EDISON

Renewables rising

Here comes the sun – the wind, hydro and the rest

Industry focus — renewables

November 2014

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Sector primer

Industrials

24 November 2014

With regard to renewables, those lyrics, "*Here Comes the Sun*",[1] finally seem to be coming to fruition, as evidenced by the recent performance of many companies in the alternative energy/renewables sector. The recent plethora of yield company spin-offs, as well as similarly missioned "total return" companies, has provided visibility to the sector, validating it further, and offering investors a unique way to play the alternative energy/renewables space in terms of both yield and growth potential. While volatility is likely to be high, overall, we are bullish on the alternative energy/renewables sector, and believe the "total return" concept offers investors the potential for diversification, higher yield and more secured cash flows associated with renewable assets. In this report, we initiate coverage of the alternative energy/renewables sector, and present an overview of climate change, snapshots of the main subsectors and spotlights on select "yieldco/total return" companies in the space.

We need more…

Energy and electricity. Despite some progress with energy efficiency, long-term population growth, increased demand for energy as developing countries further industrialize their economies and finite supplies of fossil fuels will ultimately drive demand for alternative and renewable sources.

We need it to be clean…

Or at least, cleaner. With climate change, and carbon dioxide (CO_2) levels hovering around 400ppm, we are likely to see increased demand for cleaner energy. Availability of water, land use, as well as social justice issues must also be considered.

We need it to make sense – dollars and cents

We are all for people and planet, but without the profit, it does not work.

We are bullish on the overall alternative energy and renewables space based on the following expectations: a) increased demand driven by global population and energy trends; b) increased demand for cleaner energies in order to address climate change impacts and resource shortages; and c) expected transition of companies from niche players to more mainstream energy/utility providers. We have chosen to focus on the "yieldco/total return" companies herein; in shifting discussion away from preoccupation with the labyrinth that is global regulation, these companies have enabled better visibility on underlying asset portfolios, which often generate cash flow secured by long-term power purchase agreements. As a result, they are able to pay dividends now, provide potential for capital appreciation in the future, and have simplified the investment thesis.

Companies in this report

Abengoa Yield (ABY)

Brookfield Renewable Energy Partners (BEP)

Capstone Infrastructure (CSE.TO)

Hannon Armstrong Sustainable Infrastructure (HASI)

NextEra Energy Partners (NEP)

NRG Yield (NYLD)

Pattern Energy Group (PEGI)

TransAlta Renewables (RNW.TO)

TerraForm Power (TERP)

Bluefield Solar Income Fund (BSIF.L)

Greencoat UK Wind (UKW.L)

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[1] G. Harrison, (1969), *Here Comes the Sun*, (Beatles), *Abbey Road*: London, England, Apple.

Investment summary

Bullish on alternative energy/renewables

We believe the market will expand for alternative energy/renewable solutions, benefiting companies that can help provide those solutions. This will be driven by less-developed countries further industrializing, macro trends in population and energy growth, finite fossil fuel supplies, as well as climate change impacts. Over time, we believe some of these companies will transition from niche players to more mainstream, alternative, energy/utility providers. While there will be winners and losers in the space, and volatility is likely to be high, overall, we are bullish on the alternative energy/renewables sector, and believe the yield company spin-offs, as well as similarly missioned "total return" companies, can offer investors a way to play the space with the prospect of increased diversification, higher yield and capital appreciation.

No silver bullet, multiple technologies can prosper

Hence the subtitle, "Here comes the sun – the wind, hydro and the rest." Despite the overall positive, long-term view, there is no "silver bullet" here possessed by any one technology. All have specific advantages and disadvantages in terms of addressing climate change, and/or global energy and resource challenges. Hence, while this translates into opportunity for different companies and subsectors as they mature, it also presents the challenge of making sense of a large, disparate universe, where not everyone will succeed.

Fossil fuels not going away – do not have to be "bad guys"

Given they still satisfy 78% of our global electricity needs, use of fossil fuels is not going away anytime soon. Further, in addition to natural resources, many of the traditional fossil fuel-based companies have significant financial resources. To the extent these companies can clean up their technologies (ie, capture carbon, use less water, etc), they should reap the benefits of increased focus on clean energy as well.

KISS$: Keep it simple; show them the money

Many alternative energy/renewables stories are not simple, or easy to understand. While many offer diversity in terms of their asset portfolios, this often comes with lots of moving parts. Hence, companies must be able to coherently articulate, as well as successfully execute, their business plans if they hope to achieve higher valuations. In providing increased visibility on current projects, pipelines, expected cash flow and dividends, "yieldco/total return" companies have simplified things somewhat.

Focus on the forest, not just the other trees

A rising tide tends to lift most boats. Structure and semantics aside, all of these companies – whether classified as alternative energy, renewable, clean/green tech, diversified energy/utility – have similar mandates: to expand market share in the global energy market, a sector that should provide opportunities for many players for a while. At this stage, the big picture remains of key relevance. Until sub-sectors mature further, it may be difficult to determine which ones are better positioned, and hence we present an overview of the global renewable market herein, as well as brief sub-sector backgrounds.

Investment conclusion

"We'll always have Paris"[2]… but who cares if nothing happens?

That is not a famous line from a famous movie because they just talked a lot in Paris; they made things happen. Hopefully, our world leaders will do the same at the upcoming United Nations Climate Summit, taking place in Paris in March 2015. With 74 nations, and over 1,000 companies, already having signed a declaration setting a price for carbon, all eyes have been focused on the US and China, because these two countries "have often been seen as antagonists" in terms of addressing climate change.[3] The number one and number two carbon emitters globally, China and the US recently came to an agreement in mid-November, seen as critical to gathering further support among countries worldwide, in terms of furthering global initiatives on climate change. The new agreement includes the US now targeting double the previous pace of reductions hoped for between 2005 and 2020, with a revised goal of 26-28% lower emissions off the 2005 number. Similarly, in addition to pledging to "reach peak carbon emissions by 2030, if not sooner," China said that "clean energy sources, like solar power and windmills, would account for 20 percent of China's total energy production by 2030."[4] Hence, while there is still much to be done, and there will, no doubt, be challenges along the way, these moves are seen as promising in terms of the global need to address climate change.

In light of global population and energy trends, finite fossil fuel supplies, and no end in sight to greenhouse gas emissions, we believe 2015 and 2016 could be an inflection point for companies that can provide clean energy solutions, many of which are already making things happen right now.

Additionally, the recent plethora of yield company spin-offs, as well as similarly missioned "total return" companies, has provided visibility to the sector, validating it further, and offering investors a unique way to play the alternative energy/renewables space in terms of both yield and growth potential.

2 *Casablanca* (1942) [Motion picture on DVD]. (1942). USA: Warner Brothers.

3 M. Landler, "U.S. and China Reach Agreement on Climate After Months of Talks," *New York Times,* November 12, 2014, pp.A1 & A11. www.nytimes.com/2014/11/12/world/asia/china-us-xi-obama-apec.html?_r=0

4 Ibid.

Contents

Introduction

What comprises the alternative energy/renewables sector?

Alternative energy, renewables, clean tech and green tech are all terms used when referring to companies engaged in the production of services or equipment related in some way to cleaner, renewable or more energy efficient technologies, which in some way help to address global energy and resource challenges. Using this definition, though broad, dynamic, and possibly classified differently elsewhere, the alternative energy/renewables space encompasses a variety of sub-sectors, some of which are, or will be, profiled in separate reports.

1. Alternative energy (electricity)/renewables*:* i) solar, ii) wind, iii) hydro, iv) geothermal, v) wave, and vi) biomass;
2. Alternative hydrocarbon fuels*:* i) biofuels, ii) gas to liquids, and iii) coal to liquids or gas, etc;
3. Alternative energy equipment/systems*:* i) fuel cells, ii) battery storage, iii) electric vehicles, and iv) waste, recycling, desalination, pollution control, etc; and
4. Energy savings solutions*:* i) energy efficiency software/equipment, and ii) /smart grid/LED, etc. (See Edison's LED there be light report.)

Scope of this report

Given the underlying portfolios of most companies profiled herein fall into the first category, this report will focus on the alternative energy/renewables segment. In this initial report, we spotlight a select group of companies that aim to offer investors some combination of yield and/or total return, based on, for the most part, renewable assets.

Industry background: Global population and energy

Global population – there are a lot of us…

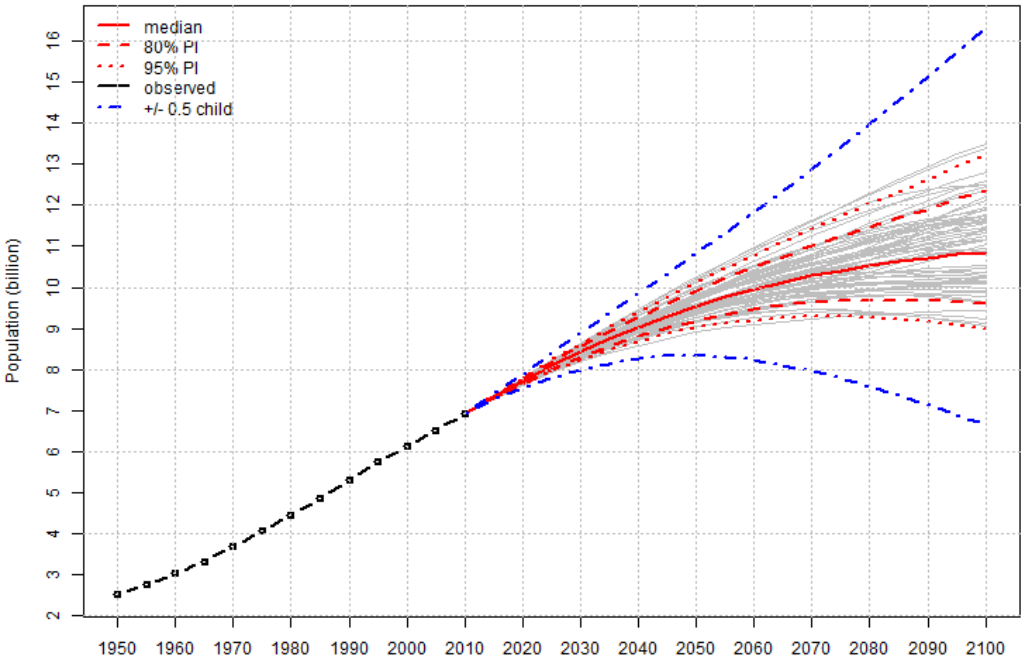
There are more of us every day. The United Nations stirred up a great deal of emotion recently when upping its forecasts, also indicating that, now, there is considerably less uncertainty associated with those forecasts.

UN revised projections: Given its Bayesian probabilistic methodology, the analysis, published online in *Science*, 18 September 2014, concludes that contrary to previous estimates:

1. world population is unlikely to stop growing this century;
2. world population is likely to grow from approximately 7.2 billion people to somewhere between 9.7 and 12.5 billion by 2100. Further, the broader increase occurs in the first part of the century, with an estimated 2.3 to 3.0 billion people added between 2010 and 2050, and 0.6-2.6 billion added during the second half;
3. excepting parts of Europe, most world regions will continue to see population growth, with Africa and Asia experiencing the highest rates; and
4. the proportion of working-aged people is likely to decline substantially in all countries, even those currently having younger populations.

What is a Bayesian probabilistic methodology? A Bayesian probabilistic methodology is a fancy way of saying that the UN did not only trend out population this time, it considered many other variables, such as geographic aggregates, income and age groups; and then correlated future fertility trajectories for any world area possessing greater than 90,000 inhabitants. Further, for countries with 2%+ adult HIV prevalence from 1980-2010, it factored in revised life expectancies consistent with the 2012 Revision of the World Population Prospects.[5]

Exhibit 1: UN revised world population projections (1950-2100)



Source: United Nations, Department of Economic and Social Affairs, September 2014

[5] United Nations, Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section, accessed September 2014, http://esa.un.org/unpd/ppp/Documentation/highlights.htm

This is a surprise? Math, medicine, birds and the bees. With all of the advancements in modern medicine, HIV/AIDs, cancer, fertility, etc, not to mention increased globalization, communication, and the internet providing greater access to everything, the UN's figures do not seem, intuitively, unreasonable. However, the problem inherent in any model is that it is just math, loaded with assumptions that often cannot be proved (or disproved), but can always be disputed. Nevertheless, we contend that the revised estimates are reasonable, based on a much less sophisticated (vs Bayesian) analysis.

Population assumptions/growth rates: While no one can be sure of exactly how many of us populate the planet at any given time, it was reported that we reached six billion people as of 12 October 1999,[6] and seven billion as of 31 October 2011.[7] Hence, taking the implied growth rate and keeping it static throughout our model results in human population growth slowing from an estimated 1.38% in 2000 to 0.58% by 2100, which gives us not the approximate 11 billion estimated by the UN, but an estimate of over 14 billion by 2100.

Exhibit 2: Population estimates selected highlights (2000-2100)

Year	2000e	2010e	2014e	2025e	2050e	2075e	2100e
Population, billion	6.09	6.92	7.26	8.17	10.24	12.31	14.39
% growth	1.38%	1.21%	1.16%	1.03%	0.82%	0.68%	0.58%

Source: Edison Investment Research, 2014

Further, one has to be comfortable, in all cases, that the growth slows more in the out-years. While there is less diversion in forecasts in the early years, most models assume there is considerable slow-down in the period post 2050. So, for example, using our forecast through 2050, even to arrive near the high range of the UN's 80% confidence level forecast, we need to assume the number of people added each year is cut in half after 2050.

Exhibit 3: Population estimates reworked to see UN high-end estimate for 2100

Year	2000e	2010e	2014e	2025e	2050e	2075e	2100e
Population, billion	6.09	6.92	7.26	8.17	10.24	11.28	12.31
% growth	1.38%	1.21%	1.16%	1.03%	0.82%	0.37%	0.34%

Source: Edison Investment Research, 2014

Summarizing, while no one knows for certain, significant takeaways are: a) UN forecasts do not appear unreasonable; b) there are already a lot of us here, more coming; and c) even if we do see an ageing population, it may be wishful thinking (given advancements in medicine) to believe population growth will slow as much as presently anticipated by the UN.

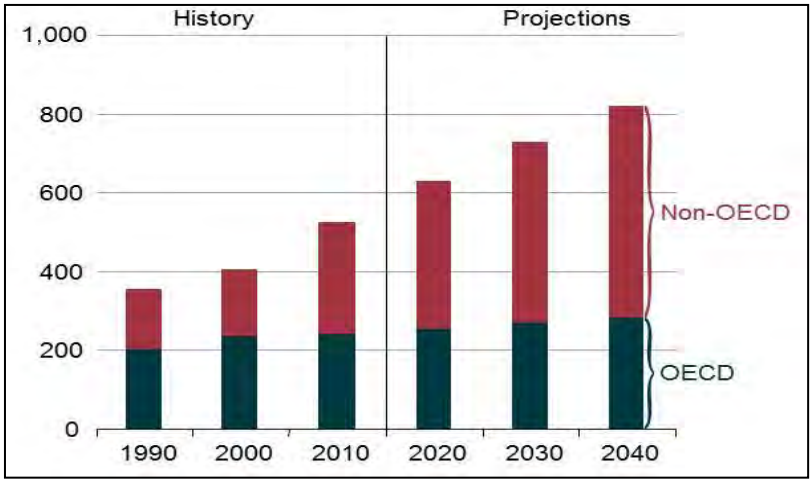
[6] J. Sommerfeld, "World Population Hits Six Billion," MSNBC.com, 12 October 1999, accessed 1 October 2014, www.nbcnews.com/id/3072068/#.UtQ0-55dWQw,

[7] H. El Nassar, "World Population Hits 7 Billion," USA Today, 31 October 2011, accessed 1 October 2014, http://usatoday30.usatoday.com/news/world/story/2011-10-30/world-population-hits-seven-billion/51007670/1

Global energy trends – what do we need?

As less-developed countries begin to industrialize, their energy needs are likely to rise as well.[8]

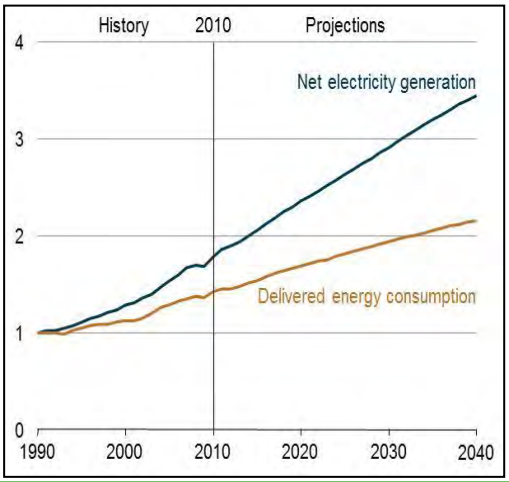
Exhibit 4: EIA world energy consumption forecast 1990-2040 (Quad BTU)



Source: EIA, 25 July 2013

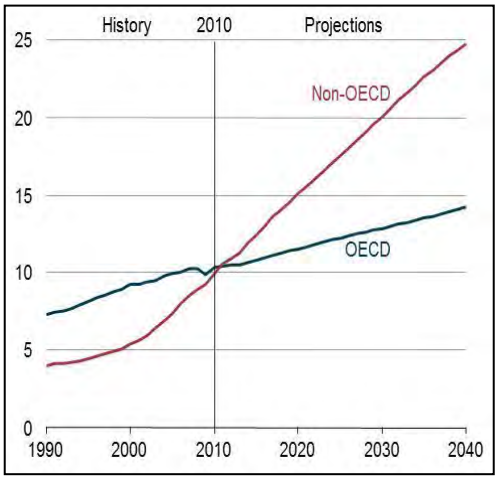
Electricity is the fastest growing form of delivered energy, and continues to represent an increasing portion of global total energy demand, with expected growth of 93% from 20.2 trillion kWh in 2010, to 39.0 trillion kWh in 2040.

Exhibit 5: Indexed growth in global electricity generation vs energy consumption



Source: EIA, 25 July 2013[9]

Exhibit 6: Non-OECD vs OECD estimated electricity growth vs consumption 1990-2040 (kWh trillions)



Source: EIA, 25 July 2013[10]

EIA estimates of future fuel mix in global electricity generation

Although the mix has shifted, and anticipated growth rates have changed, coal is still expected to be the leader in terms of primary fuels for electricity generation. Nuclear power also saw rapid increases between the 1970s and 1980s, with natural gas ramping rapidly between 1980 and 2000 as well. Because of growing concerns about supply and environmental concerns, oil for electricity use has fallen since the 1970s. With average growth estimated at approximately 2.8% annually, the EIA forecasts renewable energy sources to be the fastest growing segment in terms of electricity

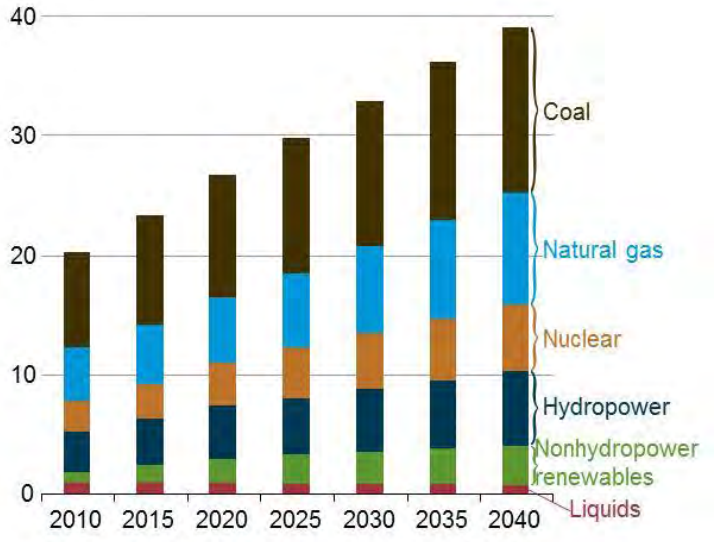
[8] There is more detailed information available from the Energy Information Association broken out for the US at www.eia.gov/forecasts/steo/pdf/steo_full.pdf.

[9] EIA, www.eia.gov/forecasts/archive/ieo13/electricity.cfm

[10] EIA, www.eia.gov/forecasts/archive/ieo13/electricity.cfm

generation for the period 2010 to 2040. Specifically, the non-hydropower renewables are forecast to increase market share from approximately 4% to 9% by 2040, with the greatest increase expected to come from wind. Natural gas and nuclear are also expected to grow by approximately 2.5% annually, with coal increasing about 1.8% over the projection period, which results in it still seeing the largest absolute growth over the timeframe.

Exhibit 7: Forecasted fuel mix projected for global electricity needs (1990-2040), kWh trillion



Source: EIA, 25 July 2013[11]

Water energy nexus – you can't have one without the other

There is no sufficient discussion about energy that does not factor in its close relationship with water. Hence, while greenhouse gases (GHGs) and carbon dioxide (CO_2) ppm in the atmosphere are major concerns, water must be considered as well. One of the greatest constraints, water usage will likely play a part in determining how energy technologies are evaluated. Energy is needed to process and treat water; and conversely, a significant amount of water is needed to produce varying forms of energy. Additionally, when water is used for energy, it is diverted from other uses such as human drinking water, agriculture, food, etc. Hence, we need to balance everything alongside social justice issues. So, while we might talk about needing more water for energy, or the need for electricity to be clean, there are an estimated 780 million[12] and 1.2 billion[13] people worldwide who would like clean water and electricity, respectively, to "be" at all.

Although highly dependent upon plant type and cooling technology, some renewable technologies like solar PV and wind use considerably less water than fossil fuels. However, depending upon cooling method, technologies like solar (CSP), bio-power, coal, natural gas and nuclear can all use substantial amounts of water (particularly if it is recirculated). For more detail and raw data for all categories, please see the original National Renewable Energy Lab (NREL) document at www.nrel.gov/docs/fy11osti/50900.pdf. Readers will note that hydroelectric power is not shown on this chart. Although there is some water used in construction of facilities, as well as from evaporation, water is not technically "used" in the operation of a hydroelectric plant, but is returned to its original source.

11 EIA, www.eia.gov/forecasts/archive/ieo13/electricity.cfm

12 www.unwater.org/water-cooperation-2013/water-cooperation/facts-and-figures/en/

13 www.washingtonpost.com/blogs/wonkblog/wp/2013/05/29/heres-why-1-2-billion-people-still-dont-have-access-to-electricity/

Climate change

Why should we care?

"I hope people remember this moment so that when they hear the carbon dioxide levels are 420 ppm in a matter of years, they'll say, 'I remember when it was 400.'" – Ralph Keeling, director of CO_2 program, Scripps Institution of Oceanography at UC-San Diego[14]

Whether caused by natural or human ("anthropogenic") forces, "climate change" is defined as any substantial change in a major climate metric, such as temperature or precipitation, over a lengthy period of time.[15] The purpose of this report is not to prove climate change is real, or figure out who caused it. But as analysts, we have to look at the data, and there does seem to be enough to support the contention that there is a relationship between the amount of greenhouse gases (GHGs) in the atmosphere (the most prevalent of which is CO_2), and the way in which the planet reacts. In any case, it is a major reason why there is significant interest in cleaner, renewable technologies.

Exhibit 8: People's climate march, 21 September 2014, New York

Source: Cindy Motz, CFA

Greenhouse gases (GHGs) and parts per million (ppm) CO_2

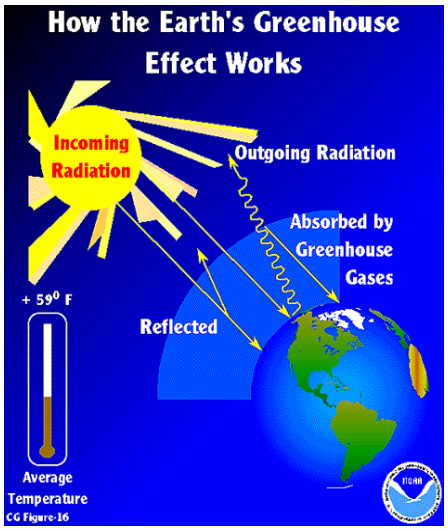
In addition to naturally occurring water vapor, there are six major GHGs, which include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO_2), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). The last three are also known as the "F" gases because of the fluorine element.[16] In order to measure the total impact of GHGs in the atmosphere on an equal footing, all of the GHGs are converted into CO_2 equivalents, which adjusts for their durations in the atmosphere and global warming potentials relative to CO_2. Because CO_2 is the most prevalent of the six GHGs, and largely results from human activities such as fossil fuel burning, and forestry/other land uses (FOLU), it is the most closely monitored.

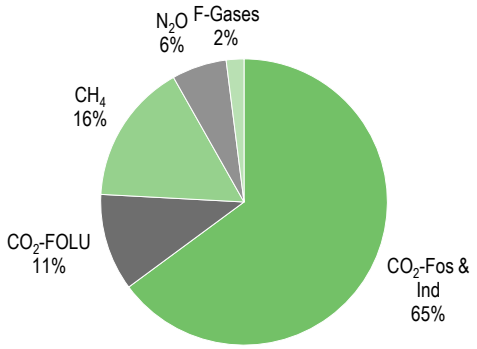
14 Kate Sheppard, "Happy Earth Day. We Just Reached Another Scary Climate Milestone, 22 April 2014, www.huffingtonpost.com/2014/04/22/carbon-dioxide-climate-change_n_5187844.html

15 U.S. Environmental Protection Agency, "Climate Change Indicators in the United States 2014," p. 3, www.epa.gov/climatechange/pdfs/climateindicators-full-2014.pdf

16 United Nations Framework on Climate Change, Kyoto Protocol, accessed 27 September 2014, http://unfccc.int/kyoto_protocol/items/3145.php.

Exhibit 9: Greenhouse effect and GHG composition[17]

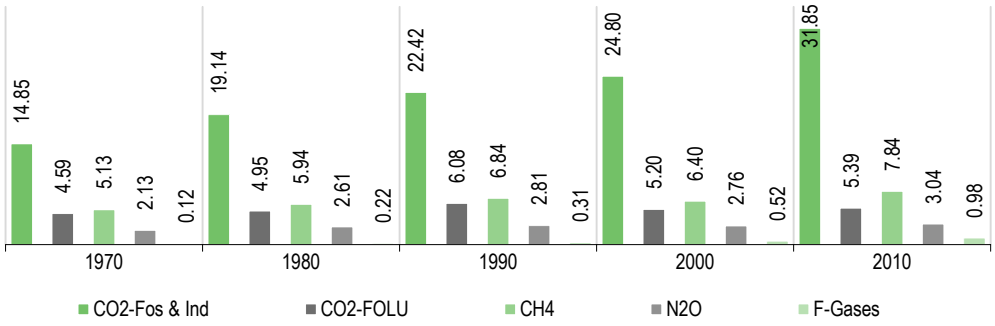




Source: NOAA graphic, and UNFCCC data used in Edison Investment Research chart

Although most GHGs have risen in the 40-year period since 2010, the absolute number of emissions was up by 83% from 27 GT/CO_2e to 49 Gt/CO_2e, driven by a 114% increase in CO_2 from fossil fuels and industrials. Additionally, growth in GHGs has accelerated in the most recent 10-year period, from a compound annual growth rate (CAGR) of 1.3% over the first 30 years, rising to 2.2% CAGR in the period between 2000 and 2010.[18]

Exhibit 10: Gigaton mix of GHG emissions, 1970-2010



Source: IPCC, 2014

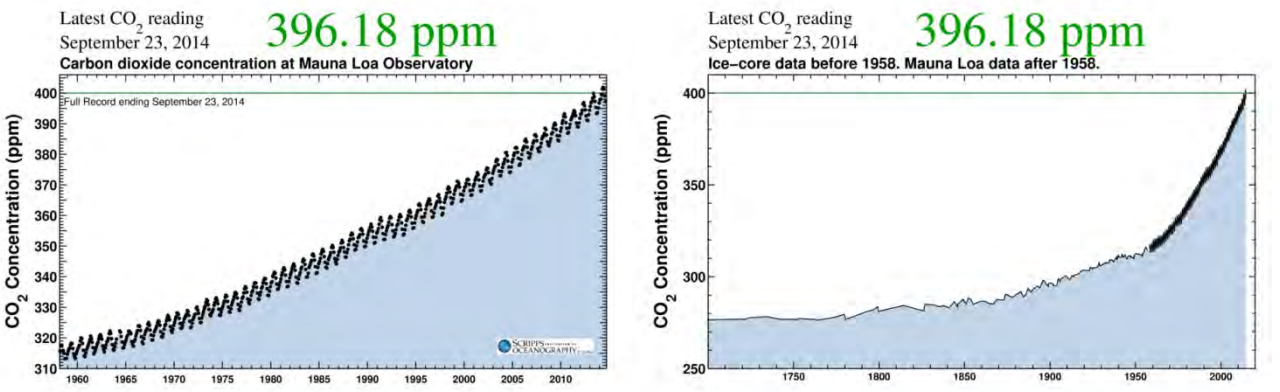
But oceans and trees absorb emissions, right? The rest escapes to space?

Not all of it. As shown in the Mauna Loa charts below, parts per million of CO_2 in the atmosphere have continued to rise, with a notable increase since the Industrial Revolution, as well as even more recently. Further, the oceans' increased uptake of CO_2 has its own issues; and while trees/plants help alleviate CO_2 in the atmosphere, there is some seasonality here. So, while the reading may be around 396ppm during the fall months, it was above 400ppm in April, May and June of this year. Although atmospheric data from the Scripps Institution of Oceanography has only been tracked since 1958, prior data from ice core sampling has been used to estimate prior levels. Zooming out further in time, the graphs (slopes) seem to suggest a considerable acceleration in the growth of CO_2 since the Industrial Revolution, particularly in the last 50 years.

[17] www.esrl.noaa.gov/gmd/outreach/lesson_plans/images/CG_Figure_16.gif

[18] IPCC, 2014: Summary for Policymakers, In: Climate Change 2014, Mitigation of Climate Change. Working Group III, Fifth Assessment Report, [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, et. al]. Cambridge University Press, Cambridge, U.K. and New York, NY, USA. http://report.mitigation2014.org/spm/ipcc_wg3_ar5_summary-for-policymakers_approved.pdf

Exhibit 11: Scripps' CO_2 readings from 1958-2010; and estimated from 1700-2010



Source: Scripps Institution of Oceanography, 23 September 2014, https://scripps.ucsd.edu/programs/keelingcurve/wp-content/plugins/sio-bluemoon/graphs/co2_800k.png

Why is it accelerating? It's the *economies,* stupid

"Globally, economic and population growth continue to be the most important drivers of increases in CO_2 emissions from fossil fuel combustion. The contribution of population growth between 2000 and 2010 remained roughly identical to the previous three decades, while the contribution of economic growth has risen sharply." – IPCC Fifth Assessment Report[19]

With 50% of the total GHG increase having occurred since the Industrial Revolution, and despite all attempts to reduce levels (inclusive of all energy efficiency strides), the trajectories of atmospheric GHG growth have become progressively worse. In the most recent 10-year period, of the 10Gt increase noted, 47% was attributable to the energy sector, 30% industry, 11% transportation and 3% from buildings.[20] Although many countries are working to curb emissions, as non-OECD countries continue to industrialize their economies, it is unlikely we will see a slow-down in GHG emissions any time soon given the current energy mix. While no one knows what constitutes a "safe" level of CO_2, it appears, based on the above, that humans evolved and lived on an earth with fairly constant levels of 275ppm CO_2 until the Industrial Revolution. According to Dr James Hansen of the Columbia Earth Institute, and former Director of NASA: "If humanity wishes to preserve a planet similar to that on which civilization developed, and to which life on Earth is adapted, paleo-climate evidence and ongoing climate change suggest CO_2 will need to be reduced to at most 350ppm."

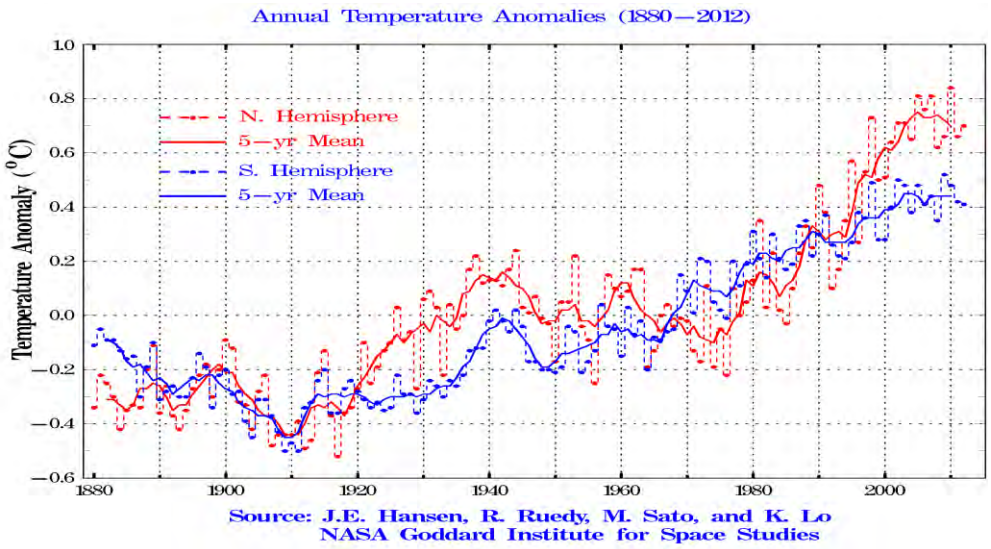
Temperatures and other climate impacts have increased as well

While climate change does not, by definition, have to equate to "global warming," it would appear temperatures have increased, on average by about 0.8 and 0.4 degrees in the northern and southern hemispheres, respectively, as shown in the graph below.

[19] http://report.mitigation2014.org/spm/ipcc_wg3_ar5_summary-for-policymakers_approved.pdf

[20] Ibid, pp. 7-8.

Exhibit 12: Annual temperature anomalies



Source: NASA, https://wwwpopulationeducation.org/sites/default/files/resource_files/J_curve_graph.png

Along with rising temperatures, climate change is also associated with more severe weather events like wildfires, droughts, floods, increased precipitation, super storms, sea level rise, ocean acidity, snow and glacier melt, increased pollen counts, disease (particularly from mosquitoes, ticks, and other vectors), as well as financial costs (estimated at $1.6 trillion) related to these things.[21] Compounding the situation, our global energy consumption is still comprised of over 78% fossil fuels; hence, as less-developed countries see greater industrialization, it is likely that global emissions will rise, and the mix will shift. While in the past, the US and Europe may have been responsible for the greatest number of emissions, going forward, it is expected that China will lead, followed by the US, Europe/Eurasia, Asia-Pacific, India, Russia and the Middle East.[22] The reason why this is significant is that social justice issues make it challenging to prescribe the same regimen for all parties, particularly when some have only recently begun to enjoy the fruits of industrialization.

Don't care who started it; I'm finishing it – *unknown parent, long ago*

At least for now, since the climate change debate will likely not conclude any time soon, we will sum up. The following charts span very different time frames (one over ~2,000 years; the other over 800,000 years according to the ice core readings).[23]

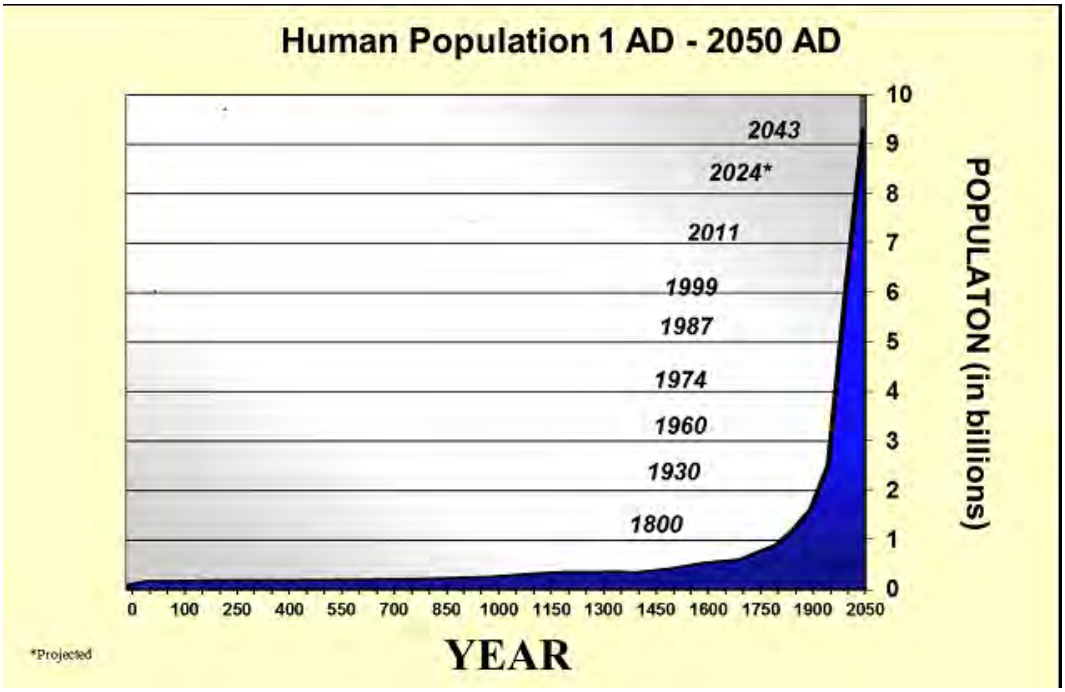
We conclude this section with a one-word question, uttered by countless parents to their children upon questioning their judgment on something – the irony, here, being that the children are much more likely to be questioning us, if we say we did not take action because we believed the following were normal variations in nature… *Really?*

[21] http://350.org/about/science/ and for financial loss figure, J. Shah, Harvard Magazine, Sept-Oct 2014.

[22] Hansen J, Kharecha P, Sato M, Masson-Delmotte V, Ackerman F, et al. (2013) Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature. PLoS ONE 8(12): e81648. doi:10.1371/journal.pone.0081648

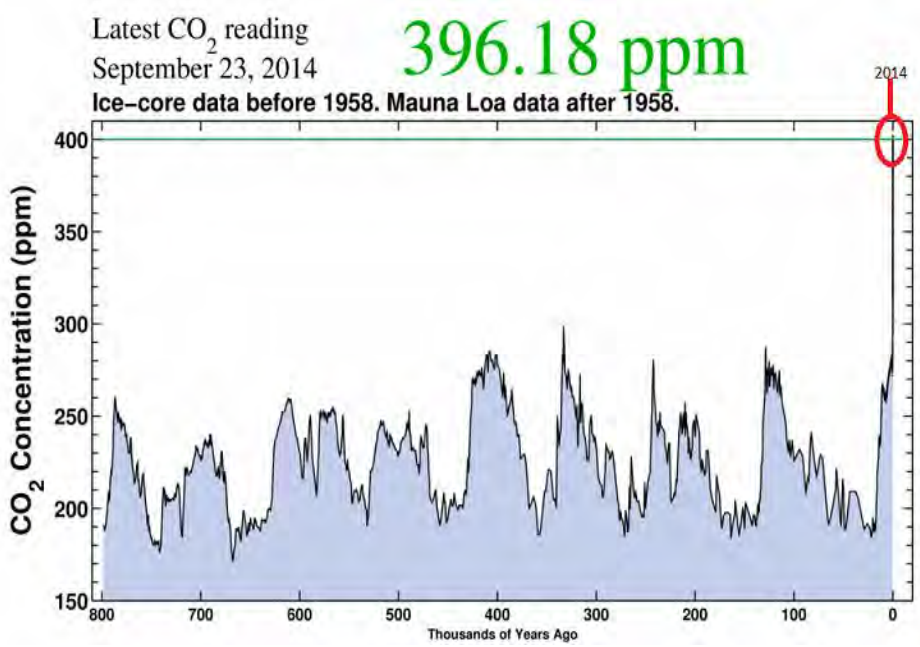
[23] **Dome C 800,000-year record:** European Project for Ice Coring in Antarctica (EPICA) members: D., M. Le Floch, B. Bereiter, T. Blunier, J.-M. Barnola, U. Siegenthaler, D. Raynaud, J. Jouzel, H. Fischer, K. Kawamura, and T.F. Stocker. http://cdiac.ornl.gov/trends/co2/ice_core_co2.html

Exhibit 13: Estimated human population from Population Education



Source: www.populationeducation.org/sites/default/files/resource_files/J_curve_graph.png

Exhibit 14: Estimated CO_2 readings going back 800,000 years (Scripps and ice core)



Source: Scripps Institution of Oceanography, 23 September 2014 chart with circled notation to clarify recent levels by Edison Investment Research, 2014

Global renewables overview

"We need a fundamental change that is at least as great in magnitude as the change that the improved steam engine brought with it, but at a much faster pace. We need, and are poised for, a new industrial and energy revolution." – Christiana Figueres, executive secretary of the UN Framework Convention on Climate Change[24]

Say you want a revolution[25]? Well, renewables could change the world

Although discussed more specifically in the next section, overall, renewable technologies present us with challenges and opportunities versus traditional technologies.

Challenges can include: a) intermittency; b) lack of storage options; c) high upfront capital expenditures/higher expense relative to incumbent providers; d) regulatory uncertainty; and e) other customary challenges characteristic of new technology companies up against an incumbent/legacy players.

Opportunities associated with renewables are often cited as: a) renewable, meaning we are unlikely, if ever, to run out of supply; b) cleaner, meaning they do not generate the same kind of GHG or pollution emissions associated with other fuels; c) despite large upfront costs, once technology is up and running, there is no "fuel" cost; and d) good potential for market expansion and faster growth if/when new technology proven and market matures. Similarly, as technologies become more efficient, more players enter the market and pricing comes down, making them more competitive with legacy technologies. This, in turn, makes regulatory incentives less important, eventually allowing those that were once niche players to transition into more mainstream, alternative energy companies.

Fossil fuels are finite in supply

Fossil fuels refer to energy sources like coal, oil and natural gas, created in the past from the remains of living organisms. By their nature, their supply is fixed; and hence, they have the potential to run out. Figures shown on the next page reflect information provided in the 2014 British Petroleum (BP) Statistical Review of World Energy,[26] and illustrate estimates (in years) of the remaining global supply of oil, natural gas and coal. Data shown are based on the reserves-to-production (R/P) ratio, which is calculated by taking the remaining reserves at the end of the year, dividing by production in that year, and assuming production continues at that rate. Individual country projections, from which this information is assumed to be derived, can be found on pages 6 (oil), 20 (natural gas) and 30 (coal) of the report.[27] Summarizing, the data indicates that if production were to remain static, we would have approximately 113 years left of coal, 55.1 years of natural gas and 53.3 years left of oil worldwide. However, given what we see are individual country proven reserves (particularly for coal), we used BP's data, as broken out both by OECD/non-OECD, and by country regions (both totaling to 100%), to come up with our own calculations. Our results indicated higher remaining supply for all fossil fuel categories. Coal came out to 131 and

[24] International Green Business Dinner, "Address by Christiana Figueres," London, October 10, 2011. http://unfccc.int/files/press/news_room/statements/application/pdf/111010_sp_international_green_business_london_3.pdf

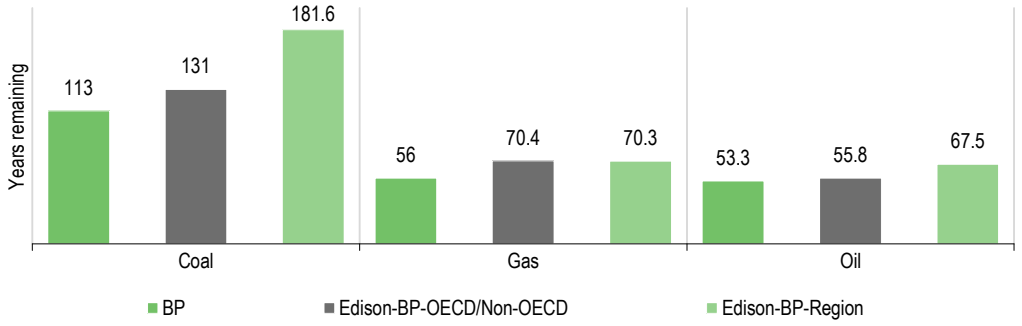
[25] J. Lennon and P. McCartney, (1968), *Revolution*, (Beatles), *White Album*: London, England, Apple.

[26] BP provides information on renewable and nuclear sources as well, but these do not have R/P rations. For those investors wishing further detail on global technical potential of renewables (ie, capacity of each renewable to satisfy total primary energy demand), please see IPCC's "Renewable Energy and Climate Change." http://srren.ipcc-wg3.de/report/IPCC_SRREN_Ch09.pdf

[27] BP Statistical Review of World Energy 2014, 63rd Edition, 2014, June 2014, page 6-43, www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2014/BP-statistical-review-of-world-energy-2014-full-report.pdf

~182 years remaining; and natural gas came out to ~ 70 years in both break-out cases; oil was similar, at 55.8 years, using OECD/non-OECD data, but higher at 67.5 years using regional data. Regardless of exact numbers, all illustrate the point that fossil fuels are limited resources. Therefore, while we will continue to make use of fossil fuels, and additional resources may be discovered, we should likely be incorporating more renewables to satisfy future demand.

Exhibit 15: Estimated fossil fuels reserve/production ratio data – three calculations



Source: British Petroleum Statistical Review, 2014, and Edison Investment Research

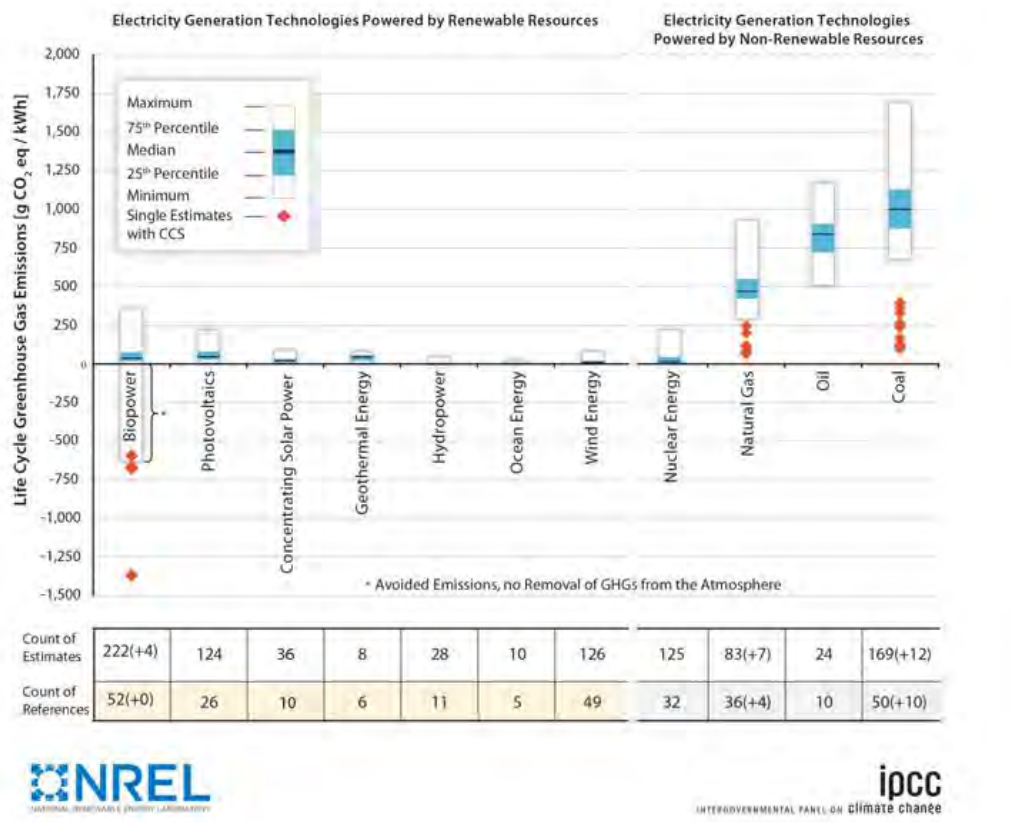
Renewables tend to be cleaner and have less environmental impact

Although every technology affects the environment, renewables tend to have less impact than some traditional fuels. The way researchers evaluate total environmental impact (cradle to grave) of any product or service is to consider life cycle analyses (LCAs), which look at not just GHG emissions, but other pollution and resource impacts (eg, water usage). Shown below is an IPCC chart reviewed by the National Renewable Energy Lab (NREL), which considers a variety of different LCAs over 30 years. One main finding was that total GHG emissions produced by solar (PV and CSP), wind and nuclear were significantly lower than those of fossil fuels. However, the following were also noted:

1. Although not as mature (therefore, not as much data), LCAs run for fossil fuels with "carbon capture" scenario (CCS) fared better, but many renewables still showed lower emissions comparatively;
2. With certain renewable technologies (biomass, hydro), there was variability/uncertainty depending upon land/biomass use and management techniques;
3. Impacts on biodiversity seem to be site specific (eg, birds or sea life with wind or wave technologies); and
4. Availability of water is likely to be an issue in terms of future energy technology choice, and while traditional power plants may be affected most, nuclear, hydropower and others are also dependent upon water.[28]

[28] IPCC, 2011: Summary for Policymakers. IPCC Special Report on Renewable Energy and Climate Change Mitigation [O. Edenhofer, R. Pichs-Madruga, et al.], Cambridge University Press, Cambridge, UK, and NY, NY, USA, www.ipcc.ch/pdf/special-reports/srren/Summary%20for%20Policymakers.pdf, pages18-20

Exhibit 16: Summary LCA emissions or renewable and non-renewable technologies

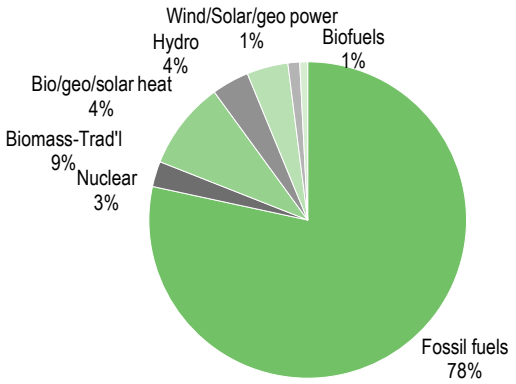


Source: IPCC Summary for Policymakers, 2011

Global renewable market share

Although, as of the writing of this report, the EIA is still tabulating information for 2012, it estimates that, for 2011, renewables represented approximately 22.8% of total electricity consumption (4,402bn KWh of 19,298bn KWh).[29] In 2012, renewables appear to represent approximately 19% of total energy consumption; and while traditional biomass made up 9% of this, hydro, solar, wind and geothermal made up the balance of 10%; nuclear was 2.6%, with the bulk, 78%, still being comprised of fossil fuels.[30]

Exhibit 17: Estimated 2012 global energy consumption by fuel mix



Source: REN21 2014, page 21

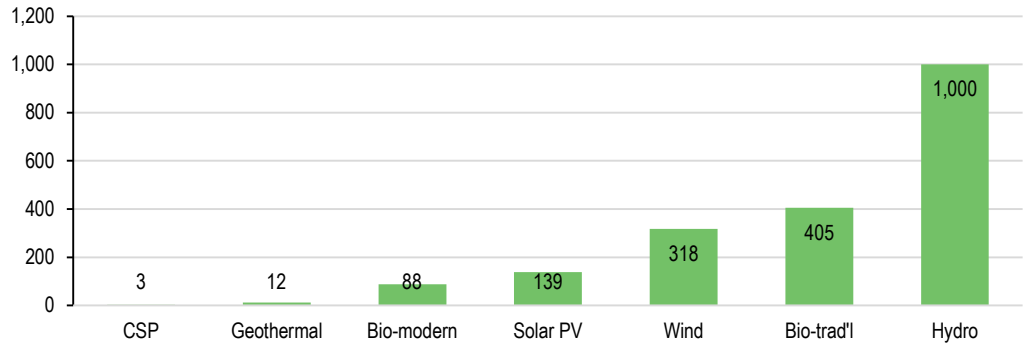
[29] EIA, International Energy Statistics www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=6&pid=29&aid=2

[30] REN21, 2014, Renewables Global Status Report, Paris:REN21 Secretariat, page 21.

Global renewable investment and capacity

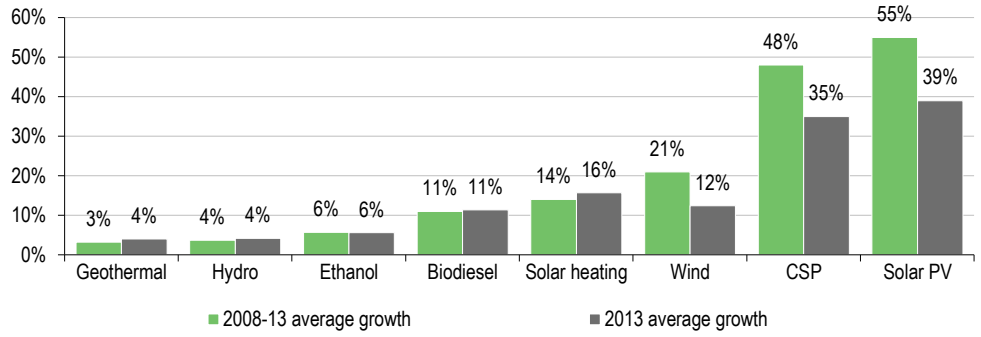
According to Bloomberg New Energy Finance, new global investment in renewable power and fuels was almost $250bn at the end of 2013, up more than six times an estimated $40m 10 years ago. Although the most significant growth was seen in the power segment (which rose by 8% to 1,560GW), the heat and transportation segments where renewables are in use has grown as well.[31] A break-out of power segment capacity is shown below, as well as growth rates for the different subsectors. Although hydropower and traditional biomass (wood burning) are still the largest segments of installed capacity, solar and wind have seen the most rapid growth in recent years. While wind added the greatest capacity over the five-year period ended 2013, solar photovoltaics (solar PV), with its five year CAGR of 55%, topped wind for the first time in 2013, in terms of capacity adds. In 2013, renewables accounted for more than 56% of net additions to global power capacity.[32]

Exhibit 18: Estimated renewable power capacity in GWs 2013



Source: REN21data, Edison Investment Research chart

Exhibit 19: Renewable capacity average growth rates (2008-13)



Source: REN21 data, Edison Investment Research chart

World markets

While many are increasingly making use of renewable energy, the top five countries (as of 2013) in terms of *existing* capacity were China, the US, Brazil, Canada and Germany. In terms of new capacity or investment, while China and the US were still numbers one and two, respectively, Japan, the UK and Germany were also adding capacity. China ranks number one in terms of hydropower, wind, solar water heating and geothermal heat; the US was first in biopower and geothermal electric. Germany is still the number one market in terms of installed solar PV, but with China, Japan and the US adding more net new capacity, it will likely not be the leader for long. For more detailed information, see REN21.

[31] Ibid, page 15.

[32] Ibid, page 13.

Regulation

In large part, growth in renewables over the past 10 years has been due to increased country policy targets, feed-in tariffs, renewable policy standards (RPS) and other mandates. Some markets have begun to face more regulatory challenges in terms of uncertainty or declining support. Additional issues include continuing fossil fuel subsidies, incumbent electric utilities concerned about competition and potential grid-related constraints. Nevertheless, many countries, states and cities have put in their own renewable energy targets, plans, projects or signed power purchase agreements (PPAs), which bypass the utilities. Shown below is a summary of global policy initiatives put together by the WorldWatch Institute/REN21.

Exhibit 20: Global policy initiatives (2004 to 2013)

Initiative	2004	2013
# countries with targets	48	144
# countries, states, regions with feed in tariff	34	98
# countries, states, regions with renewable portfolio standard	11	79
# countries, states, regions with tendering	8	55
# countries with heat obligations or mandates	N/A	19
# countries with biofuel obligations or mandates	10	63

Source: REN21 data, 2014 report, page 15

Pricing

Traditional incumbent pricing has been rising: Although markets will vary worldwide, traditional electric utility pricing has been steadily rising, for example, in the US, and is expected to continue as ageing legacy infrastructure is upgraded. For example, the average residential price for electricity per kWh in the US has risen by almost 38% over the past 10 years, from 8.95 cents in 2004, to 12.33 cents in 2014 (rolling-July); for all sectors (commercial, industrial, transportation included), the price is up over 35% from 7.61 cents in 2004, to 10.31 cents in 2014.[33]

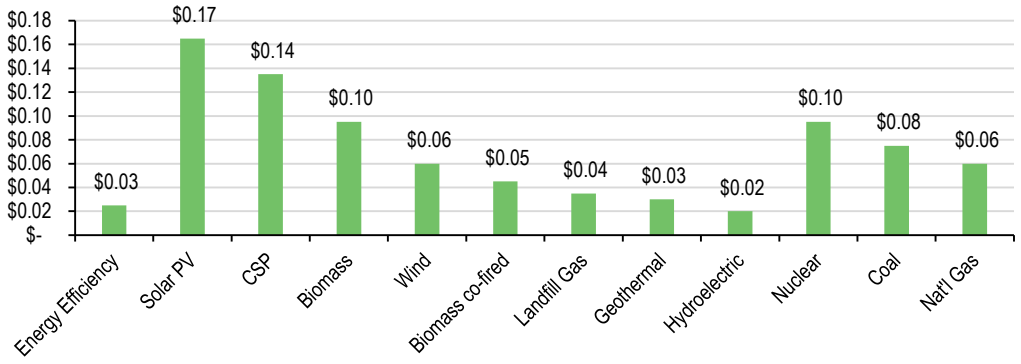
Levelized cost of electricity (LCOE): When most people think about the cost of new technology, they think higher prices. Renewables have been no exception. However, while there is sizable upfront cost to get started, once in operation, there is no fuel cost associated with many renewables. Hence, it is important to consider the LCOE, which takes into account costs over the life cycle of the investment. Combined with past regulatory incentives, the LCOE has fallen considerably, resulting in a significant number of projects being built without public financial support. Although LCOEs are not easy to determine, given different pricing data for various locations, technology and cost of capital, and are likely outdated almost as soon as written, presented on the next page are several charts recreated from information published on several industry trade websites. The first chart includes many different technologies; however, it is from a 2010 analysis done by Navigant Consulting, which appeared on the National Hydropower Association website: www.hydro.org/why-hydro/affordable/. More recently, in September 2014, Lazard put out its "Levelized Cost of Energy Analysis, 8.0".[34,35] This most recent work shows pricing has fallen by 78% and 58% in solar and wind, respectively, over the past five years. While there is no guarantee that the data is accurate, or fits any one company, it does provide context, and suggests that some renewables are becoming quite price competitive with incumbent power providers.

[33] EIA, Electric Power Monthly with data for July 2014, table 5.3, page 118, www.eia.gov/electricity/monthly/pdf/epm.pdf

[34] Available on SEIA, www.seia.org/sites/default/files/resources/Levelized%20Cost%20of%20Energy%20-%20Version%208.0.pdf#overlay-context=research-resources/lazards-levelized-cost-energy-analysis-v80

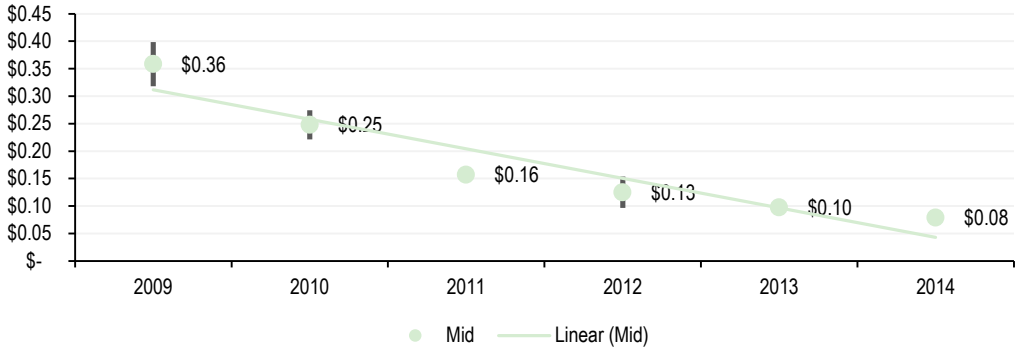
[35] AWEA, http://aweablog.org/blog/post/falling-costs-for-wind-and-other-top-5-takeaways-from-new-wall-street-report

Exhibit 21: Estimated LCOE various power types $KWh – Navigant Consulting Data, 2010



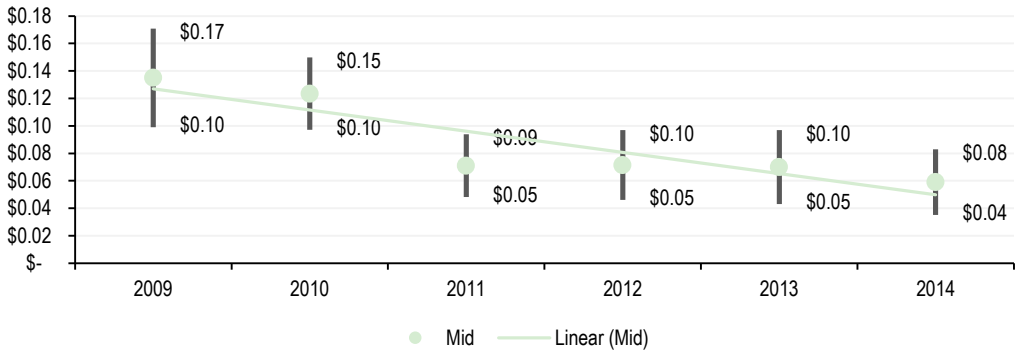
Source: Navigant Consulting Data from Nat'l Hydropower Association, Edison Investment Research chart

Exhibit 22: Estimated LCOE for solar (2009-14) $KWh, Lazard 8.0 data from SEIA



Source: www.seia.org

Exhibit 23: Estimated LCOE for wind (2009-14) $KWh, Lazard 8.0 data from AWEA



Source: Data adapted from www.awea.org, chart Edison Investment Research

Good progress *has been* made in global renewables

So, just when you thought all was lost after reading about climate change, it is clear that many countries, cities and companies are making good progress with alternative energy and renewables. Hence, we conclude this section not with questions, or scary charts, but with a few highlights suggesting renewables are part of the answer:

1. In 2013, comprising 72% of all EU electric installations, renewables saw their sixth consecutive year representing the majority of new electric capacity;
2. In 2013, for the first time, China's new renewable power exceeded new fossil fuel and nuclear capacity;
3. Many areas are targeting transitions to 100% renewable energy on some level; some have relatively short time frames; Denmark has banned fossil fuel boilers in new buildings;
4. Following up on recent September 2014 meetings, UN ministers will meet in Peru in December to discuss post-2020 agreement, and pre-2020 action. By March 2015, countries are to submit revised contributions/targets to the UN in advance of the Paris Summit;
5. Carbon tax? One of the subjects up for debate in Paris is the potential for a tax on the carbon content in fossil fuels, versus regulations that would limit power plant emissions, or cap and trade systems. Many have come out in support of such a tax; there are 40 countries that have some form of carbon taxation, and cap and trade has been in practice in the EU for a while now. However, despite his getting up at a UN General Assembly in late September 2014, urging the world to fight global warming, President Obama did not advocate carbon pricing or a tax on carbon. However, the debate is increasing, and there is support from an audience, inclusive of not only people like Jim Hansen, but also supply-side economist Arthur Laffer, former secretary of state George Schultz, The Cato Institute[36] as well as economist Dale Jorgenson, who compares a carbon tax to a "double dividend" (ie, it reduces emissions and provides tax revenues to the government) and even a "triple dividend" for big emitters like China, which are very reliant on coal (and, hence, gain a health benefit).[37] To the extent progress on a carbon tax is made, this would be a major win for renewables in terms of pricing in the externalities of carbon, as well as in leveling the playing field with traditional fuels.

The song remains the same:[38] Renewables can rise

While some may contend renewables will always have too many issues, suffer from political gridlock, or never be mainstream players, we have seen this movie before – think telecommunications, wireless. Turns out, we *did not* all get brain cancer from cell phones; we *did* figure out reciprocal compensation, data, etc. As for political gridlock, we point out the example of the AT&T break-up. The following quote is from Judge Richey's December 1982 opinion, dismissing the US vs AT&T case: "The FCC's introduction of competition in the long-distance market has been and will be …contrary to the best interests of millions of Americans". And John Dulaney deButts, former chairman of AT&T, is quoted as saying "…we couldn't survive this."[39] In fact, competition *did not* turn out to be a bad thing; and AT&T is alive and well – it has just evolved into our "wireless" provider.

[36] B. Ritter, "It's Time to Pass a Carbon Tax," *Wall Street Journal*, 1 October 2014
[37] Jonathan Shaw, "Time to Tax Carbon," [Interview with Dale Jorgenson], *Harvard Magazine*, September and October 2014
[38] *The Song Remains the Same* (1999) [Motion picture on DVD, Led Zeppelin]. USA: Warner Brothers.
[39] S. Coll. *The Deal of the Century: The Breakup of AT & T*, New York: Atheneum, 1986, page 376 and 380

Sub-sector snapshots

In this section, we provide brief snapshots of individual alternative energy/renewable sub-sectors. It should be noted that these descriptions are not comprehensive; and our intention is to follow up in the future with more in-depth, individual sub-sector reports. Each sector is discussed in the context of three main sub-headings (references for sections noted here, in order to avoid some repetition): a) background and technology; b) market[40] and c) positives and negatives.[41] Because solar has three slightly different sub-technologies, we will treat that snapshot in a slightly different manner, by discussing technology and market first for each sub-technology, and then proceed to positives and negatives.

Combined with the prior section, important overall takeaways include the following:

1. No technology is perfect (renewable or otherwise).
2. Different technologies work better in particular markets; so while companies may make statements like, “we like hydro” or “wind is best”, investors need to consider the market where the technology is being deployed. While wind may be best suited for Scotland, solar or geothermal might be the better choice for Arizona and Iceland, respectively.
3. Additionally, different markets offer different value propositions depending upon the incumbent power/energy provider’s pricing. As ageing legacy infrastructure is upgraded, costs of conventional power are expected to rise, and already have.[42] Regulation in individual markets can also be a factor.
4. In addition to varying levels of expertise, diversity of assets, geography, funding capabilities, etc, individual companies may have competitive advantages with regard to other technologies, size, history, relationships, etc. Hence, certain markets might work for one operator, but not another, despite their deploying the same technology.

[40] REN21, 2014, Renewables Global Status Report, Paris:Ren21 Secretariat, pages18-19
[41] Edison Investment Research
[42] EIA, Electric Power Monthly with data for July 2014, table 5.3, page 118, www.eia.gov/electricity/monthly/pdf/epm.pdf

Solar

Dating back to the seventh century BC, when Greeks and Romans first made use of reflecting materials to combat enemies,[43] solar technologies can be classified as either a) passive (meaning the panels sit there and collect the sun's energy), or active (panels can be moved around), b) photovoltaic or thermal, and c) concentrated or non-concentrated. Although it can be centralized or distributed, residential or commercial/utility scale, there are three main types of solar technology, which are discussed below.

Solar photovoltaics (solar PV)

Background and technology

Solar photovoltaics or "solar PV" involves photons (light particles from the sun) falling on solar panels (made from elements like silicon [Si], cadmium telluride [CdTe], copper indium gallium selenide [CIGS] and others), so that electrons are released, and electric current is created (ie, "the photovoltaic effect"). Solar PV systems can be small residential, distributed systems that are less than 20KW, or much larger, centralized utility scale plants that can range from 2MW to 550MW. First Solar is developing the largest solar PV farm in the world, the Topaz Solar project in San Luis Obispo, California. Expected to begin operations in early 2015, and providing power to 180,000 homes, the electricity will be sold to Pacific Gas & Electric.[44] Currently, the largest plant in operation since April 2014, the 290MW Agua Caliente solar PV plant is located in Yuma, Arizona, and was built by NRG. Mid-American Solar, a Warren Buffett subsidiary, now owns 100% of the Topaz project, and 49% of Agua Caliente; NRG retained a 51% share in Agua Caliente. Shown below are pictures of a SunEdison residential rooftop installation, a 16.9MW installation in Oxfordshire, UK, owned by Bluefield Solar Partners, as well as NRG's Agua Caliente Solar PV plant.

Exhibit 24: SunEdison Roof-Top, Bluefield Solar's Oxfordshire, and NRG's Agua Caliente

Sources: www.sunedisonhomesolar.com/; http://bluefieldsif.com/portfolio; http://energy.gov/articles/agua-caliente-worlds-largest-solar-photovoltaic-plant-helps-advance-americas-solar

[43] U.S. Department of Energy, 2011, page 1

[44] www.midamericanrenewablesllc.com/topaz_solar.aspx

Market

By far the largest solar segment, solar PV had a record year, and grew faster than any other renewable segment, adding 39GW in 2013, bringing total installed capacity to 139GW. One third of the growth was seen in China, although Japan and the US also saw strong growth. With competition in the market in recent years, prices have fallen substantially; and in some countries in Europe, solar PV is beginning to play a more significant role in electricity generation. New markets are opening in Africa, the Middle East, Asia and Latin America. Utility-scale, corporate and community-owned systems continued to increase, and improvements were seen with solar cell efficiencies.

Concentrated solar power (CSP)

Background and technology

Concentrated solar power (CSP) systems use a mirror, glass, or some kind of reflecting lens to channel sunlight, so as to generate temperatures high enough to drive steam turbines, or engines to create electricity. CSP plants are often hundreds of MWs in size, and can provide wholesale energy to utility companies. Although considerably smaller in terms of installed base than solar PV, one of the distinctive benefits of CSP is that it can be combined with thermal storage, so that the electricity generated by the plant can be used on demand. The US Department of Energy (DOE) recently put out a report, "2014: The Year of Concentrating Solar Power," featuring five large CSP plants coming on line this year, which will sizably increase capacity in the US. Two of the five plants were developed by Abengoa Solar: Solana, a 250MW Arizona-based plant that provides customers with stored electricity even after sunset (pictured below), and Mojave, a 250MW CSP plant near Barstow, California. Also included was NextEra's 250MW, California-based, Genesis plant (shown below); ACS Cobra's Crescent Dunes, a 110MW plant located in Nevada; and the 392MW "power tower" CSP plant developed by BrightSource, with partners NRG and Google.[45]

Exhibit 25: Abengoa's 250MW Solana thermal storage plant and NextEra's 250MW Genesis

Source: DOE and California Energy Commission

Market

Although 2014 has been a big year for CSP additions, the CSP sector is considerably smaller right now as compared to solar PV. Total installs in 2013 were up 36% to approximately 900MW, for a total capacity of 3.4GW. With the addition of the five plants noted above, there will be a further increase in 2014 of almost 1.3GW. The US and Spain remain the market leaders; however, installations are also coming online in the UAE, India and China. There have been more hybrid CSP applications with thermal energy storage continuing to be an important focus. Although there has been market expansion, some companies have chosen to close their CSP operations based on beliefs about competition from solar PV. However, the continuing trend toward larger plants and improved design and manufacturing techniques has led to lower costs.

[45] http://energy.gov/sites/prod/files/2014/05/f15/2014_csp_report.pdf

Solar thermal heating and cooling

Background and technology

Solar thermal heating and cooling systems collect the sun's thermal energy and use it to provide residential and commercial customers with space and pool heating, hot water, as well as cooling. Comprised of a solar collector, insulated piping and a storage tank for hot water, the solar collector gathers heat from the sun, and transfers the heat to potable water. Then, the heated water flows out of the collector and into the hot water tank, and it can be used when needed.

Market

China has been the most active in this segment, accounting for greater than 80% of market share in 2013. Solar water and air collector capacity rose to 330GWth (gigawatts thermal) by year end. Although demand in Europe slowed down, there was some increase in areas like Brazil, where solar thermal water heating is cost effective. Trends in larger systems and use of the technology for district heating, cooling and industrial applications continued. There has been more of an emphasis on quality due to high failure rates associated with poor quality tubing from China. While Europe saw increasing consolidation, some expect development in Greece and India.

Solar positives:

- Free (no fuel cost), clean, low emission technology.
- Renewable, supply not constrained. As long as there is sun, we will have solar energy.
- Very low water usage.
- One of the fastest growing renewable sub-sector technologies.
- Although in the past one of the more expensive renewables, the LCOE of solar PV is estimated to have dropped by 78% since 2009, and now appears competitive with traditional power in certain markets.

Solar negatives:

- Intermittent technology; the sun does not shine at night.
- Can be large upfront capital investment.
- Limited storage options; however, this is changing a bit with CSP and thermal storage.
- Competition has been intense at times; not all players have been able to survive.

Wind

Background and technology

Wind and solar are related. Wind occurs due to the way the sun heats up the atmosphere in an uneven fashion, due to irregularities on the earth's surface, as well as its rotation. Wind patterns are also affected by bodies of water, terrain and vegetative cover. By using the wind to turn blades, which spin a shaft that connects to a generator, wind turbines harvest wind/motion energy (kinetic energy) in order to produce electricity for residential or commercial use.[46] Wind farms can be located either on land or offshore in the ocean.

Market

Although Asia is close behind, Europe remained the top region in wind. Off by nearly 10GW in 2013, versus 2012, the wind sector still added 35GW for a total of 318GW. Keeping things in perspective, wind has had a number of record years, growing by 21% from 2008-13; and the drop was mainly due to a fall-off in the US market. With Latin America as a good example, there are new markets emerging throughout the world. Offshore wind added 1.6GW on its own in 2013, which is noteworthy, given these installations were added in the EU, which has had issues with policy uncertainty, cancellations and downsizing of projects in recent years. Similar to solar, the wind sector continues to see downward pricing pressure and increased competition. However, as noted previously, as prices fall, wind-generated electricity becomes more attractive relative to fossil fuels.

Exhibit 26: Pattern Energy's 152MW wind farm in Spring Lake, Nevada & TransAlta Renewables' 198MW wind farm in Ontario, Canada

Source: Pattern Energy and TransAlta Renewables

Positives:

- Free (no fuel cost), clean, low emission technology.
- Renewable, supply not constrained. Similar to solar, unless the sun shuts down (while it may vary somewhat), even if variable, there will always be a supply of wind.
- Very low water usage.
- One of the faster growing renewable sub-sector technologies.
- One of the more cost efficient renewable technologies. The LCOE is estimated to have fallen by 58% since 2009, making wind cost competitive in some markets.

[46] http://windeis.anl.gov/guide/basics/index.cfm

Negatives:

- Intermittent technology; wind does not blow all the time; can have “bad wind production,” or sometimes, winds can be too strong.
- Large upfront capital investment.
- Limited storage options. Given its intermittent nature, it would be great to be able to store wind power when there is excess; however, sufficient storage options do not yet exist.
- Aesthetics, environmental, maintenance and other issues. Although people have become more used to seeing wind turbines, there is still considerable resistance to them, their noise, shadows, etc, in certain areas. This has been an issue for proposed wind farms off the coast of Massachusetts and New York (Long Island), for example. Further, the presence of windmills can lead to environmental issues such as hurting wildlife, birds and ocean species (if offshore).
- Transport and land issues. Good wind locations can be remote, and not always located where power is needed. Transporting wind energy (particularly due to lack of storage options) remains a problem. Further, wind turbines and farms require a good amount of land, which in certain areas may be problematic or competitive with other land uses.

Hydropower

Background and technology

Although people have likely been using water to help them power activities for thousands of years, the first hydroelectric facility was built in the US in 1882, with Canada setting up a plant in Quebec in 1885.[47] Hydropower works similarly to wind or even a coal-fired plant. In all cases, a power source is made to spin some kind of propeller-like equipment that turns a metal shaft in an electric generator that then produces electricity. So, a wind turbine uses the wind to turn blades; a coal-fired plant uses steam to turn turbine blades; and a hydroelectric plant makes use of falling water to spin turbines connected to a generator that connects to power lines. With hydropower plants, geography inclusive of a considerable water source and drop in elevation is necessary. Hence, they are typically built near large rivers, with a dam built to store water behind it in a reservoir.[48]

Market

With its 22.5GW Three Gorges Dam, China is the world's largest user of hydropower, followed by Canada, Brazil and the US. According to the US Geological Survey, it is estimated that some two-thirds of the economically feasible hydro areas in the world are still to be developed, particularly in Latin America, Central America, India and China. Dwarfing other subsectors in terms of power provided, hydropower generation during 2013 was 3,750TWh. Growth in hydro has been relatively steady for the past few years, with China expanding the most. Growing by 4% to add 40GW, worldwide hydropower capacity was approximately 1,000GW in 2013. Although China added 72.5% of the new capacity (29GW), Turkey, Brazil, Vietnam, India and Russia all added capacity as well. There appears to be a trend toward less new capacity, more consolidation and upgrading of facilities, as well as smaller reservoir, multi-turbine, run-of-river projects. However, hydropower plants range greatly in size from 2.1MW as shown below at Canadian company Innergex's Montmagny facility, to China's 22,500MW Three Gorges Dam. Also shown below is a picture of a 377MW plant operated by Brookfield Renewable Energy Partners in the US. Obviously while these dams offer very different capacities in terms of power offerings, they come with very different potential environmental issues as well.

Exhibit 27: China's 22,500MW Three Gorges and 2.1MW Innergex hydro facility

Source: USGS, http://water.usgs.gov/edu/hybiggest.html and Innergex, www.innergex.com/montmagny

[47] Innergex, www.innergex.com/sources-denergie

[48] US Geological Survey, "Hydropower Electric Water Use," http://water.usgs.gov/edu/wuhy.html

Exhibit 28: Brookfield Renewable Energy Partners' 377MW hydro plant in TN and NC

Source: www.brookfield.com/content/case_studies/smoky_mountain_hydro-36254.html

Positives:

- Clean, low emission technology.
- Not intermittent; can provide power during peak periods of demand.
- Long life (100 years), very reliable technology.
- Proven history, largest renewable market share.
- Hydroelectricity does not "use" water; water is returned to source. Dams can shut gates, conserving water for when demand is higher.

Negatives:

- High upfront costs to build.
- Potential environmental issues, impacts on wildlife; altered river hydrology.
- Can have issues with surrounding communities; floods can occur if mistakes occur with water release; problems are more likely with larger dams.
- Sector is most mature, not growing as fast as other renewable segments.
- Very geography specific. Need elevation, precipitation and water source.
- Can have periods of "bad hydrology" meaning droughts or below average rainfall.

Geothermal

Background and technology

Direct geothermal energy refers to using the earth's energy to heat things, from swimming pools, to agricultural/industrial processes. Additionally, since the 1960s in the US, geothermal has been used to provide electricity. Similar to other power types, geothermal uses heat from the earth to power turbines that turn a generator to make electricity. Similar to the sun's surface, temperatures at the earth's core are very hot, around 9,932°F (~5,500°C); and large geothermal plants make use of underground "reservoirs," which are created when some of the earth's hot water or steam gets trapped under a layer of rock. There are an estimated 42 million MW of power flowing from the earth's interior via conduction (so, effectively, renewable); however, it takes work to get to that supply. In order to find a suitable geothermal reservoir, companies need to do exploratory drilling and testing to see if the appropriate temperatures (usually need around ~200˚F and 700˚F), and permeability (ie, the ability of rocks/solids to permit fluids to pass through) are present.[49]

Market

Geothermal is much smaller in terms of overall market size; approximately 455MW of net capacity came on line in 2013, bringing global capacity to 12GW. Growth was moderately up to 4% from 3% in the 2010-12 period. Although growth is not expected to be that strong, direct use of geothermal energy is estimated at 300 petajoules (PJ) annually as of year-end 2013. Although a portion, 75MW, was due to replacements, in 2013, approximately 530MW of geothermal capacity came on line. Shown below are three photographs of completed geothermal projects. The first is of US Geothermal's Raft River project, which is located on a former DOE geothermal installation in Idaho, about 200 miles south-east of Boise. Purchased in 2002, the plant began commercial operations in January 2008, and power is being purchased by the Idaho Power Company under a 25-year PPA.[50] The second picture is of geothermal operator Ormat's Steamboat complex, located in Washoe County, Nevada. Actually made up of six power plants, Steamboat has a combined capacity of 78MW. Power is sold to NV Energy under long-term PPAs, and is a main source of base power for Reno, Nevada. Lastly, Salton Sea Geothermal Complex (10 facilities), located in Imperial Valley, California, is owned by CalEnergy (another of Buffett's subsidiaries). This 327MW complex sells power under a 30-year PPA to Southern California Edison, and can support 100,000 homes.[51]

Exhibit 29: US Geothermal 13MW Raft River and Ormat's Galeria 78MW Steamboat complex

Source: US Geothermal and Ormat, www.ormat.com

[49] http://geo-energy.org/reports/Gea-GeothermalBasicsQandA-Sept2012_final.pdf
[50] www.usgeothermal.com/projects/1/Raft%20River
[51] www.midamericanrenewablesllc.com/imperialvalley_geothermal.aspx

Exhibit 30 : CalEnergy's Salton Sea 378MW geothermal plant

Source: Center Land Use Interpretation http://clui.org/ludb/site/salton-sea-geothermal-plants

Positives:

- Clean, renewable, technology once in place.
- Not intermittent; very good at providing "base load" power during peak periods of demand.
- Good for both heating and cooling.
- No fuel cost.

Negatives:

- Very geography specific. While, theoretically, it might seem like geothermal could be used everywhere, practically speaking, there are very specific locations where the appropriate kinds of reservoirs can be accessed (that are also cost competitive).
- High upfront costs; exploration and drilling need to be done at each site.
- Can have emissions/environmental issues associated with drilling.
- Can use a good amount of water, and underground reservoirs must be managed.
- Extracting water from ground can cause small earthquakes; however, recent research seems to be able to link the amount of water drawn to number of earthquakes. Hence, larger plants like Salton Sea (near the San Andreas fault) are more of a concern.[52]

[52] Christopher Joyce, "Wastewater Wells, Geothermal Triggering Earthquakes," July 2013, www.npr.org/2013/07/11/200515289/wastewater-wells-geothermal-power-triggering-earthquakes

Wave/tidal/ocean energy

Background and technology

Using energy from the ocean, waves or tides (also known as marine and hydrokinetic renewable energy [MHK]) is still in the early stages of development and roll-out. The technology works as follows: as wind passes over the ocean/sea/water body, energy is exchanged between the wind and water's surface, creating little ripples that cause higher air pressure at the front of the wave (versus back), and the ripples become small waves. The waves then become higher, their wavelengths (distance between two waves) becoming greater. Wind speed, duration and distance determine the amount of energy that can be converted. So, similar to wind, wave power is essentially a form of solar power, but a concentrated form. As energy is concentrated more, a power in excess of 100kWh per metre of wave front is possible.[53]

Market

Although the Ocean Renewable Energy Coalition (OREC, an industry trade group) estimates MHK could potentially provide up to 10% of the earth's current electricity, ocean capacity (most of which was tidal) was approximately 530MW as of year-end 2013.[54] While there may be some growing interest in the UK and France due to government and company interest, this sector is still in the pilot/testing stage, making technology acquisitions and consolidating with strategic partners. Nevertheless, in the US, according to NREL, 78% of electricity is consumed by 28 coastal states, suggesting the technology may make sense here too. While there are not many public companies presently, OREC provides a list of its members, as well as examples of their technologies.

Positives:

- Clean, renewable technology.
- Highly populated, high-energy demand cities tend to be near coasts.
- Available all the time.
- Waves have 800x higher energy density than wind, meaning more energy can be extracted from a given area (ie, less real estate needed).

Negatives:

- Very early-stage technology.
- Geography specific.
- Potential environmental impacts on oceans and seafloor and wildlife disturbance.
- Similar to offshore wind, may have aesthetic, noise issues, or be disturbing to private and commercial vessels.
- Performance drops significantly in rough weather.[55]

53 www.oceanpowertechnologies.com/faq.html
54 www.oceanrenewable.com/2011/03/02/marine-and-hydrokinetic-fact-sheet/
55 www.resolutemarine.com/about/wave-energy

Biomass

Background and technology

Biomass/bioenergy is used in the heat, power and transportation sectors, and can involve direct burning for heat ("traditional biomass," used extensively in developing countries), electricity generation, cogeneration, gasification, anaerobic digestion and biofuels ("modern biomass"). Biomass power refers to the process of burning organic material that generates gases hot enough to turn a generator and produce electricity. It can be considered carbon neutral electricity because it is created from renewable organic waste (dead trees, wood scraps, forest debris, agricultural waste, etc) that would likely wind up in landfills, be burned, or left to potentially start forest fires. It is estimated that over 30 million tons of organic waste (that might slowly emit CH_4 and CO_2 gases), and 68.8 million tons of forest waste are diverted annually because of the biomass industry.

Market

In 2013, biomass energy consumption reached approximately 57 exajoules, 60% of which was traditional, and 40% modern biomass. Heating was the primary usage, with modern rising 1% to an estimated 296GW-thermal. Modern biomass demand is driving increased trade in solid biofuels inclusive of wood pellets. Global bio-power capacity grew by 6% to 88GW, and generation was over 400TWh in 2013, including power generated in combined heat and power plants. In the US, biomass provides 45% of the renewable electricity consumed, and is a $1bn industry with 80 facilities across 20 states. Shown below is Capstone Infrastructure's Whitecourt Power facility, one of the largest biomass operations in Alberta, Canada. Made up of a single turbine and generator, Whitecourt uses wood waste to generate energy, and was the first power generating company in Canada to be certified as "Ecologo," meaning it adheres to highest environmental standards.[56]

Exhibit 31: Capstone Infrastructure's Whitecourt biomass facility

Source: Capstone Infrastructure, www.capstoneinfrastructure.com

Positives:

- Clean, renewable technology.
- Widely available, abundant source of low cost inputs.
- Converts waste to energy, helps to reduce waste.
- Helps to prevent CH_4 and CO_2 from waste that would otherwise decay in landfills.

Negatives:

- Can be energy intensive.
- Land utilization; may compete with other needs for land (corn, soy, etc).
- Needs water.

[56] www.capstoneinfrastructure.com/OurBusiness/PowerInfrastructure/OperatingFacilities/Biomass/Whitecourt

Yield/total return companies

What is a yieldco or total return company?

A relatively new class of stocks, similar in structure to master limited partnerships, “yield companies” (yieldcos) typically represent subsidiaries of independent power, utility or energy companies that have been set up with fully operational assets, and pay out a high proportion of their cash flows as dividends to investors. These cash flows and their associated dividends could be attractive to investors given that they are often secured by power purchase agreements (PPAs), negotiated with utilities or other customers, who have agreed to pay for the power for periods of 10-25+ years on average. Although there are exceptions, the energy assets are often renewable, and there may be tax advantages associated with renewable assets, as is the case in the United States.

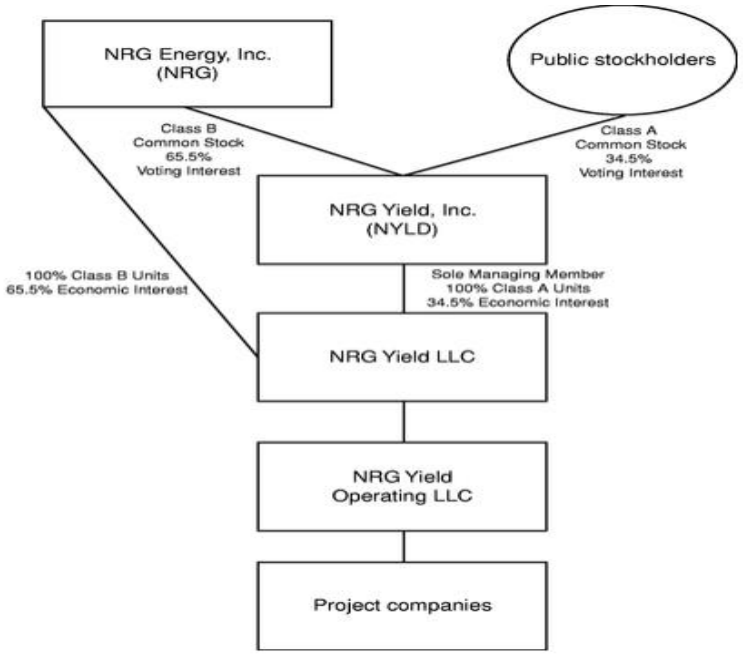
Created for various reasons, these companies generally allow investors to gain exposure to higher dividend yields, as well as the growth-oriented alternative energies/renewables sector.

Some companies profiled herein (and elsewhere) are not “yieldcos,” but include infrastructure businesses, closed-end funds or even finance companies with varying structures. However, their missions, of providing a higher total return based off an underlying portfolio of alternative energy/renewables, are very similar. We refer to these collectively as “total return” companies.

Structure

We will not spend a great deal of time on specific structure, since not all of the companies profiled herein are traditional “yieldcos,” but also include two closed-end funds and a REIT. Although all of the companies have renewable assets, expect to pay out much of their earnings in cash dividends, and generally have secured long-term contracts with utility providers or other customers to buy the power, companies and structures can vary considerably. Investors should consider individual company reports and filings to determine the exact way in which the company is set up. However, the traditional yieldco company structure is often characterized by one in which a parent company or sponsor has spun-out assets into the yieldco to public shareholders (with shareholders retaining Class A common stock), and the parent company retaining some portion in Class B shares. Shown below is a graphic taken from the NRG Yield Company S-1 Registration Statement. The project companies will hold each of the different assets held by the yieldco. With the initial IPO, the yieldco (or fund for that matter**)** will generally have been capitalized with enough equity and debt to either purchase the agreed upon assets held by the parent to be “dropped down,” or for potential future acquisitions. Although structures vary, the following discussion is more pertinent to traditional yieldcos.

Exhibit 32: Sample parent/yieldco structure – NRG and NYLD



Source: Edgar Online Filings[57]

Subsequent to the IPO, the yieldco will typically receive "drop-downs" from the parent in line with the forecasted cash flow available for dividends/dividend schedule.

The "drop-down" structure

Similar to the "drop-down" structure employed by MLPs, a yieldco "drop-down" occurs when the parent sells an asset to the yieldco at an agreed upon price. The price will vary according to specific agreements at the individual companies, but will, typically, be based upon expected cashflows and internal rate of return profile for each project. After the initial IPO portfolio has been "dropped" to the yieldco, the yieldco will typically have an option, termed ROFO (right of first offer), or "Call Right," on subsequent projects. Pipeline and drop-downs are critical to the yieldco's ability to retain its tax benefits and continuing dividend; this is why it is important to have some visibility on the pipeline, as well as an estimate for the average length of PPAs in place.

Reasons it makes sense for both yieldco and parent

We break out summary reasons for why the traditional yieldco/parent structure works for both the company and the parent.

Reasons why the structure is beneficial to the yieldco:

- All costs to find, permit and build the asset, as well as PPA agreements to secure revenues from customers, are often taken care of by the parent.
- Structure is typically immediately accretive to DCF valuation.
- There is an immediate source of cash flow to pay dividends.
- There is visibility on future growth given parent pipeline.
- The yieldco is potentially better positioned, given its strong parent, in negotiating future acquisitions.
- The structure avoids the double taxation often associated with comparable investments like MLPs or REITs; the yieldco passes through most of its earning to shareholders, and is not taxed at corporate level.

[57] http://sec.edgar-online.com/nrg-yield-inc/s-1-securities-registration-statement/2014/06/16/section6.aspx

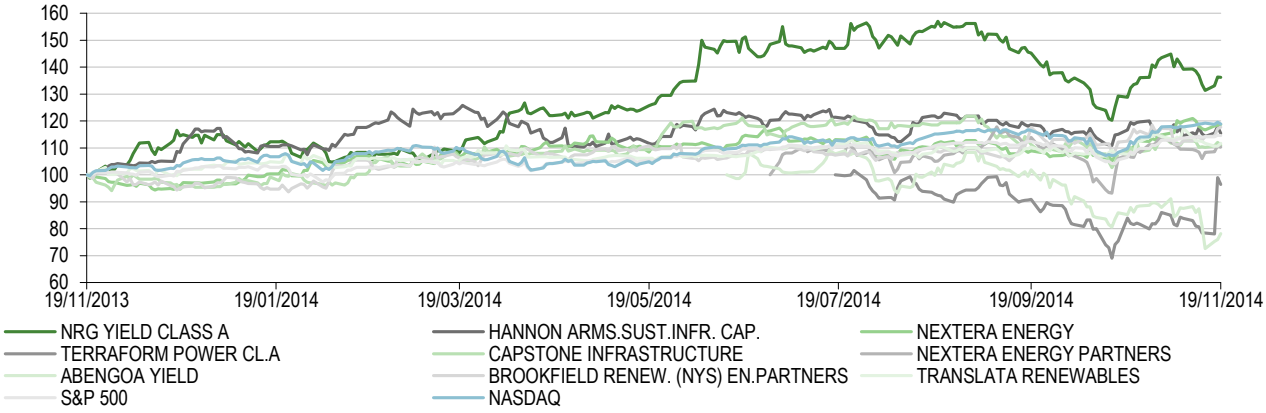
- US Shareholders receive 1099s versus K-1s, which can be attractive to investors.[58]

Reasons why the structure is beneficial to the parent:

- Utilities and independent power producers typically trade on an earnings basis, and command lower EBITDA multiples than what would ordinarily be associated with growth stocks like renewable or alternative energy companies.
- Many parent utility/independent power sponsors look to monetize assets at some point, and yieldcos provide a built-in selling partner.
- The structure generally lowers the cost of capital of acquiring and/or financing projects because instead of issuing equity (via tax equity partners, which can run 8-9%), the yieldco pays a dividend of between 2-5%.

Although volatile, broadly speaking, performance over past year has been good

Exhibit 33: Select yieldco/total return comparison – one-year performance vs S&P 500 and NASDAQ



Source: Yahoo Finance, 17 November 2014

Above, we graph a selection of yield co/total return, and infrastructure companies. After a relatively strong first nine months of 2014, with several yieldcos launching successful IPOs, fourth quarter performance has stalled, based on a variety of factors including seasonally slower third quarters (reported in very late October to mid-November), falling oil prices, and some company-specific events. In some cases, performance has become extremely volatile. As of the writing of this report, NYLD (the first yieldco) led the pack with returns close to 34%, versus most of our selected group showing returns in the range of 6-16%, and the S&P500 and NASDAQ at 14% and 18%, respectively. The exceptions were the two yieldcos that went public most recently, ABY and TERP; however, the trading history here is less than five months. It should be noted that more yieldcos may be coming. SunPower (SPWR), Sempra Energy (SRE) are reputed to be contemplating similar yieldco spin-offs.[59]

Why do we like them?

While there are always risks, the bear case here tends to revolve around this structure being a fad, temporary in nature, depleting assets, more like a high-yield bond. While certainly these concerns have merit, our belief is that depending upon one's investment objectives, and time horizon, which, in many cases, may be quite a bit shorter than the often 12-20+ year PPA agreements some of these companies have secured, these issues may be somewhat mitigated by the potential for

[58] M. Urdanick, NREL, "A Deeper Look into YieldCo Structuring," September 3, 2014, accessed 10 October 2014. https://financere.nrel.gov/finance/content/deeper-look-yieldco-structuring

[59] Tom Konrad, "Five Yield Cos. You May Not Have Heard Anything About," GreenTech Media, September 8, 2014. www.greentechmedia.com/articles/read/five-clean-energy-yieldcos-you-may-not-have-heard-of

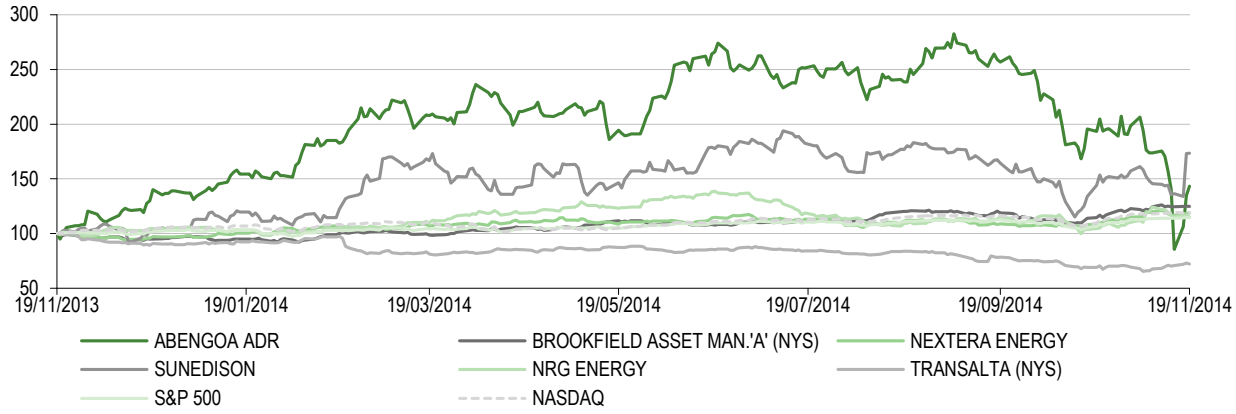
return. Unless one disputes long-term demand trends, believes renewables will not have a growing share in satisfying future demand, or imagines the sun shuts down (not supposed to happen for four billion years[60]), it is difficult to imagine all of these companies will be relegated to buckets of depleting assets.

In addition to simplifying alternative energy/renewables stories, yieldco/total return companies have also: a) validated the sector to a broader group of investors by highlighting cash flow coming from these assets, and paying most of it out as dividends to investors; and b) shifted the discussion away from the need to figure out a patchwork of regulatory scenarios, and their corresponding economic impacts on each subsector. So, while in the very recent past, one could get lost in tomes of industry, financial and academic research analysing these regulatory frameworks and schemes, these companies have simplified the stories, and "shown us the money." As an analogy, by the time we see these "babies," they should have already been cleaned up, diapered, and fed; that does not mean they cannot have any "accidents" along the way, but for now they have taken away some of the guesswork, and provided investors with real dividends.

What about the parent sponsors – why buy the cow?

Because, depending upon investor profile, the herd is often good, and the apple does not typically fall too far from the tree. While the bear case here might include sentiment suggesting the spin-offs are ultimately unattractive to parent sponsors in terms of extra work, expense, just window dressing/why bother, most of the stock charts would seem to indicate otherwise.

Exhibit 34: Select parent sponsor comparison one-year performance vs S&P 500 and NASDAQ



Source: Yahoo Finance, 17 November 2014, company reports and Edison Investment Research

Although more volatile as of late, particularly with regard to Abengoa (ABGB), which had been the top performer in the group until 14 November, public parent company stocks of our selected group have turned in returns over the past year of between 16% and 31%, versus the S&P500 and NASDAQ returns of 14% and 18%, respectively. Canadian company TransAlta (TAC) is the exception, now trading at 52-week lows, and turning in a one-year return of -28%.

Full industry sector models and long-term discounted cash flow analyses is beyond the scope of this report. However, to the extent these parent companies, as a result of spinning off their renewable assets into separate yieldco entities, should have secured lower cost of capital, they may have the potential to see their valuations rise, and also to be able to compete more effectively in the market for projects. Assuming the projects get financed, the parent should be able to drop-down more assets to the yieldco, which benefits the yieldco, not only because it gets more cash available for dividends (CAFD), but may result in the yieldco seeing an enhanced (growth versus traditional utility) valuation multiple. Since most parents maintain a stake in these yieldcos,

[60] NASA, "Ask an Astrophysicist," http://imagine.gsfc.nasa.gov/docs/ask_astro/answers/961107a2.html

intuitively, most would assume that multiple expansion at the yieldco would eventually translate into valuation improvement for the parent as well.

How should we evaluate them?

Although the selection of companies presented in the spotlight section differ somewhat in terms of their history, size, market focus, geographic location and even structure, they all share a focus on renewables or alternative energy, and a mission to provide some form of higher yield/total return to investors.

Given their high yield structure, it should be noted that the market valuation of the whole sector will be affected by interest changes in so far as they affect asset allocation decisions.

While the subsequent spotlight pages are in no way comprehensive, and do not present valuations, management evaluations or in-depth analyses of these companies – all of which should be undertaken by anyone making a decision to potentially consider investing in them – they do provide an overview, an introduction and a sector evaluation framework to consider relevant investment considerations.

Hence, in addition to providing brief company descriptions, strategy overviews, benefits and challenges, as well as brief summaries of dividend/financial information, we also present an overview chart that considers the following at each company: a) current portfolio and pipeline, partners, and/or sponsors; b) PPAs and duration; c) dividend and total return guidance; d) simplicity of story; and e) sustainability/other highlight/challenge.

Investment risks

While there are always risks to any investment, known and unknown, and no list is comprehensive, below are select risks pertinent to this report's discussion.

- **Technology risk:** Depending upon the technology in question, like any young sector, alternative energy/renewable companies have significant technology risk. In addition to potential issues like intermittency (wind, solar), there can be lack of storage options, geographic dependency (hydropower, geothermal, wave), and other technology issues. Additionally, new technologies, advancements or changes in availability of supply of inputs can emerge at any time; all of which may disadvantage or even cause a particular sub-sector or operator to fail. As an example, while opinions may vary on the precise reasoning for its failure, Solyndra was set up with a technology, CIGS, formed in response to a silicon shortage. When the shortage was over, Solyndra was too;
- **Competition:** Although there is significant demand for more energy worldwide, there are also many competitors in the market. Although this will vary by sub-sector, not only is there competition from direct alternative energy/renewables players, there will also be competition from more traditional utility/energy companies that may be in a much better strategic and financial position to compete. Further, competitors may engage in aggressive pricing behaviour that can lead to overcapacity, and affect profitability for all players, for a period of time, until the market adjusts, similar to what occurred with the Chinese and the solar market.
- **Delays. Lack of conviction about the need to address energy supply, GHGs and climate change.** Although the information on population trends, energy needs and GHGs/climate change looks very compelling, there is no guarantee that action will be taken, or that there will not be significant delays in taking action.
- **Weather/seasonality/climate change impacts.** Many alternative energy companies rely on some part of the weather for their businesses. Hence, there can be seasonality, or periods of bad wind or hydrology, etc, that cannot be controlled. Further, climate change has the potential to have many effects, including competition for resources such as water, land and other natural resources, which could have an impact on businesses.
- **Expensive:** New technologies tend to be more expensive until there is greater market acceptance, efficiency and innovation. This has been and may continue to be (for some subsectors) a major reason behind slower adoption of renewable energy. However, as a reminder, not only has pricing fallen considerably in recent years, incumbent power prices have been, and are likely to continue, rising as older infrastructure is upgraded.
- **Regulatory uncertainty:** Regulatory uncertainty can be, has been and will continue to be a significant risk to what has been a heavily subsidized industry. As pricing continues to fall, and subsectors mature, this may become less of an issue.
- **Company-specific risk:** A risk to every company, there can be individual risks related to company-specific business plans, management execution, strategy and other unforeseen risks that can have an impact on companies, funds or other investments.
- **Yield company/structure risk:** Similar to master limited partnerships, high-yield bonds, real estate investment trusts, etc, all of the companies mentioned herein have structural risks, and may not be able to secure assets, generate cash flows or pay dividends for any number of reasons, either related to the industry or their own businesses. Some of them may be subsidiaries of parent companies, or even if independent, have other companies that have significant influence over their businesses.
- **Yield company/subsidiary company governance risk:** Many of these companies are majority-owned subsidiaries of parent companies, have similar management teams, or may

have other companies that execute significant influence over their businesses. Although in most cases companies have attempted to negotiate symbiotic relationships that will be beneficial to both, there is always the risk there will be friction between parent and subsidiary. Although there are agreements in place pertaining to dropdown pipelines, the potential exists for there to be more influence or pressure exerted on the subsidiary or yieldco to take certain assets at certain times, prices, etc. Further, they may only offer combined conference calls, less access to management, and less information.

- **Yield company/total return project risk:** All of the companies profiled herein need to continue to secure cash generating assets in order to pay their dividends. There are no guarantees that this will continue to happen or for how long; they may not be able to secure assets, generate cash flows or pay dividends for any number of reasons, either related to the industry or their own businesses. Specific to yieldco/subsidiary companies (anyone who works with the "drop-down" concept), there is no guarantee that ROFO pricing will continue to be attractive to both parties. Specific to all companies herein (more so with companies without parent sponsors), there is no guarantee that there will be attractive projects available; further, there are no guarantees that projects will be completed on time, not have problems, nor cost more than anticipated, etc.
- **Yield company glut/lack of differentiation over time:** There is the chance that as more yield companies go public, there will be less differentiation among them. Certain parent companies may look to spin-off more assets into separate yieldcos, which also may result in increased competition for investor attention.
- **Yield company/total return ability to negotiate long-term PPAs with customers:** Although many of the companies herein have managed to secure long-term PPA agreements with specific utility companies to take power at set rates, there is no guarantee this will continue at attractive prices to the yieldcos.
- **Interest rate risk and ability to satisfy debt covenants:** Given their high yield structure, it should be noted that the market valuation of the whole sector will be affected by interest changes in so far as they affect asset allocation decisions. Further, as with all companies, but particularly those with sizable debt loads, rising interest rates would not only mean increasing weighted average cost of capitals (which, in turn, hurt valuations), it might also impair ability to acquire projects, lower cash flow, which would mean decreased ability to pay future dividends, and lead to possible issues with debt covenants.
- **Political uncertainty and currency risk:** There is always the possibility that certain parts of the world become more unstable, and/or there is currency risk associated with international investments. While many of the companies take measures to lower these risks, either through targeted locations of operations or through contracts hedging currency risks, these are issues faced by any global company.
- **Potential for extreme volatility, particularly with shorter history, thinly traded stocks.** Although all investments have the potential for volatility in terms of price movements, many of the companies in the renewables/alternative energy sector have only traded publicly for a relatively short time period (some less than six months), and are thus more likely to see extreme volatility in terms of price performance. Additionally, some of the stocks within this sector, as well as several of the companies profiled herein, are very thinly traded, making them more susceptible to extreme volatility when there are specific company or overall industry-wide events or announcements.

Company profiles

EDISON

Abengoa Yield PLC

Industrials

Innovative, sustainable technologies and yield

Recently public as of June 2014, and formed to be the renewable energy vehicle of parent company Abengoa (ABGB), Abengoa Yield (ABY) is an international, clean-tech yield company with assets across North and South America and Europe. ABY owns 11 properties, five of which are 891MW of renewable energy assets, 300MW of which are conventional power assets, and several electric transmission facilities, which comprise 1,018 miles of electric transmission. Despite increasing Q3 EBITDA 103% year-on-year, and raising both dividend and CAFD guidance through 2016, ABY's stock has come under a great deal of pressure recently, given concerns about parent company debt levels, and classification of debt at its private subsidiary company Abengoa Greenfield.

Company overview

Incorporated in 2013 and headquartered in Brentford, UK, ABY was set up to be the primary vehicle through which parent company and majority shareholder (~ 65% owner) ABGB plans to own, manage and acquire renewable, conventional, electric transmission and other contracted revenue generating assets throughout Arizona, California, Peru, Brazil, Chile, Mexico, Uruguay and Spain. Already with some of the world's largest concentrated solar plants, ABY also has a very substantial pipeline of 2GW of additional projects likely to be dropped down from ABGB, a leader in innovative technology and sustainability solutions.

Abengoa (ABGB) and company strategy

Headquartered in Seville, Spain, parent company ABGB is an international, engineering and construction firm with $10bn in revenue and 25,000 employees. Providing innovative solutions, ABGB's proprietary enzymatic hydrolysis technology turns crop residue ("second-generation biomass") into sustainable cellulosic ethanol at its next-generation Hugoton, Kansas, biofuels plant, a facility capable of producing 25 million gallons annually. Incorporating a technology that allows power to be generated at maximum capacity for six hours without the sun, ABY's 280MW Solana facility is the largest concentrated solar parabolic trough plant in the world, benefiting from ABGB's award-winning energy storage technology. With a focus on proprietary technology and sustainability, ABGB is also doing specialized work with hydrogen. Although ABGB and ABY have close relationship, ABY has the option to look at third-party acquisitions; and ABY reiterated that ABGB has no claim on any of ABY's assets once they are dropped down.

Consensus estimates

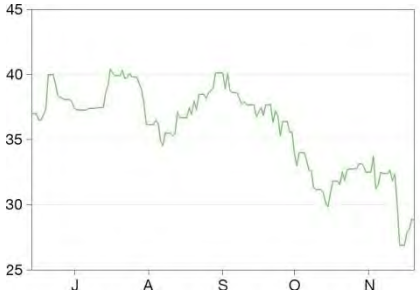
Year end	Revenue ($m)	CAFD ($m)	EPS ($)	DPS*** ($)	P/E (x)	Yield (%)
12/13*	210.9	N/A	(0.04)	N/A	N/A	N/A
12/14e*	397.7	N/A	(0.30)	1.04	N/A	N/A
06/15e**	575.8	106	1.27	1.20	22.6	4.1
06/16e**	N/A	(163)	N/A	1.84	N/A	6.4

Source: Bloomberg consensus estimates and company reports. Note:*Fiscal year end December; **12 months at 06/15e and 06/16e reported to reflect mid-year IPO. ***Annualized run-rate for dividend.

Price	**$28.73**
Market cap	**$2.4bn**

Priced as at 20 November 2014

Share price graph



Share details

Ticker	ABY
Listing	NASDAQ
Shares outstanding	82.5m
Net debt ($) as at September 2014	2.2bn
Debt to assets	67.3%

Business description

Abengoa Yield (ABY) owns solar, wind, conventional power and electric transmission line contracted assets in North America, South America and Europe.

Benefits

- Has access to parent company existing and future portfolio of diverse high technology solar, bioenergy, hydrogen and water.
- Significant duration on PPAs – average life is 25 years; big pipeline of drop-down projects (eight planned for 2015 and 2016 so far).
- Separate management team, separate conference call; increased dividends, CAFD targets.

Challenges

- Questions pertaining to ABGB's debt levels, and accounting for non-recourse debt called into question; overhang could continue.
- 64% parent-controlled subsidiary. Some concern on Q3 call about drop-down pricing and ABY's cost of capital.
- Thinly-traded stocks. Parent lock-up ends 9 December 2014.

Analyst

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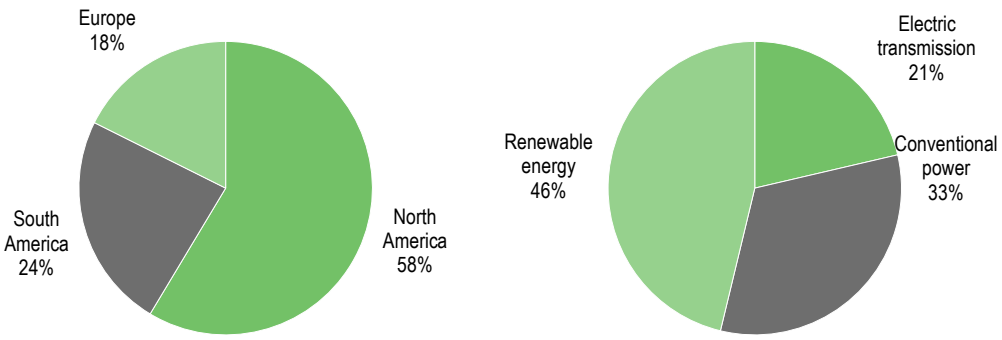
Underlying asset exposure

Although the mixes will shift over time, and the company expects its pipeline to be refilled and expanded much beyond its initial eight projects, shown below are the approximate geographic and technology mixes of the 2GW pipeline in terms of adjusted EBITDA (not including the Mojave project) as per the company's latest 10Q.

Exhibit 1: ABY's geographic and technology mix in terms of adjusted EBITDA at 30 September 2014 (as per 10Q-does not include Mojave property)

Geographic adjusted EBITDA mix | **Technology adjusted EBITDA mix**



Source: ABY and Edison Investment Research

Financials

For Q314 and the nine months ended 30 September, ABY reported adjusted EBITDA of $89.3m, and $226.4m (up 103% year-on-year), respectively. Q314 operating cashflow was reported at $67.5m, and CAFD was $28.1m. The company also announced a full-quarter dividend of $0.2592, which corresponds to $1.04 on an annualized basis (FY December 2014). Additionally, ABY raised its CAFD guidance from $92m to $106m for the 12 months post IPO (June 2015); and from $150m to $163m for the second 12 months post IPO (June 2016). This corresponds to annual dividends per share of $1.20 and $1.84, and current dividend yields of 4.1% and 6.4%. Price to book value per share is 1.25x. Although there was a concern on the Q3 call that the spread between future pricing on drop-downs from ABGB, and ABY's increasing cost of capital could narrow, ABY intends to pursue only transactions that are accretive to CAFD, and can seek third-party acquisitions as well.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio & pipeline, partners or sponsors	**	Diversified across renewables, conventional power and electric transmission line; while renewables platform is currently mostly solar, holdings are some of largest in world. Additionally, pipeline from parent is 2GW of diversified assets spanning wind, water and biomass.
PPAs' duration	***	Some of the longest negotiated PPAs in group, with 25 years on average.
Dividends and/or total return guidance	**	Current dividend yield is 4.5% and 6.8%, based on estimates for one year and two years post June IPOs. Also increased CAFD guidance for those years as well.
Simplicity of story	*	Although sub's story appears well-articulated, issues with parent or other subsidiaries, like Abengoa Greenfield, could affect market perception.
Sustainability, other highlight/challenge	**	Very innovative technologies deployed by parent; sustainability focus.

Source: Company reports, Edison Investment Research

EDISON

Brookfield Renewable Energy Partners

Industrials

Largest, premier pure-play hydro and wind

With $19bn in assets under management (AUM), Brookfield Renewable Energy Partners (BEP) is one of the largest public pure-play renewable power businesses in the world. With 6.7GW of capacity, spanning 234 generating facilities, across 13 markets in five countries, BEP has a dominant position in the hydroelectric market involving 72 river systems. BEP has a 4.8% dividend yield and a strong liquidity position, and intends to build 500-750MW of a 2GW pipeline at 15-20% returns without needing to issue new shares.

Company overview

Based in Hamilton, Bermuda, and founded in 1999, BEP operates 6.7GW of renewable power business spread over three continents including North America, Latin America and Europe. A subsidiary of Brookfield Asset Management (BAM), BEP operates 204 hydro, 28 wind and two natural gas facilities, and has seen its capacity grow at a 25% CAGR over the last 15 years, resulting in a 22% CAGR in funds from operations in the same time period. Diversified across 72 river systems and 13 power markets in the US, Canada, Brazil and Ireland, the portfolio's output is sold mostly under long-term contracts, and generates annual electricity to power an average of more than three million homes.

Brookfield and company strategy

BEP is part of the very sizable Brookfield Asset Management company (BAM), which also owns Brookfield Infrastructure Partners (BIP) and Brookfield Property (BPY). BEP has a very disciplined, consistent value strategy of buying underpriced assets, integrating them into operations, leveraging them to grow cash flow and monetizing. BEP believes demand trends for renewables are positive based on rising gas prices, contracting supply in terms of coal and oil plant retirements, as well as nuclear shut-downs. Although BEP intends to build out 500-750MW of its 2GW pipeline (which has the potential to add $140m in incremental funds from operations [FFO] by 2019), it will also consider solar as pricing continues to fall further in that sector.

Consensus estimates

Year end	Revenue ($m)	EBITDA ($m)	FFO* ($m)	EPS ($)	DPS ($)	P/E (x)	Yield (%)
12/13	1,706	1,208	594.0	0.42	1.45	72.0	4.5
12/14e	1,807	1,269	N/A	0.53	1.55	60.8	4.8
12/15e	1,900	N/A	N/A	0.64	N/A	50.4	N/A
12/16e	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Bloomberg consensus and company reports. Note: *Funds from operations.

Price	**$32.27**
Market cap	**$8.8bn**

Priced as at 20 November 2014

Share price graph

Share details

Ticker	BEP
Listing	NYSE, TSE
Shares outstanding	272.9m
Net debt ($) as at Sept 2014	7.1bn
Debt/assets	38%

Business description

A listed partnership of BAM, Brookfield Renewable Energy Partners (BEP) operates 6.7GW of predominantly hydro and wind assets spread across North America (5.7GW and $15bn AUM), Latin America (670MW and $3bn AUM), and Europe (330MW and $1bn AUM).

Benefits

- Premier powerhouse of hydro and wind renewables, 6.7GW with another 2GW in development pipeline.
- Proven track record with buying undervalued assets and turning in an average of 16% pre-tax, annualized total return since inception.
- Strong balance sheet and significant liquidity; investment grade issuer with 36% debt to assets ratio. Significant free cash flow and $100m retained annually.

Challenges

- Significant concentration of hydro and wind assets in areas that face unpredictable seasonality. Q3 results considerably below long-term averages in wind (in US and Canada) and hydro (in Canada).
- Although fully-hedged out 18-24 months in its Canadian and European markets, BEP has currency risk (about 15% of portfolio) in Brazil.
- While it seeks PPAs, it looks to benefit from lower-priced generation, hence may see more upside, but potentially greater volatility with cash flows.

Analyst

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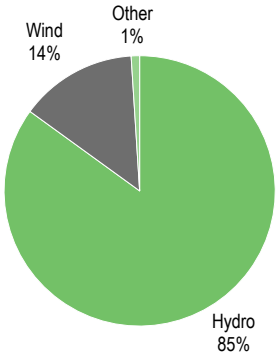
Underlying asset exposure

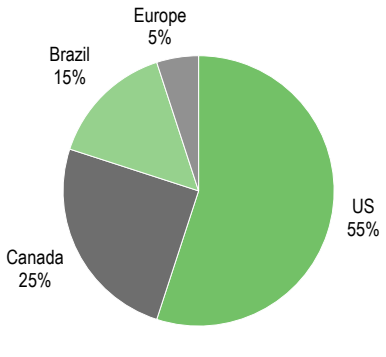
BEP notes more than one-third of total 451GW hydro capacity is still in private hands. Of the estimated $340bn market,[1] BEP has targeted $15bn (5%), or 8,000-10,000MW, of identified opportunities from utilities, industrials and financial sponsors looking to exit or recycle capital into core businesses. Although it believes substantial opportunities exist in current markets, BEP will consider future opportunities in Colombia, Peru and Mexico.

Exhibit 1: BEP's current technology and geographic mix in MW as of November 2014

Technology mix



Geographic mix



Source: BEP and Edison Investment Research

Financials

BEP reported adjusted EBITDA in Q314 of $223m versus $260m Q313 and $360m sequentially. FFO were $61m versus $108m in Q313, and $198m sequentially. Although seasonally the weakest quarter, BEP's Q3 saw wind production off substantially, down 24%, in US and Canadian markets; similarly, hydroelectric generation was down in Canada by almost 24%; US was also down from Q313, but slightly above the long-term average. Although Q314 results were below expectations, BEP still believes its adjusted EBITDA target is achievable given strong H1 results. Fully hedged on currency exposure for 18-24 months in Canada and Europe, BEP does have some exposure in Brazil, representing about 15% of portfolio assets. BEP continues to make good progress on Ireland and Brazil projects, and recently raised distribution guidance to 5-9% annually, which it sees as achievable even without M&A. BEP targets 12-15% long-term total return on a share basis. Its liquidity position is still strong at $1.1bn. The current dividend yield is 4.8%. Price to book is 3.19x.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio and pipeline, partners, or sponsors	**	Although mostly hydropower and wind, BEP is also one of the largest public renewable companies with a dominant position in hydropower. Parent Brookfield Asset Management has $200bn under management, and $16bn of capital to deploy.
PPAs' duration	**	Although it seeks PPAs, it also looks to find pricing opportunities. BEP recently acquired 2m MWh of annual generation, which could generate an additional $80-100m in upside.
Dividends and/or total return guidance	***	The dividend is 4.9%, and the company believes it could see additional $200-270m in FFO by 2019; it recently raised its annual distribution growth target to 5-9%; and reiterated its goal of a total return for shareholders of 12-15% over the long term.
Simplicity of story	**	Story and strategy well-articulated, but lots of moving parts.
Sustainability, other highlight/challenge	***	Good history of successful value strategy and strong returns. Strong scale, liquidity, position, sustainability focused.

Source: Company reports and Edison Investment Research

[1] Using company estimate of 170,000MW total capacity at $2m per MW.

EDISON

Capstone Infrastructure

Industrials

Diversified clean energy trading below book

Capstone Infrastructure (CSE) is a seasoned Canadian infrastructure company with strong asset portfolio diversity. It has a 7.3% dividend yield, and currently trades below book value of C$4.84 per share. With good diversity across its C$2bn portfolio comprising wind, hydro, biomass and solar power, CSE also has exposure to gas cogeneration, district heating in Sweden and a water utility business in the UK.

Company overview

Formerly known as Macquarie Power and Infrastructure Corporation up until April 2011, CSE is headquartered in Toronto, Canada, and is focused on developing, acquiring and re-powering clean electricity generation projects in North America. Although when it went public in 2004 it had only the single Cardinal Gas cogeneration facility, today Capstone has grown its portfolio of infrastructure investments to include wind, hydro, biomass and solar power generating facilities. Capstone's properties now represent approximately 449MW of installed capacity in Canada, a 33.3% interest in a district heating business in Sweden and a 50% interest in a regulated water utility (Bristol Water) in the UK. It also focuses on developing, acquiring, and, in the future, potentially re-powering, clean electricity generation projects in North America.

Company strategy

Capstone's growth strategy is to continue building its portfolio across four key infrastructure categories: power, utilities, transportation and public-private partnerships. In addition to working alongside strategic partners, Capstone attempts to seek out more stable markets and businesses, focusing on OECD countries in North America, the UK, Western and Northern Europe, and it is also looking at Australia and New Zealand as potential markets. Additionally, Capstone looks for regulated, or contractually defined, core infrastructure businesses that can generate stable cash flows throughout the economic cycle, and offer appropriate risk-adjusted returns. Having grown its portfolio to C$2bn in terms of renewables, utilities, and, in the future, potentially, transportation infrastructure, in its Q314 outlook, the company said it expects continuing stable performance from the majority of its power facilities, some growth from Cardinal and the utility businesses, and a full year contribution from its wind power portfolio. At Bristol Water, the focus is on a regulatory decision that is expected on 12 December that will be in place for the upcoming five-year regulatory period. The company will provide 2015 guidance by year-end December after the decision.

Consensus estimates

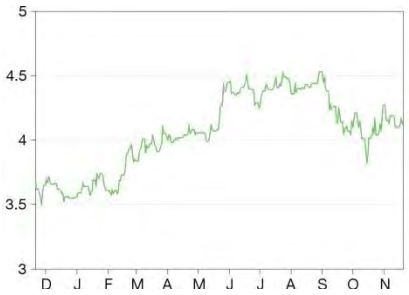
Year end	Revenue (C$m)	EBITDA (C$m)	AFFO (C$m)	EPS (C$)	DPS (C$)	P/E (x)	Yield (%)
12/13	390	128	40	0.43	0.29	9.5	7.1
12/14e	443	150-160*	N/A	0.36	0.30	11.4	7.3
12/15e	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12/16e	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Bloomberg and company estimates. Note: *Company guidance.

Price	C$4.10
Market cap	C$383m

Priced as at 20 November 2014

Share price graph



Share details

Ticker	CSE.TO
Listing	TSE, OTC
Shares outstanding	93.45m
Net debt (C$) as at June 2014	1.07bn
Debt/assets	50.5%

Business description

Capstone Infrastructure develops, acquires, and manages a C$2bn, high-quality portfolio of renewables, utilities and transportation infrastructure businesses in Canada and internationally.

Benefits

- Strong, diversified portfolio of assets, with emphasis on sustainability. According to the company, the Bristol Water investment has good potential for growth, and a full year contribution from the wind power portfolio is expected this year.
- Fully contracted revenues with average life of 12 years; on track with EBITDA guidance of C$150-160m.
- CSE is an independent, infrastructure company trading at 0.87x book value with a current dividend yield of 7.3%.

Challenges

- Bristol Water has an upcoming decision from Ofwat on 12 December. 2015 guidance is somewhat dependent upon Bristol decision.
- Although retrofit seems to be on track and most issues are resolved, there could still be some overhang associated with Cardinal facility.
- High dividend payout on reducing trend.

Analyst

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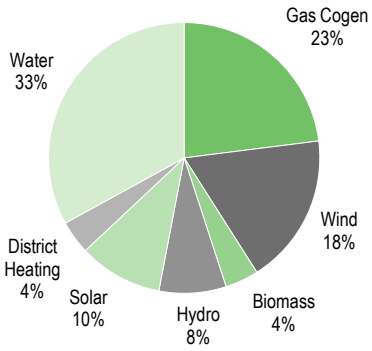
Underlying asset exposure

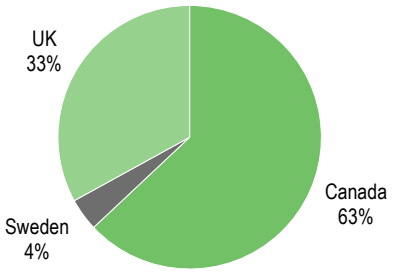
CSE is focused on three geographic locations, Canada, Sweden and the United Kingdom, with diversification across gas cogeneration, wind, biomass, hydro power, solar power, district heating and water as shown below in the 2013 break-out of adjusted EBITDA by geography and business.

Exhibit 1: Business and geographic mix by adjusted EBITDA as at December 2013

Business asset mix



Geographic asset mix



Source: CSE and Edison Investment Research

Financials

Quarterly and fiscal year-to-date revenues rose by 13.9% to C$12.7m, and 16.4% to C$45.7m, respectively, reflecting an increased contribution from Bristol Water as a result of favorable foreign currency translation, higher regulated rates, increased water consumption, and the Renewable Energy Developers transaction, which came on last year. Similarly, quarterly and year-to-date adjusted EBITDA increased by 22.5% and 25.3%, respectively, reflecting higher wind power production, and higher contracted power rates at Cardinal. Adjusted funds from operations (AFFO) increased by 61.9% quarterly and 43.9% year to date, reflecting an increased contribution from the power segment, as well as lower taxes. The dividend payout ratio for Q314 was 134% and ytd was 58%, lower than Q313 of 171%, and ytd 2013 of 66%. During the Q314 conference call, the company reaffirmed prior guidance of expected 2014 adjusted EBITDA to be in the range of C$150-160m. The dividend yield is approximately 7.3%. The company is trading at 0.87x book value.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio and pipeline, partners or sponsors	**	C$2bn portfolio of 24 projects spread across wind, hydro, solar, biomass, gas cogen, district heating and water in Canada, the UK and Sweden.
PPAs' duration	**	100% contracted revenues, 12-year average life on PPAs.
Dividends and/or total return guidance	***	Currently 7.3% dividend yield; trading below book.
Simplicity of story	**	Lots of different businesses, but appears to provide good information.
Sustainability, other highlight/challenge	**	Has a 50% stake in Bristol Water; tries to look at projects that have a sustainable emphasis.

Source: Company reports and Edison Investment Research

EDISON

Hannon Armstrong Sustainable Infrastructure

Industrials

Yield from green investments

Hannon Armstrong Sustainable Infrastructure (HASI) is a specialty finance company/REIT with a broad sustainability focus, strong dividend yield and substantial partners. On 22 October, HASI announced a $144m investment in 10 wind farms owned by a JP Morgan affiliate, raised $115m in fixed-rate debt and upped Q414 dividend guidance by 18%. On 27 October, HASI announced a common stock follow-on offering raising approximately $59m.

Company overview

Headquartered in Annapolis, MD, and formed more than 33 years ago, HASI went public in April 2013 and has since added $1bn worth of transactions to its portfolio. The company's clean energy projects encompass a diverse portfolio of technologies including solar, wind, geothermal, biomass and natural gas. Energy efficiency projects center on reducing building energy usage or cost, via heating, ventilation and air conditioning systems, as well as lighting, energy controls, roofs, windows and/or building components/shells. Other sustainable infrastructure projects relate to water and communications. Partnering with some of the best known companies in each segment (eg, NRG Yield, NextEra, Siemens, Johnson Controls), HASI also recently acquired American Wind Capital Co LLC in May 2014. Although qualifying as a REIT for US federal income tax purposes, HASI is similar to clean energy "yield companies" in that it has a strong underlying portfolio of clean energy assets, and potential, given fully contracted revenues, for sustainable total returns.

Company strategy

In addition to focusing on high credit quality, sustainable infrastructure projects with contracted revenue streams, HASI has reiterated its 2014 priorities, which include: a) focus on growth in distributed energy assets; b) increase leverage and fix-out rates with term debt and asset-backed structures; c) achieve 13-15% EPS growth Q413 to Q414; d) target 20% annualized return to shareholders; and e) target $1bn in assets.

Consensus estimates

Year end	Revenue ($m)	EBITDA ($m)	PBT ($m)	EPS ($)	DPS ($)	P/E (x)	Yield (%)
12/13	24.4	(6.8)	(12.9)	(0.08)	N/A	N/A	N/A
12/14e	29.9	N/A	N/A	0.89	0.91*	15.2	6.8**
12/15e	49.9	N/A	N/A	N/A	N/A	N/A	N/A
12/16e	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Bloomberg, Thompson Reuters, S&P estimates and company reports. Note: *Company guidance. **Annualized run-rate for dividend.

Price	**$13.60**
Market cap	**$352m**

Priced as at 20 November 2014

Share price graph

Share details

Ticker	HASI
Listing	NYSE
Shares outstanding	25.8m
Net debt ($) as at June 2014	369m
Debt/assets	66.6%

Business description

Hannon Armstrong Sustainable Infrastructure (HASI) is a specialty finance company/REIT that provides debt and equity financing for clean energy, energy efficiency and other sustainable infrastructure projects.

Benefits

- Strong, underlying portfolio of clean energy, efficiency and sustainable infrastructure assets.
- Diversification: technologically and geographically agnostic.
- Fully contracted revenues with average life of 12 years.

Challenges

- Complex story; many moving parts. Confusion of company classification – alternative energy/yield play, SRI, finance company, REIT?
- No guidance to date on 2015 earnings, expected in Q414.
- Managing dividend expectations. Presently, HASI is paying out entire EPS in dividends.

Analyst

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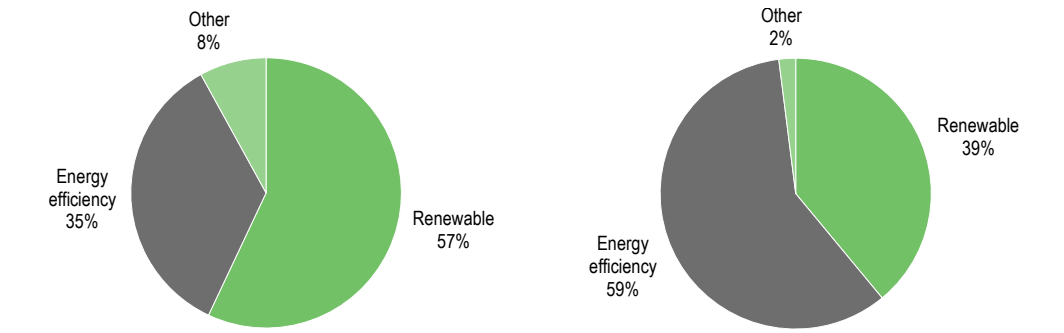
Underlying asset exposure

Since the IPO, the company has closed an additional $1.1bn in transactions, grown its portfolio to over $610m, and expanded the pipeline by $500m to $2bn. Approximately 97% of the portfolio is rated investment grade, and consists of $349m of clean energy (wind and solar), $210m of energy efficiency investments and $51m of other sustainable infrastructure investments.

Exhibit 1: Asset mix of current and pipeline portfolios



Source: Hannon Infrastructure and Edison Investment Research

Financials

During Q314, the company completed $175m in transactions, and invested $144m in 10 wind projects, funded by $115m of nonrecourse fixed-rate debt. HASI reported Q314 core EPS of $0.22, up from $0.14 reported in Q313, and flat sequentially. Year to date, the company has earned $0.64 per share; dividends paid were $0.22 in the quarter, and $0.66 year to date. Although the company is targeting Q4 EPS to be approximately $0.26 per share (20% growth), this would be slightly higher than its stated 13-15% EPS growth from Q413 to Q414. Q414 dividend guidance was increased by 18% to $0.25-0.26 following on from recent wind farm investment. Presently, HASI appears to be paying out more than 100% of its earnings as dividends. The current annualized dividend rate is 6.8%. The price to book value per share is 1.38x.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio & pipeline, partners, or sponsors	**	$610m portfolio; $2.0bn pipeline. Diverse businesses across clean energy, efficiency and other sustainable projects; geographically and technologically diverse (including solar, wind, geothermal, biomass, natural gas, efficiency, water and communication). Strong group of company partners.
PPAs' duration	**	100% contracted revenues, 12-year average life on PPAs.
Dividends and/or total return guidance	**	Currently 6.8%; dividend guidance recently upped by 18% for Q414. Dividend payout currently exceeds earnings.
Simplicity of story	*	Although likely broader investor appeal, story is more complex, REIT, many parts.
Sustainability, other highlight/challenge	**	Sustainability focus; HASI gets paid before operating partners.

Source: Company reports and Edison Investment Research

EDISON

NextEra Energy Partners, LP

Industrials

Premier US wind and solar yieldco

NextEra Energy Partners, LP (NEP), which is 80% owned by NextEra Energy (NEE), closed on its initial public offering on 1 July 2014, raising $438.3m in net proceeds. With an initial portfolio of seven wind and three solar projects, NEP agreed on 30 October to acquire two additional contracted projects in Texas and California, accelerating its drop-down schedule, and expanding its footprint across North America to 1,260MW of clean energy properties. On its 3Q14 earnings call, NEE said it expects to see additional agreements of 600-800MW announced by year end; and adjusted year end 2015 EBITDA and CAFD for NEP of between $400-440m, and $100-120m, respectively. Declaring its first dividend at an annualized $0.75 per share, NEP revised its 2015 dividend guidance upward to $1.13, and expects LP distributions to grow 12-15% for the next five years.

Company overview

Based in Juno Beach, Florida, and 80% owned by NEE, NEP closed on its IPO in July 2014 at $25 per share with an initial wind and solar portfolio of 990MW. Additionally, the company has a right of first offer (ROFO) to acquire an additional 1,549MW from parent NEE, represented by 15 projects, most of which are wind. NEP is the first yieldco to offer incentive distribution rights (IDRs) to its sponsor/general partner. This means that once NEP reaches a certain level of distribution, 50% of the marginal cash will go back to its general partner, NEE. This is a good way to align interests with the parent, and ensure NEP keeps gaining access to projects at reasonable prices.

NextEra Energy and company strategy

Formerly known as FPL Group until 2010, NEE, the largest generator of wind power in North America with a good presence in solar as well, is the parent company of NEP and of Florida Power & Light (FPL), a regulated utility, and third largest electric company in the US. Early into renewables, FPL acquired its first wind power project in 1998, and went on to acquire many other US and Canadian wind projects. NEE has 42GW of capacity across 26 US states and four Canadian provinces, and has a significant clean energy portfolio of 56% natural gas, 24% wind, 14% nuclear and 6% solar/other. NEE plans to become even more renewable focused, with an additional 4.4GW of additional solar and wind, a 40% increase in renewable energy capacity, expected to be completed by 2016.

Consensus estimates

Year end	Revenue ($m)	Adjusted EBITDA ($m)	CAFD ($m)	EPS ($)	DPS ($)	P/E (x)	Yield (%)
12/13	NA	NA	N/A	NA	N/A	N/A	N/A
12/14e*	289	250	87	0.64	0.75	49.6	2.1
12/15e*	462	400-440	100-120	1.08	1.13	43.4	3.2
12/16e	N/A	N/A	N/A	1.43	N/A	N/A	N/A

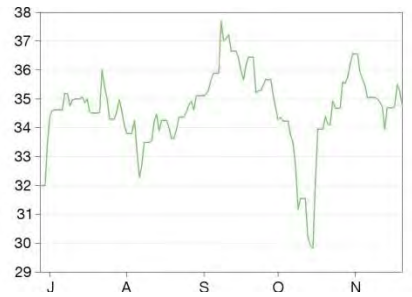
Source: Company guidance for Adj EBITDA, CAFD, & annualized run-rate for dividend; Revenue & EPS information is Consensus from Reuters as of 1 November 2014.

Price	**$34.73**
Market cap	**$649m***

**Public float/share count as noted in 10Q.*

Priced as at 20 November 2014

Share price graph



Share details

Ticker	NEP
Listing	NYSE
Shares outstanding	18.7m
Net debt ($) as at September 2014	1.91bn
Debt/assets	69%

Business description

A subsidiary of NEE, NextEra Energy Partners (NEP) is a dividend-oriented limited partnership that owns and operates wind and solar projects across North America.

Benefits

- Significant, experienced sponsor NEE and affiliates are largest generator of wind power and third largest electric utility in the US.
- Fully contracted revenues with average life of 20 years.
- Offers incentive distribution rights (IDRs) to sponsor, a good way to align interests.

Challenges

- The dividend yield, at 2.1%, is lower than the peer group; however, this is due to strong price appreciation.
- 80% parent controlled subsidiary.
- Competition for projects may heat up.

Analyst

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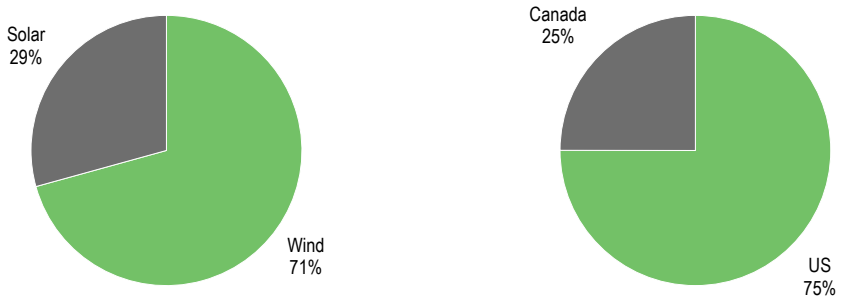
Underlying asset exposure

Although NEP's current asset portfolio is predominantly wind at 71%, versus 29% solar in the US and Canada, NEE made some bullish comments on the price of solar becoming more cost effective, referencing three planned solar PV projects coming online in 2016. Additionally, NEP already owns one of the largest CSP facilities in the world, the 250MW Genesis Plant, a parabolic trough operation located on 1,800 acres in the Sonoran Desert. NEP also announced on its Q314 earnings call that it entered into agreements to acquire two additional properties, Palo Duro, a 250MW wind project in Texas, and a 20MW solar project in Kern County California, both with 20-year PPAs.

Exhibit 1: Asset mix in terms of technology and geography as of July 2014

Technology mix | **Geographic mix**



Source: NEP and Edison Investment Research

Financials

NEP announced Q314 earnings with parent NEE on 31 October 2014. In addition to the two announced acquisitions scheduled to take place in Q115, NEP also declared its first quarterly dividend of $0.1875 per share (annualized $0.75). Further, for the full year 2015, NEP expects adjusted EBITDA of $400-440m, and CAFD of $100-120m, a level that should support an annualized dividend of $1.125 per share. After that, NEP expects 12-15% growth in the dividend (ie, limited partnership distributions) for at least the next five years. NEP reported Q314 CAFD of $27m, (versus $22m in Q2), which it said was in line with expectations, implying $49m year to date, putting it ahead of its $87m annualized run-rate forecast. The current dividend yield is 2.1%, and the price to book value is 1.16x.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio & pipeline, partners, or sponsors	**	Has very strong parent in NEE. Additional pipeline includes 1.54GW of new power potential. Currently not as much diversity.
PPAs' duration	***	100% contracted revenues; 20-25 year average life on PPAs; all creditworthy partners.
Dividends and/or total return guidance	*	Expects price distributions to grow by 12-15% annually over next three years; but current dividend yield of 2.1% is lower than most.
Simplicity of story	**	Story and strategy are well-articulated; still have to consider parent to get entire story; structure is fairly complex – see S1.
Sustainability, other highlight/challenge	**	IDR structure appears to align parent interest (parent IDRs are subordinate to common LP units).

Source: Company reports and Edison Investment Research

EDISON

NRG Yield

Industrials

Diversified, US clean energy yieldco

NRG Yield (NYLD) is 55% owned by NRG Energy (NRG), the largest competitive power company in the US. NYLD is a leading US clean energy, total return investment company, with 32 assets spread across 10 states. With 4.3GW of operating power generation, and another 2.1GW in the pipeline, NYLD owns and operates some of the largest renewable and conventional power, thermal and infrastructure assets in the US.

Company overview

Based in Princeton, New Jersey, founded in 2012, and spun-out as a public company in July 2013, NYLD is a leading, US-based total return investment company. With 32 assets representing capacity of 4.3GW spread across 10 states, NYLD's portfolio includes 19 solar and wind properties (many are utility scale, some distributed), four conventional natural gas facilities, and thermal infrastructure assets with an aggregate steam and chilled water capacity of 1,346 net megawatts thermal equivalent, and electric generation capacity of 123 net MW. The company recently announced the closing of the acquisition of the largest wind farm in North America, Alta Wind.

NRG and company strategy

NYLD is a 55% owned subsidiary of NRG. A Fortune 250 company, NRG owns 54GW of generation capacity at over 147 facilities across the US, and serves three million retail customers in 12 states plus Washington, DC. NRG and NYLD are strategically aligned in terms of NRG Energy's competitive energy platform, which involves a) going green; b) expanding retail; c) enhancing core generation; and d) balancing capital allocation. An exceptionally strong, visible pipeline of 2.1GW of additional assets exists for future dropdown to NYLD, inclusive of some of the largest, premier renewable projects such as Agua Caliente, the largest operating solar PV plant in the world (NYLD owns 51%; MidAmerican Energy owns 49%); and Ivanpah, the largest solar thermal plant in the world (NRG owns 49.95%; Google and BrightSource Energy own 50.05%). The companies have also made significant acquisitions in terms of NRG's acquisition of Edison Mission, and NYLD's acquisition of Energy Systems and Alta Wind.

Consensus estimates

Year end	Revenue ($m)	EBITDA ($m)	CAFD ($m)	EPS ($)	DPS ($)	P/E (x)	Yield (%)
12/13	313.0	244	91	1.50	1.20	31.6	2.5
12/14e	600.8	455*	145*	1.69	1.50**	28.0	3.2
12/15e	863.0	585*	160*	1.80	N/A	26.3	N/A
12/16e	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Bloomberg, company and S&P reports. Note: *Company guidance. **Annualized run-rate for dividend.

Price	$47.36
Market cap	$3.7bn

Priced as at 20 November 2014

Share price graph

Share details

Ticker	NYLD
Listing	NASDAQ
Shares outstanding	77.3m
Net debt ($) as at September 2014	3.5bn
Debt to assets	59%

Business description

A subsidiary of NRG Energy, NRG Yield (NYLD) owns and operates renewable and conventional power, thermal and infrastructure assets in the US.

Benefits

- Premier, diversified, clean energy company; 4.3GW of operational, conventional, renewable and thermal assets; project pipeline includes ~2.1GW.
- Fully contracted revenues with average life of 18 years; strong asset development and acquisition record.
- First yieldco, backed by strong sponsor, NRG, with strong management team and significant deal experience.

Challenges

- Dividend yield at 3.2% is below peer group; however, this follows strong price appreciation.
- Parent controlled subsidiary. Overlap of management; no separate Q314 conference call.
- Cool summer weather affected NRG's (parent) results; lowered Q4 adjusted EBITDA results.

Analyst

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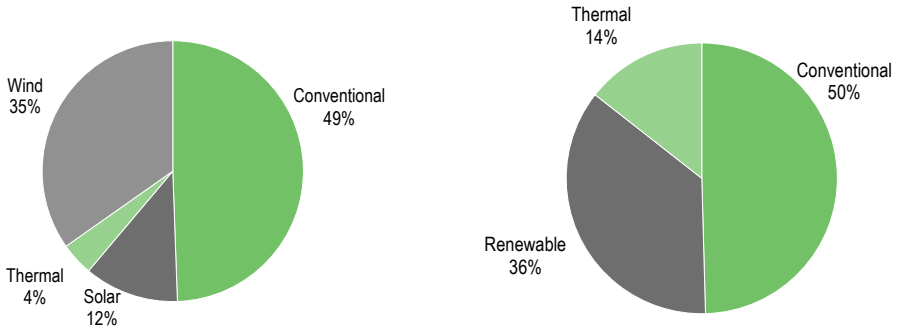
Underlying asset exposure

Although the largest portion of the company's assets and adjusted EBITDA have been derived from conventional fuels, the mix is changing as the company works through its ROFO pipeline, and with the closure of the Alta Wind transaction. Shown below are the current asset mix by generation, and the adjusted EBITDA by source.

Exhibit 1: Asset mix in terms of capacity as of September 2014 and approximate EBITDA

Approximate asset mix by generation, MW*	Adjusted EBITDA by source



Source: NYLD and Edison Investment Research. Note: *NRG Yield Company 10Q, November 2014.

Financials

In Q314 NYLD turned in $140m ($17m from Alta Wind acquisition) of adjusted EBITDA versus $103m in Q313, and $109m sequentially. CAFD was $94m versus $57m in Q313, and $38m sequentially. During the quarter, the company raised and paid its third quarter dividend from $0.35 to $0.365. NYLD also announced that it will increase its dividend again, by 2.7% quarter over quarter, such that the Q414 dividend will be $0.375 per share (or $1.50 annualized, which represents a 25% increase over Q413's annualized $1.20 per share). The company reaffirmed its full year 2014 guidance of $455m in adjusted EBITDA and $145m in CAFD; and initiated 2015 financial guidance of $585m in adjusted EBITDA and $160m in CAFD. The current annualized dividend rate is 3.2%. The price to book value per share is 1.23x.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio & pipeline, partners, or sponsors	**	Has very strong parent in NRG. Very large, diversified portfolio spread over 10 states and 32 projects representing 4.3GW. Additional upside from pipeline projects of ~2.1GW. Company owns and operates some of the largest renewables properties in the US.
PPAs' duration	***	100% contracted revenues, 18-year average life on PPAs; all creditworthy partners.
Dividends and/or total return guidance	***	Recently raised dividend by another 2.7%, up from prior quarter raise of 4.3%; current yield is 3.2%. Stated FY14 guidance is $145m in CAFD. Trading at price to book of only 1.23x. Five-year dividend CAGR target is 15-18%.
Simplicity of story	**	Story and strategy are well-articulated; still have to consider parent to get entire story.
Sustainability, other highlight/challenge	**	Considered to be first yieldco in space; management has significant deal experience.

Source: Company reports and Edison Investment Research

EDISON

Pattern Energy Group

Industrials

Independent wind player expanding to solar

Pattern Energy Group (PEGI) is a pure-play wind operator with 1,472MW of owned capacity, with 11 wind power projects across the US, Canada and Chile. It recently announced that it was increasing its identified ROFO list to seven potential project acquisitions, broadening into solar power and filing universal shelf registrations in the US and Canada. PEGI filed an 8-K on 24 October 2014 concerning non-reliance on Q214 financial information based on some technical/fully-diluted share count errors. PEGI will file amended 10Qs, and has put in place additional financial controls with which its auditors, Ernst & Young, appear to be comfortable.

Company overview

Founded in 2012, and headquartered in San Francisco, California, Pattern Energy (PEGI) is 35% owned by private North American power operator Pattern Energy Group, LP ("Pattern Development" or "PEG.LP"). PEGI owns, builds and operates wind projects throughout the US, Canada and Chile. Of the total owned interests in 11 wind power projects, seven are projects in operation and four are under construction, comprising a total capacity of approximately 1,472MW of electricity sold primarily to local utilities. An additional 3,000MW of right of first offer (ROFO) development pipeline projects have been identified from Pattern Development, including 724MW of near-term growth. Adding three new projects this quarter, PEGI added its first 104MW solar PV project that is being constructed in Chile.

Pattern Development and company strategy

Unlike many of the other yieldcos profiled in this report, PEGI is independent; hence, while there is a "drop-down" relationship for projects, Pattern Development retains only a 35% stake in PEGI. The companies appear to have a more symbiotic relationship, whereby PEGI provides management services to PEG.LP, which, in turn, offers administrative and technical support, as well as access to construction ready projects. Additionally, if and when the market capitalization of PEGI reaches $2.5bn (double the level as of the writing of this report), and remains at that level for a period of 20 days, the companies will reintegrate. For more information, see PEGI's S-1. PEGI's strategy is to focus on low-risk, utility-scale projects; and while to date its business has been comprised of wind assets, PEGI is now venturing into solar. Overall, its strategy is to grow the business via third-party acquisitions, maintain strong balance sheet/liquidity, and provide sustainable cash flow and dividends.

Consensus estimates

Year end	Revenue ($m)	EBITDA ($m)	CAFD ($m)	EPS ($)	DPS ($)	P/E (x)	Yield (%)
12/13	201.6	130.9	N/A	0.26	N/A	99.9	N/A
12/14e	267.4	N/A	N/A	0.24	1.34*	108.2	5.2
12/15e**	365.7	N/A	N/A	1.04	N/A	25.0	N/A
12/16e**	N/A	N/A	N/A	1.11	N/A	23.4	N/A

Source: Reuters, S&P, company reports. Note: *Annualized run-rate for dividend. **Consensus likely to change due to forthcoming Q2 restatements.

Price	**$25.97**
Market cap	**$1.21bn**

Priced as at 20 November 2014

Share price graph

Share details

Ticker	PEGI, PEG.TO
Listing	NASDAQ, TSE
Shares outstanding	46.6m
Net debt ($) as at June 2014	986m
Debt to assets	60%

Business description

Selling electricity to local utilities under long-term PPAs, Pattern Energy Group is an independent power company that focuses on wind projects in the US, Canada and Chile.

Benefits

- Independent pure-play wind operator with 11 wind projects in three major wind markets, and one solar project; may expand further into solar.
- High-quality projects, pipeline. Almost fully (89%) contracted revenues with average life of 17 years with creditworthy counterparties.
- Healthy 5.2% dividend and liquidity of $336m as of Q314.

Challenges

- Pattern Development is a private company. PEGI does not release details until PPA signed; hence, not as much information available on pipeline.
- Accounting issue: 8-K filed on 24 October for non-reliance on Q214 results for three- and six-month periods ended June 2014.
- Although expanding into solar, it is less diverse being mostly wind, and has mentioned increasing competition.

Analyst

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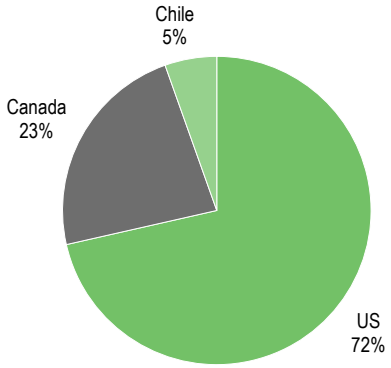
Underlying asset exposure

PEGI recently expanded its list of ROFO projects to seven, with 724MW of total owned capacity. In addition to five ROFO wind projects previously identified, the company also added 50MW of the 100MW Belle River Wind project in Ontario, and at least 73MW of the 104MW Conejo Solar PV power project in Chile. PEGI mentioned it may consider future markets like Mexico and Japan.

Exhibit 1: PEGI geographic asset mix of 1,472 owned MWs as of 31 October 2014



Source: PEGI and Edison Investment Research

Financials

Overall, PEGI felt it had a strong Q3, driven by proportionate electricity sales that were up 94% to 710GWh. Revenue was up 25% to $71.5m, and adjusted EBITDA was up 39% to $44.3m, but lower than $58.8m in Q214 (for wind, Q3 is typically seasonally lower). CAFD was up 73% to $10.9m. As a result, PEGI increased the Q414 dividend by 2% from $0.328 in Q314 to $0.335 per Class A share. Pattern Energy sold 710,325MWh of electricity in Q314, versus 365,766MWh in the year prior. The net loss in Q314 was $9.3m versus net income of $4.2m in Q313. The loss was primarily due to the unrealized losses on interest rate and energy derivatives. The current annualized dividend rate is 5.2%. The price to book value per share is 2.36x. Regarding the 8K filed on 24 October, while PEGI stated it believed errors were not substantive, the filing states that the company has a material weakness in internal control over financial reporting. PEGI stated that it has put procedures in place to correct the deficiency in controls.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio & pipeline, partners, or sponsors	**	Strong partner in Pattern Development. Strong ROFO pipeline, but lack of diversity in asset mix. Further, Pattern Development is private, and does not release detail of projects, pipeline until PPA agreement signed.
PPAs' duration	**	89% contracted revenues; 17-year average life on PPAs; all creditworthy partners.
Dividends and/or total return guidance	**	Recently raised Q314 dividend by 2%; current yield is 5.2%. Growth target of 10-12% in CAFD over three years.
Simplicity of story	**	Independent company; focus primarily on wind makes story easier to understand.
Sustainability, other highlight/challenge	*	Recent accounting issue. However, issues were unrelated to revenue recognition, expenses, and more controls put in place.

Source: Company reports and Edison Investment Research

EDISON

TransAlta Renewables

Industrials

Largest Canadian wind provider

Operating as a 70% owned subsidiary yieldco of parent company, TransAlta (TAC-NYSE), TransAlta Renewables (RNW) is one of the largest publicly-traded renewable companies in Canada. It operates 29 renewable power generation facilities, mostly wind and hydropower, with 1,255MW of installed generating capacity. RNW went public in August 2013, and offers a current dividend yield of 6.6%.

Company overview

Headquartered in Calgary, Canada, and spun-off from parent company TAC as a publicly traded entity in August 2013, RNW is Canada's largest generator of wind power with 1,255MW of net wind capacity, spread across five operating regions in Canada. With 100% of its revenue contracted with investment-grade partners, RNW has PPA agreements in place for an average contract life of 17 years. Having access to much more than 1,000MW, given the recently announced change in drop down strategy from parent (TAC) to include Australian and Canadian natural gas properties, RNW expects C$175-180m in pro forma adjusted EBITDA, and C$86m in estimated annual dividends for year-end 2014.

TransAlta and company strategy

With a 70% ownership stake in RNW, TAC intends to remain majority shareholder, and is an integral part of the yieldco, RNW, strategy. Incorporated in 1909, TAC has over 9,000MW of generating capacity, and operates in Canada, the US and Australia. Its portfolio includes a diverse group of energy assets including coal, natural gas, hydro, wind and geothermal. In addition to strong partnerships at the subsidiary level, TAC has a strategic partnership with MidAmerican Energy to develop, build and operate new natural gas projects in Canada. On its recent Q3 conference call, TAC acknowledged having a difficult quarter that was below expectations, specifically related to Canadian and US coal, and hydroelectric. Consolidated EBITDA was down by 20% to C$232m from C$266m in Q313, resulting in TAC missing consensus estimates. TAC mentioned it continues to see attractive asset opportunities, and will seek to utilize RNW as a financing and investment vehicle. RNW looks for assets with proven operating history, long-term PPA contracts with investment-grade counterparties, as well as familiar technologies and suppliers. RNW closed on its first US asset in December, the 144MW Wyoming Wind project. RNW is considering solar and other opportunities to diversify its business more.

Consensus estimates

Year End	Revenue (C$m)	EBITDA (C$m)	FFO (C$m)	EPS (C$)	DPS (C$)	P/E (x)	Yield (%)
12/13	245.3	N/A	N/A	0.48	N/A	23.9	N/A
12/14e	230.9	175-180	NA	0.42	0.76*	27.4	6.6
12/15e	235.9	N/A	N/A	0.47	N/A	24.5	N/A
12/16e	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Bloomberg, Yahoo Finance, Reuters *Annualized run-rate for dividend.

Price	**C$11.50**
Market cap	**C$1.32bn**

Priced as at 20 November 2014

Share price graph

Share details

Code	RNW.TO, TRSWF
Listing	TSE, OTC-Grey
Shares in issue	114.5m
Net debt (US$) as at September 2014	650m
Debt to assets	32%

Business description

TransAlta Renewables develops, owns and operates renewable power generation facilities, mostly wind and hydro, in Canada. A subsidiary of TransAlta (TAC-NYSE), the company is the largest provider of wind power in Canada.

Benefits

- Strong 6.6% dividend yield.
- Fully contracted revenues with investment grade partners and average life of 17 years.
- Access to capital markets; recently completed secondary offering.

Challenges

- Parent controlled subsidiary, overlap of management team; no conference call.
- Ytd dividend is C$0.58 and ytd EPS is C$0.24 per share. Parent had difficult quarter.
- Depending upon wind production, may be difficult to achieve Q4 estimates.

Analyst

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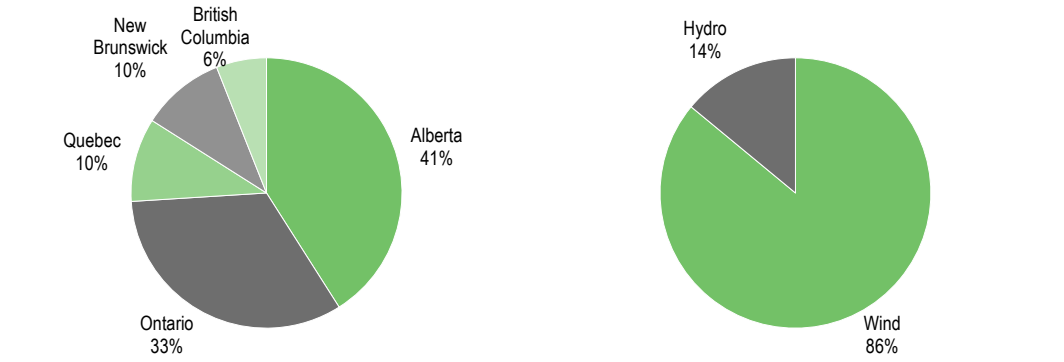
Underlying asset exposure

Spread throughout Canada, RNW's current asset mix is approximately 86% wind and 14% hydro in terms of underlying assets. RNW is looking to expand both its asset and geographic diversity, and has potential acquisitions from TransAlta, which include 813MW of hydro, 99MW of contracted wind and 164MW of geothermal assets.

Exhibit 1: Asset mix in Canada and by power type, 30 September 2014



Source: TransAlta Renewables and Edison Investment Research

Financials

RNW reported Q314 earnings results and upcoming dividend payments, after market close on 31 October. RNW reported Q314 revenues of C$42.6m versus C$43.5m in Q313, and C$50.00m in Q214. EBITDA was reported at C$28.2m versus C$29.1m in Q313, and C$35.2m in Q214. Funds from operations was C$19.6m in Q314 and C$92.9m year to date. Wind in Canada tends to be stronger during the first and fourth quarters. Up until late last year, RNW was not a separate company, hence comparable historical information available is limited. Further, power was previously sold on a merchant basis to other entities; now there are PPA agreements involved with independent partners for generating facilities. Earnings for Q314 were nil, versus C$0.03 and C$0.05 per share in Q313 and Q214, respectively. Similar to Q214, the company paid C$0.19 per share in dividends in Q314, and year to date C$0.58. The current annualized dividend rate is 6.6%. The price to book value per share is 1.31x.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio & pipeline, partners, or sponsors	**	Parent TransAlta should be an asset; however, it missed estimates considerably this quarter. TAC does have strong partners. RNW has 29 portfolio projects, but mostly wind, and almost all in Canada; however, this is changing since first US Wyoming wind acquisition; pipeline also includes geothermal, may look at solar as well.
PPAs' duration	***	100% contracted revenues; 17-year average life on PPAs; all investment grade partners.
Dividends and/or total return guidance	*	Currently 6.6%. Stated guidance was C$86m in annual estimated dividends for Q214. Appears to be paying out significantly more than it is earning in dividends
Simplicity of story	*	Because of close relationship, parent story needs to be analyzed here as well.
Sustainability, other highlight/challenge	**	Lower leverage than most.

Source: Company reports and Edison Investment Research

EDISON

TerraForm Power

Industrials

Stirring up the energy mix with a new recipe

TerraForm Power (TERP) recently completed its IPO, on 23 July 2014, at $25. Its mission is to become the renewable energy leader that changes how energy is generated, distributed and owned. TERP is the yieldco of clean-energy veteran SunEdison (SUNE). A dividend growth-oriented company, TERP has grown its portfolio to operating 646MW, up from a pre-IPO level of operating 322MW (on total 808MW), and visibility on its "call right" pipeline up to 1,637 total MW. Although to date TERP's assets have been mostly solar, TERP and SUNE recently announced their intention to acquire US wind operator First Wind for $2.4bn. Upon closing of this transaction (expected Q115), TERP will add 521MW of contracted, operating wind assets to its portfolio, and another 1.6GW to its call right list, doubling the total pipeline to 3.2GW. TERP will also consider a variety of clean power assets, including natural gas, geothermal and hydroelectricity.

Company overview

Founded in 2014, and formerly known as "SunEdison Yieldco" until May 2014, TerraForm Power operates as a subsidiary of SunEdison, and is headquartered in Beltsville, Maryland. TerraForm Power operates solar and wind generation assets serving utility, commercial and residential customers across the US, Canada, the UK and Chile. After a successful IPO, raising $599m, completion of a 50MW drop-down from SunEdison, and the execution of two third-party distributed generation acquisitions, TERP continues to have $475m in liquidity as of Q314, rising to $665m pro forma the First Wind transaction, based on its being immediately accretive to CAFD. As a result, TERP raised 2015 dividend guidance by 44% to $1.30 per share, and set dividend guidance for 2016 at $1.53 per share.

SunEdison and company strategy

Founded in 1984 as MEMC Electronic Materials, and known as "SunEdison" as of May 2013, the parent of TERP is differentiated in its servicing of major utility companies, and intends "to become the world's largest renewable energy development company." With the First Wind acquisition, SunEdison doubles its total addressable market, adding 8.0GW of total pipeline, backlog and leads. For Terraform, the transaction expands the operating portfolio, doubling TERP's "call right" projects for potential drop-down from SUNE to 3.2GW between 2016 and 2017.

Consensus estimates

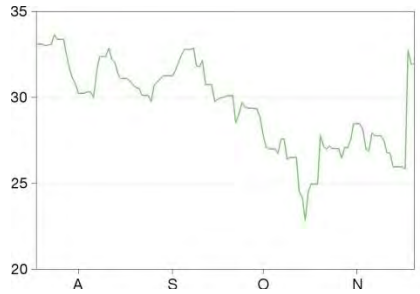
Year end	Revenue ($m)	EBITDA ($m)	CAFD ($m)	EPS ($)	DPS ($)	P/E (x)	Yield (%)
12/13	45	N/A	N/A	(0.50)	N/A	N/A	N/A
12/14e	144	112	N/A	(0.07)	0.90*	N/A	2.8
12/15e	467	360	214	N/A	1.30**	N/A	4.1
12/16e	N/A	N/A	233	N/A	1.53**	N/A	4.8

Source: Bloomberg, Zacks and company reports. Note: *Annualized run-rate for dividend **Annualized pro-forma First Wind transaction

Price	**$31.91**
Market cap	**$3.2bn**

Priced as at 20 November 2014

Share price graph



Share details

Ticker	TERP
Listing	NASDAQ
Shares outstanding	101m
Net debt ($) as of June 2014	1.03bn
Debt/assets	39%

Business description

TerraForm Power (TERP) owns and operates ground mount, rooftop and distributed generation projects throughout the US, Canada, Chile and the UK.

Benefits

- Strong partners associated with both parent and yieldco.
- Contracted revenues, ~ 96%, with average life of 20 years with creditworthy counterparties.
- Solid liquidity of $475m rising to $665m with First Wind acquisition

Challenges

- Stock has not traded as well as others since IPO.
- Lots of acquisitions, moving parts. May be difficult to integrate large number of acquisitions at such a rapid rate.
- Parent controlled ~ 64% owned subsidiary; potential conflict of interest/governance issues.

Analyst

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Underlying asset exposure

Similar to others in the space, there is not significant financial history associated with TerraForm. Hence, it is important to focus on the potential of its underlying assets, the ultimate driver of its CAFD and dividends. TERP is actively acquiring assets. In addition to First Wind, a Boston-based wind operator with 1.3GW of projects servicing 425,000 homes in the Northeastern and Western US and Hawaii, TERP recently acquired the Mt Signal solar project in July 2014 with SUNE; in September, Google made an equity investment of $145m in Regulus, TERP's and SUNE's largest solar plant based in California. In Q314, TERP announced another 103MW of distributed solar assets acquired through third parties. Most of TERP's assets will be located in the US. Shown below is the estimated breakout of solar and wind assets expected as of January 2015 when the First Wind Transaction is expected to close.

Exhibit 1: TERP asset mix at IPO versus pro forma First Wind transaction (Q115)

Source: TerraForm and SunEdison

Financials

TERP reported Q314 adjusted revenue of $56m up from $22m in Q214. Adjusted EBITDA was approximately $47m versus $20m in the prior quarter. Q314 CAFD was $30m, up from $11.4m in Q214. Year-end 2015 guidance (non-pro forma First Wind) based on the IPO portfolio was $234.7m in operating revenues, $109.8m in operating income and $22.4m in net income. Based on improved execution and faster than expected drop-downs, TERP had already revised its CAFD guidance again to $156m, up from $127m (which had already been an increase from the original $107m based on its IPO portfolio). TerraForm has now guided upward, pro forma First Wind, for CAFD to be $214m in 2015 and $233m in 2016.

Evaluation criteria

***Ahead of peer group; **In line with peer group; *Lower than peer group

Criteria	Rating	Comment
Current portfolio & pipeline, partners, or sponsors	**	Strong partner in SunEdison. Strong ROFO pipeline, positioning to be sizable renewable player. Mostly US assets.
PPAs' duration	***	20-year average life on PPAs; all creditworthy partners.
Dividends and/or total return guidance	**	Recently revised 2015 CAFD guidance upward to $156m, and again pro forma for First Wind acquisition to $214m, up from $107m in IPO portfolio; initial contention that CAFD can grow >15% without dilution is on track; in future, it will likely have to come to markets to support faster growth.
Simplicity of story	*	Actively making acquisitions; increasing guidance, while good news means more complex.
Sustainability, other highlight/challenge	**	Differentiated, localized strategy that likely helps expand solar market and share.

Source: Company reports and Edison Investment Research

EDISON

Bluefield Solar Income Fund

Industrials

Dividend and growth-oriented UK solar fund

Launched in July 2013 following an IPO raising £130m, Bluefield Solar Income Fund (BSIF) is a Guernsey-registered investment company focusing on large-scale, ground-based, commercial and industrial solar assets. It has since had follow-on placements of £13m in February 2014 and £123m in November 2014 and has grown rapidly to over 150MW spread across 14 projects in the UK, and recently affirmed (17 October) its intention to pay a 7p dividend (versus 4p in 2014) by the end of its second full year (July 2015), with the additional objective of providing long-term, stable dividends that grow in line with the Retail Price Index.

Company overview

Established in 2009 as an investment adviser to companies and funds interested in investing in solar energy infrastructure, BSIF's team has a track record in acquiring and managing large-scale UK and European energy and infrastructure assets. Since 2008, the BSIF team has been involved in over £500m of solar PV funds and/or transactions in the UK and Europe, including over £235m in the UK since 2011. As of 30 June 2014, BSIF had 14 projects spread throughout England and Wales, 11 of which were operational, and three under construction, due to be connected to the grid by Q414. BSIF's properties range in size from 1.2MWp at Goshawk, to 16.9MWp at Goosewillow, and are spread across three ROC (renewable obligation certificates) bands, which include 1.4, 1.6 and 2.0, as well as feed in tariff (FIT) incentives. With over 150.6MW of projects (118.5MW operational; 32.1MW expected Q414), BSIF's projects should be able to power almost 46,000 homes, and save almost 65,000 in CO_2 emissions on an annual basis when fully operational.[1]

Company strategy and investment policy

Targeting stable renewable energy output over a 25-year asset life, BSIF invests in UK solar assets, with a focus on utility-scale properties and portfolios on greenfield, industrial and/or commercial sites. The solar assets will typically be held within special purpose vehicles into which the company will invest through debt or equity; and BSIF generally seeks to obtain legal and operational control; however, it will also participate in joint ventures or minority stakes where it makes sense to do so. BSIF aims to generate a substantial amount of its targeted return through UK regulatory incentives, which include FITs that are linked to the RPI, as well as the sale of ROCs. These incentives are currently underwritten by the UK government, provide for 20-year terms and allow for RPI escalation. ROCs are given to operators of facilities for the renewable electricity they produce, and these certificates can be traded with other parties to demonstrate the obligation has been met; to the extent a supplier has not met its obligation, it must pay an equivalent amount into a buy-out fund like BSIF. Further, where possible, BSIF also intends to enter into PPA agreements with co-located industrial energy customers or wholesale energy purchasers.

[1] BSIF, Solar Trade Association.

Price	**103.75p**
Market cap	**£157m**

Priced as at 20 November 2014

Share price graph

Share details

Ticker	BSIF.L
Listing	LSE
Fiscal year end	June 2014
Shares outstanding	150.92m
NAV/share as at September 2014	97.84p
Premium	0.88%
Yield	3.9%
Net debt ($) as at June 2014	N/A
Total assets	£156m

Business description

Bluefield Solar Income Fund is a Guernsey-registered closed-end investment company focusing on large-scale, ground-based, commercial and industrial solar assets. It currently has 14 solar projects throughout England and Wales.

Benefits

- Strong management team with significant, direct experience with UK solar infrastructure transactions.
- Long-term regulatory incentives (20-25 years) with FIT and ROCs.
- Fast mover, established relationships.

Challenges

- Lack of geographic and technological diversity.
- Closed-end fund; less information, less liquid, not available to US investors.
- Very dependent upon UK regulatory framework; competition for projects may heat up.

Analyst

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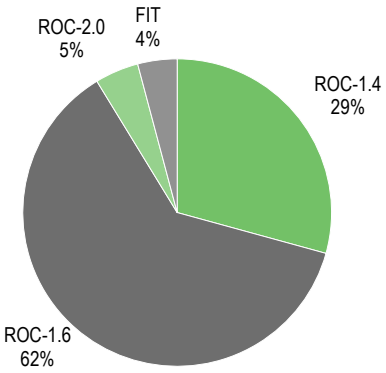
Underlying asset exposure

Because all of BSIF's properties presently are based in the UK and are solar, asset mix graphs in terms of technology and geographic mix are not provided. However, shown below are the ROC band break-outs in terms of projects and MWs. The majority of the properties, 62% in terms of MWs and seven projects, fall under the ROC 1.6 Band incentive; five more, or 29%, fall under the 1.4 ROC Band; one 6.9MW project in Cornwall falls under ROC 2.0; and two projects are FIT-based.

BSIF works with a variety of solar companies on its projects, including Trina Solar, SunTech, Jinko Solar, Hanwha Solar, Yingli, Solar Max and more.

Exhibit 1: ROC band break-outs



Source: BSIF and Edison Investment Research

Financials

The company's objective is to provide shareholders with an attractive return, principally in the form of semi-annual income distributions, by investing in a portfolio of large-scale, UK-based solar energy infrastructure assets. Its strategy is to target delivery to shareholders of RPI-linked distributions of 7p per ordinary share in each financial year (other than the company's first financial year wherein it paid 4p as of June 2014). The company is targeting to deliver a total return, net of all set-up costs and fund expenses, of no less than 7% per annum. BSIF announced total income for the financial year to June 2014 of £12.04m, and earnings per share of 6.99p. Total dividends paid for the period were 4.0p. Net asset value per share was 102.96p. The total return to shareholders was 4.6% (based on share price and dividends paid), and the total return (based on NAV increase and dividends paid) was 7.0%. The yield is currently 3.9%. As at 30 September NAV was 97.84p, and total assets were £150.92m.

BSIF has announced the proposed acquisition of several further operational assets adding up to 137MWp of additional capacity to the portfolio under a mix of FIT and ROC regimes. The acquisitions were supported by an equity placing with the issue of some 120m of new ordinary shares, raising gross proceeds of £123m, representing approximately 83% of the issued ordinary share capital of the company prior to the placing. Upon admission, the total number of ordinary shares outstanding will be 270.9m.

EDISON

Greencoat UK Wind

Industrials

Dividend and growth-oriented UK wind fund

Structured as a UK investment trust, Greencoat UK Wind PLC (UKW) is a renewable infrastructure company investing in land-based and offshore UK wind farms. Having gone public in March 2013, UKW raised £260m for the purpose of buying low-carbon power plants in the UK, followed by £83m in December 2013 and a further £125m equity offer, completed in October 2014. UKW was created to help the UK with its ageing electricity infrastructure; its objective is also to provide investors with dividends in the range of 6%, growing in line with the Retail Price Index.

Company overview

Supported by the UK government as part of its target for renewables to service 30% of the overall power market by 2020, UKW approached the government in 2011 and proposed buying wind farms from utilities that had been building plants for a while, and now needed to recycle some of the cash into retrofitting ageing infrastructure assets. The company now manages approximately 271.5MW of wind capacity across 15 projects.

Company strategy and investment policy

In addition to focusing on both land-based and offshore wind, UKW's strategy is to continue investing in UK wind farms that are greater than 10MW in capacity within the UK. Essentially, UKW buys utility-owned, operating wind farms and takes a position (100%, majority or minority stake) using special purpose vehicles that ultimately hold the underlying wind farms as assets. With offshore projects, the company will only invest where a utility retains an equity interest for a lock-up period. Revenue generated by these wind farms comes from the sale of power and accredited green incentives. The utilities are required to buy a certain percentage of the power from renewable sources by law. UKW may enter into long-term PPAs that fix the price of electricity and does make use of portfolio leverage to finance the acquisition of its investments. The company's goal is to provide a sustainable dividend that increases with inflation on a real basis. It intends to target total IRR to investors, net of fees and expenses, at around 8-9%. Any excess cash flow (above what is paid out in dividends) will be reinvested in new UK operating wind farm assets.

Financial update

UKW is a closed-end investment fund with £585m in gross assets, intending to pay dividends in the range of 6% increasing with RPI. UKW recently completed a £125m equity offering (25% above the company's initial £100m target), the proceeds of which will be used to pay down existing bank debt, resulting in total gearing of approximately 20%.

[1] www.bloomberg.com/news/2013-02-14/greencoat-taps-63-billion-wind-assets-in-u-k-ipo.html

Price	**111.75p**
Market cap	**£515m**

Priced as at 20 November 2014

Share price graph

Share details

Ticker	UKW.L
Listing	LSE
Shares outstanding	460.7m
NAV/share as at end Sep 2014	104.8p
Yield	5.5%
Est net debt as at November 2014	£105m

Business description

With 16 wind farms spread across the UK and 271.5MW of capacity, Greencoat UK Wind is a renewable infrastructure company investing in land-based and offshore UK wind farms.

Benefits

- With net generating capacity of 271.5MW, Greencoat UK Wind is a leading renewables infrastructure fund.
- The company's portfolio of assets benefit from strong UK governmental regulatory support for renewable energy assets.
- Strong pipeline of future opportunities. Greencoat UK Wind is involved in tapping further into the £50bn wind market.[1]

Challenges

- Lack of geographic and technology diversity; all wind assets in UK.
- Closed-end fund; less information, less liquid.
- Very dependent on UK regulatory framework; price risk.

Analyst

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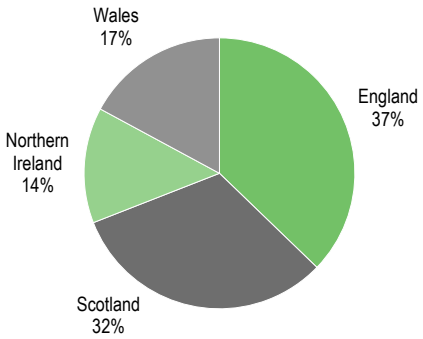
Underlying asset exposure

Because all of UKW's properties are based in the UK and are wind, asset mix graphs in terms of technology and geographic mix are not provided. However, shown below is a map of the company's projects, as well as an illustration showing Greencoat's capacity break-out in the UK. The majority of the properties are in England and Scotland, 37% and 32%, respectively, with the balance in Wales and Northern Ireland, at 17% and 14%, respectively.

Exhibit 1: UKW.L wind farms and mix by region in MWs as at October 2014

UK breakdown in net MWs



Source: Greencoat UK Wind and Edison Investment Research

Wind power in the UK

According to trade group RenewableUK, "The UK is the windiest country in Europe, and could power itself several times over using wind".

With 657 projects and 5,645 turbines (and more on the way), wind remains the most mature renewable technology in the UK. With 7,534MW in onshore wind capacity and 3,653MW offshore capacity, UK wind operators are able to provide 6,446,696 homes with approximately 27,263,077MWh of electricity on an annual basis according to RenewableUK, DUKE (Digest of UK Energy Statistics) and DECC (Department of Energy and Climate Change). Further, DECC estimates that at current levels, this equates to saving around 11,723,123 tonnes of CO_2 each year.[2]

With additional capacity coming online, these numbers are likely to increase given the UK is now seeing wind energy generation outpacing nuclear and coal in certain months. According to National Grid statistics, on five separate occasions in August, wind generated more electricity than coal-fired plants, and on 29 August, more than nuclear. Daily records were set on two occasions in August, when wind provided as much as 22% of wind capacity on 17 August 2014, making for a record August of total wind generation averaging 10%, close to the record of 13% set in December 2013.[3]

[2] www.renewableuk.com/en/renewable-energy/wind-energy/uk-wind-energy-database/figures-explained.cfm

[3] www.renewableuk.com/en/news/press-releases.cfm/2014-09-01-wind-power-beats-nuclear-and-coal-in-record-breaking-august

Glossary

1703	Section of Energy Policy Act of 2005 allowing DOE to provide loan guaranties to biomass, hydrogen, solar, wind/hydropower, nuclear, advanced fossil energy coal, carbon sequestration, etc.
AFFO	Available funds from operations. Similar to CAFD (see below); term used by companies for cash available for dividends.
Anthropogenic	Caused by, related to, or derived from humans or human actions.
AWEA	American Wind Energy Association. Wind trade association
CAFD	Cash available for distribution
Call Right	Option yieldco has (TERP uses terminology with SunEdison) to have first rights on a parent's project.
CCS	Carbon capture system, storage, or sequestration
CO_2 and CO_2e	Carbon dioxide and carbon dioxide equivalent. Used to measure, add up emissions after converting GHGs using global warming potentials.
DOE	United States Department of Energy
Drop-Down	Term used originally with MLP structures, now with yieldcos when they receive "drop-downs" from parent, essentially an asset sale, negotiated at an agreed upon price.
DSIRE	Database for State Incentives for Renewable Energy
EIA	Energy Information Association. Provides US energy research, data.
Exajoule	International unit of energy or work; there are 1×10^{18}, or quintillion joules in an exajoule
FIT	Feed-in tariff
FOLU	Forestry and other land uses
GHG(s)	Greenhouse gases. CO_2, CH_4, N_2O, SF_6, HFC, and PFCs
Gt	Gigaton. One billion tons
GWP	Global warming potential. Measure of how potent a GHG is in terms of its ability to lock in heat and remain in atmosphere.
IDR	Incentive distribution rights. Refers to an arrangement between an LP and a GP (here a parent and yieldco like NextEra and NEP) that allows

	the parent to receive increasing portion of the cashflows generated as more drop-downs are made.
IEA	International Energy Association
IPCC	Intergovernmental Panel on Climate Change. Set up in 1988 by UNEP and WMO, IPCC is an intergovernmental, scientific organisation that looks at climate change and risks.
kWh	Kilowatt hour. Measure of electricity representing power expended over one hour; 1kW=1,000 watts, 3,412Btu or 3.6m joules
LCA	Life cycle analysis/assessment. Method of evaluating environmental impacts incurred by a product/service considering all inputs in life cycle.
Photovoltaic	Phenomenon occurring when sunlight strikes element causing electrons to be released (ie, photovoltaic effect). Refers also to PV devices.
PPA	Purchase power agreement. Agreement between two entities agreeing to purchase power at an agreed upon price on a per kWh basis.
Ppm	Parts per million
REN21	Renewable Energy Policy Network. Reports on global renewable trends
ROC	Renewable obligation certificates
ROFO	Right of first offer. Essentially, a right of first refusal granted to a subsidiary yieldco on a parent's pipeline of projects.
RPI	Retail Price Index
RPS	Renewable Portfolio Standard
SEIA	Solar Energy Industry Association. Solar trade association
SRI	Socially responsible investment. Looks at social and environmental factors instead of solely relying on traditional financial metrics.
Thin Film	Refers to process where "thin film" of element coating sprayed to make solar cell, vs wafer or block of semiconductor material.

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