

**Testimony of Daniel R. Abbasi
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House Committee on Ways & Means
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Chairman Rangel, Congressman McCrery and Members of the Committee:

Good afternoon. My name is Dan Abbasi, and I'm a Senior Director with MissionPoint Capital Partners, an investment firm in Norwalk, Connecticut that runs one of the first and largest private equity funds exclusively focused on financing the transition to a low-carbon economy.

Thank you for the opportunity to speak to the Ways & Means Committee about the design of a climate change bill. It is a privilege to be with you at this crucial juncture in national policy-making.

The Committee has requested our perspective as clean energy investors on how to design a climate change bill to best encourage innovation and deployment of clean energy.

Three Key Points

I will make three main points in my testimony today.

First, our country has a profound opportunity before us – to establish the U.S. as the global leader in fostering a clean, low-carbon economy by building one of the most strategic industries of the 21st Century, one that will:

- Boost job creation just when we need it most;
- Diversify our energy supply and achieve long-term energy security; and
- Tackle the fundamentally economic threat of unabated climate change.

Second, this opportunity is time-perishable and hanging in the balance because mobile, global capital is looking for a home today, and the U.S. still lacks a primary ingredient for success: a comprehensive, wise and stable policy framework that sends the right short and long-term signals to investors and entrepreneurs. Most fundamentally, it is time for Congress to remedy a glaring market failure and institute a price on carbon. The market is primed to respond today: we as capital providers are ready, entrepreneurs are mobilized, companies big and small are poised to create and deploy a wide range of low-carbon solutions. Moreover, scientific indicators unequivocally point to the urgency of action.

Third, we believe that a properly designed cap-and-trade policy is the preferred mechanism to price carbon, not a carbon tax. It is the most dynamic system for stimulating our

nation's entrepreneurial capacity and achieving the policy objective at the least cost. Further, we recommend auctioning most of the allowances in the cap-and-trade system – 75% or more – and using the revenues to selectively reduce distortionary taxes, to fund a climate change tax credit and to finance a robust package of supplementary policies to stimulate the innovation and deployment of low-carbon solutions. Later in the testimony, we describe a set of investor-friendly criteria for designing those supplementary policies and then provide over a dozen examples of specific ones we would urge Congress to consider.

I will elaborate on these three points in the balance of this testimony. But first, given that the Committee seeks our input from an investor perspective, it is worth briefly describing how MissionPoint is situated – and differentiated – in the broader investor landscape.

Overview of MissionPoint

First, MissionPoint is a specialist, not a generalist firm. We are entirely focused on financing the transition to a lower-carbon economy. This includes low and no-carbon energy and energy efficiency as well as carbon/environmental financial services. Our view of the carbon mitigation opportunity includes a continuing role for fossil fuels, but with newly aggressive and innovative management of its carbon by-product. Our team brings deep energy and environmental domain expertise based on senior roles in finance, technology, policy and operations at such organizations as General Electric, ABB, SwissRe, FMC and U.S. EPA. The firm was founded and is chaired by Mark Schwartz, former Chairman of Goldman Sachs (Asia) and CEO of Soros Fund Management.

Second, MissionPoint's primary focus is on "growth stage" businesses, where a technology or service is at the threshold of commercialization or already commercialized and needs capital and other support to rapidly scale up and penetrate its target market. This growth-stage focus stems from our belief that carbon mitigation is an urgent, large-scale imperative and that we need to accelerate diffusion of solutions already in existence. However, we also carve out a portion of our fund for earlier stage, venture investments that we believe have transformative potential. This dual investment focus mirrors our view that the public policy framework should similarly accelerate both innovative R&D and faster deployment of existing solutions.

Third, MissionPoint is an active business builder that is involved in a hands-on way beyond providing capital. We are not passive investors or asset-allocators. We provide our portfolio companies with strategic guidance, executive talent, technology support, policy guidance, operational support, etc. As such, we are equal parts investor and entrepreneur.

A sampling of our investments includes:

- SunEdison, the leading solar developer and independent power producer in the U.S.
- UpWind Solutions, which services wind installations to maximize power production

- Hannon Armstrong, an efficiency financing company that specializes in funding efficiency upgrades in federal facilities;
- Greenhouse Gas Services, a carbon offset project developer that we formed with General Electric and AES;
- APX, a transaction and data infrastructure company that facilitates creation and tracking of renewable energy certificates and voluntary carbon credits;
- Advanced Aerofoil Technology, an efficient manufacturer of natural gas turbine components that also sells systems to optimize fossil fuel power plants for lower emissions.
- Trilliant Networks, a “smart meter” company that provides technology and products that enable utility and consumer energy efficiency and demand response;
- Amonix, an advanced, high-concentration photovoltaic system manufacturer
- Energy Source, a developer of geothermal power generation assets.

I. A PROFOUND AND STRATEGIC GROWTH OPPORTUNITY

At MissionPoint, we foresee a staggering, multi-decadal investment, growth and job creation opportunity associated with the emerging transformation our global system of energy production and use. Driven by the low-carbon imperative and the pursuit of energy security, trillions of dollars will be invested in the innovation and deployment of efficient, low-carbon solutions across the generation, transmission, distribution and end-use segments of our energy system.

A concerted national strategy to modernize and decarbonize our energy system will provide a wide-range of co-benefits beyond addressing climate change, including:

- Hundreds of thousands of high-quality, technology-led jobs here in the U.S.
- Greater international economic competitiveness, and export leadership
- Greater energy security and diversification, marked by resilience to volatility and scarcity pricing in traditional fuels;
- Greater national security through less dependence on oil and gas imported from politically unstable areas of the world;
- Added protection of human health and the environment from avoidance of air pollutants emitted along with greenhouse gases

The International Energy Agency (IEA) did a major scenario exercise this year projecting the expenditure that would be required above the business-as-usual baseline to reduce global carbon emissions by half by mid-century relative to 2005 levels. It found that up to \$47 trillion would need to be invested over the 2010-2050 period in a wide range of technologies. In their scenario, technologies responsible for reducing emissions would be: energy efficiency (36%); renewable energy (21%); carbon dioxide capture & storage

from fossil power plants and industrial facilities (19%); and nuclear, fossil fuel switching and supply side efficiency in power generation (24%). The IEA also found that the \$47 trillion would command a big reward: a \$51 trillion savings in fuel expenses.

MissionPoint and others are investing across the full range of these technologies. Solar energy is among the standouts, as it continues to experience 40%+ compound growth rates, and wind power, on a much larger base, achieves 20% compound growth rates.

The Prometheus Institute estimates that global solar manufacturing capacity will grow from just under 2 Gigawatts in 2006 to 40-60 Gigawatts by 2015. This estimate suggests a 50% compounded annual growth rate.

- Assuming a capex/watt of \$1.00 for the module in 2015, this estimate implies up to \$40 to \$60 billion in capital investments into manufacturing capacity alone.
- Assuming a total installed system cost of \$3/watt in 2015, a 40-60 GW manufacturing base will produce \$120 to \$180 billion annually in solar power generation systems, of which the solar panels themselves will constitute about half and the remaining “balance of system” and installation will constitute the other half.

But the U.S. must accelerate if it is to attain a leadership position in solar power manufacturing and other globally competitive low-carbon markets. According to PV News, the U.S. share of global solar production was a mere 9% in 2005, then decreased to 7% in 2006, where it held level at 7% again in 2007. Meanwhile, Europe increased its share from 26% to 28% over that same two year period, while the overall size of the pie grew dramatically from 1700MW of global production capacity to 3700 MW. The rest of the world (other than Japan) grew from 18% to 40% share.

Continued growth in these markets will be driven increasingly by:

- Realization of cost reduction through scale economies, with many key technologies on pace to eventually mature to the point that subsidization becomes unnecessary;
- Emergence of stronger, increasingly mainstream market demand; and
- Improvement in relative economics as traditional fuels are required to absorb a carbon price. More on this below.

Provided the market is not interrupted by policy uncertainty and other factors, success along the way toward the low-carbon future should create positive feedback loops that attract:

- More talented management
- More innovation

- More capital
- More solutions
- Lower costs

Declining cost curves over time are a robust trend for wind, photovoltaics, concentrating solar power, geothermal and other renewable energy technologies. Further cost reductions are attainable to a varying extent across technology sets, and we aim to selectively accelerate those with the most room for further cost and performance gains per dollar invested.

Solar, again, is particularly attractive in this regard. Over the last 25 years, we've seen an extremely reliable trend: each time we double installed capacity of solar energy, the price of solar energy drops approximately 18%. Solar power research has reduced solar power costs by nearly 50% in the past decade alone, and we can forecast sizable further cost reductions to come.

Most photovoltaic (PV) modules today are made from crystalline silicon (c-Si) and cost approximately \$3.00 per Watt to produce. Even without a shift to more advanced thin film technologies, the cost of the incumbent c-Si technology is projected to drop to \$1.70 per watt by 2011, \$1.31 by 2016, and \$1.10 by 2021. These cost reductions are expected to come largely from manufacturing economies of scale rather than major technological breakthroughs, reinforcing the importance of sustaining a strong policy stimulus so we can progress down the cost curve.

Aggregate installed system costs – which is what the customer ultimately pays – are largely driven by module costs, but also a function of “balance of system” costs (i.e., electrical equipment and mounting structures as well as labor costs for field installation). According to Deutsche Bank, installed costs for c-Si systems today average approximately \$7.29/watt and are expected to decline to \$4.38/W in 2011, \$3.26/W in 2016 and \$2.61/W in 2021 (assuming a commercial-scale 150kW system).

We believe that Levelized Cost of Energy (LCOE) is the most important metric by which one can measure the competitiveness of energy technologies. This figure is calculated based on the installed cost of the system, the energy produced over the life of the asset, its operational & maintenance costs, and its financing costs.

The LCOE of c-Si systems today averages about \$0.32/kWh and is expected to decline to \$0.19/kWh in 2011, \$0.14/kWh in 2016 and \$0.11/kWh by 2021. The Energy Information Agency projects that average residential grid electricity prices will rise from \$0.104/kwh today to \$0.108 in 2009 before declining to \$0.104 in 2021 – demonstrating a small and relatively stable dispersion around 10 cents and a coming solar cross-over with average grid prices.

MissionPoint believes that as the cost of producing solar energy continues this steady downward march towards “grid parity” (generally viewed as 10 cents per kilowatt-hour, or “kWh”), the demand for solar energy will grow very quickly to an extraordinary level.

DOE Solar America Initiative estimates that solar energy will achieve price parity at panel costs of \$1.25 per watt – and that the industry will get there by 2015.

Of course, many people pay already more than the average grid price. The market size today for electricity at prices greater than 15 cents is already \$30 billion, a price that solar systems can meet in areas with appropriate sun once federal (and sometimes state) tax credits and incentives are factored in.

Thin-film solar technologies, the next generation after c-Si, are expected to produce even steeper cost declines as they grow in manufacturing scale and increasingly drive industry-wide pricing. First Solar, today's lowest cost thin-film producer, is manufacturing cadmium telluride thin film PV modules at \$1.25/watt and expects to produce over 400 MW in 2008.

Job Intensity of Renewable Power

At a time of job loss and uncertainty, it is worth noting that the job-intensity and quality of renewable energy jobs are exceptionally high:

- The U.S. Department of Energy reports that wind energy produces 27% more jobs per kWh than coal-fired energy, and 66% more jobs than natural-gas fired energy.
- 1MW of solar creates 7-10X more man-hours of employment than 1MW of conventional fueled sources.
- The U.S. Solar Energy Industries Association has set a goal of supplying half of all new U.S. electricity generation from the sun by 2025, which it says would create over 260,000 new jobs by 2030.
- An analysis by the European Photovoltaic Industries Association shows that a projected installation of 205 Gigawatts of solar photovoltaics by 2020 could generate 2 million jobs worldwide.
- According to research by Roger Bezdek for the American Solar Energy Society, the U.S. wind industry created 16,000 direct jobs and 36,800 total jobs in 2006.
- According to a study by the Renewable Energy Policy Project, a national development of 50,000 - 70,000 MW of wind energy could potentially create 215,000-331,000 full time equivalent job/years of employment.

Renewable energy tends to generate highly skilled manufacturing, construction and high-tech jobs – as well as new white collar jobs in high-growth companies. Many of these jobs are likely to be inherently domestic and localized, as well as long-term rather than transient. For example, the U.S. has distinctive expertise and competitive advantage to leverage into the high-tech segment of the renewable industry, such as advanced materials. And the service and installation/asset deployment jobs are not easily subject to overseas

outsourcing. Manufacturing in this sector, like others, will continue to be at risk of moving to low-cost overseas operations, but Congressional and state-level support can mitigate this risk through cost-sharing grants for new manufacturing facilities.

We need a supportive policy framework to keep these jobs at home. Earlier this year a major U.S. solar panel manufacturer reported having diverted jobs and in-demand solar panels to overseas markets as a result of aggressive incentives in Europe, including into countries with much less sun than the U.S.

Beyond Renewables

Beyond solar, wind and other renewables, there are many other less iconic but compelling clean energy opportunities to pursue, including:

- Development of a smart grid to enable more productive interconnection of renewables, enabling of demand-response and energy efficiency solutions
- More energy efficient end-use appliances, devices and services
- Carbon capture & sequestration, to manage the carbon by-product associated with fossil fuel generation
- Expansion of carbon-free nuclear power
- Capture/use of waste heat
- Hybrid fossil/renewable generation
- Plug-in hybrid vehicles

Waste heat is an enormous and still relatively untapped electricity resource in our country. Boilers, gas and steam turbines and even the internal combustion engines in automobiles generate heat that today goes unused. One company that MissionPoint evaluated determined that using a patented turbo-expander cycle to capture 20% of the waste heat in energy intensive sectors (e.g., steel, aluminum, copper, cement, refineries) could produce over 180 Gigawatts of electrical power capacity, more than double the nation's renewable capacity, including hydro, at the time. The Energy Independence and Security Act of 2007 authorized a new Recoverable Waste Energy Inventory Program that requires EPA to create a registry of recoverable waste heat from major industrial and large commercial combustion sources and sites in the U.S. and to collaborate with DOE in providing technical assistance to qualifying sites for energy capture. With further policy support and funding for research and deployment, we expect to see more productive use of waste heat in stationary and mobile applications.

With carbon weighting as the key metric rather than technology-specific promotion, we should also see growing creativity in developing hybrid fossil/renewable configurations that can join the power density and scalability advantages of traditional fossil and nuclear power with the low-carbon advantages of renewables. To take just one of many examples, using solar power to do feedwater heating for a coal-fired plant will increase the efficiency of the coal plant dramatically and produce what is, in effect, an increment of emissions-free power.

Perhaps the most well known hybrid configuration – and the most promising emissions reduction technology in transportation -- is hybrid vehicles and plug-in hybrids. It is under-recognized that even while most electricity is generated from fossil fuel sources, the inherent efficiency advantage of an electric drive train over an internal combustion engine is so great that the all-in carbon reductions from mainstream adoption of this technology would be tremendous, and well worth stimulating via all available policy tools.

II. TIME TO PRICE CARBON

Having previewed the enormous scope and magnitude of the investment and growth opportunity, we now outline key reasons why we believe it is time to price carbon now.

- 1. Investors / Entrepreneurs are Primed Today:** Capital providers and business builders are primed and ready to go today. MissionPoint was a pioneer in forming a pool of growth capital dedicated to financing the transition to a low-carbon future, and in the past year alone the number of private equity firms investing in clean technology has more than doubled. Venture capitalists invested over \$2.2 billion into more than 200 clean technology deals in 2007, a 340% increase from 2005 (Thomson Financial). Broadening to include all investment activity – including venture capital, private equity, public markets, project financings and M&A -- 2006 saw approximately \$31 billion of activity. Much of this capital has come into the market anticipating a price on carbon. If a supportive policy framework is not put in place, there is little doubt that a rapid reversal is possible. Investors and business talent will look elsewhere. We will have squandered the market readiness that now exists, and the opportunity for public sector funds to leverage much larger pools of private capital.
- 2. Dangerously Late in Addressing Climate Change – Cost of Inaction:** As fact-driven investors, we observe that by almost all scientific accounts, we are dangerously late in addressing climate change. This threat appears just as perilous as war and recession, and perhaps more so given its irreversibility, planetary scope and the intensity of adverse impacts that lie ahead on the trajectory we're presently on. Many others have surely catalogued these impacts to the Committee, but they can be particularly arresting when singled out. For example, several leading scientists from the respected Met Office Hadley Centre for Climate Prediction and Research in the UK projected that under a mid to high emissions scenario we could go from 3% of the planet being in extreme drought to 30% by the end of the century. These are conditions in which agriculture is impossible. Think about the food security implications alone, and the economic consequences.

We applaud the House for holding hearings recently on the cost of inaction, which indicate that the cost of unabated climate change will be much higher than the costs of a mitigation policy – by 5 to 20 times, according to Sir Nicholas Stern's report and testimony. Many others have reached similar conclusions. This was not spotlighted adequately in the Senate debate this past summer, in which the costs of policy action were presented rather one-sidedly as unacceptable. We must frame our choice

accurately: it is not between the status quo and the costs of policy action. The real choice is between the grave economic risks of unabated climate change and the costs of policy action. Moreover, the costs of inaction are fundamentally economic: apart from disruptions to household well-being and purchasing behavior, especially in coastal zones, unabated climate change will have direct consequences for growth and jobs in a variety of climate-sensitive sectors. agriculture, fishing, forestry, recreation, even oil and gas, as we've seen with extreme weather disruptions.

Having witnessed the Senate floor process on the climate bill earlier this year, it appears that many of our leaders do not recognize the magnitude of the stakes. Going forward, we see risks of continued stalemate. Other critical issues competing for attention on the national agenda may crowd it out, particularly the economic slowdown. So we urge you to transcend business-as-usual and to exercise collective intelligence of the kind the U.S. Congress has historically summoned in moments of peril to our national well-being and to pass a comprehensive climate change bill.

Some economists have suggested that because climate change is a cumulative problem, our policies should be flexibly designed to allow emission reduction obligations to shift around across a 50-year timeframe. But scientists indicate we may be crossing or approaching unknown trip-wires in the climate system today (what they call “non-linear thresholds”). We hear frequently of the “astonished scientist” returning from the field to describe that climate change impacts are happening faster than originally forecast. NASA Scientist Jim Hansen cited recent evidence of the accelerating breakup of the ice sheets in urging policy-makers to reduce the target maximum atmospheric concentration of carbon dioxide from 450-550 down to 350 ppm, a threshold we've passed. The Intergovernmental Panel on Climate Change said the 450 ppm level would give us only a 50% chance of keeping the global average temperature from rising more than 2 degrees C (or 3.6 degrees F) above pre-industrial levels – a level at which increasingly severe impacts may occur; droughts, floods, heat waves, species extinction, sea level rise, ocean acidification, wildfires, spread of infectious diseases. A 50% probability outcome is not what we investors would consider an adequate “margin of safety” in our investment decisions, and should not be satisfactory for public policy purposes either.

We at MissionPoint regularly monitor the science and hold each other accountable to be guided by the facts, just as we are with non-scientific facts and data. Yes, business favors a degree of predictability, but facts on the ground change as circumstances evolve. So what we really need is an ability to consult objective data and a confidence that such data will be accepted as a shared framework for societal action, especially by policy-makers.

For example, many pending climate bills call for periodic review of emissions reduction targets by such bodies as the National Academy of Sciences. Our concern is that such open-ended reassessments are not sufficiently prescriptive. Therefore, MissionPoint introduced a new concept in our April 2008 testimony to the Select Committee on Global Warming urging Congress to specify a composite index of

scientific indicators in the legislation itself so that when each reassessment date arrives, the emissions targets would be adjusted based on measurable impacts – on whether, and by how much, those impacts have worsened or improved relative to the prior forecast. This could help insulate what should be a scientifically driven decision from recurring political pressures. Indicators in the index could include: atmospheric concentrations of greenhouse gases, average global temperature, rate of melting of the Greenland or West Antarctic Ice Sheets, extent and magnitude of drought globally, spread of climate-sensitive disease, incidence/intensity of extreme weather events, ocean acidification and so on. If we had such an index, we in the business community could track its progress just like we track macro-economic indicators and we would actually have better visibility into likely policy changes ahead than if the decision-making process were purely discretionary, as currently envisioned.

3. **Acting Now Avoids Steeper Challenge Later:** The longer we wait to institute a carbon policy, the steeper the reduction in emissions will need to be on a year over year basis going forward if we are to attain the policy objective of mitigating climate change while managing a smooth economic adjustment to a low-carbon future. Experts have estimated that if U.S. emissions peak in 2010 and begin to decline after that, we could reduce at 4% per year, but if our emissions grow moderately and peak in 2020, we would need to reduce by a much more challenging 8% per year.
4. **Non-Market Regulatory Options Loom:** The window for using efficient, market-based mechanisms to address climate change could narrow and even close, based on regulatory and judicial developments and the increasing magnitude of climate change impacts. The July 2008 D.C. Circuit judicial ruling on the Clean Air Interstate Rule left ambiguous whether EPA’s existing authority would permit it to use a cap-and-trade mechanism to regulate greenhouse gases, or whether it would need to use traditional command-and-control technology mandates. If Congress does not act expeditiously in 2009, EPA may well try to use its existing authority, which may limit the use of efficient market-based instruments. Hence Congress should assert itself and take the initiative now. EPA aside, if the scientific community continues to identify worsening climate change impacts, the window for a gradually phased-in cap-and-trade system may close anyway, and we will instead be compelled to use a less flexible, more costly regulatory structure that compels one-size-fits-all technology retrofits at the largest emitters and institutes draconian measures in a variety of sectors.
5. **Prompt Start Will Signal Credibility to Investors:** We investors understand that legislators cannot irrevocably bind their successors with a long-term goal – even if enshrined in law, it can be superseded or reversed by a future Congress. This puts a special premium on Congress not just passing a multi-decadal carbon pricing law, but including a “prompt start” and stringent early-year emissions reduction targets. The market appears to be expecting the first compliance year to be 2012 or 2013, but an “upside surprise” here with a fast 2011 start would spark major business and finance interest and capital inflows. Such commitments will also increase the credibility of the longer term commitments embodied in the policy, and stimulate investment in longer-term solutions.

- 6. Domestic Action Must Pave Way to International Agreement:** We need to act now because we need to be well positioned to engage in the international negotiations in 2009 toward a post-Kyoto agreement. If Congress does not make legislative headway in the balance of 2008, our chances to push a bill over the line early in 2009, and thereafter proceed to negotiation on a truly compatible international agreement will be reduced. Moreover, our ability to urge other nations – especially developing countries – to reduce their emissions will be squandered. The U.S. needs to lead the next phase of global carbon diplomacy rather than being passive and even defiant observers. This should start with a strong domestic foundation.

III. CAP-AND-TRADE WITH AUCTIONS OVER A CARBON TAX

Assuming agreement that it is time to price carbon, a threshold question before the Congress remains: what should be the mechanism? A carbon tax, a cap-and-trade system, or even both together?

The carbon tax has long been the popular choice of economists and has benefitted from recent public arguments in its favor, from the Congressional Budget Office, from scientist Jim Hansen, the Environmental Justice Forum on Climate Change and other influential policy thinkers. Given this Committee’s jurisdiction and carbon tax legislation introduced by Committee Member John Larson, we would expect the Committee to give full consideration to the carbon tax option.

Some have pointed out that a carbon tax and a cap-and-trade can be made to look a lot like each other if certain design points are included. For example, if a cap-and-trade includes a price ceiling (i.e., “safety valve”), then the system will convert to a tax-like system when that price trigger is breached. Similarly, if the rate of the carbon tax were adjusted yearly based on emissions levels in the prior year, then it could be increased or reduced to support an emissions target over time – making it look more like a cap.

But let us put those line-blurring features aside for a moment. MissionPoint believes that a cap-and-trade is far preferable for the following reasons:

- 1. Environmental Integrity:** A cap-and-trade sets a firm emissions reduction target and then allows the price of an emissions allowance to float. By contrast, a carbon tax sets a firm price and allows emissions levels to float – thereby undermining the core environmental goal of controlling emissions levels at pre-specified and scientifically determined levels. MissionPoint believes that we do not know the demand elasticities well enough in our economy to set the tax rate needed to get a targeted level of emissions reductions, so we need the certainty of a cap.
- 2. Anti-Tax Sentiment and Likelihood of Setting Tax Too Low:** Given this country’s long-standing anti-tax sentiment, and the political risks associated with enacting new taxes, we believe that the chances of enacting a carbon tax may be lower than a cap-

and-trade. And even if a carbon tax does pass, we believe there will be pressure to keep it so low that it will be sub-optimal in stimulating needed investments in low-carbon technologies. As noted earlier, one remedial option would be to institute a flexible tax level that updates yearly in response to emissions data, but this would give up the predictability that is the tax's greatest reputed strength.

3. **Trading Flexibility:** A carbon tax is technically a market-based instrument in that it injects a price signal and lets the market respond. But a cap-and-trade more fully harnesses the market's dynamism and captures efficiency through trading. It allows emissions reduction burdens to be traded to the least-cost sources (i.e., those where the cost per ton of carbon dioxide abated is lowest). This is a trait of enormous value to regulated entities, and in reducing the cost of the system to the economy as a whole. The advantage of trading is that a liquid market enables participants to interact and "find" each other, without leaving it to bilateral contracts – in other words it avoids the risk of "ships passing in the night" and comparatively inexpensive emissions reductions going untapped as a result. Extending this logic, a cap-and-trade system will permit the U.S. to trade internationally (international allowances, offsets or both), thereby maximizing flexibility to devote resources to least-cost reductions globally. This will also create options for international coordination toward a targeted outcome that would be harder to accomplish with a carbon tax.
4. **Price Volatility:** Many have argued that a cap-and-trade exposes market participants to volatile pricing, whereas a carbon tax provides price certainty. Congress can use many design features in the carbon bill to manage the risk of extreme volatility, but I hasten to add that some degree of price fluctuation is a characteristic of any properly functioning market – and should be permitted. The direction, duration and patterns of changing price signals provide valuable information about supply-demand dynamics, and market players are accustomed to interpreting and acting on these. Financial instruments (forwards, futures, options) are routinely used to manage and hedge commodity risks of all kinds, and are already emerging to do the same for carbon allowances and offsets. Futures in Regional Greenhouse Gas Initiative (RGGI) allowances are already trading. One of MissionPoint's portfolio companies – Greenhouse Gas Services (GGS) – can structure contracts on carbon offsets to provide price certainty to regulated entities. We would expect to see market participants like GGS facilitate a transparent and liquid forward price curve offering regulated entities price visibility and management options.

Given these design options and market capabilities, we strongly oppose inclusion of a government-administered price ceiling (i.e., "safety valve" or "escape valve", depending on your perspective) that fixes the maximum price of an allowance. As with a carbon tax, the safety valve would sacrifice the integrity of the emissions cap. But even more to the point, allowing some degree of price fluctuation attracts capital too. The carbon market will accord real value to the "call option" if carbon prices trade freely, while a fixed carbon tax foregoes this upside value entirely. Flattening the upside associated with carbon-mitigating investments will deter risk capital.

Many other creative options beyond a “safety valve” exist for mitigating the risk of extreme price volatility, through flexibility mechanisms such as trading, longer compliance periods, allowing substantial use of offsets, banking of allowances and granting an oversight body (a “Carbon Fed”) the authority to administer to conduct early auctions of future-year allowances or other temporary relief measures. Under a banking system, the price should converge toward the long-term abatement supply curve, discounted back at the cost of carry. This can provide incentives to invest early in higher cost abatement strategies and build in needed lead time for their development and commercialization.

5. **Unleashes Entrepreneurship:** We believe a cap-and-trade will unleash maximum entrepreneurship, as new businesses emerge to aggressively pursue carbon-reduction opportunities available anywhere in the economy. A cap-and-trade creates a currency (allowances and offsets) that independent entrepreneurs can produce and/or own autonomously, so it gives them more latitude than a carbon tax system where the primary initiative must be taken by the emitter or other entities exposed to the tax-based price signal. In a tax system, the entrepreneur must persuade the tax-minimizing entity to undertake an emissions reduction action by buying a particular solution, and in increments equal to that entity’s tax minimization objectives. In a cap-and-trade system, the entrepreneur has greater degrees of freedom to undertake independent activities that generate offsets detached from a tax-minimizing entity. This market dynamism also may affect the decisions of emitters who might have regarded a carbon tax as grounds for a tax minimization exercise only, whereas they might frame a cap-and-trade system as affording them new revenue generation opportunities. For example, a business may be more inclined in a cap-and-trade system to invest in a technology or other capability to reduce emissions in its own facility, and then package this into a marketable offering to others. Some economists argue that the incentive structures in both models are identical, but theory is not always reality: MissionPoint lives on the ground in these markets and believes these behavioral, organizational and motivational dimensions must be considered.
6. **Private Sector Supply of Cap-and-Trade Infrastructure:** Carbon tax advocates often point to the additional costs the government will incur to create the infrastructure to administer, monitor and enforce a cap-and-trade system, and that regulated entities will bear in terms of compliance costs. But if government creates the basic rules and oversight, much of this infrastructure will be funded by the private sector as it is in other financial and commodity markets. For example, one of MissionPoint’s portfolio companies, APX, is an infrastructure provider for power settlement and environmental commodity markets and is ready to do much more to facilitate efficient nationwide implementation of a mandatory cap-and-trade. APX has tremendous experience on which it can build. It is North America's largest provider of environmental registries, providing transaction and data infrastructure including tracking of renewable energy certificates and early adopter markets for greenhouse gas offsets and allowances. APX is the technology and service provider for the first formal state Energy Efficiency Portfolio Standard program, provides the underlying technology and manages one of the nation's largest Demand Response programs and is the largest provider of hosted

power operations to the wind power industry. APX's sophisticated suite of software allows power developers, utilities, non-regulated generators and financial companies to navigate market entry, schedule and settle power transactions on their respective Independent System Operators (ISO). MissionPoint, APX and many others stand ready to execute on Congress' guidelines in implementing a cap-and-trade system.

We also launched last year a U.S. carbon originator called Greenhouse Gas Services, LLC ("GGS"), in partnership with General Electric and AES. GGS has core competencies in the development and operation of energy projects, in risk analysis and transaction structuring for energy projects, in marketing and in carbon markets. We made this early investment, because we recognized that the U.S. voluntary carbon market is at a critical stage of development marked by inconsistent standards and a paucity of credible suppliers. Yes we wanted to seize a profitable position, but also to demonstrate to policymakers and the market that the private sector can and will step in to produce rigorous carbon offset methodologies and high quality offsets, and thereby pave the way for a mandatory cap-and-trade system. We and the other GGS's partners stand ready to allocate to it hundreds of millions of dollars to develop voluntary, pre-compliance and ultimately compliance offset credits here in the U.S., which will reduce the aggregate cost of compliance to our economy.

Cap and Trade Design Points

Among the many key design points for a cap-and-trade bill, let me just note a few of our recommendations. These outcomes would best allow MissionPoint and others like us to invest in solutions that will in turn help Congress to achieve its policy goals.

- **A Stringent Emissions Target** capable of stabilizing atmospheric concentrations at 450 ppm of CO₂ equivalent – by getting down to at least 1990 emissions levels by 2020 and then reducing at least 4% per year to reach 80% below 1990 levels by 2050. We believe a prompt start is needed – no later than 2010.
- **An Upstream Point of Regulation** that would require submission of allowances by all producers and importers of fossil carbon-based fuel (coal, oil, natural gas), rather than downstream fuel users/emitters. Since the problem arises when fossil carbon is removed from the subsurface, it makes sense to regulate it there. This would reduce the risk of leakage to non-covered sectors or to smaller companies under the regulated size threshold, and maximize environmental integrity in attaining the cap. It would achieve administrative simplification by obligating approximately 2,000 fuel producer or importers to surrender allowances for compliance, rather than over 400,000 downstream large emitters.
- **No Safety Valve:** As noted earlier, we strongly oppose inclusion of a “safety valve” that fixes the maximum price of an allowance. This would limit the upside associated with carbon-mitigating investments and deter capital. Use other cost management options instead, as discussed earlier.

- **Broad But Rigorous Offsets Eligibility:** Offsets reduce costs and increase flexibility. We oppose geographic or quantitative limitations on offset credits so as to maximize the opportunity to reduce GHG emissions at the lowest cost, but support – and are already helping to establish – the most stringent criteria for offset quality.

Allocation / Auction Decision

The Committee particularly requested MissionPoint’s view on the allocation/auction decision and use of the auction proceeds.

Having just explained our preference for a cap-and-trade over a carbon tax, the auction/allocation choice is the one design point in the cap-and-trade system that we believe should be resolved in a way that makes it similar to a carbon tax. That is, we believe that most of the allowances – 75% or more – should be auctioned rather than allocated, so that revenues will be received by the government, as they would be with a carbon tax, and made available for worthwhile policy purposes we’ll discuss below.

Some argue that a key advantage of a carbon tax is that it will bring revenue to the government that it can use to offset distortionary taxes. In fact, a cap-and-trade system can offer the exact same virtue if allowances are auctioned. In addition, a cap-and-trade system is likely to generate substantially more revenue than a carbon tax given that the allowance price will probably go higher than a politically feasible tax.

We share the concern of others that generating an additional revenue stream to the government will bring temptations to divert it to other purposes – including wasteful ones. But we believe this risk can be managed, for example by assigning revenues to a special account (akin to a Trust Fund) dedicated to transitional economic assistance and to furthering the core policy objective of carbon mitigation. This will take this critical financing flow off-budget and free it from fluctuations in the annual appropriations process.

In theory, such public policy objectives could be furthered through allocation as well – either in the form of allowances the recipients could then sell, or by permitting the recipients of the allowances to request the equivalent cash option instead of allowances. A key question then becomes whether such objectives can be more efficiently attained by having the government receive the revenues and administer policy instruments. MissionPoint believe this to be the case. As our discussion of investor-friendly policy instruments below will show, we believe that the tool-set available to the Federal Government is broad and tune-able, and worth funding with sizable auction receipts.

Before discussing those instruments, we will comment briefly on the issue of the allocation/auction percentages. Precedents in U.S. Acid Rain trading program and in the European Union’s ETS have distributed allowances at no cost to directly regulated entities. This has created expectations among many that such “grandfathering” should also be undertaken in the coming U.S. system. In fact, we at MissionPoint initially regarded this

question very pragmatically – believing that this ability to distribute allowances freely to emitters gave the government the needed currency for the side-payments and horse-trading that would be required to bring industry and others along and enable a bill to pass and be enacted

Upon further study, our perspective on this has changed, and we now favor auctioning most of the allowances – 75% or more – for many reasons, including:

- The magnitude of asset value that will be created in a carbon allowance program is so much larger than in the acid rain program that it must be treated differently and with recognition of a wider range of legitimate claims on that value.
- One of the lessons of the ETS problematic first phase was that free allocation led, in effect, to overallocation (due to measurement issues and gaming), and as a result the January 2008 European Union’s European Trading Scheme Review has proposed 100% auctioning for the power and refinery sectors starting in 2013 (the first year of its Phase 3) and then full auctioning for all sectors by 2020.
- Our review of the economists’ work suggests that only a modest share of the allowances would need to be given away free to large emitters to make them whole. The Congressional Budget Office estimated that only 15% or less of the value of the allowances would be needed to offset the net financial losses that shareholders in companies affected by these policies would otherwise face. Work by Bovenberg and Goulder (2000) estimated that fully compensating the coal, oil and natural gas industries, in particular, for lost revenues and reduced asset valuations would require less than 20% of the auction or tax revenues. This stems from the ability of regulated or other exposed industries to pass the carbon cost thru to their customers and other factors.
- Six of the 10 pioneering states in the Regional Greenhouse Gas Emissions Initiative have studied this intensively and intend to auction 100% of their budgeted allowances, with potentially more yet to also take this approach.
- A looming issue is whether the proposed border adjustment mechanism intended to shield domestic industries from competition from imports from uncapped economies will be compliant with World Trade Organization rules. James Barrett of Redefining Progress, among others, has argued that if permits are freely allocated rather than auctioned, such border adjustments would probably not be WTO-compliant, whereas a carbon tax or a cap-and-trade system with auctioning would at least be able to make the case that the border adjustment is leveling the playing field rather than doubly advantaging entities with a windfall and a tariff-like barrier.
- Many of the headaches in a predominantly allocation-based system go away with auctioning. For example, there is no need to deal with whether or not to take away grandfathered emissions from entities when they retire a facility, or to set aside a

new entrant reserve for emerging competitors. Everyone simply buys allowances at auction.

Once we agree to auction a dominant share of the allowances, the next question becomes what to do with the resulting revenue. First, we would expect that 25% or so of allowances that would not be auctioned from the start would be provided to energy and energy-intensive manufacturing companies (and therefore their shareholders) to cushion their relative exposure to carbon pricing for a transitional period, for example to defray the reduced profits of carbon-intensive generating assets or of stranding them altogether. Then, MissionPoint would encourage Congress to apportion the revenues from the 75% allowance auction across several objectives:

- Promote economic efficiency by selectively reducing distortionary taxes (15-25%);
- Ameliorate equity/regressivity problems due to carbon pricing through a climate change tax credit for low and middle income consumers (50-60%); and
- Promote low-carbon technologies and services through a package of supplementary instruments (25%)

We recognize that some of the revenue can and should be spent on the first two objectives. We would encourage, however, that the carbon mitigation objective be factored into the way this is done. So, for example, economic efficiency argues for using some of the revenue to reduce distortionary taxes on labor (payroll tax) and investment (capital gains). Rather than instituting an across-the-board reduction in the capital gains tax, we would encourage Congress to adopt a preferentially low capital gains rate for investments in carbon-mitigating technologies and services. Similarly, some of the revenues should be used to assist lower and middle income households in adjusting to increased energy costs from carbon pricing, probably through a tax credit. But again, rather than simply providing funding for any purpose the recipient chooses, Congress should structure the tax credit instrument so that at least some of it is available only if used for carbon-mitigating efficiency investments. This will reduce the recipient's exposure to the carbon price over time (thereby making it transitional rather than a permanent entitlement) and, in aggregate, should reduce the cost of carbon compliance to the economy as a whole. We will return to this theme below in the discussion of specific proposed policy instruments.

Finally, and most pertinently for today's hearing, we at MissionPoint believe that a substantial portion (25%) of the auction proceeds ought to be apportioned directly to fund supplementary instruments that accelerate low-carbon technologies and services. We refer to these as "supplementary" rather than "complementary" in order to emphasize that the core policy foundation for mitigating carbon dioxide emissions should be a cap-and-trade system and other instruments targeting the same objective should be supplementary to it.

If the total allowance value ranges from \$50-250 billion per year, and we take a mid-point of \$150 billion per year, then 25% of the 75% of total allowances that are auctioned would amount to approximately \$30 billion per year that would be available to fund the supplementary instruments. We believe that well-crafted supplementary instruments can catalyze and incentivize multiples of that sum in terms of private capital, thereby creating a

robust war-chest to tackle the problem of climate change while improving U.S. productivity, competitiveness and job creation.

Justification for Supplementary Instruments

How can we justify expenditures on supplementary instruments, especially when some might regard them as redundant once a cap-and-trade system is put in place to already favor low-carbon solutions? The threshold question is: will a cap-and-trade system, on its own, generate the optimal level of investment needed to attain the targets specified? Our answer is: probably not and therefore we will need a package of supplementary instruments, for the following reasons.

1. **Market Failures:** We in the private sector tend to under-invest in first-of-a-kind technologies since the rewards are rarely commensurate to the risk. Others can free-ride on the creation of knowledge in the first project. So often it is not rational for a market participant to underwrite this unless the public sector offers a subsidy that effectively shares and buys down the risk.

Furthermore, many barriers to diffusion of new technology are not sensitive to price signals due to other distortions in the market's imperfect transmission system. At MissionPoint, we undertake intensive research in market to diagnose the barriers to adoption of the low-carbon alternative before investing, and we run into these barriers all the time. They include:

- Information barriers (solution: standards, codes, information clearinghouses);
 - Agency problems (solution: subsidized financing, disclosure requirements)
 - Chicken-and-egg (or “network”) problems in large integrated systems like that required for a carbon capture & storage pipeline network (solution: government investment, subsidization or financing tools)
 - Asymmetric information between project developers and lenders (solution: loan guarantees for first-of-a-kind projects); and
 - Incomplete insurance markets for liability (solution: government insurance guarantees or liability caps).
2. **Early Catalyst To Accelerate Economies of Scale:** Supplementary instruments can reduce the aggregate compliance costs of the cap-and-trade system by activating earlier investments in solutions than a cap-and-trade, alone, would generate. The classic example would be early investment in technologies that offer economies of scale and scope. Solar is referenced most frequently as an example here, and indeed many targeted policies worldwide have accelerated its progress down impressively declining cost curves. A related but distinct case occurs when some technologies are higher cost on a per-ton basis initially and perhaps even for a sustained period, but offer greater

execution leverage by being able to produce high-volume reductions from fewer facilities, with fewer decision-makers. For example, a typical carbon capture & storage project (CCS) offers the potential to reduce 5-6 million tons from one power plant, whereas a single methane landfill project might offer 50,000 to 100,000 tons of carbon dioxide equivalent, or less. CCS will experience economies-of-scale too, but with the important additional virtue of reducing emissions in higher volume steps with reduced friction.

3. **Global Competitiveness Issue Puts Extra Premium on Early Stimulus:** So far the competitiveness discussion in the Congress has focused on the risks of the U.S. unilaterally controlling carbon domestically before key developing country trading partners like China cap their own emissions. But in guarding against that risk, we must not overlook the opposite risk, which is moving too late to build a globally competitive clean energy industry in the U.S. and thereby ceding a valuable export leadership position in a technology set that will be strategic for decades to come. If we rely on a cap-and-trade system, alone, to stimulate acceleration of our native technology and export potential, we may forego the benefits of an even faster stimulus due to supplementary instruments. These are extraordinarily fast developing markets and time is of the essence.

4. **Long-Shot Technologies:** As noted earlier, the science unequivocally indicates that we are very late in addressing climate change. Therefore we need Congress to substantially intensify funding for R&D incentives broadly, including lower probability but high-impact breakthrough technologies that the private sector would not invest in without subsidization. We say this not because we can depend on such hail-mary breakthroughs (we cannot, and should avoid hype and false promises that can drain support from more mainstream solutions) but because we may need them and we should invest now in increasing their chances of success. Remember that all stabilization targets focused on 2050 assume that emissions thereafter plunge toward net zero. That will only happen if we make public and private R&D investments now in zero-carbon technologies that will be ready for deployment as early as 2040. MissionPoint believes climate mitigation may be recognized as a national and international emergency within 10 years – inspiring commitment to a massive upscaling of public RD&D spending in the U.S. and around the world. But we should not wait for that catalytic moment. RD&D is inescapably an extended process and, in our view, leadership means not waiting for the emergency.

In the end, the number and type of supplementary instruments we need will vary depending upon key choices the Congress makes about the design of the cap-and-trade. For example, how stringent will the targets be? Will the cost containment measures amount to off-ramps? What proportion of the compliance burden will be addressable through offsets? If the Congressional process makes choices on these points that drive carbon prices too low, supplementary instruments will be even more important in spurring strategic technological progress in transportation, carbon capture and other areas. If on the other hand, Congress rises to the scientific imperative and passes a stringent bill without

excessive flexibility and off-ramps, then a proportionately more limited set of supplementary policies will be needed.

Furthermore, we must not fall into the trap of becoming so preoccupied with the design of supplementary instruments that we defer the cap-and-trade itself. Today, for example, standalone bills to stimulate carbon capture & storage are in play and there is debate about whether passing them would be a legitimate basis to defer the full cap-and-trade bill itself. One variation of the argument goes like this: we must not institute a cap-and-trade until we have proven technology to meet the targets proposed in the cap-and-trade, or until we have let a particular supplementary instrument run its course so we can assess if it, alone, can succeed in driving adequate emissions reductions.

This approach has characterized government policy for the past eight years and is often described as a “technology-push” model (i.e., policy incentives encourage investment in creation of new technologies and thereby push them into the market). This is contrasted to “technology pull” models, where demand is created to pull low-carbon solutions into the market, for example by relative input re-pricing through a cap-and-trade system. The technology push approach, alone, is like one-handed clapping, as Princeton engineer and carbon specialist Rob Socolow once put it. We need both supply and demand to generate economic activity. And practically speaking, we will not invest into supplying the most significant low-carbon technologies without visibility into a near-term future where they are pulled through by credible policies creating sustainable demand.

General Criteria for Supplementary Instruments

Assuming these justifications for supplementary instruments carry the day, what criteria should Congress use in selecting and designing them? Our view is that the criteria should reflect the needs of capital providers, not because this should amount to an enrichment scheme of course, but because that’s the only way capital will be formed and deployed to adequately address climate change.

The sobering realities of the U.S. budget deficit and debt mean that public resources must be used with maximum efficiency and must leverage the larger pools of private investment capital. We have a chronic problem in U.S. policy-making in that those who write the laws frequently lack private sector experience, especially finance experience. We cannot let this knowledge gap lead to ineffective design of supplementary instruments. Our margin for error has been extinguished by our tardiness. New policies must be calibrated to market realities and financial dynamics.

Below are the key criteria we urge the Congress to apply and a discussion of each:

- Rigorously Carbon Weighted
- Long Duration
- Diversity of Instruments Along Technology Life-Cycle
- Performance-Oriented and Dynamically Updating:
- Targeted on Technologies with Most Attainable Performance Gains

- National, Strategic and Synergistic

1. **Rigorously Carbon-Weighted:** Like many, we believe the government should not pick technology winners – at least not at a specific level. Such choices are better left to the private sector. But we should acknowledge that the very notion of supplementary instruments implies more categorical specificity than the economy-wide cap-and-trade, the latter being a system whose very strength lies in its ability to level the playing field and create full cross-sectoral and cross-technology fungibility so that the cheapest emissions reductions will be prioritized and harvested. Supplementary policy instruments, by contrast, often entail picking certain categories like carbon capture & storage or vehicle fuels and targeting incentives to them. Our point is that this level of selection with regard to technology category should be allowed, but that within such categories, the instruments should be neutral as to specific companies and technologies. The selection of a technology category should be based on strategic importance for carbon mitigation and then incentives should be structured so that intra-category winners prevail based on carbon weighting.

Let's take the example of vehicle fuels. EPA is finalizing its contentious rule implementing the 2007 Energy Law requirement that new renewable fuel production facilities meet a standard of 20% better than petroleum-based fuel in terms of lifecycle emissions. EPA has hinted that it is likely to factor in global effects, not just domestic effects. This is a crucial distinction because evidence has mounted that land is being deforested abroad to produce crops that would not otherwise not be demanded were it not for the diversion of so much of the corn crop in the U.S. to ethanol production. This deforestation causes substantial carbon dioxide emissions and, if included in the lifecycle analysis, could make ethanol ineligible under the 20% standard.

Given this, if we were to apply carbon-weighting to vehicle fuels and not specify a technology, even at the level of saying the fuels must be liquid fuels, then a superior out-of-the-box option like “fuel electricity” could emerge. The use of electricity in electric and plug-in hybrid vehicles has the potential to be a lower emitting means of propulsion for our vehicles, even if the generating source is a coal plant. This is due to the huge efficiency gain entailed in moving from a ~15% efficient internal combustion engine to a ~90% efficient electric drive train. The policy lesson here is that the government should not pick winners, but rather should allow all options to compete fairly in a functional category, broadly defined. Fuel electricity should compete on a level playing field with all liquid fuels, including ethanol, and in fact we would encourage Congress to make it eligible on a Btu-equivalent basis for the Renewable Fuel Standard.

Carbon weighting implies all the sticky challenges associated with life-cycle analysis, but there is no way around this vital tool. We encourage Congress to build the capacity to conduct such analysis and associated carbon accounting for all

proposed bills, just as it does standard budget scoring. This could be accomplished through an in-house capacity, at the Congressional Budget Office for example, or through reliance on another governmental or non-governmental body. With this capability, Congress could, for example, make carbon accounting a key criterion for scoring provisions in the reauthorization of the U.S. Transportation law slated for next year. And I would add that support for carbon-weighting appears to be bipartisan. President Bush endorsed it prominently in his April 2008 Rose Garden speech on climate change, when he called for climate-related technology grants and programs to be carbon-weighted.

- 2. Long Duration:** At a time where budget constraints will almost always favor shorter duration, investors strongly prefer longer duration in policy instruments. Congress must understand that while energy technology is dynamic and changing rapidly, it remains an arena of long-term infrastructure investment. Despite casual comparisons, the current energy boom is not like the dot-com era, and is not conducive to overnight riches. In energy as opposed to IT, there are bigger sums of money at risk, for longer periods of time. Energy investing requires long development timelines, must often wait on conservative utility decision-makers to act, and confronts the inertia of slow turnover in incumbent capital stock.

Let's consider the investment and production tax credits slated to expire at the end of this year. When renewed, they should be long-dated if they are to mobilize capital. This will permit rational planning periods for large new projects, and also spur industry to investment in the required supply chain. When runways are short, we see lost efficiency and higher costs in the development cycle. When the timeframe is artificially compressed, we see more developers competing for the same resources (drill rigs, steel, cranes, gear manufacturers, construction workers), which drives costs up. Long-dated supplementary instruments will relieve these pinch points in the supply chains, rather than exacerbating them, and we'll see a lower aggregate cost to society to comply with the cap-and-trade system.

Long-dated does not equate to eternal. Renewable energy subsidies can, over time, achieve cost reduction through scaling, with many key technologies maturing to the point that subsidization becomes unnecessary. As positive feedback loops kick in – drawing more talented management, innovation, capital, solutions and lower costs – incentives can eventually be phased out. However, this must be done carefully. Making such incentives investor-friendly will mean letting all investments that have fairly applied and are in the queue obtain their subsidy even if the first one thru has crossed some sun-setting trigger like cost parity on an unsubsidized basis.

- 3. Diversity of Instruments Along Technology Life-Cycle:** We need a diversity of policy instruments addressing each stage of the technology lifecycle: from pre-commercial phases including basic research, applied research, development and demonstration to the crucial final phase: commercialization and deployment. DOE tends to be in the early R&D business (e.g., Small Business Innovation Research grants), whereas MissionPoint seeks more public support for its focus at the

commercialization end of the spectrum. We need to restore a balance between early-stage and deployment-stage incentives to help ensure that the technologies developed in the national laboratories or nurtured in the private sector by federal R&D funding, actually get to the marketplace.

It is critical not just to design the instruments, but to fund them. There are many deployment-oriented programs that Congress authorized in EPACT 2005, but were not funded or were funded insufficiently. These cut across many areas, including public buildings, private building energy codes, appliance efficiency, state energy programs, low income efficiency programs, public information and education and pilot projects. The opportunity to dedicate a recurring revenue stream from carbon auctions to such programs, thereby avoiding the need for uncertain appropriations, would help to overcome this neglected follow-through. States have traditionally done a better job of targeting dollars at commercialization and scale-up activities (e.g., state cost-sharing for manufacturing facilities), and we would encourage the Federal government to emulate their example.

4. Performance-Oriented and Dynamically Updating: As implied by the carbon-weighting criterion, we would encourage Congress to make its policy instruments output or performance-oriented, rather than input-oriented wherever possible. Take the example of distributing carbon allowances to states foreseen in the leading Senate carbon bill – or the functionally equivalent option of auctioning the allowances and granting the cash equivalent. Some states have argued that if the federal cap-and-trade system is to preempt multi-state programs like the Regional Greenhouse Gas Initiative, then allowances should be allocated to the states to make them “whole” for revenue they will forego by not being able to conduct their planned state auctions. Such “make-whole” revenue could be granted in support of efficiency programs to preserve the policy objective. But then, what should be the basis of the Federal allocation to the states? Matching state expenditures on efficiency programs? State performance in fulfilling efficiency objectives, such as reduced energy consumption per capita or reduced Vehicle Miles Traveled (VMT)? Our view is that this sort of supplementary policy instrument should be based on the latter, on a measurable performance output. A corollary of being performance-oriented is dynamic updating. So the distributions to states would not be a scheduled entitlement specified in advance, but would be updated at discrete intervals based on measured state performance.

5. Targeted on Technologies with Most Attainable Performance Gains: Supplementary instruments should be targeted to technologies that, according to independent expert validation, offer the greatest comparative potential for improvement to come, in terms of performance, cost, etc. Estimating such potentials can be controversial, given the possibility for non-linear research breakthroughs. But they are not entirely mysterious either, and experts working from the first-principles of physics can often forecast the remaining gains to be squeezed out via investment in a specific research pathway. There are recurring

patterns of technology development, where periods of rapidly improving performance improvement then plateau toward an asymptotic limit.

A good example of this is wind vs. solar. Most energy technologists will tell you that while wind technology is cheaper than solar today on a cents per kilowatt hour basis, solar has more room for improvement to come, and is likely to far surpass wind eventually in terms of its costs, flexibility and ubiquity. Where such consensus exists, prudent public policy should preferentially accelerate those technologies. As the cost of producing solar energy continues its steady downward march towards “grid parity” (generally viewed as 10 cents per kilowatt-hour, or “kWh”), the demand for solar energy will grow very quickly to a staggering level. DOE Solar America Initiative estimates that solar energy will achieve price parity at panel costs of \$1.25 per watt – and that the industry will get there by 2015.

6. National, Strategic and Synergistic: It is not enough to fashion supplementary instruments that are individually effective. We need to compose an integrated package that reflects mutual dependencies and synergies between these instruments, so that the whole will amount to more than a sum of the parts. This means that we need to assert a national level of coordination, if not jurisdiction, in place of a state patchwork of state-by-state decision-making on certain key energy issues.

- Transportation policy is a good example. We’ve never had a truly national transportation policy for building up our intermodal infrastructure across state jurisdictions. Instead, we have widespread earmarking and formula-based apportionments of federal highway funds and other resources. This has limited our ability to implement vital strategic changes, such as financing the infrastructure to move freight from the roads to rail, where energy usage is much lower.
- The power grid is another example. Today we have a balkanized grid with 200,000 miles of power lines divided among 500 owners. Public utility commissions operate at the state level and the rules they use to evaluate transmission upgrades and investments usually discourage major grid projects that cross state lines. In states with low electric rates, utility regulators are focused on keeping those rates low and resist efforts to build new lines that may export their power. We need to spend ~ \$60 billion to build a high voltage backbone that will reduce congestion as generation increases and remote wind and solar sources interconnect. Congress and FERC have implemented reforms such as the July 2008 rule on transmission pricing reform, to try to attract more private finance to this urgent national priority. But we would encourage Congress to put more public funding behind this and to follow through, despite influential objections, to building the two designated national transmission corridors resulting from the 2007 Energy Law. Congress needs to understand the complex linkages here. We don’t just need more transmission, we need

modernized transmission if, for example, wind is to be cost effective at more than a minimal (e.g., 5%) system penetration. As an intermittent source, wind energy can strain our grid, particularly as we drive penetration rates higher – even toward the 20% target spelled out in a DOE study this year. Issues of harmonic distortion, reactive power compensation, voltage regulation and frequency control, minimization of costly spinning reserves (i.e., backup natural gas generators that kick in when the wind's not blowing) must be addressed through improvement in the grid and associated components.

- We also need policies that better reflect the synergies between energy efficiency and renewable energy. California's solar initiative is pioneering in this regard, requiring that if you want to tap the solar incentive for your household, you must first do an efficiency audit. This makes sense under a carbon-weighting hierarchy: efficiency investments are routinely the cheapest way to avoid carbon emissions on a cost per ton basis. So opportunities for efficiency gains should be at least identified and ideally harnessed before higher cost solar options are subsidized.
- Moreover, the federal government to act in a more coordinated and supportive fashion when it interfaces with the clean energy industry as its business leaders choose where to locate globally. Germany provides an example here. When a clean energy firm seeks to do business in Germany, and the government validates that it fits their development needs, the national as well as state governments tend to do a lot more hand-holding than we do in the U.S. because they've made a strategic commitment to this industry. They map out federal, state and regional incentives to subsidize the building of manufacturing facilities and personnel training costs. They often assist the company with utility costs. They work with the company on quality-of-life issues to support recruitment. We have learned this first-hand as MissionPoint's portfolio company Advanced Aerofoil Technologies builds a gas turbine component manufacturing facility today in Germany. States in the U.S. do provide more hand-holding than the Federal government, and the competitive dynamic between them can drive incentive packages to an attractive level. But it is time for the U.S. to make a national commitment.

Specific Supplementary Policy Instruments

The above are a set of criteria to be guided by, not a strict checklist. Given these, what kinds of specific supplementary policy instruments would we like to see Congress advance? Before offering examples, I would note that the Ways & Means Committee is well positioned to lead on many of these instruments. By modifying existing tax policies, or fashioning entirely new ones, the Committee can fine-tune our tax code to selectively reduce the carbon intensity of our economy, particularly if offsetting revenue can be

generated by auctioning the carbon allowances. Below are our recommendation for specific supplementary instruments, followed by a discussion of each:

1. Extend, and Improve on, Renewable Tax Incentives
2. Introduce Low-Carbon R&D Grants and Tax Credits
3. Accelerate Smart Meters to Enable Efficiency
4. Accelerate Government Usage of Energy Service Performance Contracts
5. Professionalize and Expand Loan Guarantee Program
6. Enhance Accelerated Depreciation Rules
7. Nationalize Time-Dependent Valuation in Building Codes
8. Tradeable Low-Carbon Obligation to Accelerate Carbon Capture & Storage on Coal Plants
9. Preferential Corporate Tax and Capital Gains Taxes for Low-Carbon Solutions
10. Reduce Vehicle Miles Traveled Through Highway-to-Rail Shift and Carbon-Efficient Mortgage Deductions
11. Expand (and Internationalize) Forest Conservation Bonds
12. Climate Change Tax Credit – add Bonus for Efficiency Investments
13. Promote/Fund Carbon-Efficient Utility Rate Designs

1. Extend -- and Improve on -- Renewable Tax Incentives: First, and at long last, we urge Congress to extend the Investment Tax Credit and Production Tax Credit before they expire at the end of this year – and to do so with longer (10+ year) durations than spelled out in pending bills. We are part of a vibrant growth industry that is counting on these credits, and primed for acceleration and greater capital inflows if the extension terms are improved enough to constitute an upside surprise. As deployment incentives, these tax credits operate at a crucial phase of the technology lifecycle for carbon mitigation – getting these solutions out into the field where they can start reducing emissions right away. Without getting into the Congressional debate over whether and how pay-go applies to these particular extensions, common sense suggests that the availability of carbon auction revenues should ease the funding issue in the outyears and enable Congress to act more boldly.

I would note that the math on tax credit extensions is not additive. In other words, 4 extensions of 2-years does not equal one 8-year extension. The uncertainty associated with each extension creates little boom-bust cycles and increases the cost of capital. We need lead time, not only for each project (where development cycles for large installations are 3-6 years) but for the builders of supply chains to have enough visibility into sustained demand to justify investing in domestic manufacturing facilities.

We encourage Congress not only to lengthen the extensions, but to look for ways to make our nation's renewable promotion program even more stimulative. After first extending existing credits, Congress could consider offering an even more investor-friendly alternative such as a Feed-In-Tariff (FiT), whereby a fixed subsidy is paid to

the generator “feeding” renewable energy into the grid. Those operating under the extended PTC or ITC regimes would have the option to either continue the same terms or to upgrade to the FiT. In this way, the compact with investors to provide stability would not be violated, but neither would a potential improvement be crowded out. The FiT policy has led Denmark, Germany and Spain to the largest renewable penetration percentages in the world. The Swiss introduced a new FiT this summer and to avoid disrupting the industry, they grandfathered in PV installations installed between the inception of their deliberations in 2006 and the 2008 implementation date. The FiT mechanism has largely been ignored in the U.S., although variations of it are being experimented with in California (the tiered Performance Based Incentive for solar power), and have been recently been introduced as proposed legislation in Michigan, Rhode Island, Minnesota, and Illinois. Advantages of a FiT include avoidance of the need for a tax appetite to claim the subsidy, a clear performance orientation (relative to the ITC), timely payments rather than tax cycle delays and long durations (European policies tend to lock in the tariff for 20-25 years, depending on the type/size of renewable installation).

As Congress considers re-introducing the national Renewable Portfolio Standard (RPS) this fall or in 2009, we would encourage that it be given strong consideration, provided it is designed to stimulate a range of technologies and backed by credible enforcement. But we would also encourage Congress to debate a Feed-in-Tariff as a more investor-friendly model. The RPS or any quota system offers less confidence to the investor that demand will be sustained once the quota is fulfilled. The FiT also lends itself to greater fine-tuning since rates can be differentiated between different types and sizes of renewable energy, as well as phased down over time as certain MW or unit cost milestones are reached. In the absence of sub-quotas (i.e., a minimum of the total that must be solar), an RPS will only stimulate the lowest cost renewable source (generally wind, rather than solar, power today), whereas a FiT can easily be calibrated to support multiple generation incentives.

Let me provide a couple of examples from our experience in the field. MissionPoint has two thriving portfolio companies whose growth momentum will be adversely affected by a failure to extend the renewable tax incentives. One, called UpWind Solutions, benefits from and complements the Production Tax Credit by supporting the growth of its primary industry beneficiary – wind energy. Unbeknownst to many of its enthusiasts, wind energy has faced significant performance problems. As we analyzed the bottlenecks to the diffusion of this particular low-carbon technology, we saw that gearboxes were failing prematurely and turbine manufacturers were offering shorter warranties and moving away from post-warranty O&M services. Some of this is explained by the lack of operating history on the installed base of turbines, which increased the risks of mechanical failures and shortfalls in electricity output. This created demand for third-party O&M and optimization providers, so we created UpWind. UpWind provides services to keep wind turbine installations well maintained and optimized for maximum electricity production. Upwind’s customers need the PTC extension if they’re going to keep growing – and, in turn, hiring Upwind in states like TX, CA, Iowa, and Montana. UpWind highlights how emerging renewable industry

growth will spawn additional supporting service industries, including labor intensive industries such as O&M

Another of our portfolio companies, called SunEdison, is a high-growth business solar developer of rooftop and utility-grade installations. The company leverages Investment Tax Credits and other policies to solve a longstanding problem: how to mitigate the high up-front capital costs and transaction headaches associated with buying solar electricity. SunEdison's business model provides solar power to large national accounts like Wal-Mart and Kohl facilities throughout the country. What SunEdison saw was that there are plenty of other commercial and municipal customers out there interested in buying solar power, but who don't because they don't want to have to shop around for systems, contract their own installation and, essentially, pay for 20 years of electricity costs today. SunEdison steps in to develop the project, manages the process, install the solar system on the customer's roof and sells them the power from it for less than what the customer would be paying for utility power, without their having to deal with the hassles of owning and maintaining the system or financing the cost. SunEdison uses all available incentive programs and structuring creativity to close the gap on solar and scale it up much more rapidly, including not just the ITC, but also Solar Renewable Energy Certificates (from state Renewable Portfolio Standard programs) and accelerated depreciation tax treatment. In about five years, the economies-of-scale SunEdison is already achieving should bring solar to parity with fossil fuel electricity without subsidies in areas with good sun and high electricity prices, e.g., Arizona, California, Hawaii, Nevada, New Mexico, and others.

- 2. Introduce Low-Carbon R&D Grants and Tax Credits** – We encourage Congress to use new auction revenues to substantially increase direct and indirect energy R&D and thereby provide a stream that is partly insulated from the annual appropriations processes. By direct, we mean direct Federal spending on energy R&D through contracts and grants which is ~\$4.7 billion total in 2008 (according to the methodology used by Harvard's Energy Technology Innovation Policy Group). This is about 42% lower than its peak level in 1978 on a constant dollar basis. By indirect, we mean government tax credits intended to stimulate private sector R&D funding. While controversial and probably subject to underestimation errors, some analysts tracking private sector energy funding say it has fallen even faster than public sector funding, from about 50% share of the total energy R&D in the 1980's - 1990's to 24% in 2005 (Gregory F. Nemeta and Daniel M. Kammen, 2006). Some states, like California, Iowa, Wisconsin, and New York, have partly compensated for this decrease by increasing their R&D spending. But what we really need now is a federally coordinated and massively scaled up R&D strategy, at least at the doubling level recommended by the National Commission on Energy Policy in its 2004 report and probably more. The IEA scenario exercise discussed earlier in this testimony calls for \$10 to \$100 billion in annual expenditures from 2010 – 2050 to achieve the halving of 2005 emissions by 2050. Assuming the U.S. were to share the global burden for research in proportion to its share of global greenhouse gas emissions (approximately 25%), and that the high end of the IEA range were deemed appropriate, we would be looking for a five-fold increase from just under \$5 billion in U.S. energy R&D to \$25 billion per year.

But this actually understates the challenge, because the 2008 figure of \$4.7 billion in energy R&D includes energy research that has nothing to do with mitigating greenhouse gases. We encourage Congress to bring a new selectivity to its R&D spending by allocating substantially more of the total to low-carbon technologies in its direct investment program, and by offering the private sector higher R&D tax credits for low-carbon investments. R&D tax incentives targeted to this or any other policy objective would be subject to difficult questions when defining eligibility criteria. What counts as low-carbon? How will the key policy-makers and IRS rule-makers decide? These are not easy questions but, as noted earlier, the carbon management imperative requires us to do the heavy lifting to work through this despite the complexity, and if we can furnish the government with a carbon life-cycle analysis capability, as we have advocated, it can be used for this purpose.

At MissionPoint, we favor a disproportionate policy emphasis on tax credits over direct contracts and grants, because they leave specific R&D investment and allocation decisions to the private sector, avoid administrative burdens and slowdowns (witness DOE's notoriously slow-starting loan guarantee program) and can avoid the uncertainty of annual appropriations if the available option to make them permanent is exercised. The IRS Section 41 Research & Experimentation (R&E) tax credit, which lapsed at the end of last year, should be extended. It had provided a 20% tax credit for qualified research expenses above a historical baseline. Its \$5B average value has tended to go to the computer, software, chemicals/pharmaceutical and transportation sectors, and not the relatively un-innovative energy sector.

To overcome this relative neglect, we believe a special incentive rate of 33% should be created specifically to spur low-carbon R&D, when the tax credit is extended. We would also make it refundable so that smaller, growth companies with less taxable income are able to use it, and we would consider establishing a higher percentage credit for smaller and mid-market companies, as measured by revenue, so that the tax credit value will be less dominated by large companies. This is not just a matter of equity, but of spurring the dynamism we've seen as investors backing growth-stage entrepreneurs.

We also believe the new authorized, but not funded, agency ARPA-E, holds great promise given that it is modeled on the highly successful DARPA and is to be focused on transformational, high-risk energy research that the private sector might not fund alone. After being authorized last year, it failed to receive a funding appropriation so remains a concept only. MissionPoint believes some of the auction revenue should be allocated to this agency, which was originally authorized at \$300 million per year at the outset, scaling up to \$1 billion per year over the next half decade. It should be staffed with its own in-house carbon analytical capability and charged with a mandate to distribute the auction-sourced funds on a carbon-weighted basis.

In addition to ARPA-E's anticipated vanguard work, some of the auction revenue should be allocated to major low-carbon breakthrough research paths via traditional

programmatic funding channels, especially – in our view – to nuclear fusion. Congress instituted a 1/3rd cut of the President’s fusion research request, to \$286.5 million in FY 2008 (though only an 8% cut from FY 2007), resulting in the U.S. scaling back its funding of Princeton’s Plasma Physics Laboratory and the 7-country, 30-year, \$9 billion plus ITER fusion reactor project based in France. The separate Innovative Confinement Concepts program, which distributes fusion research dollars to dozens of research institutions around the U.S., absorbed a cut in FY 2007 to an anemic \$19 million. This past May, twenty American Nobel prize-winning physicists sent a letter to President Bush, asking him to support supplemental funds for ITER and other physics work in 2008, pending a hoped-for increase in FY 2009. MissionPoint believes that a portion of the auction revenues should be considered for deployment on fusion and other basic R&D innovation pathways that could ultimately prove crucial in bringing a low-carbon economy to fruition if deployment of existing solutions and more evolutionary advancements prove inadequate to the massive decarbonization challenge ahead.

- 3. Accelerate Smart Meters to Enable Efficiency:** The Energy Policy Act of 2005 required state utility commissions to investigate and decide whether to require their utilities to install time-based meters enabling demand response and other energy management services. The Energy Independence and Security Act of 2007 then called on FERC to conduct a national assessment of demand response and produce an action plan within 18 months of enactment. These are encouraging developments, but we would encourage Congress to move more quickly, and to use all options within Federal authority to incentivize state Public Utility Commissions to fully account for the benefits associated with Advanced Metering Infrastructure (AMI) functionality and to expedite its roll-out. This incentive could include using a portion of the auction revenues to finance a tax credit for utilities promoting smart metering, as proposed just last week by Senators Charles Grassley and Max Baucus. Other alternatives would be direct payments to utilities or a federally funded incentive rate of return to utilities for undertaking these initiatives.

MissionPoint closed an investment this year in Trilliant, Inc., which provides the advanced communications systems that are essentially the “brains” of the smart meter. These devices enable two-way, time-stamped communications over the distribution portion of the power grid, and enable utilities to administer demand-side solutions providing customers with price signals that more accurately reflect the true economic costs of electricity. Utilities can read customer usage at different times of the day and provide them feedback on their usage patterns and costs through new in-home display devices, which will become even more useful as more utilities institute time-of-use pricing. They can empower customers to program their appliances and devices, including smart thermostats, water heater controls, pool pump controls, switches, and other energy demand limiting devices so as to better manage their energy bills and carbon footprints. They also allows utilities to work with customers to curtail power demand during peak demand times and reduce the need to invest in costly new generation capacity.

The small share of energy costs in the overall cost structure of most businesses and many consumer segments has traditionally made them relatively insensitive to energy-price signals. But with the kind of pricing transparency enabled by Trilliant, we expect to see reductions in average prices of electricity and increased deployment of efficiency. These smart meters and associated devices will therefore be an important supplement to carbon pricing, enabling consumers to see and respond to any new increment in their price. Smart grid technology offers many other co-benefits, such as continuous grid monitoring, so that outages can be detected and remedied more quickly, before they become full-scale blackouts.

We can report that Trilliant's value proposition is getting real traction. It has already delivered more than 750,000 intelligent devices with integrated communications supporting advanced metering, demand response and other Smart Grid applications. Its technology is being rolled out in a 1.3 million meter deployment for Hydro One on Ontario, Canada, one of the largest ongoing advanced metering deployments in North America. But we at MissionPoint are asking ourselves how this roll-out could be accelerated here in the U.S. to counteract the increasing costs of generation.

MissionPoint also believes that the smart meters will facilitate more rapid penetration of plug-in hybrid vehicles, a strategic technology for greenhouse gas mitigation. Earlier this year, Ford Motor executives and utility executives from Southern California Edison accelerated their efforts to prompt state utility regulators to establish a nationally uniform technology protocol on how to bill electricity consumers that use plug-in hybrids. Smart meters' time interval data and other functionality will help solve this. Success will allow plug-in hybrids to communicate with the electricity grid, to potentially store energy on a distributed basis, and should help motivate auto manufacturers to mass produce the vehicles.

- 4. Accelerate Government Usage of Energy Service Performance Contracts:** One of our portfolio companies – Hannon Armstrong, LLC – is the market leader in securitizing Energy Savings Performance Contracts (ESPCs) with the Federal government and is increasingly extending into commercial and industrial accounts. The ESPC contractual vehicle was statutorily created in 1978 and amended in EAct 1992, and has saved the federal government billions of dollars. They offer a way for the government to get the lifecycle savings from efficiency improvements, without appropriating the dollars for the upfront investment.

Despite this, over the past year, the Department of Defense (DOD) has used very little of the authority it has to tap into third-party financing and execute its widespread energy efficiency opportunities. MissionPoint believes that DOD, and other agencies, should be using this vehicle to at least attain the specified levels of required efficiency spelled out in EACT 2005 and strengthened in 2007 via Executive Order. It calls for agencies of the federal government to attain year-over-year energy intensity reductions to 3%, culminating in a total energy intensity reduction of 30% by 2015. We would urge Congress to seek to remedy the declining use of this vehicle by DOD, in particular, using any means within the Congress' formal or informal authority.

Moreover, Congress has not yet authorized DOD to use ESPCs for mobile platforms, as encouraged by the Defense Science Board Task Force on DOD Energy Strategy “More Fight – Less Fuel”. To take just one example, re-engining the B-52 fleet would yield net savings of \$11 billion. The major impediment to this expansion of ESPC authority today is a scoring conflict between the Congressional Budget Office (CBO) and the Office of Management and Budget, wherein CBO consistently and inexplicably fails to account for the energy savings side of the ledger in its cost estimates of enabling legislation.

While the most rational correction of this problem would be for CBO and OMB to re-score this potential expansion as being zero cost to the Treasury, if this is not possible, then Congress should consider using a portion of the auction revenues to offset the scored cost of the mobile ESPCs. In reality, this money would not be required, and Congress would be able to retain those revenues for other purposes. But the methodological hurdle would be overcome.

5. **Professionalize and Expand Loan Guarantee Program:** The loan guarantee program authorized by Congress in EPACT 2005 to back technologies that reduce or sequester greenhouse gas emissions has been very slow out of the gate. The final rule for the program was not issued until October 2007, when it invited 16 pre-applicants to submit applications. DOE is still reviewing those applications later submitted and announced in June three additional solicitations for a total of \$30.5 billion for renewable energy, energy efficiency, advanced Transmission & Distribution, and nuclear power (including front-end fuel cycle). Years have passed and DOE is only now beginning to actually issue loan guarantees. Senators Bingaman and Domenici have proposed a new low-carbon corporation to move loan guarantees out of the civil service and into quasi-public management by a more agile entity. We endorse this proposed change and believe that those loan guarantees support for nuclear power should be increased given the high cost of each plant and therefore the limited number of plants that will be backed under the current limits. MissionPoint continues to favor intensification of Federal and State support for nuclear as a large-magnitude, low-carbon generation option.
6. **Enhance Accelerated Depreciation Rules:** We see a straightforward justification for generous accelerated depreciation provisions for renewable energy. Traditional fossil fuel generators can deduct fuel cost in the year consumed from their taxable income. By contrast, renewable energy generators, which typically have the benefit of free fuel (the blowing wind or shining sun), must invest more in capex upfront, but then have no fuel cost to deduct. So renewable energy is systematically disadvantaged by having to deduct the all-in cost of energy over a longer period, increasing its effective cost. Accordingly, Congress has already set out a Modified Accelerated Cost-Recovery System (MACRS), establishing a set of class lives for different assets, including an accelerated 5-year depreciation for solar, wind and geothermal property placed in service after 1986 and seven years for certain biomass assets. Then this year’s federal Economic Stimulus Act, enacted in February 2008, included a 50% bonus depreciation

provision for eligible renewable-energy systems acquired and placed in service this year. We encourage Congress to consider extending this bonus depreciation provision beyond 2008, and to liberalize it so that any financier of the assets can claim the deduction (rather than only the original taxpayer using the asset).

We would also urge that MACRS eligibility be expanded to other low-carbon technologies such as smart meters and end-use efficiency devices. As more digital intelligence is applied to energy assets, the R&D, deployment and obsolescence cycle will speed up (e.g., the use of advanced semiconductors in power electronics and power management). It therefore makes sense for these assets to benefit from accelerated depreciation so that utilities can assess them as shorter-lived assets with accompanying tax benefits.

- 7. Nationalize Time Dependent Valuation in Building Codes:** California has been a leader in advancing efficiency through stringent building codes. In 2005, the California Energy Commission pioneered a new concept called Time Dependent Valuation (TDV) in its revision to the Title 24 Building Standards. TDV considers the varying cost of delivering electricity hour-by-hour and across 16 diverse climate zones in California. Historically, the standards viewed energy costs as flat over time and did not factor in these intersecting time and geographic variations. Now, for example, TDV software used by building designers awards compliance credits to different appliances and building systems based on whether they draw power during the peak time of day (i.e., a scorching mid-August day), when the cost of delivering electricity is highest, or off-peak (4 a.m. on a fall morning) – and all the hourly cost variations in between. TDV will help reduce the costs of generation and, in some cases, reduce emissions since peak demand is when the least efficient and most polluting plants come online. We encourage Congress to consider providing incentives out of the auction revenue to states as an incentive to incorporate TDV in their building code revisions – so that this can be nationalized as a best practice. In addition to potential emissions reductions, the cost reductions from peak shifting and shaving would help cushion the incremental carbon price – making it an important “supplementary” policy to the cap-and-trade system.

We would also encourage Congress to also consult with experts on whether additional fine-tuning could create a Carbon-Dependent Valuation (CDV) methodology that would add a carbon overlay to the time and geographic features of TDV. This would reflect the carbon content of a particular zone’s generation mix, as well as the varying carbon efficiency of different appliances and building practices.

- 8. Tradeable Low-Carbon Obligation to Accelerate Carbon Capture & Storage on Coal Plants:** For all its pervasiveness in our economy, greenhouse gas emissions are a surprisingly concentrated problem. According to a July 2008 report by The Boston Consulting Group (BCG), if the 1,000 largest fossil-fuel-burning power generators and industrial manufacturing facilities implemented Carbon Capture & Sequestration (CCS) by 2030, more than 1/3rd of the projected total global emissions could be reduced. The report noted that high cost and uncertainty have been major roadblocks to

commercializing and deploying the technology. BCG found that a stable carbon market price of €30 per ton could allow CCS to pay for itself, but that an additional subsidy of €100 billion during the ramp-up time would be needed.

Our own research at MissionPoint indicates that the required carbon price for CCS may need to be somewhat higher than the €30. In fact we don't know the true cost profile yet because many of the scale-up challenges have not yet been tackled in a commercial facility, creating a level of uncertainty that is unattractive to investors and commands a prohibitive risk premium. All these factors – immature technology, uncertainty, long-term payback, carbon price volatility – suggest the need for government intervention to risk-share and accelerate this technology.

CCS could be accelerated by providing bonus allowances for injected tons as part of the cap-and-trade regime – as envisioned in pending legislation. However, this would leave CCS implementation optional and its scale-up uncertain. A stricter and probably faster-starting approach to early acceleration of CCS would be to institute a policy conceived by Robert Williams of Princeton University and Dave Hawkins of the Natural Resources Defense Council called a “low-carbon generation obligation” applicable only to coal plants.

In this model, each retail power supplier would be required to provide a growing fraction of coal power generation with CCS (at 85-90% capture) in its electricity supply portfolio each year. The proportion would be set at a level large enough to cover the new coal generating capacity expected to be built during 2012-2020. Williams estimates this to start at 0.3% of coal power generation in 2012 to 2.2% by 2015 to 9.3% by 2020. Each obligated retail power supplier would self-generate low-carbon coal power, or purchase it from independent electricity suppliers, or purchase credits in a tradeable credit market. The credit value in ¢/kWh would equate to the cost increment for coal power with CCS, and selling these credits would make it profitable for some coal power generators to pursue CCS. The incremental CCS cost would increase costs at low-carbon coal power plants, but the purchase obligation required of all retail suppliers would spread these costs over all their ratepayers. Williams proposes that the incremental cost would be \$1.3 - \$2 billion per year depending on the rate of learning over time, and spread evenly over all U.S. rate-payers, showing a less than 1% increase in electricity prices over the period. This aggregate cost is consistent with Congressman Rick Boucher's legislation to provide \$1 billion per year to CCS, though he suggests a different mechanism. We would encourage Congress to consider increasing the percentage beyond that envisioned by Williams, and arranging for the incremental cost to be borne equally between rate-payers and the allowance auction revenue pool.

One might ask why we would advocate a separate trading regime for low-carbon coal power at the same time an economy-wide cap-and-trade would be put in place. The answer is that CCS is a strategic technology and investors have demonstrated significant technical and economic risk aversion to it so far. CCS would be optional in a cap-and-trade, so we believe a targeted incentive that would mandate its phase-in

would accelerate it significantly, and therefore warrants a separate trading regime among the retail suppliers. We would, however, be open to embedding this as a sub-regime of the cap-and-trade system with bonus ratios (as discussed). Then the double-dip problem would need to be managed. Either CCS would be excluded from cap-and-trade eligibility, or both policies would be allowed to pay out, in order to further incentivize investors to embrace this high-risk technology.

Another model would be to use a portion of auction revenues to fund a public reverse auction in which market participants would bid the minimum long-term government offtake price or subsidy needed to deliver a specified magnitude carbon dioxide reductions from a single facility. If the quantities of emissions reductions awarded were substantial enough (say four million tons per year), then the market clearing price would be set by technologies like CCS, rather than “cheaper tons”. This kind of subsidy would have the virtue of being sensitive to magnitude of emissions reduced and being guaranteed, rather than fluctuating with allowance or credit values. Therefore it would be more attractive to many investors. We would encourage pegging the subsidy to production in kWh, rather than upfront capital expenditure.

9. Preferential Corporate Tax and Capital Gains Taxes for Low-Carbon Solutions:

We recognize that there is a movement afoot to urge Congress to reduce the corporate tax rate across the board to increase our country’s attractiveness to mobile investment capital, while closing loopholes that have long created a lower effective rate for companies that can afford the best tax counsel. We believe that many of the arguments advanced for this change apply with special force to companies in the emerging clean energy industry. Therefore we would urge Congress to consider fashioning a special, lower corporate tax rate for companies that produce and sell carbon mitigation products or services. Having an internationally competitive tax regime is important for all industries, but especially for major new industries like clean energy that are deciding today where to take root across the world. Talent, innovation and capital are mobile and Congress should entice this industry to the U.S. Of 30 industrialized nations, the U.S. had the second highest corporate tax rate (after Japan) in 2006. If lowering corporate tax rates proves politically impossible, another option would be to provide tax holidays of specified duration to eligible clean energy firms, as some countries do today (e.g., Singapore’s 17 year tax holiday for a photovoltaic manufacturing facility).

For earlier stage companies without taxable income, a more appropriate instrument would be to institute a preferentially lower capital gains rate – or exemption – for investments in low-carbon technologies and services. Or, if Congress decides to increase the overall capital gains rate, as one of the Presidential candidates is calling for, then the rate for low-carbon investments could be maintained at current levels, giving them preferential treatment. We would urge Congress to apply some of the auction revenue to this purpose.

10. Reduce Vehicle Miles Traveled Through Highway-to-Rail Shift and Carbon-Efficient Mortgage Deductions:

Congress says it is determined to remedy our addiction to oil, but many of its policies so far (e.g., favoring renewable fuels as a

solution) have constituted thinking inside the box. Even improving vehicle efficiency is a partial, though extremely important, solution. Rather, we need Congress to think outside the box by taking steps to reduce Vehicle Miles Traveled (VMT) through bold strategic realignments such as: 1) rapidly transitioning passengers and especially freight from the highways to the railways, a much more carbon-efficient mode of transportation; and 2) using tax incentives to promote higher density development and reduce sprawl.

Our primary modes of transportation today – planes, cars, trucks – are not surprisingly the ones most promoted by public infrastructure spending and subsidies. And they are fueled primarily by oil. Congress provides massive road subsidies and most of the funding for airport construction by issuing tax-free government bonds. We need to bring similar public support and incentives to rail, so that we can spur the build-out of an extensive passenger rail and public transit system and propel it largely by electricity (the best low-carbon “fuel” given the efficiency of electric drive trains). It is worth noting that rail emits 1/7th the greenhouse gases that trucking does per gross-ton mile. As Congress approaches the reauthorization of our nation’s surface transportation bill next year, we encourage Congress to systematically reallocate significant portions of highway funding to rail infrastructure – including but not limited to expansion of funds for the Congestion Mitigation and Air Quality (CMAQ) program, a useful but indirect mechanism for intermodal financing. Congress should, in this crucial reauthorization, apply rigorous carbon-weighting of the options before making its policy choices.

Studies by the American Association of Railroads anticipate a rail system that will jump from 1% to 1/3 congested over the next 25 years, unless we undertake a spending program of \$140 billion, and they’ve asked public sources to provide approximately 1/3rd of that total. And this would be to just maintain rail’s current market share for freight. If we want to increase rail’s share, we’ll need yet more spending. Therefore we would encourage not only re-allocation of some of the Highway Trust Fund but also use of some of the new carbon auction revenue to these purposes, including full funding of the proposed 25% Freight Rail Infrastructure Tax Credit, extension of the Short line Rehabilitation Tax Credit, and significant new targeted tax incentives for the financing of intermodal connectors and other infrastructure. We believe this would be money well spent, even if it needs to be diverted from spending to decongest highway systems. If we are going to reduce congestion and thereby encourage usage of a particular mode of transportation, let us focus preferentially on those modes that are most carbon efficient.

In terms of mitigating sprawl, we would urge Congress to modify consumer and developer incentives. Consider author Douglas E. Morris’ idea that the home mortgage deduction should be modified so that it is available on a go-forward basis only to those who buy in sprawl-minimizing (and therefore carbon-efficient) locations such as existing urban areas, small town centers or near public transportation stops. While this is probably too much of a radical discontinuity to achieve passage, it is the kind of bold action Congress should be considering to reduce transportation emissions, while improving our national quality of life. Morris aims to soften his blow somewhat by

favoring grandfathering of all existing mortgages, but making the modification apply to future mortgages. But a variation of his proposal that might be more passable would be to simply provide a higher mortgage deduction rate (a bonus multiplier of 1.5, for example) for location-efficient mortgages. As with the original proposal, eligibilities would need to be carefully designed so as not to disadvantage certain socio-economic groups. But this kind of innovation would nonetheless use federal tax abatement authority in a more focused way to fulfill this crucial policy objective. Congressman Earl Blumenauer's visionary smart growth bill (H.R. 6495) includes among its provisions a location-efficient mortgage concept equally worthy of consideration for auction revenue funding.

Congress should also emulate California's path-breaking work in this area. The California Senate just approved over Labor Day Weekend 2008 a bill intended to discourage sprawl as its population that commanded the support of environmentalists and home builders. It would loosely tie billions of dollars in state and federal transportation subsidies to cities' and counties' compliance with sprawl mitigation as they do their planning for roads, bridges and housing. It would seek to promote building near existing job centers and public transit or create higher-density developments close to jobs and transit stops.

11. Expand (and Internationalize) Forest Conservation Bonds: The \$370 billion Farm Bill passed this year established a new national program authorizing the issuance of \$500 million in tax credit bonds (which provide bondholders tax credits in lieu of tax-exempt interest) for the acquisition of forestland for conservation purposes. Some have contended that this program was designed to favor a particular Montana forest to be acquired by the Nature Conservancy and Trust for Public Land, and therefore that its wider availability is limited. But the instrument appears worthy and we believe should be expanded for a broader group of users and specifically to promote conservation of forests for carbon mitigation purposes. If we are going to ask developing countries to preserve their forests, we need to lead by example. Congress might also look at making these bonds apply for U.S. acquisition of rainforests abroad.

12. Fund Climate Change Tax Credit – add Bonus for Efficiency Investments: Bob Greenstein, Executive Director of the Center on Budget and Policy Priorities, testified to the Senate Finance Committee in April 2008 that the revenue from auctioning about half the carbon allowances would preserve the purchasing power of the poorest 20% of Americans and significant relief to the bottom 80%. Of the variations he offered, MissionPoint would favor his proposed single, refundable "climate change tax credit" available to low and middle-income households and adjusted based on family size, rather than expansion of the Earned Income Tax Credit which leaves out a significant middle-income segment. We also agree with Mr. Greenstein that the Electronic Benefit Transfer (EBT) system should also be used to administer an equivalent of the tax credit to the poor households that are not currently within the scope of the income tax system.

However, we would also advise Congress to consider modifying Mr. Greenstein's proposal by splitting it into a base credit available on an unconditional basis, and an incremental credit available only for the same recipients to invest in energy efficiency products, whether in the home, the personal vehicle or otherwise. This would have the significant advantage of providing recurring savings to the household beyond the flat credit since energy consumption would be reduced. Recognizing this, the Model Rule for the Regional Greenhouse Gas Initiative specified that each state must allocate at least 25% of its budgeted allowances to a consumer benefit or strategic energy purpose account to be used to promote energy efficiency, to mitigate electricity ratepayer impacts, or to promote lower-carbon-emitting energy technologies. Dallas Burtraw and his colleagues at Resources for the Future did a study for the State of Maryland and found that the dedication of 25% of the allowance value to investments in end-use efficiency could offset any increase in retail electricity price that would occur from the state's joining RGGI.

13. Carbon-Efficient Utility Rate Designs: The Federal government has traditionally refrained from encroaching on state prerogatives in utility regulation. However, it has significant latitude to use disbursement of federal funds to promote, if not to require, favorable state policy-making. We would encourage Congress to use a portion of the carbon allowance revenue to provide positive incentives to motivate state regulators to adopt decoupled rate designs that are more favorable to efficiency and carbon mitigation. Variations of this are already encompassed in pending Federal cap-and-trade legislation. We are intrigued by a new decoupling rate design proposed by the National Regulatory Research Institute called a Straight Fixed Variable (SFV) rate, which it then combines with a revenue neutral energy efficiency fee-bate (a combined fee and rebate). This rate would ensure utility recovery of all fixed costs through a fixed rate charge, rather than making part of this recovery dependent on fluctuating electricity usage. As such, it would "decouple" a utility's ability to earn its regulated return from the volume of electricity it sells, and eliminate a key disincentive to invest in efficiency. It reportedly has administrative advantages over other decoupling proposals. But we are especially intrigued by the conjoined fee-bate, which would basically charge fees to those who user more than a benchmark amount of electricity, while rebating an equivalent amount in the same rate class to those who use less than the benchmark. This is a crucial part of the overall package, because without it, users could actually be less incentivized to reduce energy usage under an SFV rate because less of their utility bill would be subject to fluctuating usage. Congress should consider rewarding state regulators who mandate this rate design by providing incentive auction revenue to them to be used in augmenting the efficiency investments beyond that enabled by the revenue-neutral feebate (e.g., the rebate dollars could be matched by auction revenue dollars on some pre-specified ratio, up to a cap).

CONCLUSION

In July of this year, the G-8 leaders pledged in Japan to "move toward a low-carbon society" by cutting greenhouse gas emissions in half by 2050. But it was a pledge, not a

binding commitment, and the group failed to agree on interim targets for the next 10-20 years that would make the pledge actionable. Pledges aside, the U.S. Energy Information Administration outlook released in June showed the world heading in exactly the opposite direction – with carbon dioxide emissions projected to increase by 51% by 2030 if we stay with business-as-usual policies.

Will Congress fashion and enact a bold and integrated policy package capable of stimulating a true transformation of our system of energy production and use – of shifting us from a +50% to a -50% emissions trajectory? Will it recognize and capture the wide range of associated benefits promised by this transformation, in terms of economic growth, job creation, energy security and health?

MissionPoint, and many others prepared to build the clean energy economy now, hope the answer is yes.

To sum up, we believe that:

- The U.S. has an extraordinary opportunity ahead to lead the most strategic industry of the 21st Century
- In order to seize the opportunity, Congress needs to price carbon.
- A cap-and-trade mechanism is our preferred way to price it.
- 25% of the allowances should be distributed as transitional aid to industries in proportion to their retained exposure so as not to provide a windfall;
- 75% or more of the allowances in the cap-and-trade should be auctioned and the proceeds put into a trust fund to be used:
 - To reduce distortionary taxes;
 - To mitigate adverse impacts on consumers through a broad climate change tax credit, part of which would be dedicated to financing end-use efficiency upgrades; and
 - To fund a range of bold, creative and carbon-weighted supplementary policies intended to accelerate research, development, demonstration and deployment of low-carbon technologies. We have provided an illustrative set of such policies for Congress' consideration.

On behalf of my colleagues at MissionPoint, I thank the committee for the opportunity to provide our input to your deliberations. We stand ready to do our part, and look forward to your leadership.