The U.S. Carbon Market

Michael J. Walsh, Ph.D.
Executive Vice President
Chicago Climate Exchange®, Inc.
www.chicagoclimateexchange.com
312-554-3350
CCX: A Global Exchange Platform

- **Chicago Climate Exchange™ (CCX)**
  - Launched 2003 with 14 members, now 325+ members (US, CA, MX, BR, NZ, AU, CH)

- **European Climate Exchange™ (ECX)**
  - FSA-regulated futures market for European CO₂ Allowances
  - Launched April, 2005 – accounts for 80-90% of total exchange traded volume in the EU ETS

- **Chicago Climate Futures Exchange™ (CCFE)**
  - CFTC-regulated futures exchange for U.S. SO₂ allowances and U.S. NOx Ozone Season allowances
  - Launched in December 2004, world’s first environmental derivatives exchange

- **Montreal Climate Exchange™ (MCeX)**
  - Joint venture with the Montreal Bourse
  - To host Canadian GHG trading, other environmental markets

- **New York Climate Exchange™ and Northeast Climate Exchange™**
  - Developing financial instruments for northeast Regional Greenhouse Gas Initiative (RGGI)

- **California Climate Exchange™**
  - Developing financial instruments relevant to the California Global Warming Solutions Act, AB32

- **India Climate Exchange™**
  - (In development)
2022 US Compliance Gap, Optimistic Scenario, Under 1%/yr Reduction Schedule (vs. 2005 baseline)

Capped sectors: Assumes industrial sector emissions decline 1%/yr, all others (including power generation) freeze at 2005 levels

Total gap is ~3 billion metric tons CO₂

500 million ton gap to be filled with Offsets and/or imports
## How to fill a 500 million ton U.S. compliance gap in 2022?*

### One example

<table>
<thead>
<tr>
<th>Action</th>
<th>tons</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2O reductions</td>
<td>38.1</td>
<td>30% cut in ag n2o</td>
</tr>
<tr>
<td>Landfill gas</td>
<td>56.4</td>
<td>40% cut in lfg</td>
</tr>
<tr>
<td>Ag methane</td>
<td>50.8</td>
<td>40% cut in ag ch4</td>
</tr>
<tr>
<td>Natural gas systems</td>
<td>48.8</td>
<td>40% cut in gas system ch4</td>
</tr>
<tr>
<td>New grass</td>
<td>25</td>
<td>25 million acres X 1.0</td>
</tr>
<tr>
<td>Ag soils</td>
<td>50</td>
<td>100 million acres of no-till (5x vs current)</td>
</tr>
<tr>
<td>Forests</td>
<td>100</td>
<td>10 million acres yielding 10 tons per acre per year</td>
</tr>
<tr>
<td>Early Action credits</td>
<td>100</td>
<td>1 billion tons total spread over ten years</td>
</tr>
<tr>
<td>Imported offsets</td>
<td>30.9</td>
<td>(residual)</td>
</tr>
<tr>
<td><strong>sum</strong></td>
<td><strong>500</strong></td>
<td></td>
</tr>
</tbody>
</table>

*The gap grows rapidly as time passes, and is larger if the reduction requirements are larger or emission reductions are smaller*
Capped sectors: Assumes power sector emission growth slows from +2%/y to +1%/y, industrial sector emissions decline 1%/y, all others grow at half their recent rates

1.34 billion ton gap

Conceptual framework borrows from: "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies", S. Pacala* and R. Socolow*
What is Chicago Climate Exchange?

*Chicago Climate Exchange (CCX®) is the world’s first and North America’s only voluntary, legally binding pilot greenhouse gas reduction, audit, registration and trading program for emission sources and offset projects in North America, Brazil and globally.*
**Phase I:** Members made legally binding commitments to reduce or trade 1% per year from 2003-2006, for a total of 4% below baseline.

**Baseline** = Avg. emissions from 1998-2001, emissions in 2000 (Phase II)

**Phase II:** Legally binding commitments to reduce to 6% below baseline by 2010.

**Economic Growth Provision** limits recognized emission increase to 2% above baseline in 2003, 2004, 3% above baseline 2005-2010
CCX Operations include:
Use of CEMs and WRI/WBCSD emission calculation methods
- CCX Registry: official holder, transfer mechanism for CCX Carbon Financial Instruments
- Trading platform integrated with Registry; all trades guaranteed
- NASD provides market surveillance and emission verification

CCX Governance:
Self-regulatory organization overseen by Committees comprised of Exchange Members, directors and staff
Committees include: Environmental Compliance, Forestry, Membership, Offsets, Trading and Market Operations
CCX® Comprehensive Market Structure

Electronic Market Registry

1. Total holdings of CCX Carbon Financial Instruments
   (Exchange Allowances plus Offsets plus Early Action Credits, in hundred metric tons CO2)

2. Exchange Allowance holdings
   (Exchange Allowances plus Offsets plus Early Action Credits, in hundred metric tons CO2)

3. Exchange Offset holdings
   (Exchange Allowances plus Offsets plus Early Action Credits, in hundred metric tons CO2)

4. Exchange Early Action Credit holdings
   (Exchange Allowances plus Offsets plus Early Action Credits, in hundred metric tons CO2)

Comprehensive Rules System

- Emitters: Standard baseline, multi-year allowance stream equal to reduction targets
- Offset Providers (project credits)
- Emission audits, project verification
- Liquidity Providers
- Associate Members

Web-accessible Electronic Trading Platform
Chicago Climate Exchange Members

Aerospace and Equipment
Rolls-Royce

Automotive
Ford Motor Company

Beverage Manufacturing
New Belgium Brewing Company

Chemicals
Dow Coming
Dupont
Rhodia Energy Brasil, Ltda

Electric Power Generation
AGL Energy (AU)
American Electric Power
Associated Electric Cooperative
Central Vermont Public Service
DTE
Duquesne Light Company
Green Mountain Power
Manitoba Hydro
NRG
TECO Energy, Inc.

Electronic
Motorola, Inc.
Sony Electronics
Square D/Schneider Electric N.A

Environmental Services
Wasatch Waste Mgmt District
Waste Management, Inc.

Food Processing
Premium Standard Farms

Forest Products Companies
Abitibi-Consolidated
Araucaria Celulose, S.A.
Cenibra Nipo Brasiliara, S.A.
International Paper
Klabin, S.A.
MeadWestvaco Corp.
Stora Enso North America
Temple-Inland, Inc.

Information Technology
IBM

Manufacturing
Bayer Corporation
Interface, Inc.
Knoll, Inc.
Ozinga Bros., Inc.
United Technologies*

State & Local Governments
The State of Illinois*
The State of New Mexico
King County, WA*
City of Aspen
City of Berkeley
City of Boulder
City of Chicago
City of Melbourne, Australia*
City of Oakland
City of Portland*

Pharmaceuticals
Baxter International, Inc.

Universities
The University of Iowa
Hadlow College
Michigan State University*
The University of Minnesota
The University of Oklahoma
Tufts University

Recreation
Aspen Skiing Company

Retail
Safeway Stores

Semiconductors
Freescale Semiconductor
Intel
STMicroelectronics

Steel
Roanoke Electric Steel Corp.

Transportation
Amtrak
San Joaquin Regional Rail

*in process
Size of Live, Emerging, Possible GHG Markets

CCX includes more industrial emissions under its legally binding cap than any country in the world.

- Live Market
- Market in development
- Under discussion

<table>
<thead>
<tr>
<th>Country</th>
<th>2003 Start</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>400</td>
<td>290</td>
</tr>
<tr>
<td>Canada</td>
<td>290</td>
<td>245</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>245</td>
<td>237</td>
</tr>
<tr>
<td>Poland</td>
<td>237</td>
<td>232</td>
</tr>
<tr>
<td>Italy</td>
<td>232</td>
<td>174</td>
</tr>
<tr>
<td>Australia</td>
<td>174</td>
<td>171</td>
</tr>
<tr>
<td>Spain</td>
<td>171</td>
<td>169</td>
</tr>
<tr>
<td>US NE States (RGGI)</td>
<td>169</td>
<td>151</td>
</tr>
<tr>
<td>France</td>
<td>151</td>
<td>130</td>
</tr>
<tr>
<td>California</td>
<td>130</td>
<td>109</td>
</tr>
<tr>
<td>Alberta</td>
<td>109</td>
<td>94</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>94</td>
<td>86</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>86</td>
<td>71</td>
</tr>
<tr>
<td>Greece</td>
<td>71</td>
<td>60</td>
</tr>
<tr>
<td>Belgium</td>
<td>60</td>
<td>56</td>
</tr>
<tr>
<td>New South Wales</td>
<td>56</td>
<td>45</td>
</tr>
<tr>
<td>Finland</td>
<td>45</td>
<td>37</td>
</tr>
<tr>
<td>Portugal</td>
<td>37</td>
<td>33</td>
</tr>
<tr>
<td>Austria</td>
<td>33</td>
<td>0</td>
</tr>
</tbody>
</table>
# CCX Associate Members

## Architecture/Planning
- Mithun, Inc.

## Brokerage Services
- Amerex Energy

## Consulting
- Domani, LLC
- Global Change Associates
- Natural Capitalism, Inc.
- RenewSource Development, L.P.
- Rocky Mountain Institute

## Documentary Production
- Cloverland, Inc.

## Energy and Management Services
- Orion Energy Systems Ltd
- Sieben Energy Associates
- Thermal Energy International
- Rumsey Engineers, Inc.
- Vanasse Hangen Brustlin, Inc.

## Financial Services
- Access Industries, Inc.
- MB Investments, LLC

## Financing Agencies
- Ohio Air Quality Development Authority

## Green Power Marketers
- Green Mountain Energy Company

## Information Technology
- Open Finance LLC
- Intercontinental Exchange

## Legal Services
- Foley & Lardner, LLP
- Sullivan & Cromwell, LLP

## Risk Management
- The Professional Risk Managers’ International Association

## Religious Organizations
- Jesuit Community of Santa Clara University

## Renewable Energy
- Airtricity
- Intergy
- Reknewco, Ltd.

## Retiring/Offsets
- Carbonfund.org
- Terrapass, Inc.

## Social Investment
- KLD Research & Analytics
- Pax World

## Technology
- Millennium Cell
- Polar Refrigerant Technology

## Non-Governmental Organizations
- American Coal Ash Association
- American Council on Renewable Energy
- Delta Institute
- Houston Advanced Research Center
- Midwest Energy Efficiency Alliance
- World Resources Institute

## Private Colleges
- Presidio School of Management

## Trade Associations
- Confederation of British Industry
Why Are So Many Businesses, Governments and Institutions Taking Direct Action via CCX Membership?

Practical and strategic drivers:

- Competitive advantages through leadership:
  - obtain practical expertise through “hands-on” participation
  - build institutions: first-mover; global linkages
  - get ahead of disparate regulations, prepare for policy
  - reduce long-term mitigation costs
  - improve focus on energy efficiency, identify free savings
  - build carbon price into minds of operators and planners
  - trading profits, possible early action crediting
  - positioning in face of major growth in social investing
  - meet fiduciary commitments to shareholders and other stakeholders
CCX Participant Members

**Offset Aggregators**
- C-Green Aggregator, LLC
- Delta Institute
- Environmental Carbon Credit Pool, LLC
- Environmental Credit Corp.
- First Capital Risk Management, LLC
- AgraGate (Iowa Farm Bureau)
- National Carbon Offset Coalition
- North Dakota’s Farmers Union

**Offset Providers**
- Beijing Shenwu Thermal Energy Trading
- Hubei Sanhuan
- Gallo Cattle
- Granger Holdings
- Intrepid Technologies, Inc.
- Lugar Stock Farm
- Precious Woods Holdings
- Sexton Energy
- Sustainable Forestry Management, Ltd.

**Liquidity Providers**
- AGS Specialists, LLC
- Amerex Energy
- Breakwater Trading, LLC
- Calyon Financial, Inc.
- Cargill Power Markets, LLC
- Eagle Market Makers, LLC
- Evolution Markets, LLC
- EXO Investments
- FCTEurope, Ltd.
- First New York Securities, LLC
- Friedberg Mercantile Group, Ltd.
- Galtere International Master Fund, LP
- GFI Securities, LLC
- Goldenberg, Hehmeyer & Co.
- Grand Slam Trading, Inc.
- Grey K Environmental Fund, LP
- Haley Capital Management
- ICAP Energy, LLC
- Kottke Associates, LLC
- The League Corp.
- Marquette Partners, LP
- Natsource, LLC
- Peregrine Financial Group
- Rand Financial Services, Inc.
- Serrino Trading Co.
- Shatkin Arbor, Inc.
- S.R. Energy, LLC
- SwissRe Financial Products Corp.
- TEP Trading 2 Ltd.
- TradeLink, LLC
- Tradition Financial Services, Ltd.
- TransMarket Group, LLC
CCX Offset Projects: Maximizing the Solution Set

• Project-based mitigation offers low-cost, win-win greenhouse gas mitigation

• Large volumes of project-based mitigation must be integrated into the market
  • Predictable, verifiable rules
  • Low transaction costs
  • Maximize participation
  • Avoid perverse incentives (e.g. till-up a no-till field)

• Landfill, agricultural and coalmine methane: Waste Management (IN, TX), Others (PA, etc), Environmental Credit Corp., Premium Standard Farms (MN, WA, TX)

• Agricultural soils: Iowa Farm Bureau, Delta Institute (midwest), North Dakota Farmers Union, C-Green (Canada), National Carbon Offset Coalition (mountain)

• Reforestation: U.S. Farms, Precious Woods (Costa Rica)

• All projects undergo independent verification by approved entities
  
  • Offsets equal to approximately 18 million metric tons CO₂ generated to date (12% of total reductions)
Stable, predictable offset rules contribute to successful GHG mitigation financing

IDAHO FALLS, Idaho, Sept. 8 /PRNewswire-FirstCall/ -- Intrepid Technology and Resources, Inc. (ITR) (OTC Bulletin Board: IESV), a renewable energy company, has recently signed an Engagement Letter with the brokerage firm of Ferris Baker Watts, Washington D.C., to commence the marketing and placement of 17,790,000 dollars in Tax Exempt Industrial Revenue Bond financing. The financing, expected to be completed within 45-60 days, will provide ITR the capital to triple the size of their existing biogas facility near Rupert, Idaho, (and) construct the Westpoint Dairy biogas plant, ...

our ability to sell the substantial number of green credits that the system produces on the Chicago Climate Exchange makes these four projects very attractive to ITR’s shareholders. At the same time we provide enhanced air, ground and water quality for the livestock owner.
CCX Market Activity

2005 metric tons CO$_2$ traded: 1.3 million

2006 metric tons CO$_2$ traded: 10.6 million

2007 metric tons CO$_2$ traded to date: 18 million

• Most trades have occurred in the range of $3 to $4 per ton
Conclusions: big picture results from CCX®

• Nearly all “currently viable” mitigation options reported by IPCC are reflected in CCX Rules

• NO SHOWSTOPPERS TO IMPLEMENTATION OF A MULTI-SECTOR GHG CAP AND TRADE SYSTEM SUPPLEMENTED BY DIVERSE OFFSETS

• Major pool of private and public sector talent engaged
  • members, hundreds of experts focusing on energy efficiency and savings
  • other experts: auditors, verifiers, policymakers

• Thousands of individuals now far more informed on carbon management and trading

• Detailed rules and methods tested and refined
  • many second generation procedures now in place
  • hands-on experience for emissions and project verification experts
  • detailed expertise accumulated by members
Key Issues to Watch in U.S. Legislation

- Included sectors, targets, gasses, timetables (start date, true-up periods)
- Pint of regulation (if any) for transport emissions (e.g. fuel vendors?)
- Availability and cost of domestic and international offsets
- Safety valves? (price, quantity, policy?)
- Parallel technology and policy development efforts (e.g. CAFE standards)
- International market and policy linkages
- Initial Allocation of tradable permits
  - grandfathering
  - auctions
  - benchmarking
  - accommodation of growth?
Views on CCX

- “What would be wrong, at least on a theoretical basis, with taking what you have come up with by way of requirements for your (CCX) members and essentially mandating that everybody in the country comply with those?”
  
  *Senator Jeff Bingaman (D-NM), ranking minority member, Senate Energy & Natural Resources Committee, April 4, 2006*

- “the Chicago Climate Exchange is providing an innovative means of involving American businesses and citizens in the effort to protect the environment...I listed my farm in Indiana on the Chicago Climate Exchange to set an example for farmers and foresters in my state and throughout America...For example, the exchange mechanism could be utilized by turning unused farmland into tree farms that sequester carbon while providing farmers with extra money... In short, American farmers could become the vanguard in using market forces to the benefit of both the environment and the pocketbook…”
  
  *Senator Richard Lugar (R-IN)*

- “The CCX is leading the way toward a future in which reducing greenhouse gases could bring not only environmental rewards, but financial ones too.”
  
  *Al Gore, from An Inconvenient Truth (book version), 2006*