

Transforming Climate Change through the Capital Markets: Carbon as Commodity

By Andrew J. McKeon
Principal, carbonRational

Human-induced climate change has emerged as one of the defining issues of the 21st century. Not simply an environmental concern, climate change is a business issue—indeed the most significant business issue facing industrialized society as it is inextricably linked to issues of energy, security and sustainability. The capital markets system will play a transforming role in addressing climate change, enabling the transition from a fossil-fuel based economy to a post-carbon economy.

Throughout the 20th century, capital powered the world's industrial system providing businesses with the resources to grow and flourish. This aligned the aims of two powerful systems—the world financial system and the global economy--and brought about sustained levels of growth and industrial progress never before seen in human history.

At the dawn of the 21st century, science has made clear the dangers of anthropogenic CO₂. To address this, the aims of both finance and industry must now be aligned with that of a third system: the earth's ecosystem. Trading carbon as a capital markets commodity is the first manifestation of that alignment by using a market-based system to incorporate the cost and right to produce carbon into the global economy. **This paper outlines the risks posed by climate change, the role the carbon markets can play for investors and in shaping a post-carbon future, and how a cap-and-trade system can bring about that future.**

1. The Risk of Climate Change

While the exact consequences of climate change are unknown, the potential risks they pose cannot be ignored. Simply put, anthropogenic climate change is the biggest systems problem humanity has ever faced, therefore systems theory must be used to understand its risks and formulate solutions.

To understand climate change, it is useful to discuss first what climate change is not. An extremely hot summer in the northeast U.S., or a snowstorm in the Gulf of Mexico is not an example of climate change. Specific weather events, no matter how unusual, prove little about our role in changing the earth's climate since natural variation within the climate system is so great.

“Climate change” refers not to the weather, but to human activities that are creating a fundamental geophysical change in the earth’s atmosphere. By burning fossil fuels, humans have been adding huge amounts of carbon dioxide (CO₂) to the earth’s atmosphere. In 2007, the U.S. alone added 7.3 billion metric tons of CO₂e¹ into the atmosphere (about one-fifth of the world’s total), up 1.4% from 2006 and up 17% from 1990.² Since CO₂ is a greenhouse gas that traps heat, the more of it we pump into the atmosphere, the more heat that gets trapped and the warmer the planet becomes.

Viewed as a system, the global economic system powered by fossil fuel is out of alignment with the workings of the earth’s ecosystem. Climate change is a symptom of that misalignment. **Simply put, if the earth were a doctor’s patient, climate change would be an indication of a serious rising fever—persistent and perhaps life threatening—and in need of immediate counteraction.**

People reasonably pose questions about climate change, such as: Is a warming climate a problem? Won’t some people benefit from warming? If humans are a part of nature, isn’t the climate change caused by humans indeed natural?

Should we bother doing anything about climate change? Is all the buzz about climate change and carbon trading just a fad that will pass?

¹ The ‘CO₂e’ refers to CO₂ ‘equivalent’. There are five other major greenhouse gases in addition to CO₂ that contribute to climate change, each with different greenhouse properties. The terminology CO₂e is an attempt to arrive at an aggregate effect of all six greenhouse gases in terms of CO₂.

² U.S. Energy Information Administration Report #: DOE/EIA-0573(2007) Released Date: December 3, 2008

These questions are valid, yet they reflect a lack of deeper understanding of the context of climate in human history. Climate change represents not just warming, but a destabilizing of the climate system. The history of human advancement has been underwritten by a stable climate. Civilization was built on agricultural surpluses that liberated humanity from subsistence living and enabled specialization. Those agricultural surpluses were built on a stable climate. Even today our agriculture, water systems, and population centers are still attuned to and have been optimized around the stable climate we inherited 10,000 years ago. Scientists are now concerned that global warming from climate change could disrupt that stability. Some of the potential consequences of climate change include:

- threats to major sources of fresh water for billions of people;
- reduction in agricultural yields through crop migration and changes in soil moisture;
- damage to indigenous species of trees and flora;
- severe impacts on habitats of humans, animals and insects;
- loss of balance between components of irreplaceable ecosystems; and
- significant rise in sea-level from a destabilizing of the ice shelves in Greenland and West Antarctica.

Climate change is a systemic problem which is becoming more urgent and more evident every day. Global annual emissions of CO₂ in 2007 were 50% above

those of twenty years earlier.³ In 1998, scientists forecast that the North Pole would become completely ice-free in summer by sometime between 2050 and 2100. More recently, many scientists now believe this could happen as early as 2015.⁴ Like the patient with the persistent, life-threatening fever, we don't need a precise diagnosis to know the results of this unchecked symptom. We need to take steps to reverse it. This is why most of the world's countries (both industrialized and developing) have decided that CO₂ emissions from human activities must be controlled, curtailed, and by 2050 reduced by 80-90% from 1990 levels.

2. Investor Opportunities in the Carbon Markets

Climate change is a systems problem, and it will require a systems solution. It will force a realignment of our global economic system in order to serve the aim of the earth's ecosystem. The first-ever world market with this primary aim and purpose is the global carbon market. First and foremost, the carbon market serves the ecosystem by setting a cap on CO₂ emissions and shrinking that cap annually. In turn, this market serves entrepreneurs and innovators by using market-based mechanisms to put a price on carbon, which encourages new green technologies and penalizes fossil-fuel-powered industry. Finally, it represents a market of great size that could see even more explosive growth with

³ Earth Policy Institute. April 9, 2008. <http://www.earthpolicy.org/Indicators/CO2/2008.htm>

⁴ Mark Serreze, a scientist with the National Snow and Ice Data Center in Boulder, Colorado, in an interview with Agence France-Presse, June 27, 2008.

the anticipated participation and leadership of the U.S. by 2010. The new mantra of the eco-entrepreneur is “Cap, Trade, and Grow.”

Despite the facts that the carbon market is barely four years old and lacks the participation of the world’s biggest CO₂ emitter--the U.S.—It has already become a significant global market. In 2008, the global carbon market was valued at almost €100bn, more than double 2007’s figures, according to the carbon consultancy Point Carbon⁵. The market in 2008 saw 4.9 billion metric tons of CO₂e change hands, up 83% from 2007.⁶ Some industry observers project a \$3 trillion market in carbon by 2020. Given its growth trajectory, carbon very likely could become the most widely traded commodity in the world in the next ten years.

Making carbon allowances and credits into easily tradable instruments with a transparent price provides investors with access to equity vehicles, such as the recently launched AirShares EU Carbon Allowances Fund (NYSE Arca: ASO). Additionally, more specialized investors can enter into futures contracts and can speculate in the spot market. Trading in the secondary markets further enhances price discovery and liquidity, which stabilizes the market and helps industry plan for the long-term with a stable price signal for carbon.

⁵ *Carbon Market Monitor* - released by Point Carbon, January 2009.

⁶ *Ibid.*

What drives the price of a metric ton of CO₂? As in all markets, it comes down to the law of supply and demand: in this case, the supply of and demand for available carbon allowances or credits. This is driven by how much carbon our industrialized economy wants to discharge into the atmosphere and how much governments agree to permit. Three major factors discussed below affect this: economic activity, policy, and the availability of alternatives to fossil fuel.

Economic activity is a key driver of demand for carbon allowances because it is so closely correlated to energy use. Since 85% of U.S. energy is fossil-fuel based⁷, U.S. energy consumption generally results in the discharge of CO₂. Lower levels of economic activity put less CO₂ into the atmosphere and thus decrease the demand for carbon allowances in a carbon-constricted economy, while greater activity serves to increase the demand. In early 2009, global economic activity is slowing, reducing energy usage and placing downward pressure on the price of carbon. As economic activity recovers, demand for energy will likely increase, and in a carbon-constricted economy so will demand for carbon allowances.

Policy is the tool that puts the 'cap' in cap-and-trade, shaping supply and demand by determining (a) the level of the cap, (b) the allocation of allowances, and (c) the breadth of the market.

⁷ U.S. Energy Information Administration – U.S. Energy Consumption by Source, 2007.

- (a) **Today there is a great deal of debate about the so-called proper level for the global cap on CO₂,** balancing economic and environmental considerations.⁸ A higher cap would allow for more discharge of CO₂ and thus reduce the demand for carbon allowances, whereas tightening carbon regulations with a lower cap would increase demand.
- (b) **Once a cap is set, allowances must be introduced into the market, either by allocation or through an auction system.** A liberal allocation of allowances can hamper the environmental effectiveness of cap-and-trade, as happened in the now-completed Phase I of the European Union - Emissions Trading Scheme (or EU-ETS). Overallocation also can drive down the price. In January 2008, the European Commission proposed a number of changes, including auctioning a large portion of allowances and centralizing allocation of the rest. Both of these policies would tend to make allocations more scarce and in all likelihood improve environmental effectiveness and drive up allowance price.
- (c) **Market size impacts market effectiveness.** Participants in the global carbon markets today are anticipating the U.S. will join a global agreement to cap CO₂ and trade allowances. U.S. participation would increase both supply and demand of carbon allowances, but more important, it would complete the family of nations participating in these markets and add credibility, liquidity and stability.

⁸ Dr. James Hansen of NASA stated in 2008 that an atmospheric concentration of CO₂ above 350ppm is dangerous for the long-term health of the planet. The Kyoto Protocol looks to stabilize atmospheric CO₂ at about 450ppm by 2050. The current level of atmospheric CO₂ is about 385ppm according to NOAA's Earth Systems Research Laboratory.

Alternatives to carbon-based energy also impact the demand for carbon allowances. Although non-fossil fuels supply only about 15% of the energy used in the U.S. it's highly likely that their share will increase. In 2009, it's believed that the new Obama administration will propose "strategically investing \$150 billion over the next ten years to catalyze private efforts to build a clean energy future" as stated on the White House website.⁹ That compares with inflation-adjusted energy spending of \$7.7 billion in 1979 – an all time high – and as little as \$3.3 billion in 2006. It is clear such spending will increase the share of alternatives in the U.S. energy portfolio. It is less clear by when and how much.

Another clean energy source that impacts the demand for carbon allowances is the use of no energy at all. A study by McKinsey & Company and the Conference Board in 2007¹⁰ reported that close to half of a 3 gigaton annual abatement of CO₂e could be achieved at *negative cost*, since it involved saving energy through things like home insulation, efficient appliances and transport and smart product packaging. This could also reduce the demand for carbon allowances—but significant reductions through efficiency will require the political will to implement tremendous changes in the way we use energy, and that will take time.

⁹ Website URL: http://www.whitehouse.gov/agenda/energy_and_environment/

¹⁰ U.S. Greenhouse Gas Abatement Mapping Initiative December 2007, McKinsey & Co. and The Conference Board

Four factors together would align with a stable and strong demand for carbon allowances: economic activity increases over the medium to long-term;

- U.S. joins the carbon markets;
- carbon caps are tightened; and
- fossil based fuels are still a significant source of energy.

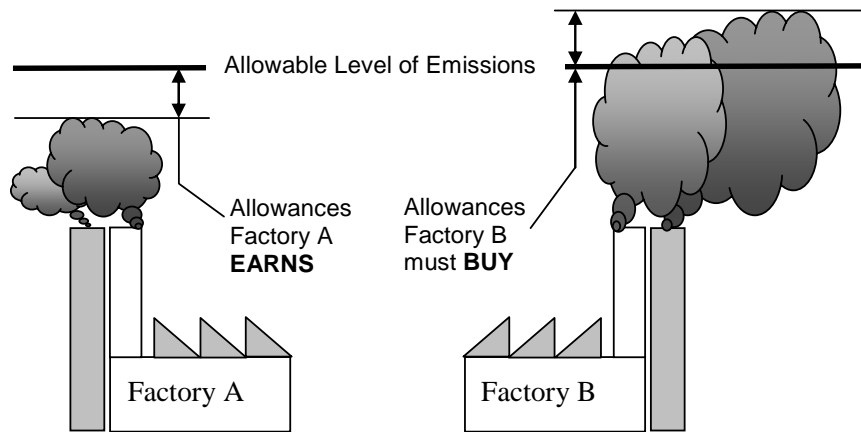
On the other hand, a lack of U.S. participation over the medium to long-term would tend to destabilize the carbon markets, and a quick shift towards renewables or boost in energy efficiency would weaken demand for allowances.

In the final analysis, if one believes that global economic activity will increase compared to early 2009 levels, that policies will change that will bring the U.S. into cap-and-trade, and that fossil fuels will remain a primary energy source over the next five-to-ten years, then the carbon markets represent one of the largest global growth opportunities.

3. Development of Cap-and-Trade

When a market must constrain a pollutant's discharge, many economists believe cap-and-trade provides the least-cost solution. Cap-and-trade sets a cap on emissions for the overall market and then allocates individual limits to each polluter. Those with the cheapest means to reduce emissions (i.e., the lowest marginal abatement cost) may stay below their limit. These companies can then sell their excess allowances to others who have exceeded their cap. As a result,

the overall compliance cost to the economy is driven by the lowest abatement cost, rather than the average cost.



The Acid Rain Program (ARP), under the EPA's Clean Air Markets Programs, is seen as an effective application of the cap-and-trade mechanism. Acid rain comes primarily from emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x). ARP puts a cap on both gases discharged from large coal-fired electric generation sources. Power plant owners regulated under ARP whose levels come in below their assigned cap accrue allowances they can sell in the market, while owners who exceed their cap can buy allowances from the market. In 1997, ARP saw SO_2 and NO_x emissions reduced by 43% and 51%, respectively, compared with the 1990 baseline. The EPA projects public health benefits from emission reductions will be over \$120 billion annually by 2010, exceeding

program costs by a margin of more than 40:1.¹¹ The success of this program led *The Economist* to call ARP's cap-and-trade program "probably the greatest green success story of the past decade."¹²

The success of the ARP program inspired the application of the cap-a-trade mechanism beyond acid rain. In 1997, the Kyoto Protocol adopted cap-and-trade for CO₂ and five other greenhouse gases¹³ after concluding it was the fastest and cheapest way to reduce emissions. (Some observers think it was also implemented to encourage the U.S. to participate in the carbon markets given the EPA's acid rain success and U.S. preference for market-based mechanisms.)

Even though the U.S. has yet to regulate CO₂ at the federal level, the Chicago Climate Exchange (CCX) started the first voluntary US cap and trade program in 2003. In addition, there are regional U.S. mandatory carbon markets that have been set up along the ARP model. They include in the northeast the Regional Greenhouse Gas Initiative (RGGI – pronounced 'Reggie'), in the Midwest the Midwestern Greenhouse Gas Accord (MGGA), and in the far west the Western Climate Initiative (WCI).

¹¹ Acid Rain Program 2007 Progress Report, published by the U.S.EPA, January 2009

¹² *The Economist*, July 6, 2002

¹³ The six gases or gas groups regulated under the Kyoto Protocol are carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons and perfluorocarbons.

There are also other market-based mechanisms to limit formerly abundant resources that share similarities to cap-and-trade. Take congestion pricing. By imposing a fee on cars that enter the city center at peak hours, places like Stockholm and London have been able to reduce traffic congestion and pollution, while increasing ridership on and raising funds for mass transit. Instead of regulating what goes into the atmosphere, governments are regulating space on city streets.

Cap-and-trade has its critics. Some say that a carbon tax would be easier to implement, less costly, and more effective at changing behavior. Others argue that because cap-and-trade rewards those with the cheapest solution, it drives quick fixes and short-term oriented solutions without regard to the long-term efficacy. Still others argue, in an economy-wide cap-and-trade system in a global market, monitoring and verifying compliance will be very difficult and costly.

However, cap-and-trade is best suited for global problems with little direct local effect. In this sense, it is perfectly suited for CO₂. Some pollutants, like mercury for example, have catastrophic local effects. But CO₂ has virtually none. It doesn't matter whether a smokestack is in Beijing or Boston, the CO₂ it emits is evenly distributed around the planet's atmosphere. This property of CO₂ reinforces the potential for a truly global carbon market.

4. Conclusion

Because the dangers of climate change are real and multiplying rapidly, there is an urgent need to address them. The cap-and-trade mechanism applied to carbon represents a market-based system for incorporating the cost of carbon into the U.S. and global economy. It also represents a new alignment of systems. The aim of virtually all commodity markets is to align natural resources in service of human industry. Carbon represents the only commodity market that aligns human industry in the service of a natural resource – the earth’s atmosphere.

The drivers of the carbon market include changes in global economic activity, domestic and international policy, and advances in energy and technology. Despite early growing pains, carbon has developed into one of the world’s largest and fastest growing commodity markets. For investors, it represents a unique opportunity to participate in a fundamental market transformation as we shift from a fossil-fuel based economy to a post-carbon economy.

About the author:

Andrew McKeon is a principal at carbonRational, which provides education, consultation and communication on the implications of climate change including opportunities for increased global competitiveness, profitability and sustainability. Mr. McKeon is not a professional investment advisor.

Mr. McKeon is also a co-founder of InTERRAction, a consortium of experts from science, legal, architecture, engineering, management, marketing and public relations to provide a host of perspectives and expertise to clients as they move forward on addressing climate change and sustainability. Mr. McKeon has been invited to speak on business and climate change by community groups, universities, corporations, scientific organizations and world bodies. He is an advisor to the UN Global Alliance for ICT Development (UN GAID), and is a member of the board of TransitCenter. He holds an M.S. in Engineering and an MBA both from Columbia University.

###

Information in the report is issued without regard to the specific investment objectives, financial situation or particular needs of any specific recipient and does not contain investment recommendations. ALPS Distributors, Inc. does not accept any liability for any direct, indirect, or consequential damages or losses arising from any use of this report or its contents. The opinions expressed in the article are strictly those of the author. The opinions expressed are made as of the date of this material, and are subject to change without notice. There is no guarantee the views and opinions expressed in this communication will come to pass.

About XShares Advisors LLC

XShares Advisors LLC, a registered investment advisor, sponsors and develops innovative exchange traded products (ETPs). XShares Advisors partners with major institutions and index providers to create and license distinctive intellectual property for its ETPs. For more information, visit the company's website at: www.xsharesadvisors.com.

###

Risk Considerations

To determine if this fund is an appropriate investment for you, please carefully consider the fund's investment objectives, risk factors and charges and expenses before investing. This and other information can be found in the fund's prospectus, which may be obtained by calling 1-800-925-2807 or visiting our website at www.xsharesadvisors.com/airshares/prospectus. Please read it carefully before investing.

Commodities and futures generally are volatile and may not be suitable for all investors.

Commodity trading is highly speculative and the underlying instruments determined by the methodology on which the fund's trading will be based, are likely to be volatile and could suffer from periods of a prolonged decline in value.

The AirShares EU Carbon Allowances Fund is speculative and involves a high degree of risk. The market for European Union Allowances (EUAs) may be volatile and illiquid, which may adversely affect the value of the fund's shares. An investor may lose all or substantially all of an investment in the fund. The fund is subject to fees and expenses and will be successful only if losses are avoided.

In addition to the normal risks of investing, foreign investing involves special risks, such as risk of loss from currency fluctuation or political or economic uncertainty. The trading activities of the fund will subject holders of AirShares to currency risk. European Climate Exchange CFI Futures Contracts and most of the assets of the fund will be denominated in Euros while the shares trade in U.S. dollars. Changes in the value of the euro relative to the U.S. dollar alone may cause the trading price of the shares to decline. Funds focusing on a single commodity generally experience greater price volatility than a diversified commodity pool.

If the member states of the European Union fail to adhere to their obligations under the Kyoto Protocol or the EU ETS, the value of the shares may be adversely affected.

Depending upon the performance of the fund, including the interest rate environment and the amount of interest the fund earns on its fixed income securities, the expenses of the fund alone could result in losses to your investment.

Although the shares are intended to provide investment results that relate directly to the value of its long positions in futures contracts for EUAs, the value of the fund's shares may diverge from the value of such long positions for various reasons. There is a risk that the calculation of the NAV of the fund will not accurately reflect the realizable market value of such futures contracts.

The fund has only a brief and limited operating and trading history on which to evaluate an investment in the shares.

The fund is not a mutual fund or any other type of investment company within the meaning of the Investment Company Act of 1940, as amended, and is not subject to regulation thereunder.

Shares of the fund are not FDIC insured, may lose value and have no bank guarantee. AirShares EU Carbon Allowances Fund is distributed by ALPS Distributors, Inc.

XShares Advisors LLC and ALPS Distributors, Inc. are unaffiliated entities.

AirShares is a trademark of XShares Advisors LLC.

AIR 167 Exp 10/31/09