Financing Low-Carbon Development through the Capital Markets

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Global energy demand is growing rapidly—Asia took center stage beginning around 2000.

- Total world consumption of marketed energy is expected to expand from 412 quadrillion British thermal units (Btu) in 2002 to 645 quadrillion Btu in 2025, or a **57-percent increase** over the 2002 to 2025 time period.
- The emerging economies, driven by China, India, and others in Asia will account for nearly **two-thirds** of the increase in world energy use, surpassing energy use in the mature market economies for the first time in 2020.

Approximately $17 trillion in new investment will be needed over the next 20 years to meet future fuels demand alone.

*Source: Energy Information Administration*
Capital and Innovation in Energy- and Materials-Related Private is the Most Promising It’s Been in Decades

- All aspects of the system from the wellhead to pipelines and tankers to drilling rigs to refineries are at or near 100% capacity.
- Slack supply capacity for most energy and materials has evaporated since 1980 (e.g., petroleum: from 17 mBPD to 1-3 mBPD)
- Massive capital requirements to upgrade energy infrastructure
  - $17 trillion for Fuels
  - $44 trillion, all energy
  - $100 trillion, existing but problematic infrastructure

Source - Simmons & Company International
Risk of Not Investing—Green Investing as a Super-Theme

• Opportunity: Pervasive across asset classes

• Risk of Missing Theme: Investment opportunities and returns are likely to be disproportionately represented by green investments

• Transformation in Capital Markets: Major dislocations and shifts in opportunity can be expected by geography and asset class
Clean versus Cleaner

- **Clean**
  - Alternative energy technologies intended to have minimal impact on the natural environment
  - Examples: wind, solar, geothermal, hydro, tidal

- **Cleaner**
  - Focused on transforming the inherent inefficiencies associated with traditional energy production

- **Efficiencies from source to use:** Coal (<20%), Solar (<15%), Petroleum (<15%)
Critical Sectors for Funds and Funds of Funds Investors

• Cleantech
  – Promoting the revolution in new technologies
  – Venture capital, growth equity, private equity
• Infrastructure
  – Lower-risk investments associated with deploying proven but more efficient technologies into the Asian energy infrastructure
• Real Estate
  – Energy efficiencies and shared savings
  – Fully one-half of energy consumption is associated with buildings
7 Principles for Successful Investment in Natural Resources and Sustainability Going Forward

1. Invest with End Points in Mind
2. Benefit from New Investor/Government/Industry Interdependency
3. Incorporate Rapid Technological Change
4. Adapt to Structural Shortage in Liquidity
5. Develop New Skills Needed for Success
6. Monetize Environmental Costs/Benefits
7. Build or Find Value-Added Capabilities
• Revolution in Clean Technologies ➔ rapid change

• Financial, operating, and even most technological risk can be overcome by anchoring company/project cash flows:
  – Long-term Power Purchase Agreements (PPAs)
  – Industrial supply agreements
  – Government purchase agreements

• Company and project investments will generally be too risky without anchoring the cash flows—true for private market and public markets investments
  – Case: 500 competing solar technologies worldwide
Principle II—Interdependency of Investors, Governments, and Industry

- Capital cost requirements dwarf capacity of investors alone—requires significant co-investment from governments and industry

- Governments and industry provide anchor orders and purchase agreements

- Governments can provide critical incentives

- Investor/government/industry partnerships will become ubiquitous
Principle III - Technological change will fundamentally change market opportunities

Forecast and Historical Real Cost Trends of Renewable Energy

Source: NREL Energy Analysis Office
Costs are based on constant 2005 dollars
Potential Share of Renewables in US
• Massive capital costs associated with clean technology, construction, energy and materials projects will swamp scarce capital

• Structural de-leveraging in the world’s financial institutions will likely persist for decades to come

• Scarce liquidity and financing will become a major competitive advantage for investors with liquidity resources

• Prudent investors should demand a premium return in exchange for sacrificing liquidity going forward
• Nearly three decades have past since last major energy & materials infrastructure investments were made

• Centrality of emerging markets and Asia rather than the OECD in the production and deployment of new technologies and infrastructure reverses practices of 1980s-90s

• Carbon pricing and the monetization of other environmental costs are new to these managers
• Carbon pricing mechanisms and the monetization of other ecological costs/benefits will become major components of returns in projects and companies.

• Emerging markets private equity will play a disproportionate role in the production, consumption, and distribution of the world’s natural resources including energy, materials, and water.
• Traditional asset allocation model assumptions poorly account for expected returns, volatilities, correlations, and liquidity going forward

• Realized returns and volatilities will vary dramatically among investors, particularly in the private markets

• Building a capability for sourcing and assessing private market opportunities will become a major source of differentiation among investors
  – Case of Ontario Teachers: 25% allocation to infrastructure
Expected Returns for Private Markets will Vary by Amount Invested and Plan Capability (In Contrast to Stocks and Bonds) \( E[R] = a + b \times \exp(c \times \%) \)
Implications

• Opportunities are no less numerous or compelling than they were 5, 10, and 20 years ago; yet, they have shifted fundamentally in geography, sector within virtually every major asset class

• A sense of capital shortage is likely to persist for a decade or more, making liquidity considerations a permanent feature of sound allocation decisions

• New opportunities related to natural resources are likely to become increasingly important considerations for sustainable investing across every major asset class

• Green investing shouldn’t mean sacrificing returns