and demand for sustainable energy. The current level of investment is insufficient to bridge the growing gap between energy demand and energy supply. Failure to increase investment in sustainable energy promotes a status quo that is environmentally unsustainable. Progress toward a more sustainable future cannot afford the luxury of negotiated solutions and incremental improvements. A sustainable energy future depends on the implementation of an investment framework that embraces coordinated actions by business and economies to promote diverse energy solutions.

At present, there is no shortage of willing investors, innovative ideas, or good government policies for sustainable energy. The failure to coordinate these, however, inhibits successful investment in sustainable energy within and across APEC economies. While many economies have surged ahead with ambitious policies to encourage sustainable energy development and deployment, the investment landscape is marked by independent and isolated actions, which are motivated by domestic concerns for the security of affordable energy. The complexity of energy and scale of action necessary to avert energy crises, however, rely on coordinated, collaborative commitments to a sustainable energy investment environment.

Economies have two alternatives—more of the same, or a decided step forward to a sustainable future. In the context of energy, economies that choose to “go-it-alone” are not guaranteed economic or environmental status quos; rather, they risk an accelerating decline relative to those economies committed to a cooperative and coordinated energy future. Businesses should be concerned with economies that do not consider their roles in context of the APEC community. Economies that opt out of a coordinated investment framework for sustainable energy effectively opt out of the economic gold rush that can create new technologies, new opportunities, new markets, new jobs, and new competitive advantages that will define how economies and businesses compete in the 21st century.

This report, unfortunately, makes it easy to understand why investment in sustainable energy fails to keep pace with growing demand and continues to be overshadowed by new commitments to fossil fuels. Short-term concerns for energy security and energy affordability result in myopic policies that distort energy prices, limit market sizes, and create uncertainty about the return on investment for sustainable energy. It is not enough, however, to tell economies to integrate markets, provide transparent pricing, and commit to policy certainty; the legacy of fossil fuel infrastructures, incumbent interests, costs to change, and consumer ignorance generates inertia that constrains commercialization of the disruptive and divergent innovations required to move sustainable energy forward.
Conclusion (contd.)

Our research demonstrates that economy differences in natural endowments, stages of development, industrial and scientific capabilities, and availability of talent necessitate different sustainable energy solutions for different economies. The research also suggests that these differences lead to independent and isolated policies that create investment uncertainty and generate inertia for the status quo. The investment framework needed to promote a sustainable energy future must alleviate the innate tension between independent energy concerns and the need for collaborative and innovative solutions to close the energy gap. A framework that coordinates divergent and disruptive innovation will empower businesses to lead APEC to a sustainable energy future.

It is worth repeating; there are plenty of willing investors, innovative ideas, and good government policies for sustainable energy. But businesses are held up at the starting gates while money flows into more certain fossil fuel projects. Businesses want progress and demand leadership. They repeated the need for clear commitment to a sustainable energy future. Businesses and investors said that progress depends on economy commitments to transparent energy prices and policy certainty; they recognize and applauded APEC goals to integrate markets and facilitate trade in EGS; but businesses and investors also emphasized the need for accelerated efforts to harmonize standards, provide common certifications, encourage common definitions, and share and disseminate best practices. To accomplish all of this, businesses stressed the need for a coordinated investment framework, and suggested that Free Trade Agreements are useful but underutilized mechanisms for encouraging greater investment in sustainable energy.

Collective courage and political will is necessary to lead APEC to a sustainable energy future. Without leadership, economies will continue independent, isolated energy policies that compromise the security and sustainability of APEC economies, and forgo opportunities for economic growth and prosperity. The leaders of today will be judged by their decisions on how to move sustainable energy forward. This report provides a foundation upon which leaders can develop an investment framework that can ensure the long-term energy security, economic prosperity, and environmental sustainability of their economies. When history reflects on the leaders of today let it celebrate the collective will to avert an energy crisis. After all that is said and done, let historians write that more was done than said.
### Mapping Issues to Solutions

<table>
<thead>
<tr>
<th>Issues</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Sizes</td>
<td>New Zealand adopts Australia’s standards to transform its 4 million person market into a 26 million person market.</td>
</tr>
<tr>
<td>Leapfrog Fossil Fuels</td>
<td>China has installed solar water heaters in both urban and rural communities.</td>
</tr>
<tr>
<td>Transparent Pricing &amp; Energy Efficiency</td>
<td>Unregulated prices that include the cost of externalities encourage usage moderation, energy efficiency and energy innovation.</td>
</tr>
<tr>
<td>Business Pathfinder</td>
<td>Wal-mart’s installation of LED lights in high-priced energy economies has caused costs to drop to a level that it is considering installing them in low-price energy economies as well.</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>US uses the Energy Star label to signal energy efficient appliances to consumers.</td>
</tr>
<tr>
<td>Public-Private Partnerships</td>
<td>Australia utilizes the option of public-private partnerships to build transmission and distribution lines when the lines will benefit discrete groups.</td>
</tr>
<tr>
<td>Investment Policy</td>
<td>Singapore has enacted a clear, certain and comprehensive investment policy to attract sustainable energy businesses to its economy.</td>
</tr>
</tbody>
</table>
APEC Must Accelerate and Intensify Its Ongoing Efforts

Businesses are impatient. They want progress. APEC has made significant inroads into EGS by addressing energy security, harmonization of standards, common definitions for EGS and energy efficiency. We urge APEC to accelerate and intensify its efforts by setting a timeline and deadlines for the economies to achieve ambitious goals.

Agree on a common definition for sustainable energy goods and services.
APEC should continue and complete its efforts to reach consensus on an APEC definition for EGS and should begin with sustainable energy goods and services. The absence of a definition not only impedes trade, but it hinders valuation of the market for EGS.

We urge APEC to craft a common definition for sustainable energy goods and service and strongly encourage all economies to honor it in trade. We also urge APEC to create a certification agency that will streamline the bureaucracy and determine which goods and services satisfy the EGS definition and under what circumstances.

Harmonize standards for sustainable energy goods and services across APEC economies.
Harmonized standards transform small markets into commercially viable ones, streamline the value chain and shed unnecessary transaction costs. They create demand so that investors see the ROI.

We urge APEC to establish a taskforce in charge of working with economies to create harmonized standards within the region.

(contd.)
APEC Must Accelerate and Intensify Its Ongoing Efforts

Set ambitious energy efficiency targets. Only by setting “stretch” goals will economies be able to break through the inertia of half-hearted attempts to improve energy efficiency. Energy efficiency has an immediate and infinite effect on closing the gap between supply and demand.

*We urge APEC to set ambitious energy efficiency goals for each economy.*

Centralize certification and labeling of sustainable energy goods and services within the APEC region. Labels such as the Energy Star label have helped create consumer awareness and education, contributing to increasing demand for sustainable energy goods and services. Labeling is a step that all economies can implement to help increase demand. A universally accepted certification for sustainable energy will prevent unnecessary delays and transactions costs that can prevent technologies from being developed or deployed.

*We urge APEC to create its own certification and labeling agency on sustainable energy goods and services that would serve as a reputable, widely accepted, third-party stamp of approval within the region.*

Constantly and continuously communicate regarding the issues, needs and opportunities of the sustainable energy goods and services market. APEC should continue its dialogue surrounding this market because it only serves to increase awareness and promote EGS in such a way that encourages regional energy security, economic growth, and environmental sustainability.

*We urge APEC to host periodic conventions dedicated specifically to facilitating and continuing the conversation among influential policy-makers, businesses, academics and public representatives regarding all above points.*
1. **Establish a separate and coordinated sustainable energy investment framework.**
   Similar to APEC security framework, we urge APEC to create an investment framework that will address market access and integration, facilitate trade, coordinate energy policies across economies, enhance trust between economies, and stimulate competition.

2. **Establish regulatory certainty. Set time-based targets for sustainable energy goals to encourage long-term policy and investment.**
   Business executives were in rare consensus that economies must make long-term commitments to a clear, comprehensive and certain policy in order to reduce the risk of investment uncertainty. Without such commitments, businesses fail to see the ROI and will not make the necessary investments in R&D for technology, capital-intensive energy projects or human capital knowledge and/or training.

   *We urge APEC to establish a taskforce to study current energy policies and capabilities across economies and to offer recommendations for developing a clear, coordinated, and certain investment framework for sustainable energy goods and services.*

3. **Build the trade infrastructure for sustainable energy.**
   The Free Trade Agreement analysis concluded that FTAs are silent when it comes to sustainable energy goods and services. The language in FTAs relating to the environment is ineffectual and inconclusive. FTAs, however, provide a real opportunity to address and improve almost all of the issues that inhibit sufficient investment and trade in sustainable energy. FTAs already contain the building blocks for sustainable energy and EGS, e.g. labor mobility provisions. The Environmental Cooperation Agreement attached to the Trans-Pacific Strategic Economic Partnership is a step in the right direction towards model measures for EGS FTAs.

   *We urge APEC to establish a taskforce to develop a set of model measures for sustainable energy chapters within FTAs, and for negotiating sustainable energy-specific MOUs.*
4. Put a price on carbon. Encourage developing economies to leapfrog to a carbon pricing scheme.
There was also consensus around putting a price on carbon. Failure to do so will leave sustainable energy rudderless and relegated to a category of good intentions that are never realized. There has to be a price on carbon in order for consumers to understand the true cost of energy. Failure to understand the true cost of energy only serves to perpetuate the current vicious cycle of reverting to fossil fuels.

*We urge APEC to study carbon pricing and establish a timeline by which economies should fix a carbon price according to their energy use per capita, their status as a developed or developing economy and their carbon footprint.*

5. Remove fossil fuel bias. Encourage developing economies to leapfrog to a sustainable energy future.
Most developed economies have a fossil fuel bias because of the extensive fossil fuel infrastructure that is already in place and is costly to replace. Transmission and distribution lines, the ability to store and transport fossil fuels, and dominant fossil fuel incumbent businesses are only the tip of the iceberg. Economies continue to provide fossil fuel subsidies that dwarf those of sustainable energy. Until these practices are no longer working in contravention of sustainable energy efforts, investors will continue to balk.

*We urge APEC to establish a timeline by which economies should remove fossil fuel subsidies in an economically responsible manner. We also urge APEC to incentivize infrastructure development and storage technology research & development.*
6. **Strengthen and stimulate demand-side of sustainable energy.** Create and leverage a repository for the collection, cataloging and dissemination of sustainable energy technology, knowledge and best practices. Measurement and incentives are critical to creating the awareness. Without strong pull, investments will not flow. Progress could be accelerated through dissemination of knowledge and basic technology amongst economies. By obviating duplicative efforts and creating awareness of progress in other economies, APEC could advance sustainable energy in a meaningful manner.

*We urge APEC to create a robust clearinghouse dedicated specifically to sustainable energy goods and services where economies access information on past projects, new opportunities, current programs, and sustainable energy suppliers. We encourage APEC to implement special labor mobility provisions to encourage movement of critical sustainable energy skill sets within APEC.*

7. **Create demonstration projects in economies.**

Seeing is believing. Setting up demonstration sustainable energy projects on a small scale educates the stakeholders and provides tangible examples of the utility and technological maturity of such projects. Projects could be sponsored by non-government organizations, individual economies, or even corporate sponsors to encourage demand for sustainable solutions.

*We urge APEC to establish a small scale trade system to promote the establishment of demonstration projects.*

(contd.)
**Action Agenda: High Priority**

8. **Design and launch awareness and education campaigns for three separate entities - government, business and end consumer.**

   Without awareness, demand for sustainable energy will not reach a size to sufficiently pull investment through supply, trade and R&D. People do not understand where their energy comes from, how much it truly costs, the dire situation of the gap between the world’s energy supply and demand, or even basic things such as how much they use. Rather, they continue ignorance, use the commodity and pay for it after usage. Awareness, coupled with the ability to measure and understand energy usage and carbon footprints, is one of the key components to creating sufficient demand so that investors see the ROI in sustainable energy.

   *We urge APEC to create a taskforce or employ an agency in charge of educating these three entities about sustainable energy goods, services and projects.*

9. **Create a framework for cross-border, business-economy dialogues.**

   Energy by its very nature is subject to political regulation and thus requires its involvement. Businesses are in a position to do what businesses excel at—driving results—by working in partnership with economies to take giant steps towards a sustainable energy future.

   *We urge APEC to encourage public private partnerships to bring together those whose incentives for change are aligned so that they reach implementable solutions.*
APPENDIX: Free Trade Agreements
Trade Agreements Research

Objectives

The primary objective of this research study was to provide a comprehensive catalog of all EGS provisions within Free Trade Agreements (FTAs) and Regional Trade Agreements (RTAs) within the APEC region. Over time APEC economies have negotiated an increasing array of trade agreements with differing goals and purposes. This proliferation of trade agreements, while facilitating trade at one level, has created a complex web of bilateral and multilateral agreements which make coordination across economies increasingly difficult.

Specifically, the objectives of the EGS policy analysis were to:

• Identify and locate all relevant trade agreements that have been executed between APEC economies.
• Compare the level of policy detail within EGS provisions, across agreements, and across economies.
• Analyze the similarities (convergence) and differences (divergence) in the language used to address EGS issues within all relevant agreements.
EGS related trade in APEC is in its nascent stage. As of 2010, APEC has only a few bilateral and multilateral trade agreements that address the promotion and diffusion of EGS.

The Trans-Pacific Strategic Economic Partnership Agreement and the North America Free Trade Agreement are examples of trade agreements with Environmental Cooperation Agreements.

Our research identified 19 trade agreements that contain environment provisions. These provisions are heterogeneous in their placement and content. In most of the agreements, the parties do not undertake commitments. The absence of a stand-alone environmental agreement at the WTO and a universally adopted model to point to when developing environmental provisions is hindering the growth of EGS focused trade agreements.

Our team reviewed a total of 44 trade agreements currently in force or soon to become active. We also researched with limited success 17 trade agreements under negotiation.
Economies and Trade Blocks Mentioned in Trade Agreements

Economies Mentioned in Bilateral Agreements:

*In our research Russia was mentioned only as part of a proposed bilateral trade agreement with Korea.

Economies Mentioned in Multilateral Agreements:
**ASEAN:** Brunei Darussalam - *Cambodia* - Indonesia - Laos - Malaysia - *Myanmar* - Philippines - Singapore - Thailand - Vietnam
**TPSEPA:** Chile - New Zealand - Brunei Darussalam - Singapore
**AANZFTA:** Australia - New Zealand - ASEAN
**APTA:** Bangladesh - *India* - Laos - China - Korea - *Sri Lanka*
**NAFTA** Mexico - United States - Canada

*Non-APEC members*
## Trade Agreements in Force (*waiting ratification*)

### Bilateral Agreements

- Australia – New Zealand
- Australia – Papua New Guinea
- Canada – Chile
- Chile – Mexico
- New Zealand – Singapore
- Singapore – Australia
- Japan – Singapore
- Australia - United States
- Japan – Mexico
- Chile – United States
- Singapore - United States
- Chile – Korea
- China – Hong Kong, China
- Japan – Malaysia
- Japan – Thailand
- Korea – Singapore
- Australia – Thailand
- New Zealand – Thailand
- Peru – United States
- Chile – China
- Japan – Philippines
- Chile – Peru
- Peru – Thailand
- Chile – Japan
- Australia – Chile
- Canada – Peru
- China – New Zealand
- China – Singapore
- Japan – Vietnam
- Peru – Singapore
- Brunei Darussalam – Japan
- Indonesia – Japan
- New Zealand – Malaysia
- Peru – China
  *New Zealand – Hong Kong, China*
  **Korea – United States**

### Multilateral Agreements

- Association of Southeast Asian Nations Free Trade Area (ASEAN)
- North America Free Trade Agreement (NAFTA)
- ASEAN – China
- Trans-Pacific Strategic Economic Partnership Agreement (TPSEPA)
- ASEAN – Japan
- ASEAN, Australia and New Zealand Free Trade Area (AANZFTA)
- Asia Pacific Trade Agreement (APTA)
- ASEAN – Korea

### Notes:

*Signed on March 29, 2010 but not yet entered into force.*

**Signed on June 30, 2007 but U.S. Congress approval is pending**
# Current and Under Negotiation Trade Agreements

<table>
<thead>
<tr>
<th>APEC Economies</th>
<th>Australia</th>
<th>Brunei Darussalam</th>
<th>Canada</th>
<th>Chile</th>
<th>China</th>
<th>Chinese Taipei</th>
<th>Hong Kong, China</th>
<th>Indonesia</th>
<th>Japan</th>
<th>Korea</th>
<th>Malaysia</th>
<th>Mexico</th>
<th>New Zealand</th>
<th>Papua New Guinea</th>
<th>Peru</th>
<th>Philippines</th>
<th>Russia</th>
<th>Singapore</th>
<th>Thailand</th>
<th>United States</th>
<th>Viet Nam</th>
<th>ASEAN</th>
<th>AANZFTA</th>
<th>NAFTA</th>
<th>TPSEPA</th>
<th>APTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viet Nam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASEAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AANZFTA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAFTA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPSEPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APTA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Agreements in force:**
- **36 Bilateral**
- **8 Multilateral**

**Potential Agreements:**
- **21 Under Negotiation**
- **8 Proposed**
Environmental Provisions:
19 Mention environmental clauses
13 Refer to a separate document
“The Parties recognize that it is inappropriate to encourage investment by relaxing domestic health, safety or environmental measures. Accordingly, a Party should not waive or otherwise derogate from, or offer to waive or otherwise derogate from, such measures as an encouragement for the establishment, acquisition, expansion or retention in its territory of an investment of an investor. If a Party considers that another Party has offered such an encouragement, it may request consultations with the other Party and the two Parties shall consult with a view to avoiding any such encouragement.”

- North American Free Trade Agreement

“Each Party, in pursuit of sustainable development and taking into account its obligations under those international agreements concerning environment to which it is a minimizing, in an economically efficient manner, harmful party, confirms the importance of avoiding or environmental impacts of all activities related to energy and mineral resources in its Area.”

- Japan Indonesia Economic Partnership Agreement
Insight into Trade Agreements: Common Issues

Trade agreements are a powerful tool to encourage trade in a specific sector. Currently, trade agreements within APEC do not address EGS directly. At best, they mention a concern for the environment and state the signatories’ best intentions to foster environmental protection, but use vague language about how relevant issues should be tackled. The reality is that EGS policies remain very much more in the realm of domestic policy-making than in international trade policy-making.

Common Issues in Trade Agreements

Declaration of Best Intentions
Most trade agreements will mention “Commitment to Environmental Protection” in the preamble without addressing environmental issues much further or going into specifics.

Little Focus and Effectiveness
Some trade agreements have separate sections or separate documents referenced that deal with environmental issues or sustainable goods and services. However, these documents usually fail to generate an effective approach for the successful diffusion of EGS.

Common Language
A common clause found in trade agreements is: “The Parties recognize that it is inappropriate to encourage investment by relaxing domestic health, safety or environmental measures”. This is found in most agreements whether specific policies regarding environmental issues have been outlined or not.
Insight into Trade Agreements: Building Blocks for EGS Trade Platform

A number of clauses in trade agreements can have a definitive impact on EGS.

Trade agreements contain several building blocks necessary for the successful trade of EGS.
Case Study on the Trans-Pacific Strategic Economic Partnership Agreement and Its Environmental Cooperation Agreement

A case study of the ECA agreed among the parties in the Trans-Pacific Strategic Economic Partnership, Brunei Darussalam, Chile, New Zealand and Singapore:

The agreement supports the signatories’ commitment to encourage sustainable development. The parties recognize “that environment and trade policies should be mutually supportive, with a view to achieving sustainable development.”

The agreement also recognizes “the existence of differences in the Parties’ respective natural endowments, climatic, geographical, social, cultural and legal conditions and economic, technological and infrastructural capabilities.”

Yet, it still endeavors to “have its environmental laws... practices in harmony with its international commitments” and prevent “inappropriate use... for trade protectionist measures.”

Originally signed in 2005 by the 4 economies mentioned above, there are current negotiations to expand the agreement to include the U.S., Australia, Peru and Vietnam.

The Environmental Cooperation Agreement attached to the Trans-Pacific Strategic Economic Partnership is a step in the right direction.

However, there are still opportunities for the ECA language to be refined to become the ideal trade agreement for EGS. The language in the ECA reflects the first pass attempt in creating the world’s first EGS based trade agreement, but as the economies work together, the ambiguity can be replaced with set goals and provisions from their preliminary discussions. The goal is to include EGS provisions similar to any other business provisions in trade agreements. In the meantime, special EGS provisions must be made to accelerate the process.

This is an example of a policy and trade infrastructure that could be used to facilitate trade in sustainable goods and services market. Additionally, there are currently no agreements that could be used as a model provision for other agreements in EGS.
APPENDIX: Economy Research
Energy Policy Research Process

Objective: Provide an in-depth analysis of the nature and extent of energy policy for APEC economies.

Goal 1
- To identify the energy resources located in each APEC economy.

Goal 2
- Collect data on the energy policies that exist within each APEC economy.

Research Approach:
1. Constructed database with the energy resources located in each economy and catalogued them into two areas:
   - Fossil Fuel Resources: coal, oil, and natural gas
   - Sustainable Energy Resources: solar, wind, hydro, uranium, biomass, and geothermal

2. Cataloged energy policies for each APEC economy based on the following categories:
   - Incentives: government subsidies, loans, tax break, feed in tariffs, and government funds
   - Government Policies: government projects, EGS standards, labeling and certification, consumer awareness campaigns, energy efficiency targets, CO2 emission reduction plans, transportation.
   - Private and Public Initiatives: research institutions, training programs, education grants, conference, online exchange and database, carbon pricing regime.

3. Conducted a comparative analysis of each economy’s policy based on specific attributes (Lead vs. Need, Developed vs. Developing) and performed analysis for:
   - Correlation between developed/developing economies and the number of sustainable energy policies.
   - Correlation between lead/need economies and the number of sustainable energy policies.
   - Correlation between net energy importers and the number of sustainable energy policies.
### Research Limitations and Assumptions

- Policies and updates outside of the references may not be included in our analysis.
- Analysis does not consider the scale, scope and implementation of policies.
- Availability and amount of natural resources is not quantified.

### Sources

- APEC Energy Overview 2009
- APEC Energy Demand and Supply Outlook 4th Edition-Economy Review
- G20 Clean Energy Factbook
- World Investment Report 2010
- Global Trends in Sustainable Energy Investment 2009
## Energy Snapshot

<table>
<thead>
<tr>
<th>Economies</th>
<th>Fossil Fuels</th>
<th>Sustainable Energy Sources</th>
<th>Sustainable Energy Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People’s Republic of China</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Republic Korea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Philippines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viet Nam</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Policy Differences Overview

Developed economies do not have a significantly higher number of policies than developing economies. Similarly, lead economies do not have a significantly higher number of policies than need economies. On average, the number of policies are the same for developed vs. developing economies, and lead vs. need economies.

Our research indicates that developed/developing and lead/need economy status is not a determinant for the existence of sustainable energy policies.
There is no significant correlation between the developmental status of an economy and the number of EGS policies. This suggests that an economy does not need to be at a specific stage of development to enact policies intended to encourage EGS.
There is no significant correlation between the number of EGS policies in place and whether an economy is considered a lead or need economy. This suggests that lead economies do not feature more policies to encourage EGS than need economies. The ability to lead in EGS may depend on the content and enforceability of specific policies rather than just number of policies.
Our research indicates that the energy dependency of an economy reflected by its net imports is not a significant determinant of the number of sustainable energy policies.
Key Findings

These findings are based on a qualitative analysis on the number of EGS policies for APEC economies. The findings only take into consideration the existence of policies under specific categories listed in the scope of this section. This analysis does not account for the scale or effectiveness of these policies.

Major Findings:
• There is no significant correlation between the developmental status of an economy and the number of EGS policies.
• There is no significant correlation between the lead/need economies and number of EGS policies.
• Economies with limited domestic resources seem to feature energy efficiency policies because of energy security concerns.

Additional Findings:
• Only 11 APEC economies have clear and specific renewable energy portfolio targets.
• 16 economies have introduced policies to promote energy efficiency, but the benefits of these policies are yet to be realized.
• None of the APEC economies impose pricing on carbon on an economy-wide basis.
• 12 APEC economies have established Labeling and Certification processes, but these processes are inconsistent and introduce redundant transaction costs.
• 90% of APEC economy governments have initiated clean and green projects.
• 50% of APEC economies offer tax subsidies for companies providing clean energy.
• More than 80% of APEC economies provide funding for sustainable energy projects.
• Only 3 economies are hosting consumer awareness campaigns to promote sustainable energy.
• 18 economies have climate change/CO2 emission reduction policies, but these policies lack coordination.
• Less than 50% of APEC economies focus on energy efficiency in the transportation sector.
• Only 3 economies provide preferential low interest loans to sustainable energy projects.
Economy Specific Issues

Australia

Business Points of Pain
• Insufficient transmission and distribution infrastructure
• Technologies do not remain within Australia
• Insufficient FTAs

Best Practices
• NABERS program allows consumers to understand and quantify environmental impact of buildings
• SENE program incentivizes the construction of transmission and distribution infrastructure
• Over AUD 500 million has been allocated to the development of renewable energy businesses

Summary
Current energy policy revolves around energy efficiency measures, emission targets and financial support: tax breaks, subsidies and grants. Australia is rich in both fossil fuel and sustainable energy natural resources, allowing it to be more aggressive with its sustainable energy targets.

Brunei Darussalam

Business Points of Pain
• Energy policy does not encourage sustainable energy investment.

Summary
Brunei Darussalam’s energy policy revolves around expanding its large oil and gas industry. Energy efficiency efforts focus on public educational awareness campaigns and are in place to increase the efficiency of their oil and gas sector. Sustainable energy policy is limited and does not encourage investment.

Information for Brunei Darussalam has been extrapolated from policy documents related to sustainable energy.
Economy Specific Issues

Canada

**Business Point of Pain**
- Siloed provincial policies due to constitutional limitations on national energy policy
- Lack of consumer awareness

**Best Practice**
- Strict efficiency standards for consumer products

**Summary**
Canada’s energy policy is determined by the varying factor endowments found in each province. Sustainable energy is utilized if it is available and each provincial government supports sustainable energy policies through financial incentives and emission controls.

Chile

**Business Points of Pain**
- Financial support for sustainable energy is limited
- Demand is lacking because of limited incentives

**Best Practice**
- Chilean Energy Efficiency Agency promotes energy efficiency measures
- Chile government supports small and medium consulting firms to export EGS service to its neighbor countries

**Summary**
Chile has a market driven energy policy that uses the least expensive energy resources. Therefore, it imports fossil fuels rather than utilizing its rich domestic resources. Chile does not offer subsidies for sustainable energy and instead focuses on an energy efficiency policy.
Economy Specific Issues

China

Business Points of Pain
• IP protection for technologies
• Strict FDI requirements

Best Practice
• Robust financial incentives for sustainable energy
• The Standardization Administration has approved 46 economy-wide standards

Summary
China is taking the lead by instituting a comprehensive policy that encourages sustainable energy. China has set aggressive energy targets that are supported by subsidies, tax breaks, feed in tariffs, government grants, policy and programs. China is also focusing on energy efficiency because of the large proportion of its energy use that comes from fossil fuels.

Chinese Taipei

Business Points of Pain
• Lack of FTAs
• Limited natural resources

Best Practice
• Feed in tariffs established to meet energy supply targets

Summary
Government support is low but increasing for sustainable energy. With limited natural resources, Chinese Taipei is dependent on foreign entities for its energy needs and primarily uses coal and oil, which has resulted in environmental concerns. It is looking to European energy policies for adoption.
Economy Specific Issues

Hong Kong

**Business Points of Pain**
- Low customer demand
- Sustainable energy not a priority for government
- No incentives for investment

**Best Practice**
- Scheme of Control agreement gives a greater return for sustainable energy assets.
- The government launched the ‘I Love Hong Kong, I Love Green’ campaign to engage the public in protecting the environment

**Summary**
Hong Kong does not have any significant natural energy resources and must import their fossil fuels. Hong Kong’s energy policy focuses on energy efficiency programs rather than sustainable energy.

Indonesia

**Best Practice**
- ICCTF: Government funding mechanism increases financing opportunity for sustainable energy

**Summary**
Indonesia has set aggressive sustainable energy targets and policies to encourage adoption. Energy policy revolves around subsidies, tax breaks, emission targets, energy efficiency programs and government projects.

Information for Indonesia has been extrapolated from policy documents related to sustainable energy.
Economy Specific Issues

Japan

Business Points of Pain
• Policies may favor domestic businesses
• High domestic standards create mismatch with quality and price demands of export market
• Reliance on imports of natural energy resources such as liquefied natural gas, rare earth metals and nuclear material

Best Practices
• High consumer awareness through government and business promotion such as Eco-Points program which spurs demand for energy efficient appliances
• Focused R&D on smart grid technology and battery storage
• High energy prices

Summary
Japan has a robust energy policy due to its lack of natural energy resources. Stringent emission, capacity and energy efficiency targets are designed to ensure that Japan has a stable supply of energy. Japan’s policies reflect its goal of becoming a leader in energy efficiency technology and it is investing heavily to become a leader in exporting this technology.

Korea

Business Points of Pain
• Highly subsidized price of electricity
• No long-term, consistent policy

Best Practices
• Leader in nuclear energy technology due to high R&D investment
• Consumer driven efficiency campaigns
• Establishment of Global Green Growth Institute, a globally represented, non-profit institute promoting economic growth and development while reducing carbon emissions, increasing sustainability, and strengthening climate resilience (i.e. green growth)

Summary
Korea’s energy policy focuses on energy efficiency measures because it has little natural energy resources. It has set aggressive carbon emission and sustainable energy supply targets to ensure it is a leader in energy resource development and trade.
Economy Specific Issues

Malaysia

Best Practices
• The SREP program permits power generated from renewable resources to be sold through Malaysia’s grid system which fast-tracks sustainable energy generation.

Summary
Malaysia is rich in oil and gas resources and its energy policy revolves around prolonging the use of these resources. To promote the development of green technology, Malaysia has established funding mechanisms and sustainable energy projects.

Information for Malaysia has been extrapolated from policy documents related to sustainable energy.

Mexico

Business Points of Pain
• Non-control of joint venture restrictions

Best Practice
• Significant discounts on transmission for renewable energy

Summary
While Mexico has developed a clear long-term goal for the reduction of greenhouse gas emissions, its policies have yet to lead to significant changes in the economy’s energy mix.

Information for Mexico has been extrapolated from policy documents related to sustainable energy.
Economy Specific Issues

New Zealand

Business Points of Pain
• Small market size

Best Practice
• EECA: Energy Efficiency and Conservation Authority implements energy efficiency programs
• New Zealand adopt Australia’s standards to integrate its market with the larger Australian market

Summary
Renewable energy, especially hydro-electricity, makes up a large portion of New Zealand’s energy mix. The government has taken positive steps to expand the market for renewable energy technology and promote energy efficiency.

Peru

Business Points of Pain
• Double taxation for Peruvians working abroad

Best Practice
• Peru introduced a biofuel mandate to encourage the adoption of biofuels

Summary
Peru’s sustainable energy program is largely motivated by energy security concerns. It has made investments in wind, solar and biofuels projects. The government has incentives for energy efficiency investments and is looking into the feasibility of nuclear power generation.
Economy Specific Issues

**Papua New Guinea**

**Summary**
Papua New Guinea’s policies reflect its large oil and gas reserves. It has a stated goal of encouraging and developing renewable energies and has begun utilizing geothermal sources.

Information for Papua New Guinea has been extrapolated from policy documents related to sustainable energy.

**Philippines**

**Business Points of Pain**
- Policy implementation
- Transparency
- Public/Private Partnership is complicated
- Bureaucracy

**Best Practice**
- Strong policies to promote sustainable energy over coal
- Opening up to foreign investment
- Significant use of geothermal and other natural, renewable factor endowments

**Summary**
The Philippines has geothermal, wind and biofuel projects in operation. It is exploring the feasibility of nuclear power generation. Energy labeling and efficiency standards programs are being rolled out. The Philippines hopes to create a globally competitive energy industry.
Economy Specific Issues

Russian Federation

Summary
The Russian Federation has extensive fossil fuel reserves and has developed a large nuclear energy program.

Information for Russia has been extrapolated from policy documents related to sustainable energy.

Singapore

Business Points of Pain
• Instability of energy policy
• Small market size: most technologies are exported

Best Practice
• Tax incentives for investment in sustainable energy
• World-class energy-efficiency program

Summary
Singapore is heavily dependent on imported energy due to the absence of factor endowments that lend themselves to sustainable energy. In addition to diversifying its energy mix, it has actively pursued energy efficiency. Singapore has encouraged market priced energy and provided incentives to encourage R&D. Incentives include tax breaks and government training programs for necessary human capital.
Economy Specific Issues

Thailand

Business Points of Pain
• Access to financing is limited
• Trouble with standards when exporting to other economies

Best Practice
• Government support for small/medium enterprises with a significant focus on biomass, cogeneration
• Actively trying to attract foreign investment in sustainable energy
• Promotion of energy efficiency through government agencies
• Dedicated Department of Alternative Energy Development and Efficiency which established a fund to be handled by two private fund managers

Summary
Thailand’s energy policy use is robust and utilizes the following factors: a sizeable energy fund, government regulations, a designated energy efficiency organization and clear, consistent and comprehensive energy policy.

United States

Business Points of Pain
• Aging and obsolete infrastructure is a major hurdle for renewable energy development

Best Practice
• Government invests heavily in R&D

Summary
The United States is heavily dependent on fossil fuels. Significant changes in regulatory policy are being inhibited by the oil, gas and coal industries. Investment in R&D is strong and the adoption of sustainable energy is increasing due to strict emission targets and supply standards.
Economy Specific Issues

Vietnam

Summary
Vietnam’s energy policies are aimed at achieving energy independence. It has significant oil coal and natural gas reserves. It is working to develop a nuclear program.

Information for Vietnam has been extrapolated from policy documents related to sustainable energy.
APPENDIX: Interview Template
INTERVIEW POLICIES & INTRODUCTION

CONFIDENTIALITY POLICY
Your personal identity will be held confidential. Data and quotes will not be directly attributed to you or your firm. We would like to include your firm’s name in the final report to demonstrate the breadth of perspectives captured in our research. May we list your firm?

WHO WE ARE
We are simply researchers, agnostic to the topic and do not represent any economy.

PROJECT OVERVIEW
The University of Southern California Marshall School of Business is conducting primary research on behalf of the ABAC (APEC Business Advisory Council) on the topic of environmental goods and services in the APEC region. A key objective of this study is to capture the voice of various businesses within APEC. I have 11 other colleagues who are in other countries conducting interviews as well at this moment. We are interviewing executives and thought leaders in the business, government and academic sectors in leading APEC economies such as yours to understand the current barriers faced by businesses in the economy as well as best practices within APEC. The study will also include a review of EGS clauses in current national policies as well as various bilateral and multilateral Free Trade Agreements between the APEC economies. Our findings will be presented at the APEC Business Advisory Council Summit, November 8-10 in Yokohama, Japan.
APEC’S DEFINITION OF EGS (breathing definition)
(EGS) is an industry sector devoted to solving, limiting or preventing environmental problems. EGS companies may be involved in manufacturing and/or services related to water or air pollution, waste management, recycling, renewable energy, monitoring, analysis and assessment, or a number of other goods and services. The provision of EGS generally accounts for 2-3% of GDP developed economies. The development of an EGS industry in transition economies is instrumental in eliminating preventable diseases, enhancing quality of life, protecting natural resources and attracting in-bound investment. Many sustainable development goals are also facilitated by a healthy EGS industry.
There is not a clearly accepted definition or classification system for EGS, but healthy debates have existed amongst government and private sector analysts, international organizations, NGOs and trade policy negotiators since the early 1990s. The mission of this environmental goods and services information exchange is to advance this debate, and provide a foundation for the facilitation and promotion of trade and commerce in environmental goods and services in the APEC region and worldwide.

SECTION I – INITIATING ENGAGEMENT
"The unique approach we are taking to this research study is to identify where money is being spent/where it is not being spent and where the government is trying to encourage money to be spent. This will help us examine the current investment landscape in your economy."
What are the most popular areas in the “green” or environmental goods and services sector right now?
Where are the biggest investment areas in the green or environmental goods and services area?
Why are these areas attracting the investment?
How are you (or your firm/branch of government) involved in “green” initiatives?
Interview Template

In your economy, has “EGS” been clearly defined? If so, do the relevant industries refer to the definition and use it, or do they ignore it? Please explain.

SECTION II – INDUSTRY & ECONOMY SPECIFIC QUESTIONS

Please research one to two policies/laws and trade agreements specific to your economy and interviewee regarding EGS & investment.

POLICY/LAW
Are you familiar with __________________ policy? Encircle one. Yes or No.
Do you think it is effective? Encircle one. Yes or No
(Yes or No) In what ways do you think it has or has not been effective? Why do you think it has or has not been effective?
Are there any other EGS policies that have benefited your industry? Please explain.
Are there any other EGS policies that hinder your industry? Please explain.

FOREIGN DIRECT INVESTMENT POLICY
How do this country’s EGS provisions in FDI policies affect your industry? How do the EGS provisions in FDI policies of other countries affect your industry? How do they affect your company’s investment decisions?

TRADE
Are you familiar with __________________ trade agreement? Encircle one. Yes or No.
Do you think it is effective? Encircle one. Yes or No
(Yes or No) In what ways do you think it has or has not been effective? Why do you think it has or has not been effective?
Are there any other trade agreements that have benefited your industry? Please explain.
Are there any other trade agreements that have hindered your industry? Please explain.
SECTION III – FUNCTION SPECIFIC QUESTIONS

APEC FLOW CHART
APEC’s Virtuous Cycle of Success for the EGS Framework
This EGS Work Program framework ("the Framework") uses the basic value chain of EGS as a framework to holistically address all aspects of EGS.
**Interview Template**

**R&D.** For both goods and services, this refers to developing new and better EGS through innovation and R&D which address not only trade in EGS but also environment and development (i.e. rural development, job creation and applied technology). APEC economies can share ideas and best practices on innovation and R&D programs that spur the development of EGS.

**Supply.** For goods, this includes the incorporation of cleaner, more resource and energy efficient technologies. For services, this includes the training of skilled personnel. Both entail a need for more focus and investment in the EGS industry. APEC economies can explore ways to facilitate investment in EGS and share best practices in developing the EGS industry sector.

**Trade.** This component aims to improve trade in EGS through trade facilitation and trade liberalization. For the former, APEC MAG (Market Access Group)/GOS (Group on Services) can come up with projects that facilitate trade in EGS. For trade liberalization, this component adheres to the Doha Para 31(iii) mandate. Recognizing that the negotiations will be done in the WTO, APEC MAG/GOS can come up with ways to support the negotiations in the WTO.

**Demand.** An increase in demand will create incentive for the market to increase R&D and investment in EGS. APEC economies can look into sharing best practices in public education on EGS and pro-EGS consumer policies, such as measuring and showing the impact of EGS on the environment.

Where do you think your business/function/knowledge/expertise falls under looking at this framework? Check all that apply.

- [ ] R&D
- [ ] Supply
- [ ] Trade
- [ ] Demand

Industry: ____________________
With the APEC framework in mind and your area of expertise, what are the main issues that have promoted or hindered the success of EGS businesses?

<table>
<thead>
<tr>
<th>Government setting standards</th>
<th>Government policies and regulations</th>
<th>Existence of policies and programs to fund and/or incentives to invest</th>
<th>Effectiveness of policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment &amp; Incentives</td>
<td>Sufficient private investment</td>
<td>Favorable ROI</td>
<td>Acceptable payback period</td>
</tr>
<tr>
<td>Technology</td>
<td>Available and accessible supporting technologies</td>
<td>Cost of technologies</td>
<td>Services</td>
</tr>
<tr>
<td>Institutional support (education)</td>
<td>Available and accessible expertise</td>
<td>Cost of expertise</td>
<td>Retention of expertise in country</td>
</tr>
<tr>
<td>IPR Protection</td>
<td>Available IPR protection laws</td>
<td>Enforcement of IPR laws</td>
<td>Energy Security</td>
</tr>
<tr>
<td>Awareness</td>
<td>Government policies and regulations</td>
<td>Existence of policies and programs to fund and/or incentives to invest</td>
<td>Effectiveness of policies</td>
</tr>
<tr>
<td>Resources (Supply Security)</td>
<td>Available resources</td>
<td>Developed resources</td>
<td>Self-sufficient economy</td>
</tr>
<tr>
<td>Competition for access to resources</td>
<td>Investment</td>
<td>Sufficient private investment</td>
<td>Favorable ROI</td>
</tr>
<tr>
<td>Acceptable payback period</td>
<td>Infrastructure</td>
<td>Existence of technological infrastructure</td>
<td>Cost of infrastructure</td>
</tr>
<tr>
<td>Agreement on global standards for infrastructure</td>
<td>Energy Efficient Products</td>
<td>Labeling</td>
<td>Government policies and regulations</td>
</tr>
<tr>
<td>Support of trade policies and agreements</td>
<td>Actions to liberalize trade</td>
<td>Political stability</td>
<td>Currency exchange rate</td>
</tr>
<tr>
<td>Artificial Market Forces</td>
<td>Tariffs Barriers</td>
<td>Non-Tariff Barriers</td>
<td>Existence of subsidies</td>
</tr>
<tr>
<td>Investment</td>
<td>Available Foreign Direct Investment</td>
<td>Services</td>
<td>Short-term easy movement of people (consultants, experts)</td>
</tr>
<tr>
<td>Long-term easy movement of people</td>
<td>IPR Protection</td>
<td>Available IPR protection laws</td>
<td>Enforcement of IPR laws</td>
</tr>
</tbody>
</table>
Interview Template

SECTION III:B – PROBING QUESTIONS

R&D
How important is R&D to the proliferation of energy-related goods and services?
Where is the most money being invested in R&D right now? Where is it coming from? What role does FDI play in this field?
What are the top 3 promoters to R&D? Why?
What are the top 3 obstacles of R&D? Why?
What kind of IP protection currently exists? What needs to be done in terms of IP?
What supporting institutions are set in place to develop and promote services/expertise? (education, training, incentives) Are they effective? How?
How important do you think cross-border trade is in R&D efforts? Why?
Which countries/regions are the best sources of innovative R&D?
Who are the biggest players in R&D? Who can effect change?
What is the current role of government in R&D? What should the government do?


**SUPPLY**

What energy sources are currently being used? Why?
Where is the biggest push being made in terms of energy sources? What areas are growing? Why?

What factors stimulate the adoption of clean energy by an economy?

What factors impede the adoption of clean energy by an economy?

What kind of infrastructure is required to support the growth of the clean energy industry?

Currently, what level of infrastructure is available in your country?

What are the major factors that influence investment decisions? Is investment viable?

What policies have been made, what policies are in process, what should be made? Please explain.

What kinds of risks are associated with alternative sources of energy? What could be the potential impact of those risks?

What is the impact of alternative sources of power on utility companies in terms of infrastructure, costs and supply?

What supporting institutions are set in place to supply services/expertise? (education, training, incentives) Are they effective? How?

Are energy efficient products (in transportation, production, construction, etc.) available and accessible? Are they attractive? Why?

Is the market self-sustaining?

Who are the biggest players in supply? Who can effect change?
TRADE
Which **countries** are you trading with and why?
What industry/good/service is experiencing the **most trade**? Why?
What are the **barriers** to international trade in your industry? Tariff & non tariff barriers?
Does **government** support the trade of your industry? In which ways?
How does the government policy/law on **IP** affect your industry?
Can you bring in **overseas consultants/workers**? Why?
How easy is it to get **visas** for workers? What are visas based on?
DEMAND
What government actions have stimulated demand in clean energy?
What government actions have impeded demand in clean energy?
Should the government set standards in clean energy? If so, like what?
What should the government do to create a comprehensive energy plan?
How can government better involve the private sector? Who else does the government need to involve?
How educated is the population on issues of EGS/in particular clean energy?
What tactics have been successful in creating awareness among consumers about energy issues? Among businesses?
What tactics have not been successful in creating awareness about energy issues?
Is money being invested in the public agenda setting? Such as PSA’s (public service announcements).
What kinds of messages have been most effective in creating awareness about energy issues? Least effective?
What motivates a government to create demand for clean energy goods and services?
What motivates a business to create demand for clean energy goods and services?
Is there a demand for energy efficient products? How much? What motivates this demand? (cost, emotion, other preferences)
What is the government doing to reduce consumption of energy? This touches upon the issues of decreasing demand for regular energy but increasing demand for renewable energy.
Do energy efficient products enhance energy security?
How does demand for EGS affect energy security?
Interview Template

SECTION IV – THE BIG QUESTIONS

If you were the key decision maker (king/queen/leader/prime minister) in your country for a day, what would you do to improve EGS? Energy?

Now, relative to what APEC can do collectively across economies, what could APEC do to facilitate trade, investment and development? (Reduce tariffs, non tariff measures, public statements, align technical standards, facilitate diffusion of tech).

Do you think that APEC can even do the job? Or other organizations such as WTO, etc.?

What best practices have you seen out there?

Why do you think they're so successful?

Who else do you think we should speak to?
APPENDIX: Survey & Results
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

Investment in Energy in APEC
Progress to a more sustainable future across all 21 APEC economies is a major objective of the APEC Business Advisory Council (ABAC). ABAC has commissioned a research study of the investment environment for sustainable energy within the APEC region in an effort to identify where APEC can best play a role in promoting major improvements. Your ABAC representatives would like your input on what recommendations they should make to APEC. They would like to know where the best opportunities to make breakthrough progress are, what are the major barriers and impediments, and what APEC can do to improve the investment landscape for sustainable energy. The findings and recommendations from this research project will be presented to ABAC at the Meeting of APEC Business Advisory Council, November 8-10, in Yokohama, Japan.

Research Questionnaire
To date, researchers from the University of Southern California have traveled to 13 APEC economies and conducted more than 150 in-person interviews with business executives and industry leaders active in sustainable energy. We are now actively summarizing and analyzing the interview data, and attempting to draw out rigorous generalizations and conclusions from the information, suggestions, and recommendations shared with us. In order to determine whether we have accurately captured the key issues, and recommendations, we have prepared a short questionnaire. We would like your opinions/perspective, and comments, on the key issues and recommendations we identified in our preliminary interviews. Importantly, where you believe we have missed important issues or recommendations, we would like you to use the spaces provided in the questionnaire to share your ideas with us.

Confidential Participant Information
Your personal identity will be held confidential. Data and survey responses will not be directly attributed to you or your organization. However, we need to know the identity of respondents to ensure that we receive feedback from business executives in all APEC economies.
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

Definitions
For this survey, we use the term “sustainable energy” to encompass not only renewable energy, such as solar, wind and geothermal, but also cleaner forms of traditional energy, e.g. clean coal, as well as nuclear and co-generation.

<table>
<thead>
<tr>
<th>Industry of Respondents</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>37.04%</td>
</tr>
<tr>
<td>Sustainable Energy</td>
<td>22.22%</td>
</tr>
<tr>
<td>Government &amp; Policy</td>
<td>11.11%</td>
</tr>
<tr>
<td>Retail</td>
<td>7.41%</td>
</tr>
<tr>
<td>Chemical</td>
<td>3.70%</td>
</tr>
<tr>
<td>Consulting</td>
<td>3.70%</td>
</tr>
<tr>
<td>Food &amp; Beverage</td>
<td>3.70%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3.70%</td>
</tr>
<tr>
<td>Pest Management</td>
<td>3.70%</td>
</tr>
<tr>
<td>Transportation</td>
<td>3.70%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Economy of Respondents</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>24.00%</td>
</tr>
<tr>
<td>Japan</td>
<td>12.00%</td>
</tr>
<tr>
<td>Singapore</td>
<td>12.00%</td>
</tr>
<tr>
<td>Australia</td>
<td>8.00%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>8.00%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>8.00%</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>8.00%</td>
</tr>
<tr>
<td>Other APEC</td>
<td>4.00%</td>
</tr>
<tr>
<td>Canada</td>
<td>4.00%</td>
</tr>
<tr>
<td>Chile</td>
<td>4.00%</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>4.00%</td>
</tr>
<tr>
<td>Thailand</td>
<td>4.00%</td>
</tr>
</tbody>
</table>
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

3. My economy has approached sustainable energy development primarily by:

- Put equal effort into improving the use of efficient energy and creating new renewable sources of energy, 51.61%
- Put somewhat more effort into creating new renewable sources of energy rather than improving the use of efficient energy, 12.90%
- Put somewhat more effort into improving the use of efficient energy rather than creating new renewable sources of energy, 25.81%
- Put most of your effort into improving the use of efficient energy rather than creating new renewable sources of energy, 6.45%
- Put most of your effort into creating new renewable sources of energy rather than improving the use of efficient energy, 3.23%
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

4. Please indicate if you agree or disagree with the following statements. N/A = not applicable to your economy, no knowledge or no opinion on this topic.

<table>
<thead>
<tr>
<th>Do you agree of disagree with the following statement:</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A major impediment to the development of sustainable energy goods and services is the market power and vested interests of existing energy producers in current energy technologies. Where existing energy producers are active players in the renewable energy sector they dull and distort the development of sustainable energy within and across economies.</td>
<td>12.5%</td>
<td>34.4%</td>
<td>9.4%</td>
<td>31.3%</td>
<td>12.5%</td>
<td></td>
</tr>
<tr>
<td>Some executives have gone as far as to argue that existing energy companies should be prohibited from investing in renewable and clean energy.</td>
<td>31.3%</td>
<td>46.9%</td>
<td>9.4%</td>
<td>3.1%</td>
<td>6.3%</td>
<td>3.1%</td>
</tr>
<tr>
<td>A lack of clear and comprehensive sustainable energy policies, and the unwillingness of politicians to make long-term commitments to them, creates an uncertain investment environment. Without stable government support, firms are discouraged from making the needed investments in sustainable energy goods and services.</td>
<td>3.1%</td>
<td>6.3%</td>
<td>12.5%</td>
<td>40.6%</td>
<td>34.4%</td>
<td>3.1%</td>
</tr>
<tr>
<td>There is currently an ample supply of both innovative ideas for sustainable energy and firms interested in investing in them.</td>
<td>0.0%</td>
<td>12.5%</td>
<td>18.8%</td>
<td>53.1%</td>
<td>9.4%</td>
<td>6.3%</td>
</tr>
<tr>
<td>There is a general lack of sufficient demand for sustainable energy goods and services.</td>
<td>3.1%</td>
<td>25.0%</td>
<td>25.0%</td>
<td>28.1%</td>
<td>12.5%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Traditional sources of energy (i.e. coal and oil-based energy) are cheaper than alternative sustainable energy sources.</td>
<td>6.3%</td>
<td>3.1%</td>
<td>3.1%</td>
<td>50.0%</td>
<td>34.4%</td>
<td>3.1%</td>
</tr>
<tr>
<td>While there are plenty of innovative ideas, opportunities to earn appropriate ROI are limited by small market sizes.</td>
<td>6.5%</td>
<td>22.6%</td>
<td>9.7%</td>
<td>38.7%</td>
<td>12.9%</td>
<td>9.7%</td>
</tr>
<tr>
<td>Average %</td>
<td>9.0%</td>
<td>21.5%</td>
<td>12.6%</td>
<td>35.0%</td>
<td>17.5%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

5. Please rank the top 3 effective ways to promote investment in Sustainable Energy Goods & Services:

<table>
<thead>
<tr>
<th>Ways to promote investment in Sustainable Energy Goods &amp; Services</th>
<th>Average Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>A clear, comprehensive and certain government policy that provides long term stability</td>
<td>1.8</td>
</tr>
<tr>
<td>Government financial incentives; e.g. subsidies, tax breaks, grants</td>
<td>2.0</td>
</tr>
<tr>
<td>Improved terms for borrowers on capital, e.g. low interest loans, longer terms for loans</td>
<td>4.1</td>
</tr>
<tr>
<td>Harmonized technical standards that integrate global markets and create sufficient scale to achieve economies of scale and generate profits</td>
<td>4.2</td>
</tr>
<tr>
<td>Collaboration on development of breakthrough technology that stimulates innovation and further investment</td>
<td>4.2</td>
</tr>
<tr>
<td>Education of consumers and industry on sustainable energy goods and services</td>
<td>4.8</td>
</tr>
<tr>
<td>Other:</td>
<td>6.9</td>
</tr>
</tbody>
</table>
6. In your economy, the most effective ways to stimulate demand are through:

<table>
<thead>
<tr>
<th>Most effective ways to stimulate demand:</th>
<th>Average Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government regulations e.g. renewable energy portfolio requirement</td>
<td>2.9</td>
</tr>
<tr>
<td>Government monetary incentives e.g. tax credits, subsidies</td>
<td>3.1</td>
</tr>
<tr>
<td>Competitively priced sustainable energy goods and services</td>
<td>4.2</td>
</tr>
<tr>
<td>Market set energy prices that include the full carbon cost/carbon footprint of a product or service</td>
<td>5.1</td>
</tr>
<tr>
<td>Government consumption</td>
<td>5.3</td>
</tr>
<tr>
<td>An effective renewable energy credit/carbon trading scheme</td>
<td>5.9</td>
</tr>
<tr>
<td>Government non-monetary incentives; e.g. HOV lane usage for hybrid vehicles</td>
<td>6.1</td>
</tr>
<tr>
<td>Consumer Education</td>
<td>6.3</td>
</tr>
<tr>
<td>Measurement devices for consumers to monitor their energy usage or environmental impact; e.g. Carbon meters or smart meters for electricity</td>
<td>7.9</td>
</tr>
<tr>
<td>Labeling of all products and appliances with carbon footprint information</td>
<td>8.5</td>
</tr>
<tr>
<td>Other:</td>
<td>10.8</td>
</tr>
</tbody>
</table>
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

7. Many executives argued that the current pricing of energy does not reflect the true cost of energy. This artificial pricing hinders investment and development of sustainable energy goods and services. Do you agree or disagree with the following statements: (N/A = not applicable to your economy, no knowledge or no opinion on this topic.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy is currently priced too low and should reflect the cost of carbon</td>
<td>6.3%</td>
<td>15.6%</td>
<td>9.4%</td>
<td>34.4%</td>
<td>31.3%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Individual and business consumers should learn to pay more for energy</td>
<td>9.4%</td>
<td>12.5%</td>
<td>18.8%</td>
<td>46.9%</td>
<td>12.5%</td>
<td></td>
</tr>
<tr>
<td>It is necessary for a global market energy price to exist for real progress to be achieved in sustainable energy development</td>
<td>6.3%</td>
<td>31.3%</td>
<td>21.9%</td>
<td>31.3%</td>
<td>6.3%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Some executives have described the economy by economy patchwork approach to energy policy development as being problematic. Their main complaint is that energy policies (such as subsidies) made in domestic isolation can distort prices in other economies and hence discourage investment in sustainable energy initiatives.</td>
<td>6.3%</td>
<td>21.9%</td>
<td>12.5%</td>
<td>50.0%</td>
<td>6.3%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Average %</td>
<td>7.0%</td>
<td>20.3%</td>
<td>15.6%</td>
<td>40.6%</td>
<td>14.1%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

8. Economies pursue energy security for 3 primary concerns: (1) securing uninterrupted and safe access to the supply of energy; (2) securing a diversity of energy sources; and (3) securing multiple suppliers of energy sources.

Do you agree or disagree with the following statements:

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issues of energy security and energy affordability in my economy will always dominate over concerns over sustainable energy development</td>
<td>3.1%</td>
<td>15.6%</td>
<td>6.3%</td>
<td>37.5%</td>
<td>37.5%</td>
<td></td>
</tr>
<tr>
<td>Economies use energy security as an excuse to engage in protectionism</td>
<td>3.1%</td>
<td>40.6%</td>
<td>31.3%</td>
<td>15.6%</td>
<td>6.3%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Average %</td>
<td>3.1%</td>
<td>28.1%</td>
<td>18.8%</td>
<td>26.6%</td>
<td>21.9%</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

9. Rate how well the following government incentives work in developing and establishing sustainable energy goods and services: (N/A = not applicable to your economy, no knowledge or no opinion on this topic.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidies</td>
<td>18.8%</td>
<td>31.3%</td>
<td>40.6%</td>
<td>6.3%</td>
<td>3.1%</td>
<td></td>
</tr>
<tr>
<td>Grants</td>
<td>21.9%</td>
<td>37.5%</td>
<td>28.1%</td>
<td>9.4%</td>
<td>3.1%</td>
<td></td>
</tr>
<tr>
<td>Tax benefits (e.g. tax credits)</td>
<td>6.3%</td>
<td>31.3%</td>
<td>46.9%</td>
<td>9.4%</td>
<td>6.3%</td>
<td></td>
</tr>
<tr>
<td>Feed-in-tariffs (i.e. a premium rate paid for sustainable energy, guaranteed over a long period of time)</td>
<td>6.3%</td>
<td>21.9%</td>
<td>21.9%</td>
<td>28.1%</td>
<td>15.6%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Non-financial incentives (e.g. customs fast-lane)</td>
<td>12.5%</td>
<td>53.1%</td>
<td>28.1%</td>
<td>3.1%</td>
<td>3.1%</td>
<td></td>
</tr>
<tr>
<td>Average %</td>
<td>3.8%</td>
<td>24.4%</td>
<td>30.0%</td>
<td>29.4%</td>
<td>8.1%</td>
<td>4.4%</td>
</tr>
</tbody>
</table>
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

10. Two major problems that were repeatedly raised as limiting progress in sustainable energy are (1) the lack of adequate storage (of energy) technology and (2) transmission and distribution capacity. Which of the following do you believe are the most promising solutions:

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross border collaboration of technology R&amp;D to find solutions to storage and transmission issues</td>
<td>3.1%</td>
<td>6.3%</td>
<td>25.0%</td>
<td>37.5%</td>
<td>18.8%</td>
<td>9.4%</td>
</tr>
<tr>
<td>New patent categories that would reward inventors for their IP but would also ensure the unimpeded, wide dissemination of such technology</td>
<td>6.3%</td>
<td>15.6%</td>
<td>31.3%</td>
<td>28.1%</td>
<td>12.5%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Government funding (e.g. subsidies, grants)</td>
<td>3.1%</td>
<td>12.5%</td>
<td>53.1%</td>
<td>31.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incentives for households and businesses to incorporate sustainable energy generation into their buildings so that distribution is no longer a factor (e.g. solar panels, cogeneration)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12.5%</td>
<td>34.4%50.0%</td>
</tr>
<tr>
<td>Average %</td>
<td>2.3%</td>
<td>6.3%</td>
<td>20.3%</td>
<td>38.3%</td>
<td>28.1%</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

11. What are the most promising approaches to reaching energy sustainability? Please allocate 10 points across the following differing approaches for achieving energy sustainability:

<table>
<thead>
<tr>
<th>Promising ways to reach energy sustainability</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on energy efficiency (green buildings, efficient appliances)</td>
<td>3.34</td>
</tr>
<tr>
<td>Developing new renewable energy sources</td>
<td>2.74</td>
</tr>
<tr>
<td>Making traditional energy clean (includes retrofitting of currently existing facilities or products, cogeneration)</td>
<td>2.26</td>
</tr>
<tr>
<td>Adopting nuclear energy</td>
<td>1.96</td>
</tr>
<tr>
<td>Other</td>
<td>1.4</td>
</tr>
</tbody>
</table>

234
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

12. Where should the focus of investment in sustainable energy be placed?

- Put equal effort into improving the use of efficient energy and creating new renewable sources of energy, 51.61%
- Put somewhat more effort into creating new renewable sources of energy rather than improving the use of efficient energy, 12.90%
- Put somewhat more effort into improving the use of efficient energy rather than creating new renewable sources of energy, 25.81%
- Put most of your effort into improving the use of efficient energy rather than creating new renewable sources of energy, 6.45%
- Put most of your effort into creating new renewable sources of energy rather than improving the use of efficient energy, 3.23%
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

13. The biggest challenges to the development of sustainable energy technologies are:

<table>
<thead>
<tr>
<th>The biggest challenges to the development of sustainable energy technologies</th>
<th>Average Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of storage technology to cope with unpredictable energy generation of renewable sources such as solar and wind</td>
<td>2.3</td>
</tr>
<tr>
<td>Lack of infrastructure for transmission and distribution of energy</td>
<td>2.7</td>
</tr>
<tr>
<td>Lack of investment funds</td>
<td>2.9</td>
</tr>
<tr>
<td>Lack of motivation to invest in clean technology</td>
<td>3.3</td>
</tr>
<tr>
<td>Lack of a central repository for sustainable energy technology and knowledge</td>
<td>4.3</td>
</tr>
<tr>
<td>Lack of skilled employees</td>
<td>5.5</td>
</tr>
</tbody>
</table>

14. The most effective way to spur investment in R&D of sustainable energy is:

<table>
<thead>
<tr>
<th>Most effective ways to spur investment of R&amp;D of sustainable energy</th>
<th>Average Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government must make comprehensive energy policies and make long-term commitments to them</td>
<td>1.7</td>
</tr>
<tr>
<td>Government incentives (e.g. grants, tax breaks)</td>
<td>1.8</td>
</tr>
<tr>
<td>Different accounting treatment of R&amp;D expenses (e.g. capitalize R&amp;D costs)</td>
<td>2.7</td>
</tr>
<tr>
<td>None of the above. My economy takes technology from other economies and adapts them if necessary</td>
<td>3.8</td>
</tr>
</tbody>
</table>
Survey: Improving the Investment Environment for Sustainable Energy within the APEC Region

15. The most important reason(s) for an economy to develop sustainable energy goods and services are:

<table>
<thead>
<tr>
<th>Most important reasons for an economy to develop sustainable energy goods &amp; services</th>
<th>Average Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>to protect the environment</td>
<td>2.1</td>
</tr>
<tr>
<td>to promote energy security</td>
<td>2.1</td>
</tr>
<tr>
<td>to grow the economy</td>
<td>2.8</td>
</tr>
<tr>
<td>to keep energy prices low</td>
<td>3</td>
</tr>
</tbody>
</table>

16. Do you agree or disagree with the following statements:

<table>
<thead>
<tr>
<th>Do you agree or disagree with the following statements:</th>
<th>Strongly Disagree</th>
<th>Disagree Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>APEC must move aggressively to create a framework for trade and investment to encourage the adoption of these goods and services.</td>
<td>12.9%</td>
<td>74.2%</td>
<td>12.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some business executives stated that the small initial size of markets for innovative clean energy technologies discourages aggressive investment. If firms could have easier access to global markets, this would increase demand volume and lead to more aggressive investment in R&amp;D and clean energy commercialization. Businesses would like to see APEC-wide uniform standards adopted by all economies.</td>
<td>12.9%</td>
<td>22.6%</td>
<td>48.4%</td>
<td>16.1%</td>
<td></td>
</tr>
</tbody>
</table>

Average %

| | 0.0% | 6.5% | 17.7% | 61.3% | 14.5% | 0.0% |
17. Which of the following are the most important issues APEC should address to facilitate progress in sustainable energy.

<table>
<thead>
<tr>
<th>Most important issues APEC should address to facilitate progress in sustainable energy</th>
<th>Average Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduce time-based targets for APEC EGS goals to encourage long term policy, starting with energy efficiency measures</td>
<td>1.81</td>
</tr>
<tr>
<td>Create an APEC technology/knowledge clearinghouse</td>
<td>2.55</td>
</tr>
<tr>
<td>Agreement on an APEC definition of Environmental Goods and Services (EGS)</td>
<td>2.75</td>
</tr>
<tr>
<td>Create a task force to gather, evaluate, and disseminate best practices for incentive, consumer awareness, and worker training programs for EGS</td>
<td>2.81</td>
</tr>
<tr>
<td>Use of common standards for EGS</td>
<td>2.84</td>
</tr>
<tr>
<td>Global market pricing scheme for energy</td>
<td>2.88</td>
</tr>
<tr>
<td>A supplier and technology marketplace of EGS</td>
<td>3.09</td>
</tr>
<tr>
<td>A common certification process and authority for EGS</td>
<td>3.63</td>
</tr>
<tr>
<td>APEC consumer awareness campaign to promote consumption of EGS</td>
<td>3.71</td>
</tr>
<tr>
<td>An APEC label for EGS</td>
<td>4.25</td>
</tr>
<tr>
<td>Establish special rapid temporary work visa programs for skilled workers essential to EGS</td>
<td>4.40</td>
</tr>
<tr>
<td>Other:</td>
<td>0.00</td>
</tr>
</tbody>
</table>
18. Which of the suggestion listed do you believe are least important?

<table>
<thead>
<tr>
<th>The least important issues are:</th>
<th>Weighted Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreement on an APEC definition of EGS</td>
<td>29</td>
</tr>
<tr>
<td>An APEC label for EGS</td>
<td>27</td>
</tr>
<tr>
<td>Explore special labor mobility mechanisms for skilled workers essential to EGS</td>
<td>20</td>
</tr>
<tr>
<td>Global market pricing scheme for energy</td>
<td>13</td>
</tr>
<tr>
<td>Create an APEC technology/knowledge clearinghouse</td>
<td>12</td>
</tr>
<tr>
<td>Use of common standards for EGS</td>
<td>10</td>
</tr>
<tr>
<td>APEC consumer awareness campaign to promote consumption of EGS</td>
<td>10</td>
</tr>
<tr>
<td>Create a task force to gather, evaluate, and disseminate best practices for incentive, consumer awareness, and worker training programs for EGS</td>
<td>7</td>
</tr>
<tr>
<td>A supplier and technology marketplace of EGS</td>
<td>7</td>
</tr>
<tr>
<td>A common certification process and authority for EGS</td>
<td>6</td>
</tr>
<tr>
<td>Introduce time-based targets for APEC EGS goals to encourage long term policy, starting with energy efficiency measures</td>
<td>3</td>
</tr>
</tbody>
</table>
APPENDIX: MBA Research Team
Ketan Bakhshi brings six years of diverse work experience and a strong interest of business in Asia to the ABAC Research team. He has global experience in supply chain management, operational excellence consulting and real estate development and has worked in the US, India and Hong Kong. Mr. Bakhshi earned his B.S. in Industrial & Systems Engineering at the University of Southern California and is an APICS Certified Supply Chain Professional.

Matt Basco joins the ABAC Research Team with three years of experience with the United States’ second-largest aerospace and defense firm. He specializes in estimating the employment and economic impacts of military-defense contracts. Mr. Basco earned a B.A. in Global Business at the University of Southern California and holds a Systems Engineering certificate from California Institute of Technology.


Spencer Cooke earned his B.A. of Economics from Kenyon College and has nine years of experience in operations management. He is proficient in Spanish.
Ismael Correa joins the ABAC research team with 2 years of experience in the construction sector and six years of experience in the satellite television and wireless communications industries. He lived 10 months in the Chilean Altiplano advising local Aymara communities on how to successfully commercialize their native products. Mr. Correa earned his B.A. in Business Administration at Los Andes University, Chile and his M.A. in Consumer Behavior at Adolfo Ibanez University, Chile.

Jyoti Gaur joins the ABAC research team with 4 years experience in environmental non-profit, policy and advocacy work. She spent three months in India working with the HIV/AIDS community. Ms. Gaur earned her B.A. in Environmental Policy from the University of California, San Diego.

Cathy Kim joins the ABAC Research Team with eight years of experience in law. She is a practicing business litigator specializing in government investigations, class actions and real estate. She is proficient in Spanish, German and Korean. Ms. Kim earned her B.A. in History at Yale University and her J.D. from University of California Hastings College of Law.

Raja Sekhar Pakkala joins the ABAC Research team with five years of experience in technology consulting and software development at globally recognized firms. Mr. Pakkala earned his B.Tech in Computer Science and Engineering from Nagarjuna University, India.
Jacqueline Panganiban brings to the ABAC Research Team her four years of experience in fashion apparel manufacturing, importing and exporting. She has lived both in the USA and the Philippines for almost equal amounts of time and is proficient in Tagalog. Ms. Panganiban earned her B.S. in Management Engineering at the Ateneo de Manila University and her A.A. in Apparel Manufacturing Management at the Fashion Institute of Design and Merchandising.

Binna Park joins the ABAC Research Team with two years of experience in banking as a system analyst and five years of experience in the automotive industry as an entrepreneur. He transformed his previous business into one of only two ASE certified repair shops in the city of Los Angeles. He is an ASE certified Advanced Engine Performance Specialist and also fluent in Korean. Mr. Park earned his B.S. in Information and Computer Science at University of California, Irvine.

Gabriel Tse joins the ABAC Research Team with six years of experience in engineering. His engineering focus is on the design and production of alternative energy systems. He is fluent in Cantonese and is proficient in Mandarin. Mr. Tse earned his B.S. in Mechanical Engineering at Massachusetts Institute of Technology and his M.S. in Mechanical Engineering from Stanford University.

Min (Grace) Xu joins the ABAC research team with 5 years experience in Industrial and Commercial Bank of China, the largest commercial bank of China. She is interested in photography and was a part-time photojournalist in China. Ms. Xu earned her Bachelor in Business Administration from Shanghai Maritime University, China.