Greenhouse Gas Markets and Standards to Support Sustainable Global Energy Infrastructure

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SET THE STANDARD™

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Summary

- ✓ GHG emission trading can be a revenue source for clean tech solutions (sustainable energy technologies and practices)
- ✓ GHG revenues increase ROI and accelerate uptake of clean tech
- ✓ GHG standards are basis of defining GHG revenues (credits)
- ✓ New type of globally-applicable GHG standards needed to accommodate range of clean tech solutions
- ✓ IEEE Path Forward

Conference Board

Recognizing Business Implications of Climate Change

"The need to run climate through your business today is comparable to what running the Internet through your business was a few years ago: an indispensable, and potentially landscape-altering redefinition of how work is done."

Putting Climate into Your Business: Best Practices and Models for Corporate Climate Policies, 2008

Key GHG Market Metrics

- ✓ $2 trillion to $3 trillion – value of carbon markets by 2015
- ✓ $500 billion - Value of low-carbon energy markets by 2050
- ✓ $100 billion - Demand for projects generating GHG emissions credits by 2030
- ✓ $100 billion - Worldwide investment in clean energy by 2009
- ✓ $84 billion - Cumulative net savings from energy efficiency in US by 2012
- ✓ $57 trillion - Carbon Disclosure Project signatories, 1000s of companies participating, expanding to supply chain accounting

- ✓ Sources: Thomson Reuters, Stern Report, The Climate Group, Deutsche Bank, CDP, Ecosystem Marketplace

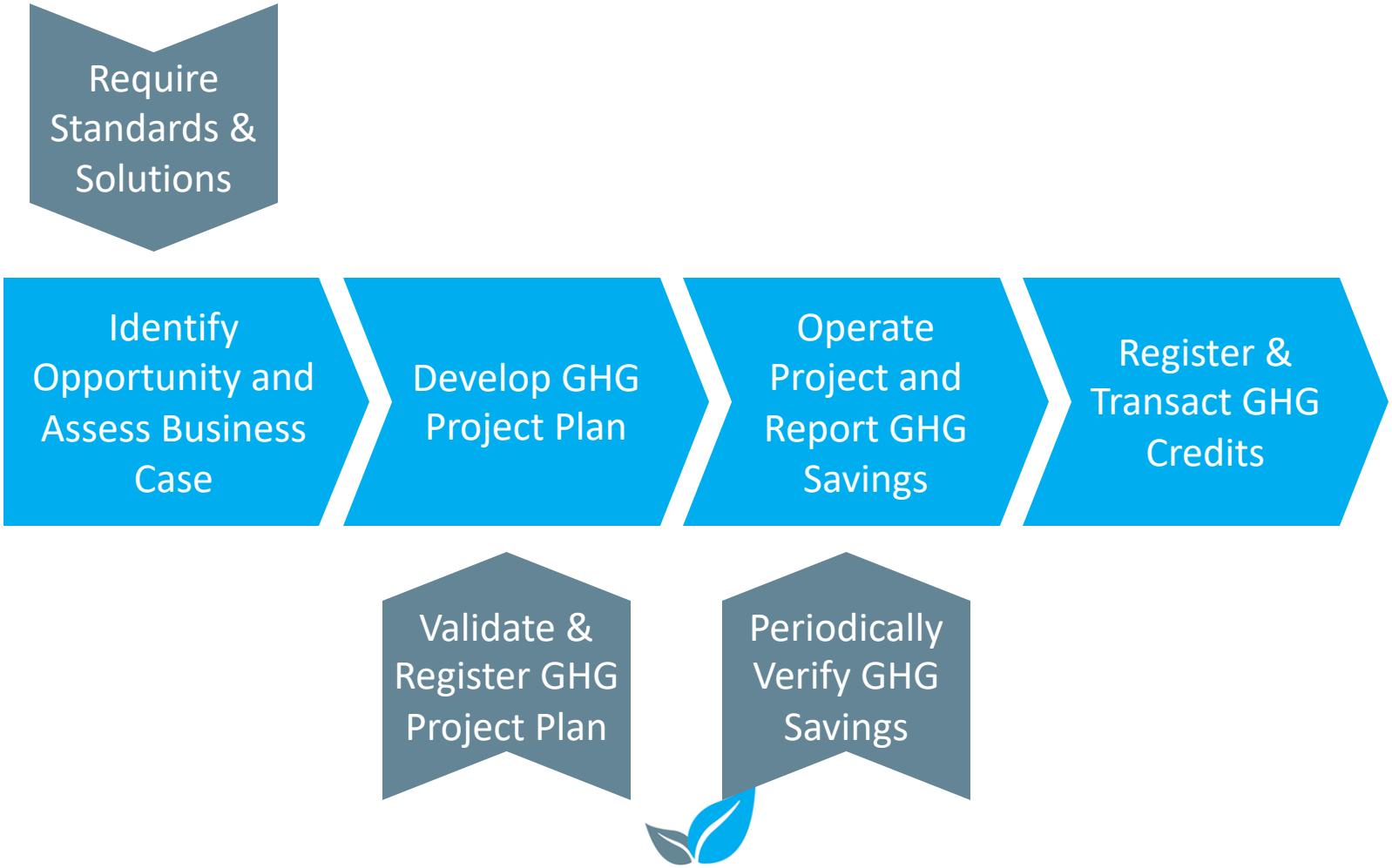
Clean Technologies and Climate Change

Transforming the Economy

- ✓ *Status Quo* → climate change and clean tech have been separate areas of focus
- ✓ Climate change → regulations and emission trading (cap & trade)
- ✓ Clean tech → business opportunities, revitalize industry and the economy, jobs, exports
- ✓ Align policy and business objectives/actions to achieve sustainable energy infrastructure

GHG Commoditization Process

Plan – Do – Verify – Transact



GHG Market Challenges

Macro and Micro

- ✓ GHG markets are fragmented (standards, state, national)
- ✓ GHG commodity (credits, permits) generation & transaction is expensive and time consuming
- ✓ Not enough qualified experts
- ✓ GHG project underperformance (lost credits)
- ✓ Inadequate market infrastructure & resources

Overview of ISO GHG Standards

Rationale for Development

- ✓ International recognition and compatibility among GHG initiatives
- ✓ Program/policy neutrality → common "building block" process standard without programmatic policy rules
- ✓ Auditable structure → independent verification and credibility for emissions trading and compliance reporting

Overview of ISO GHG Standards

Value Added to GHG Markets

- ISO 14064 (Parts 1, 2, 3) and ISO 14065 work together as a policy-neutral framework for GHG quantification, verification, and accreditation.
- Specifies auditable “what to do” requirements. These requirements are complemented by GHG guidance for “how to do it”
- Links inventory emission permits, project reduction credits, new technologies/products.
- Supports the market by improving consistency, credibility, cost-effectiveness and facilitating trade.

Overview of ISO GHG Standards

Market Use

- ✓ The Climate Registry (USA, Canada, Mexico) → GHG Inventory and Verification
- ✓ Voluntary Carbon Standard → GHG Projects and Verification
- ✓ Governments of Canada and Alberta (1st GHG regulations in North America) → GHG Projects and Verification
- ✓ GE-AES Greenhouse Gas Services → GHG Projects and Verification
- ✓ Greenhouse Gas Management Institute (training)→ GHG Inventory, Projects, Verification and Accreditation
- ✓ International Petroleum Industry Environmental Conservation Association (GHG Projects)
- ✓ Software companies, standards and certification bodies

Case Study:

Greenhouse Gas Services LLC – a GE AES Venture

- ✓ Major GHG credit business providing end-to-end operation and commoditization services → tech to projects to credits
- ✓ Based on hybridized standards → ISO 14064, WRI, CDM, EPA, IPCC)
- ✓ Compatibility with GHG project programs → the global Voluntary Carbon Standard, CCAR, Government of Canada)
- ✓ Landfills, Agriculture, Wastewater, Coal Mines, Energy Efficiency, others coming
- ✓ Google is working with GHGS for high quality GHG credits

Overview of ISO GHG Standards

ISO 14064 Part 2 Links GHG and Clean Tech Markets

- ✓ ISO 14064 Part 2 emerged from a clean technology GHG standard
- ✓ The policy-neutral, building block approach to GHG accounting of ISO 14064 Part 2 enables it to be applicable to:
  - ✓ Lifecycle accounting framework (not mandatory full LCA)
  - ✓ Emission reduction projects for GHG credits
  - ✓ New clean technologies and products, whether a specific device (e.g. fuel injector or membrane) or entire system (e.g. biofuels or community energy systems)

Overview of ISO GHG Standards

ISO 14064 Part 2 → A New Type of Standard for Post-Kyoto

- ✓ Form and Function
- ✓ Modular "building block" approach → more easily accommodate the new technology as another option for creating emission reductions – thereby saving time and costs
- ✓ Links initial investment decisions of new technologies with estimates of GHG revenues – higher confidence
- ✓ Functional equivalence → LCA concept to ensure the goods and/or services are equal between the two systems/tech
- ✓ "Making a fair comparison" → particularly important for today's well-informed consumers that do not tolerate "green washing"

Potential IEEE Path Forward

- ✓ developing and validating sustainable energy standards which can be adapted easily to specific applications to stimulate efficient technologies and management practices
- ✓ improving the consistency of terms and semantics used across sectors and programs
- ✓ establishing a process and framework for organizing information and data to improve access, as well as addressing issues of traceability, quality measures, uncertainty
- ✓ creating a framework for valuation of carbon impacts and efficiency