Testimony before the
Senate Committee on Energy and Natural Resources
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Good morning. First, I'd like to say thank you to the committee for this opportunity today. This is my first appearance before this panel under Chairman Wyden's leadership and I'm proud to try to be of service.

I come here today in my role as head of policy analysis at Bloomberg New Energy Finance, a market research firm focused on the clean energy sector. Our clients include major investment banks; wind, solar, and other clean energy equipment makers; venture capitalists and project developers; major energy-producers including utilities and integrated oil companies; as well as government agencies and NGOs. Our group, a market research division of Bloomberg LP, provides timely, accurate, and actionable insights on how the energy sector is being transformed by new technologies.

Before I begin, a disclaimer: my remarks today represent my views alone, not the corporate positions of either Bloomberg LP or Bloomberg New Energy Finance. In addition, they do not represent specific investment advice and should not be construed as such.

The topic of today's hearing is "clean energy financing." It's a potentially broad subject, covering both financing for established, cost-competitive clean energy technologies such as wind, solar photovoltaics, or geothermal as well as newer, more cutting-edge technologies still in the development phase such as marine, tidal and others. In the interests of time, my comments here pertain to the former -- the financing

of clean energy technologies that are now seeing significant levels of deployment.

Bloomberg New Energy Finance has tracked well over $1.5 trillion in mostly private capital invested in clean energy globally (defined here as traditional renewables, biofuels, power storage and smart grid). In 2011, annual investment hit an all-time high of $317bn then slipped 11% to $281bn in 2012. This marked the first time in the seven years that year-on-year investment actually declined to a notable degree.

Last week, we released our clean energy investment figures for the second quarter of 2013 and they offered a mixed outlook. On the one hand, totals funds deployed globally rose to $53.1bn in Q2 2013 from $43.6bn in Q1 2013. On the other, total investment through the first half of 2013 was down 18.2% from the same six months in 2012.

Why has the rate of capital being deployed apparently slowed in the past 18 months? Two factors are primarily to blame: (1) weakening subsidy support from governments in Europe and elsewhere; and (2) rapidly declining equipment costs.

The first of these trends -- declining subsidy support -- was, to a large degree, inevitable. In 2008 and 2009, governments globally pledged $195bn in economic stimulus support to the clean energy sector. The large majority of those funds have now been spent or the programs behind them have expired. By our tally, the US earmarked $65.6bn in clean energy-specific stimulus funding and most of that is now gone.

In addition, nations such as Spain, Italy, and Germany have scaled back support for clean energy after seeing renewable energy installations skyrocket faster than they had anticipated.

The second trend -- the dramatic drop in equipment costs -- was less predictable

but stands to have a more profound longer term impact on the market. Today, a photovoltaic module bought at the factory gate costs less than a quarter of what it did just four years ago. Wind equipment prices are also down. Both technologies are now cost competitive in certain markets around the globe -- without the benefit of subsidies.

Technological improvements deserve part of the credit for the cost declines, but a bigger factor has simply been *scale*. Global photovoltaic manufacturing capacity today stands at some 61GW -- twice as high as just two years ago, 12 times as high as three years ago, and 25 times as high six years ago.

These lower costs are allowing dollars invested in renewables to go further than they would have just a few years ago. While global investment dipped 11% from 2011 to 2012, the rate at which new capacity was actually deployed into the field actually accelerated. Annual capacity installations rose from 2011 to 2012 by 12% as nearly 90GW of new capacity was brought on line last year.

US clean energy investment, defined here as renewables and biofuels, has followed a similar path. Total capital into the sector hit an all-time high in 2011 then slipped 36% to $35.6bn in 2012. High investment in 2011 and fears over expiration of the Production Tax Credit resulted in record 17GW of new capacity getting built in 2012. Lower equipment costs also contributed to the boom.

As I mentioned, through first six months of this year, investment is down compared with the first half of 2012. But unlike last year, the US this year will also see less total capacity additions -- despite what will surely be a record-breaking year photovoltaics.

All of this I hope is useful background to ask one fundamental question: *are the*

capital markets to blame for what appears to be a deceleration of financing over the past 18 months? In a word: no *and* yes.

I would argue that today there simply is no shortage of capital (debt, equity, so-called tax equity, or other) available for high quality clean energy projects -- that is, projects being developed by reputable companies, with relevant permits in hand and, most importantly, firm long-term agreements signed to sell their electricity at a reasonable price to a credit-worthy buyer such as a major utility. The financial community will gladly underwrite such a project.

As an aside, this has not always been the case. At the height of the financial crisis, capital for clean energy projects dried up almost completely. In response, Congress acted quickly to establish the so-called 30% cash-grant program.

Today, however, there is no such shortage of capital. Instead, there is a shortage of projects that meet the criteria I outlined a moment ago. For developers, it is now considerably more challenging to sign sufficiently priced power purchase agreements than it was just a few years ago. Demand for new wind energy capacity in particular has weakened. This is partly due to competition from low-priced natural gas projects and partly because the large majority of 30 state Renewable Portfolio Standard mandates are now either being met or on their way to being so. So, in the short run, no I do not believe a lack of capital is to blame for the recent deceleration in investment.

Looking beyond the immediate term, however, capital availability and clean energy capacity growth are inextricably linked. That is, when you cut the cost for one, demand for the other inevitably rises. Less expensive capital should result in more competitively-priced power and, in turn, greater demand for that power.

Unlike fossil-fuelled plants, clean energy projects have virtually zero marginal costs. Once operating, these plants do not require their owners to spend on buying gas, coal, oil or other fuels to continue operating.

Instead, nearly all the project costs are incurred up-front when the photovoltaic modules, wind turbines, geothermal turbines, or other equipment is put on the roof or in the ground. What this means is that the economics of clean energy are heavily dictated by a project's weighted average cost of capital which gets amortized over much of its operating life. The lower the cost of capital is, the more relaxed a project owner can be about what he defines a "reasonable" return on investment.

Private equity companies, for example, may not be willing to invest in projects with returns on equity lower than mid-teens, and projects with these types of economics are increasingly rare. Utilities, on the other hand, or institutional investors, could be quite happy seeing returns in the high single-digits, and our analysis suggests there are plenty of projects with those types of economics out there.

As I mentioned earlier, our firm has tracked over $1.5 trillion invested in clean energy since 2004. Very roughly 2/3 of that has come in the form of traditional project financing for large-scale power-generating projects. Typically, these transactions involve a handful of financial institutions collaborating to provide private debt and equity at a cost of capital acceptable to the project's developer.

This system has been adequate to date but it is not how more mature segments of the energy industry raise funds. Builders of large-scale transmission lines or natural gas pipelines for instance typically turn to the public markets to raise nine- or 10-figure sums by issuing bonds or through other financial vehicles such as Master Limited

Partnerships.

Greater scale means lower costs. And to continue reducing its costs, the clean energy sector must achieve the same or greater degree of scale in capital raising as it has in manufacturing.

Already, we are seeing signs that this has begun as industry players are finding new and innovative ways to finance or re-finance projects. Most noteworthy have been the bond offerings from MidAmerican Energy Holdings Co., the subsidiary of Warren Buffett's Berkshire Hathaway. Most recently, MidAmerican sold $1bn in bonds to lower its cost of capital on a $2.74bn solar project it owns in southern California. Those bonds yield 5.375%. Globally, we have now tracked over $2.5bn raised this year via bond offerings for clean energy.

There have been other, less high profile examples as well. NRG Energy Inc. recently created a "yield co." to allow investors to take direct ownership in a portfolio of its operating solar, wind and gas-fired generating plants. On Tuesday, NRG raised $431 million for that business, which now trades on the New York Stock Exchange and offers investors an approximate 6% dividend rate. Other creative efforts in this area have included a real-estate investment trusts and Canadian income trusts trading on the Toronto Stock Exchange.

In all cases, what is being offered to investors is fairly appealing in today's current low interest rate environment: the chance to invest in a relatively low-risk asset and earn a fixed rate of return well above rates offered on 10-year Treasuries. As the committee well knows, there are now efforts afoot in Congress to make another form of "yield co" available to clean energy projects through legislation that would allow clean

energy projects to use master limited partnerships as fund-raising vehicles.

What all of these vehicles and potential vehicles have in common is that they seek to open the door to massive pools of institutional investor capital supplied by pension funds, insurance funds, and endowments. To date, that has gone largely un-tapped for clean energy. But as the successful bond offering from Buffett and others indicate, these investors are ready to invest in clean energy projects -- if given the right opportunity.

Finally, I would note that from the policy-making perspective, one question potentially worth considering is how to accelerate the maturing of clean energy project financing to reduce costs. But I would quickly also note that in doing so, policy-makers would be well served not lose sight of the other fundamental challenge I highlighted earlier: the relative weak demand for new renewable energy capacity, particularly wind capacity, today. If fostering strong long-term growth of this sector is a policy goal, then addressing both these challenges is critical.

I would like to again thank the committee for offering me this opportunity. I look forward to your questions.

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