The Real Options International (ROI) Value Proposition

Risk in the Energy & Environmental Markets

Managing Risk in Environmental Markets is a Necessity

Managing Risk Requires an Experienced, Comprehensive Approach

ROI Services for California Carbon Compliance
  - In-house Services - Outsourced Services - On-Demand Advisory Services

The ROI Team – Senior Experience in Energy and Environmental Markets

ROI Team Bios

Appendices: California Market Fundamentals
ROI turns environmental compliance and other regulatory liabilities into assets through a comprehensive approach and prudent risk management.

Our team has created extraordinary value for both compliance entities and investment banks.

ROI is the most expert and experienced team in the business, with a proven track record in energy and environmental markets.

ROI provides a tailored approach to addressing California environmental market liabilities, from assessment to implementation to risk management.

Early market opportunities exist, but will diminish as competition increases and spreads shrink, putting a premium on informed capabilities today.
Risk in Energy & Environmental Markets

- Energy markets are being roiled by concerns over energy security, a weak economy, technological change and regulatory exposure.
- Gas supply and renewable energy technology price pressure are changing the energy mix.
- Renewables and carbon markets face significant exposure to tax treatment, regulatory changes and legal challenges.
- New carbon markets are emerging not just in California, but also in Australia, Canada and elsewhere; carbon compliance assets and risks for California market entities are expanding.
- Economic recovery and market experience will bring a resurgence of carbon compliance prices, risks and opportunities.
Managing Risk in Environmental Markets

*Hedging with Financial Instruments*
- Traditional hedging requires a liquid market in exchange or OTC derivatives for standard risks
- Conventional financial derivatives are not well matched to unique carbon regulatory and delivery risks or time horizons – or can be unduly expensive

*Hedging with Real Options*
- Real options such as strategic investments can hedge unique carbon risks better, and may be the best hedge available in illiquid or emerging markets
- Real options hedges should be reinforced with tailored, parallel legal agreements providing for expansion and/or contraction in contractual obligations
- Real options can be combined with financial derivatives in an optimized hedging strategy to comprehensively address carbon price and delivery risks, as well as mitigate uncertainty
- Most firms and investor funds have not managed risk well in the renewables and carbon spaces, and now face financial and reputational damage
Managing Unique Risks Requires an Experienced, Comprehensive Approach

Requires a Comprehensive Approach

- Hedging carbon market risks requires identifying multiple and unique risks that are typically poorly understood, to develop a comprehensive hedging strategy at a reasonable cost
- Real options may be the most effective hedge to regulatory and political uncertainty
- Combining financial derivative and real options hedging strategies in these markets requires experience
- Firms should learn from the experience in Europe, the CDM and other markets to lower the learning curve and get ahead of the competition

Needs In-depth Knowledge

- A comprehensive risk management approach in these markets needs in-depth knowledge of particular market and economic dynamics, as well as of investment strategies - including the cost of deferring investments or selling assets
- Identifying an optimal mix of financial derivatives and real options requires knowledge of the dynamics of exercising such hedges for a firm
- Hedging carbon market risks requires in-depth and up-to-date knowledge of carbon offset markets, including project development, implementation and portfolio management
- Such knowledge must be built through diverse and sustained experience

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ROI Services for California Compliance

**In-House Services**
- Build or strengthen the internal environmental markets team and compliance desks
- Develop strategy and risk management tools
- Work with mid- and back-office desks to build capacity to fully manage carbon compliance obligations
- Provide expertise on the interaction of allowances, offsets and renewables investments
- Provide intelligence on significant regulatory and market developments

**Out-Sourced Services**
- Fully or partially manage carbon compliance obligations
- Allow firm to focus on its core business while receiving cost-effective delivery on compliance obligations
- Maintain firm oversight on performance and investment decisions

**On-Demand Advisory Service**
- Provide strategic advice for meeting compliance obligations
- Offer advice on hedging strategies, including investment analysis based on real options
- Offer customized risk management tools
- Provide intelligence on significant regulatory and market developments

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In-house Services for Carbon Compliance

- Develop a comprehensive approach to meeting carbon compliance requirements
- Develop a flexible strategy to risk management under market and regulatory uncertainty
- Build internal mid- and back-office tools for managing a portfolio of carbon allowances and offsets
- Provide expertise to evaluate individual offset projects or a portfolio of projects
- Develop allowance auction strategy and implementation mechanisms
- Provide ongoing intelligence on California market development and refocus implementation strategy as needed

Allows firm to manage compliance obligations and develops in-house capacity
Out-sourced Services for Carbon Compliance

- Manage compliance obligations via allowance and offset procurement and trading, as well as targeted strategic investments
- Hedge risks over a portfolio of allowances and offsets
- Provide ongoing intelligence on the development of the California market
- Offer firm the desired degree of engagement – from setting objectives and financial targets to oversight of and decisions on strategic investments

Allows firm to focus on its core business while meeting its compliance obligations
Advisory Services for Carbon Compliance

- Provide strategic advice on meeting California compliance obligations
- Assess risks in firm assets and liabilities and offer advice on risk management strategies
- Provide risk assessment tools for managing a portfolio of allowances and offsets
- Provide ongoing intelligence on market dynamics and analyze impacts on the firm, including reputational impacts

A low-cost option to tap into ROI Team expertise on an as-needed basis
The most experienced and diverse energy and environmental markets team

Led by former J.P. Morgan Head of Environmental Markets and Risk Management
- Managed the largest portfolio of environmental assets in the private and public sectors
- Advised the World Bank on its renewables and carbon investments
- Developed the standard in risk and credit management in environmental markets

Experienced management of commodities and investments from the largest generators in Europe, J.P. Morgan, BofAML, the World Bank and other firms
- Built and successfully managed environmental commodity funds and businesses throughout global energy and environmental markets – we know and have transacted in the California market

Diverse experience in energy and environmental commodity markets, portfolio management, investment banking, and renewables analysis and strategy

Superior connections in and analysis of California market
Real Options International
Team Bios (1)

- **Odin Knudsen** built J.P. Morgan's leading environmental markets business as a Managing Director responsible for global origination and business development and strategy. At J.P. Morgan, he built one of the largest and most successful portfolios of carbon projects, helping J.P. Morgan and its subsidiary EcoSecurities become leading providers of carbon offsets under the U.N.'s Clean Development Mechanism and of voluntary credits for non-compliance entities. He also became acting Head of Environmental Affairs where he was responsible for environmental risk management for all J.P. Morgan Chase operations and high risk transactions with environmental impacts. Knudsen was also a senior leader of EcoSecurities and served on the board of Point Carbon. Previous to J.P. Morgan, he was co-founder and CEO of IdeaCarbon, a leading provider of carbon intelligence and carbon project ratings. Knudsen has nearly three decades of experience at the World Bank, where he was Deputy Vice President and Senior Advisor and oversaw the bank's carbon finance business, growing carbon offset transactions from $140 million to over $1 billion, with nearly $2 billion of funds under management in the carbon offset market. Knudsen is the author of several books and over 30 articles on international economics, market risk, real options and project analysis. He holds a PhD in Applied Economics and several engineering degrees from Stanford University, as well as advanced management and financial training from the Harvard and Stanford business schools.

- **Jason Patrick** founded and led the U.S. environmental markets desk at Bank of America Merrill Lynch, where he was responsible for the origination, structuring and marketing of carbon, renewables and bundled power products across the Americas. He structured innovative physical and financial environmental commodity transactions, including commodity finance, options, spreads and indexed trades. Patrick also led strategy, analytics and portfolio risk management for these markets and products. Patrick has served on advisory boards for the Climate Action Reserve, the Greenhouse Gas Management Institute and the Gold Standard, among other organizations. He holds an M.A. in Financial Economics from N.Y.U, an M.E.M. in Environmental Management from Yale, and a B.S. from U.C. Berkeley.

- **Daniel Firger** was an associate attorney with Linklaters LLP, where he was a member of the Environment and Climate Change practice group and focused on carbon transactions and regulatory risk analysis in the new California carbon market. He has experience in negotiating emission reduction purchase agreements and conducting due diligence on domestic and international carbon offset projects. Previously, Firger served as Associate Director and Postdoctoral Research Fellow at the Columbia Center for Climate Change Law, a joint initiative of Columbia Law School and the Earth Institute. He holds a J.D. from NYU School of Law and a Master's in Public Affairs from the Woodrow Wilson School at Princeton University.
Real Options International Team Bios (2)

- **Tom Duvall** was an attorney with the International Bank for Reconstruction and Development (World Bank) for over two decades, where he helped establish the Prototype Carbon Fund and, from 2004-09, served as principal legal advisor for all carbon finance activities, including the establishment and operation of carbon funds and the negotiation of emission reduction purchase agreements with project entities around the world. Since retiring from the bank, Duvall has served as a consultant to international organizations including the UNFCCC Secretariat, providing legal advice on the Climate Investment Funds, the Global Environment Facility and the Green Climate Fund. He holds a J.D. from the University of Virginia School of Law.

- **Fernando Cubillos** has nearly two decades of experience in energy and environmental markets, working at a Chilean hydropower company, the World Bank, and J.P. Morgan, where he developed a Latin American portfolio of projects and built a risk model for environmental assets. He served as a high-level advisor to the Chilean government in the Partnership for Market Readiness, a World Bank initiative to assist emerging economies transition to low carbon growth with market instruments. Cubillos developed Chile's first CDM project and designed the first CDM baseline for the power sector. He also founded Antuko Energy, a developer with a portfolio of renewable energy projects. He holds a degree in Industrial Engineering from Universidad Católica de Chile and an M.B.A. from the University of Maryland.

- **Anand Subbiah** has over two decades of experience providing advisory services to the energy and environmental industry, with expertise in transactions analysis, project evaluation, carbon project finance, utility restructuring, integrated resource planning, cost and tariffs analysis, energy efficiency and demand-side management. He has advised private and public-sector clients in over 30 countries, and has consulted for the CDM Executive Board. He has developed national and regional energy strategies, developed econometric models to evaluate supply and demand risks, transfer pricing and marginal cost models. He holds a degree in Electrical Engineering from India and an M.B.A. in M&A from the Vienna Institute of Technology, Austria.
Appendix 1: Market Fundamentals (1)

- **AB 32** - Governor Schwarzenegger signed Assembly Bill 32, the Global Warming Solutions Act (AB32) in 2006. This law requires California to cut GHG emissions to 1990 levels by 2020.

- **Cap-and-Trade Program** - The California Air Resources Board (ARB) issued a variety of regulations to achieve the AB32 emissions reduction goal, including cap-and-trade. The program requires covered entities to hold and surrender allowances starting in 2013, with the first allowance auction to be held in Nov. 2012.

- **Mandatory Reporting Regulation** - Along with the cap-and-trade rules, ARB requires all facilities in California with GHG emissions over 10,000 MTCO2/yr, as well as natural gas / fuel suppliers and electric power entities (including power importers) to monitor and report their annual emissions. These reported emissions form the basis for entities’ compliance obligations.
Appendix 1: Market Fundamentals (2)

- **Compliance Obligation** - Facilities and entities representing 85% of California’s economy, including power, manufacturing, refineries (in 2013), and natural gas and transportation fuel suppliers (in 2015) will be required to hold and surrender allowances equal to their annual GHG emissions.

- **Compliance Periods** - The program consists of three compliance periods, running from 2013-14 (CP-1), 2015-17 (CP-2) and 2018-2020 (CP-3). Due to rulemaking delays CP-1 has been shortened from three to just two years. The final true up-date for each CP is November 1 of the year following the CP (i.e., November 1, 2015, 2018 and 2021). In addition, in each year that is not a CP true-up year, covered entities must surrender allowances or offsets equal to 30% of the previous year’s emissions by November 1.

- **Allowance Auctions** - Quarterly auctions, beginning in November 2012, will include current and future vintages, with a floor price of $10 per allowance (with yearly adjustment), and will feature a price containment reserve. Purchase and holding limits will apply to both covered and non-covered entities.
Appendix 1: Market Fundamentals (3)

- **Offsets** - Covered entities may use offsets from approved protocols (forestry, urban forestry, livestock methane and ODS) to cover 8% of their annual compliance obligation. Corresponding CRTs from Climate Action Reserve protocols have been approved as “early action offset credits.” Note the “buyer liability” rule (below).

- **Floor Price** - Auctions will feature a price floor of $10 per allowance, with a 5% yearly increase plus an adjustment for inflation beginning in 2013. Any unsold allowances, including allowances for which bids fall below the price floor for two consecutive auctions, will be returned to an “auction holding account” and re-designated for later auction. Such re-auctioned allowances may not exceed 25% of the total volume of allowances designated for any subsequent auction.

- **Allowance Price Containment Reserve** - The allowance price containment reserve mechanism will set aside an increasing percentage of allowances over time to serve as a “buffer” to prevent price spikes. In 2013, the total volume of such allowances will be offered in three price tiers ranging from $40-50/t and sold 6 weeks after each quarterly auction. Going forward, reserve allowances prices will increase by 5% per year plus inflation.
Appendix 1: Market Fundamentals (4)

- **Offset Buyer Liability** - California imposes a "buyer liability" on offsets, meaning that buyers bear the risk of potential offset invalidation by regulators up to 8 years following issuance. A shorter time period of 3 years has been imposed for ODS offsets or those that have been independently verified twice. If an offset has been retired prior to the invalidation, the entity having retired it will have 6 months to replace it by purchasing and retiring a new offset.

- **Power and Fuel Imports** - A compliance obligation is imposed on “first deliverers of electricity,” which are defined to include both operators of in-state electricity generating facilities and “electricity importers,” which includes “facilities physically located outside the state of California with the first point of interconnection to a California balancing authority’s transmission and distribution system.” For these types of facilities, the facility operator, even if wholly outside the state, is assigned the compliance obligation. Fuel importers are also covered by the program.
Appendix 1: Market Fundamentals (5)

- **Restrictions on IOU Purchases** - Allowances allocated to investor-owned utilities are subject to a monetization requirement, effectively forcing these allowances to be sold at quarterly auctions with the proceeds earmarked for the benefit of ratepayers. In addition, IOUs are prohibited from transacting certain securities, such as offset futures.

- **Specified versus Unspecified Power Emissions Factors** - Regulations currently assign a default emissions rate of 0.428 t/MWh to sources of unspecified (grid) power due to a methodology that emphasizes the percentage of hydropower in the Western power market. The Mandatory Reporting Regulation, by contrast, tracks the actual emissions of specified sources. Under certain circumstances this may lead to perverse outcomes, for instance in cases where system power sourced from coal-fired generators is assigned a lower emissions rate than marginal gas generation.
Appendix 2: Supply & Demand

- **Demand**
  - Designed to be short in the long term, our initial analysis indeed shows the market to be short by at least 100MM t by 2015
  - Calif. economic growth exceeds that of the U.S.; electricity demand and industrial output are up Y/Y
  - Wind and solar generation growth is strong and long-term coal contracts are decreasing; but nuclear is down, hydro is flat to low, and coal vs. gas is decreasing
  - The power sector must buy initially and fuel suppliers must buy as their 2015 hedging requirements loom

- **Supply**
  - The market by political design will be fundamentally long initially, but the market is not allocated 100% and allocations decrease annually starting in 2013
  - IOUs must consign their allowances at auction, effectively limiting their “free” allocation
  - Fuel suppliers and IPPs — representing the bulk of emissions at more than 1B tonnes through 2020 — receive no free allocation
  - Even industrial allocation decreases materially over the span of the program
  - Calif. offset provisions are limited, stringent and face unique operational and legal risks; we expect at most 50MM tonnes total by 2015

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# Appendix 3: Key Differences Between California and the European Market

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<tr>
<th>Issue</th>
<th>California</th>
<th>EU ETS / CDM</th>
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<tbody>
<tr>
<td>Price Floor / Oversupply</td>
<td>USD$10 floor price, increasing 5% per year plus annual inflation adjustment</td>
<td>No floor price</td>
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<tr>
<td>Allocation / Demand Management</td>
<td>Covers ~85% of economy. No allocation to IPPs or fuel; partial to industrials. Quarterly auctions</td>
<td>Covers ~50% of economy. Full allocation to industrials (Phases 1 &amp; 2). Weekly auctions</td>
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<tr>
<td>Sector coverage</td>
<td>Power (including imports), manufacturing, fuels</td>
<td>EU covers power (not imports), manufacturing but not fuels</td>
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<tr>
<td>Supply Constraints</td>
<td>Allowance Reserves triggered if prices hit $40, $45 and $50 / t</td>
<td>No allowance reserve</td>
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<td>Offset Methodologies</td>
<td>Four performance based protocols approved by Cal. regulators; more pending</td>
<td>Methodologies developed by project proponents and approved by CDM Exec. Board</td>
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<tr>
<td>Offset Invalidation Risk</td>
<td>So-called “buyer liability” rule with price differential for offset types, double verification</td>
<td>No buyer liability</td>
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<tr>
<td>Auction Purchase and Holding Limits</td>
<td>Strict purchase and holding limits</td>
<td>No purchase or holding limits</td>
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