

# Greenhouse Gas Emissions Service

## New markets linking fuels and sectors across the globe

What is a ton of CO<sub>2</sub> worth? The answer to that question is in a continuous process of being decided — by policymakers with widely diverging opinions, by markets already functioning to equilibrate supply and demand of emissions allowances, and by the energy industry that must respond to the challenge of a lower-carbon future.

Governments concerned about global warming are pushing forward agendas to limit greenhouse gas (GHG) emissions, the large majority of which is CO<sub>2</sub> resulting from the combustion of fossil fuels. Countries committed to the limits imposed by the Kyoto Protocol are taking actions to limit their own emissions while driving GHG reduction investment in the developing world through project-based reduction mechanisms. Even within countries not bound by Kyoto there are important initiatives to limit GHG emissions and ongoing debates about the appropriate course of action. Recent trends are towards ever-increasing activity to stem the growth of emissions.

Building on the success of the U.S. SO<sub>2</sub> Title IV Emissions Trading Program, policymakers are turning to market mechanisms to ensure that emissions reductions are achieved at the lowest possible cost. In the end, such markets differ from more traditional markets in that the product — namely, the right to emit GHG — has a value entirely linked to governments' decisions on desired reductions. Policymakers choose what types of reductions are desired (if any), how these would be incentivized (command-and-control regulation, renewable energy efforts, targeted subsidies, cap-and-trade programs, etc.) and when they would be required. Once implemented, these policy decisions provide the rules of the game and the structure needed for the relevant markets to operate and the relevant sectors to appropriately respond.

**PIRA'S GREENHOUSE GAS EMISSIONS SERVICE combines a thorough assessment of policymaking drivers with an in-depth understanding of the underlying emissions fundamentals involving fuel choices, technology and economic growth.** Through comprehensive reports and a customized Web “portal,” GREENHOUSE GAS EMISSIONS provides far-reaching geographic scope with special focus and capabilities regarding GHG emissions and markets. Recognizing that there are a number of different GHG regulatory frameworks and individual national and regional priorities, PIRA tracks the likelihood and potential for linkages as well as emerging competing approaches. Understanding the fundamentals of GHG also provides additional insight into markets for the primary fossil fuels (coal, gas and oil), as well as for electricity (prices, incentives for new generation and “clean energy”) and is critically important to energy-intensive industries such as refining, chemicals, cement, iron/steel and pulp/paper.

### **PIRA'S GREENHOUSE GAS EMISSIONS SERVICE provides critical analysis on:**

- **European Emissions Trading System (ETS) CO<sub>2</sub> market**, with updates and outlooks on supply/demand balances and allowance prices, leveraging PIRA's regular coverage of European electricity, coal, gas, and oil markets.
- **Compliance with the Kyoto Protocol**, by following:
  - Developments with project-based GHG markets (CDM, JI).
  - Country-specific compliance issues.

- **North American GHG policy developments**, including:
  - Prospects and implications of U.S. federal legislation
  - Implementation of regional markets (RGGI, WCI, California, etc.)
- **Prospects for post-Kyoto regulation and markets.**

## Components of the Greenhouse Gas Emissions Service

Clients to GREENHOUSE GAS EMISSIONS benefit from the following deliverables:

### 1. Monthly *European Emissions Trading System Market Outlook*

This report provides clients with an up-to-date appraisal of the ETS CO<sub>2</sub> markets, including:

- **Summary and Scorecard** - A summary of the monthly report and a quick-reference scorecard. →
- **Monthly Developments** - An updated supply/demand balance for ETS emissions allowances that assesses:
  - **Power Sector Emissions** - Leveraging its analysis of European electricity markets, PIRA focuses on power sector emissions from coal, natural gas and oil. The section includes analysis of overall demand, weather effects, inter-fuel substitution and renewable generation.
  - **Industrial Emissions** - A review of trends in emissions from other sectors covered by the European ETS — refining, cement, iron/steel, pulp/paper and others — within the context of overall macroeconomic and industrial developments.
  - **CDM/JI Prospects** - A more detailed assessment of the potential supply of emissions credits from CDM/JI projects for ETS compliance.



The Scorecard section of the *European ETS Market Outlook*.

- **Allowance Price Outlook** - While commenting on current market prices, PIRA provides forecasts of allowance prices, given the expected balances and integrated PIRA forecasts of coal, gas, and oil prices. Market opportunities and risks through the different phases of the program are highlighted.
- **Institutional and Policy Developments** - Identification of key trends in the institutional capacity and growth of this new and growing market. PIRA provides assessments of policy developments as they impact the Phase I, Phase II and prospective Phase III markets.

## 2. North American GHG Quarterly Update

While the U.S. has not signed Kyoto and Canada's commitment is uncertain, they are seeing continued domestic and regional developments in regulating GHG. Northeastern U.S. states have taken steps to implement a cap on power sector CO<sub>2</sub> emissions through the RGGI program/market, while California has committed to significantly reduce GHG and is actively developing policies to achieve its goals. On a U.S. federal level, legislative and regulatory options for national programs are being discussed, and the choices made can have serious implications for market players. Canada's efforts have been at the center of controversy, under the cloud of political uncertainty. The *North American GHG Quarterly Update* reviews the policy processes and offers timely assessments of the latest developments. It also looks at the latest emissions trends across sectors, helping inform, prepare and shape industry responses to potential new markets and regulations.

## 3. Greenhouse Gas Special Reports

The GHG Special Reports, focusing on specific relevant greenhouse emissions-related issues, provide more depth on particular longer-term regional policies, trends in the relevant markets, or the development of prospective technologies for GHG reduction.

- PIRA's forecasting of worldwide fuel balances provides insight into future emissions relative to projected UN IPCC scenarios as well as national CO<sub>2</sub> trends that illustrate expected emissions positions relative to the Kyoto requirements. Given its key role in the Kyoto and post-Kyoto frameworks, one special report will focus on Japan's GHG policies and developments.
- Post-Kyoto policy developments. While the Kyoto Protocol expires in 2012, PIRA's review and insight into ongoing discussions and proposals for GHG regulation after Kyoto can help inform longer-term strategic decision-making. Developments involving broader inclusion of the developing world into the regulatory regime and more direct regulation of additional sectors, such as aviation and transportation, are also reviewed.
- Special focus reports will address and analyze key GHG mitigation and policy issues developing in the U.S. and Canada. Additional reports include coverage of motor vehicle-related GHG analysis, emissions-reduction technologies, and corporate carbon strategies.

## 4. Greenhouse Gas Bulletins

These one-off reports provide clients with analytic briefs on important timely issues confronting global emissions markets. Unexpected shifts in the market fundamentals from movements in supply or demand require timely review and understanding to ensure an accurate assessment of emissions markets going forward. Such shifts can be policy-related (such as announcements of EC decisions on the EU ETS design), or they could involve factors such as extreme weather events or sudden movements in the fuel markets, which may lead PIRA to update our price views.

## 5. Emissions "Portal" on PIRA Online

GREENHOUSE GAS EMISSIONS SERVICE clients are able to access a special online data portal, providing updated additional data and tools such as:

- Worldwide long-term CO<sub>2</sub> projections, with by-region and by-country detail.
- Kyoto participant emissions projections, with estimates of reduction shortfalls.

- For the **European ETS**:
  - Updates of country- and sector-level emissions forecasts, overall emissions vs. total allowances
  - Historical emissions balances
  - Expected regional coal-gas price spreads
  - Implied CO<sub>2</sub> prices for fuel switching (using various generating capacity)
- **U.S. quarterly power sector CO<sub>2</sub> data.**
- **CO<sub>2</sub> “emissions calculators”** for coal, gas and oil generation technologies
- **Price histories and forecasts** — delivered through PIRA’s integrated Energy Price Portal — for
  - EUAs (Phase I)
  - EUAs (Phase II, III)
  - RGGI CO<sub>2</sub>
  - WCI CO<sub>2</sub>
  - U.S. Federal CO<sub>2</sub>

Greenhouse Emissions Retainer Service				
Who	Where	What	When	
EC and private companies	Denmark	430 MW existing Elsam coal facility	online in March 2008	Pilot CCS project, demonstration project
Vattenfall	Germany	30 MW coal	2008	Demonstration project
Total	France	existing gas boiler		Pilot CCS project
Naturkraft	Norway	450 MW gas - Karsto	2007, 2009	Capture plant to be built
Statoll, Shell	Norway	800 MW gas	2011, 2012	Plans to transport CO <sub>2</sub> to transport fields
BP, Shell, Conoco-Phillips, Scottish & Southern	UK	350 MW gas	2009	Peterhead project EOR at BP's North Sea EOR possibilities
Renew Tees Valley, Progressive	UK	850 MW coal/petcoke-gasification		
E.ON UK	UK	450 MW coal	2011	CO <sub>2</sub> sequestration
RWE	UK	1000 MW supercritical coal	2016	CO <sub>2</sub> sequestration
Scottish and Southern	UK	500 MW supercritical coal	2011/12, ?	UK's first supercritical opportunities
RWE	Germany	Ferrybridge Station 400-450 MW IGCC coal	2014	CO <sub>2</sub> sequestration
Occidental / BP/Edison Mission	California	500 MW Hydrogen powered plant	?	Plant to be developed in California
Xcel Energy	Colorado	300-350 MW IGCC	Construction start in 2009?	Application to CO <sub>2</sub> EOR and direct injection in depleted oil fields

A sample spreadsheet from GHG’s online Data Center

- Relevant emissions factors: global warming potential factors for the different greenhouse gases, carbon content of different fuels
- PIRA’s macroeconomic slide shows covering developments in Europe, North America and Asia
- Worldwide CDD/CDD weather (monthly)

## 6. Access to PIRA Staff

One-on-one interaction between our clients and our analysts is a cornerstone of PIRA’s Retainer Services. In that tradition, GREENHOUSE GAS EMISSIONS SERVICE clients benefit from direct access (phone/email) to the Group, allowing them to discuss issues that are of specific relevance to them.

## Fees

The fee for becoming a client company to GREENHOUSE GAS EMISSIONS SERVICE is \$14,000 per annum for up to 10 users located at one client site. (Companies requiring access beyond 10 users or one site should contact PIRA for a license quote.) There are discounts for existing clients to one, two or three of PIRA Retainer Services.

**For more information, please refer to the Acceptance Form or page 7.**

## Who Can Benefit from the Greenhouse Gas Emissions Service?

GHG markets have the potential to link all sectors and industries that are dependent on, or impacted by, energy from fossil fuels. In the short term, efforts to reduce CO<sub>2</sub> emissions will rely on fuel switching and improved efficiencies, but in the longer term, investments in new technologies would be needed to drive reductions without compromising economic growth. **On an ongoing basis, PIRA's GREENHOUSE GAS EMISSIONS SERVICE provides the critical market intelligence that can be relied on by professionals in the following areas of business:**

### Currently covered sectors

Most immediately, GREENHOUSE GAS EMISSIONS can clearly help industries currently covered by existing CO<sub>2</sub> programs understand the fundamentals of the underlying market and develop appropriate compliance strategies. Within the European ETS these industries include:

- **Power generation, refineries, iron and steel, cement/lime/ceramics, and pulp/paper**
- **Other sectors utilizing industrial boilers/CHPs for their production processes**

### Other GHG-intensive sectors covered by Kyoto

GREENHOUSE GAS EMISSIONS can provide insight into how developing policies to comply with Kyoto will affect their industries — including the transportation sector, where growth is driving the largest emissions increases.

### GHG-intensive industries in North America

GREENHOUSE GAS EMISSIONS sheds light on the “lessons learned” from the pioneering markets, explaining how regional efforts are shaping up and the prospects for potential national efforts.

### GHG-intensive industries in the developing countries

GREENHOUSE GAS EMISSIONS provides estimates of the value of emissions-mitigation efforts in order to assess sellable project-based Kyoto reductions and to develop a longer-term post-Kyoto emissions strategy.

### Gas, coal, and electricity traders and marketers

Provides critical intelligence and an outlook on CO<sub>2</sub> and its impact on power prices and levels of inter-fuel competition.

### Coal, gas, and oil producers

GREENHOUSE GAS EMISSIONS helps them monitor longer-term demand-side developments resulting from GHG policy changes across the globe.

### Banks and other financial institutions

More and more, investors are demanding that companies disclose their potential financial risk from GHG regulation. Efforts such as the Carbon Disclosure Project are working to catalogue and understand the differing and common approaches for identifying and addressing these risks. GREENHOUSE GAS EMISSIONS can help institutions better quantify such risks. The service also identifies risks and opportunities for investments in “greener” and higher efficiency projects and technologies.

## Greenhouse Gas Emissions Group

**Roman Kramarchuk (Managing Dir., Emissions and Clean Energy)** joined PIRA in 2005, coming from the U.S. EPA's Clean Air Markets Division, where he was extensively involved in the development of the CAIR and CAMR (Mercury) Rules and the BART Guidelines. His previous experience includes work in the merchant power sector and with PA Consulting / PHB Hagler Bailly, where he evaluated strategies on power sector fuel choice, allowance purchases, and capital investments in pollution control equipment and advised on power plant development and acquisition, transmission expansion and asset valuation within various North American markets. Additionally, Roman has spent several years working on USAID- and World Bank-funded projects to develop power markets, market rules and regulatory capacity in Ukraine, Armenia and India. He has a MPP from the Kennedy School of Government at Harvard and a BA in economics and BSE in system engineering from the University of Pennsylvania.

**Dr. Ronald B. Gold (Sr. Director, Emissions and Clean Energy)** is an International Energy Economist with broad experience in analyzing energy, economic, and environmental trends. Dr. Gold joined PIRA in 1997 after retiring from Exxon, where he was Company Economist and Manager of the Energy Outlook Division. In that capacity, he supervised the preparation of international energy and economic outlooks and conducting special business-related studies. Earlier in his career, he worked for the U.S. Treasury Department and Office of Tax Analysis, and he was also an assistant professor of economics at Ohio State University. Dr. Gold received his undergraduate degree from Brooklyn College, City University of New York, and his M.A. and Ph.D. in economics from Princeton University.

**Bruno Brunetti (Sr. Director, European Electricity)** manages PIRA's European Electricity Service. Prior to joining PIRA in 2001, he was at Caminus, where he carried out market studies, providing advice to a significant number of new projects as well as working on acquisition and divestment of assets across Europe. He began his career in the strategic planning department of Enel in Rome. Bruno graduated magna cum laude in economics and management from Bari University (Italy) and obtained a masters degree in energy economics from the ENSPM, the School of the French Institute of Petroleum (Paris).

**Jennifer McIsaac (Associate Director, Emissions and Clean Energy)** co-authors PIRA's N.A. EMS reports. Before joining PIRA, she worked at NUI, where she analyzed gas supply needs and recommended baseload/swing purchases and storage injections/withdrawals. Prior to that, while pursuing her degrees, she was an economics research intern in Exxon's Corporate Planning Department, where among many tasks she analyzed emissions in the transportation and power generation sectors. She holds a BA from Drew University and is a doctoral candidate in economics at Cornell University.

**Dan Klein (Sr. Director, International Coal)** oversees PIRA's International Coal Service, responsible for the *International Thermal Coal Market Forecast* and *International Coal Markets Scorecard*, and he contributes to the *U.S. Coal Market Forecast*. Prior, Dan was a member of PIRA's North American Electricity team. He has a BA in economics from Calvin College.

**Michelle Patron (Sr. Director, Political Risk)** oversees the Global Political Risk Service. She has over a decade of experience analyzing international energy issues. Prior to joining PIRA in 2004, she was a Fellow at the Council on Foreign Relations and conducted energy research at Deutsche Bank. She spent five years as an international policy advisor at the U.S. DOE. In 2001, Michelle served as Energy Attaché at the U.S. Embassy in Beijing. Prior to the DOE, she worked at the International Energy Agency, the White House, UNICEF and the Center for International Environmental Law. Ms. Patron holds a BA from Columbia University and an MA from Johns Hopkins School of Advanced International Studies.



## Acceptance Form

We wish to become a client to PIRA Energy Group’s GREENHOUSE GAS EMISSIONS SERVICE and we understand and agree that the fee for the service is (circle as appropriate). NOTE: **Discounts are available to clients of the Retainer Services listed below:**

Company Status	Annual Fee Options		
	GHG	<i>OR, combine your GHG Service with PIRA’s North American Emissions Markets Intelligence Service (N.A. EMIS) at these rates:</i>	GHG w/N.A. EMIS
Non-Retainer Client	\$14,000		\$25,000
Client of One Service*	\$12,000		\$21,000
Client of Two Services*	\$9,500		\$17,000

\* Services include: Global Oil, North American Natural Gas, North American Electricity, European Natural Gas, European Electricity, and International Coal

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Company: \_\_\_\_\_

First Name: \_\_\_\_\_ Last Name: \_\_\_\_\_

Position Title: \_\_\_\_\_

Address: \_\_\_\_\_

City/Code/Country: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

Total Fee: \_\_\_\_\_ Signature: \_\_\_\_\_

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