

Wells College

Adventures in Clean Tech Investing

Terence Cryan

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Why invest in Clean Tech?

- * Clean Tech refers to technology or businesses related to the use of clean (non carbon producing) technology/processes or equipment for the production of power...
- * Investors in the Clean Tech sector have a range of motivations to invest in Clean Tech Companies, including:
 1. ROI (Return on Investment)– both institutional investors , individual investors and governments recognize the profit potential
 2. Change Agents – Governments, institutions and individuals who are seeking to move the global economy away from a fossil fuel based economy

Why invest in Clean Tech?

- * As evidence of climate change mounts and the effects on our planet become more apparent, a broad consensus has emerged among governments and the private sector that Clean Technologies are among the most effective ways to reduce carbon emissions that contribute to global warming.
- * Who is leading the charge? In terms of government's, the European Union and Germany in particular have been amongst the most ambitious in their support.

Can government policy drive change?

- * Germany's Energiewende: Leading the Way...

Germany's energy transformation strategy or 'Energiewende' aims to reduce greenhouse gases by 80-90% by 2050 compared to 1990 levels. This will be achieved by a combination of improved efficiency (50% reduction in primary energy consumption) and increased renewable energy generation (target is 80% of overall generation).

Ambitious targets for a country historically reliant on coal reserves for electricity generation and with an economy that relies on manufacturing and global exports which require it to have competitive electricity generation costs to maintain its position as a top five global economy in GDP terms and a top three exporter.

Can government policy set the stage for the private sector?

- * Germany's long term commitment to renewable energy has taken a range of forms: government mandates and strict timeframes for electricity generation from renewable sources has been at the forefront in forcing the rate of change. German renewable energy production has already reached 25% of total electricity production, up from under 7% in 2000.
- * Subsidies to renewable energy producers were an important part of the equation at the start of this century to allow them to compete with mature fossil fuel based generation technology.

Can government policy set the stage for the private sector?

- * The Fukushima disaster in Japan in 2011 represented an important inflection point for German policy makers. The government's decision to abruptly shut down all of its nuclear power plants meant that in order to replace that generation capacity and maintain its long term commitment to renewable energy, significant additional support to renewable generation was going to be necessary...

What can we learn from Germany's commitment to Clean Tech?

- * Germany renewable energy output is now 25% of total electricity production (<7% in '00)
- * In the last decade, investments in the clean tech sector in Germany increased 122%, creating 380,000 jobs. That figure is expected to reach 500,000 jobs by 2020
- * German green house gas emissions have declined by 25.% since 1990, exceeding the Kyoto protocol target of a 21% decline by 2012
- * German renewable energy is targeted to reach 80% of electricity generation by 2050

source:WRI

Investment Drivers: the “push-pull” effect

- * So what can the US learn from the German energy transformation strategy ?
- * As Germany has proved, a combination of government policy, energy mandates and subsidies for clean tech generation technologies can “push” significant change in even a decade.
- * These same policies can also have the effect of “pulling” in investment from the private sector.
- * Can/Does this model work in the US?

How is the US market different?

- * Since 2008, total electricity demand in the US has been relatively flat, which means that in order for renewable energy to grow, it needs to displace traditional forms of electricity generation.
- * So how does that most effectively occur when electricity generation costs in the US from fossil fuel and nuclear are among the lowest in the world?
- * Ideally, a strong national energy policy in the US would be one of the most effective ways to drive adoption of Clean Technologies – but since that doesn't exist, what can drive change and “pull” in investment?

So who is best positioned to win in this “push-pull” environment?

- * To date, in the US its been solar and wind...
- * Lets look at why? In specific regions of the US, solar and wind are now positioned to compete with coal fired generation due to significant advances in technology, operating efficiencies, state driven mandates and optimized local operating conditions (ie. solar in CA and AZ).

What have been the key drivers for wind & solar ?

- * Technology maturation
- * Manufacturing scale
- * Grid connection access
- * State renewable generation mandates
- * Consumer preference
- * Capital availability
- * Optimized local operating conditions
- * **DRAMATICALLY LOWER COSTS**

Is rapid adoption all about cost?

- * In 2013, the cost of residential solar in the US declined approximately 15% from the prior year period, highlighting the dramatic decline in generation costs which began back in 2008.
- * Utility scale solar has seen similar large scale reductions in generating costs in the past decade which has led to a string of large scale solar generating projects by major US utilities. Witness today's announcement by Duke Energy in FL of a 500MW solar project aimed at allowing Duke to retire half their coal generating plants in FL by 2018.
- * While wind generation costs are facing stiff competition from low natural gas prices, one advantage both industrial and residential customers are seeing from wind is the ability to lock in generation costs given that wind has no commodity price based input costs.

Does the variable nature of solar & wind generation create issues?

- * The quick answer is yes, though peak electricity demand generally occurs during daylight hours when solar is available.
- * One area of concern is how to balance the variable nature of renewable generation with the need for utilities to have stable base load of electricity generating assets in place. So what does that mean? It likely means that renewable energy will continue to be one component of the overall energy generation landscape. Its hard to imagine an advanced industrial economy completely dependent on solely renewable generation assets. Gas, coal, & nuclear are all likely to continue to play a role, albeit a smaller one in the decades to come...

The Future of wind and solar...

- * Large utility scale renewable energy projects are now increasingly commonplace; Witness MidAmerican's proposed \$1.9 Billion investment in wind power in Iowa or Portland General's investment in 116 wind turbines to meet Oregon's state mandate for renewables...
- * While in the past decade wind developers have benefited from the Federal Production Tax Credit and solar developers have benefited from the Investment Tax Credit, going forward it is likely that both industries will compete head to head with fossil fuel based generation given the dramatic reduction in their Levelized Cost of Energy (LCOE).

So what's next on the horizon?

- Clean Tech companies and a range of renewable energy technologies will continue to reshape the landscape in the decade ahead.
- Possible areas for breakthrough/game changing technology advances include:
 - ❖ Hydrogen based fuel cells & other advanced energy storage systems
 - ❖ Marine Energy: harnessing the power of the ocean

So what might this mean for a **Wells College** Student?

- Whether your interest is from the standpoint of someone who wants to a)influence policy, b)contribute to combating global warming or c) pursue a career with a Clean Tech company, the first step is **Get Informed!**
- Explore how clean technologies and renewable energy are impacting your life...
- Make a decision to **get involved**, as an informed citizen, a policy advocate or as someone working in the industry...