



# ON MATTERS THAT MATTER

---

From Trend to Opportunity – Energy and Energy  
Efficiency

December 2013



## *An Occasional Essay on Matters that Matter*

### **From Trend to Opportunity: Energy and Energy Efficiency**

*As private equity investors in selected environmental markets in the United States and Canada, NewWorld Capital Group publishes occasional essays on matters that matter in our investment strategy. We seek to present an analysis of the forces at work that are shaping investment opportunities and risks in our target markets and in the broader environmental opportunities sector.*

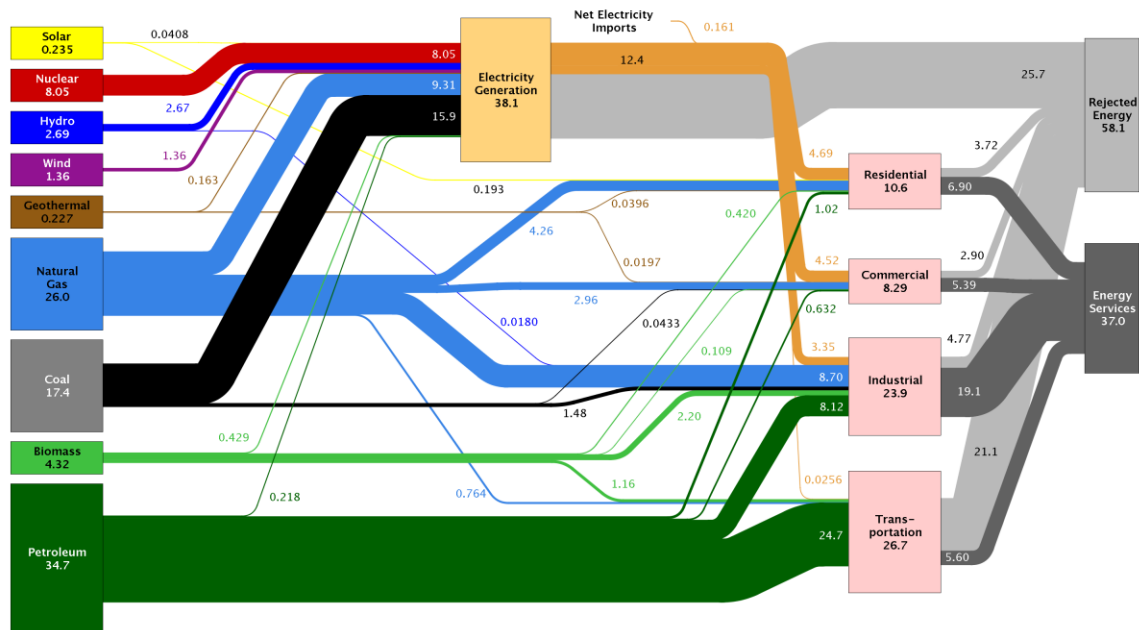
A snapshot of the U.S. energy and energy efficiency sector reveals growing opportunities for investments in alternative energy and energy efficiency measures: conventional energy resource prices are forecast to rise as available supply is harder and more costly for producers of coal and natural gas to reach, forcing them to dig deeper holes with more complicated machinery in fields farther from available transport and refinery infrastructure<sup>1</sup>; furthermore, the promise of lower cost, plentiful and local natural gas has been blunted if not virtually negated by increasing transmission and distribution (T&D) cost to the end-customer; the T&D infrastructure continues to age, thus making it more costly to maintain; and the electric grid requires reinvestment to adjust to a changing energy makeup.

The following review first examines important drivers of the above-noted trends and then takes a deeper look at major electricity production segments and efficiency measures that can lead to significant savings in energy use and related costs. It focuses on energy sources related to electricity production with occasional references to various fuel sources as percentages of total energy production (*i.e.*, electricity production together with energy related to transportation, chemicals and materials). The following chart outlines this distinction.

---

<sup>1</sup> We do not consider oil in this essay because it represents a mere 1% of U.S. electricity production, an insignificant portion of the electricity landscape. However, petroleum accounts for 70% of transportation energy consumption and will dominate transportation fuels for the foreseeable future.

Estimated U.S. Energy Use in 2012: ~95.1 Quads



Source: LLNL 2013. Data is based on DOE/EIA-0035(2013-05), May, 2013. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 65% for the residential and commercial sectors 80% for the industrial sector, and 21% for the transportation sector. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

Long term extrapolations of early growth rates in new regions of production are inherently dangerous.<sup>2</sup> Like any forecast, growth rates can be flawed as they may miss or misinterpret important variables. Energy trends are notoriously hard to predict as reserve capacity estimates change, new technologies are developed that enable production from new fields, or a catastrophic event may occur which restricts access to supply in certain regions. For example, conventional crude production in Alaska dropped 75% between 1989 and 2012, and solar panel costs fell faster than expected (60% price decline of an average solar panel since 2011; 11% cost drop in 2013 alone), leading to rapid growth in the distributed solar market.

## Drivers of Trends Affecting Energy/Energy Efficiency

### *Centralized Inflexible Infrastructure*

The U.S. electricity grid infrastructure is based on a centralized utility model that has delivered electricity to customers for roughly 100 years and is, therefore, inflexible. However, new distributed models of electricity generation are developing that require dynamic grid connections, both supplying and receiving electricity from, for example, residential solar production.

<sup>2</sup> 13D Research

Today, solar accounts for less than 1% of total electricity production in the U.S.<sup>3</sup> and does not require significant infrastructure changes. Incremental intermittent renewables (wind at under 10% and solar at under 1% of electricity production) remain sufficiently small in the U.S. so that only minor T&D investment is currently required. As long as intermittent renewables are less than 20% of total electricity generation, only modest grid investments are required.<sup>4</sup> This contrasts with Germany, for example, where renewables are pushing 50% and significant grid modifications are essential. Increasing penetration of distributed generation, both clean energy and otherwise, will require new ways to pay for maintenance on wires, with extra line charges possibly imminent.

On the other end of the electricity supply chain, natural gas from wells drilled further away from existing T&D infrastructure faces severe problems of permitting and right-of-way issues in T&D expansion. The resulting higher costs from T&D expansion are passed along to customers while prices at drill-heads may remain low. This infrastructure cost to end-users can be mitigated or avoided with distributed clean energy infrastructure investment.

NewWorld is not currently invested in developing a more flexible electricity infrastructure, but instead seeks to capitalize on increasing end-user consumption of distributed generation to avoid high and growing T&D costs. To date, NewWorld has invested in distributed commercial solar projects and residential solar installers, but will also consider other distributed generation projects and related product and services companies.

### ***Peak Power Demand***

Approximately half of commercial and industrial electricity costs are a result of peak power demand charges. Large electricity users such as hospitals, food processing facilities, and other industrial and commercial-scale facilities pay demand charges that represent the price of energy capacity the utility maintains for each customer based on its maximum electricity demand over the course of a month (typically) or at points of “peak demand.” Demand charges are usually fixed based on kilowatts (kw) of electricity. Clean energy and energy efficiency investments that can reduce these charges will significantly alter the margins for those businesses by reducing peak demand charges.

### ***Government Subsidies***

Renewables in many cases are increasingly economic without federal or local subsidy. Unsubsidized wind power generation is now competitive with subsidized fossil fuel generation. The Levelized Cost of Electricity (LCoE) of utility-scale wind farms in the right locations is lower than the LCoE of fossil fuels. However, few economical wind farms are being built, due to unfavorable Power Purchase Agreements (PPA) and

---

<sup>3</sup> Institute for Energy Research

<sup>4</sup> T&D investments may include new cables, storage, capacitors, smarter switching, and possibly small peaking power plants. More radical T&D investment is required in Germany, for example, where intermittent renewables comprise up to 50% of total electricity generation in some places. For a review of rate design changes that may also be needed, see Footnote 5.

uncertainty about the future of the PTC. If there were a longer-term (e.g., five- to ten-year plan) to gradually reduce the PTC to zero, developers and utilities could more appropriately price PPAs for development and build the most market-efficient projects. Additionally, a planned phase-out of the PTC would likely spur development to take advantage of a stable though declining tax credit. Although a long-term PTC at the current price would also support development, wind does not need this support and, in terms of politics and marketing, it would be good for the renewable world to have a “win” where subsidies are no longer necessary.

Other clean energy investments, such as commercial and residential solar, are already at grid parity in many locations, although they can still benefit from additive financing and government incentives. Net metering is a subsidy that will likely require adjustment in the form of a charge to support T&D maintenance and utility provision of standby power capacity as solar grows to be a larger portion of total electricity power.<sup>5</sup> However, redesigning these systems is likely to be incremental and occur over a slow (several year) time horizon, allowing investments to capitalize on attractive opportunities while net metering is still favorable.

Many energy efficiency investments are economic today and offer, for the most part, under a five-year payback without government subsidy. The U.S. commercial and industrial efficiency programs receive the largest share of electricity program subsidy funding (~40%); followed by residential efficiency, demand response, and low-income programs, resulting in materially shorter payback periods.

Anticipated clean energy subsidies, such as a possible carbon tax, are attractive but not accounted for in NewWorld’s investment thesis, although any enforced regulation of the hydrocarbon industry would benefit energy efficiency and clean energy investments.

### ***Rising and Volatile Hydrocarbon Pricing***

Oil & Gas (O&G) is a notorious industry for experiencing boom and bust cycles, owing largely to supply interruptions and uncertain production levels at various sites. However, the U.S. Energy Information Agency (EIA) predicts long-term price increases in oil,<sup>6</sup> natural gas, and coal. Natural gas prices in electricity generation are expected to rise more rapidly than coal prices, thus allowing coal and natural gas plants to represent approximately equal shares of U.S. electricity generation by 2040.<sup>7</sup>

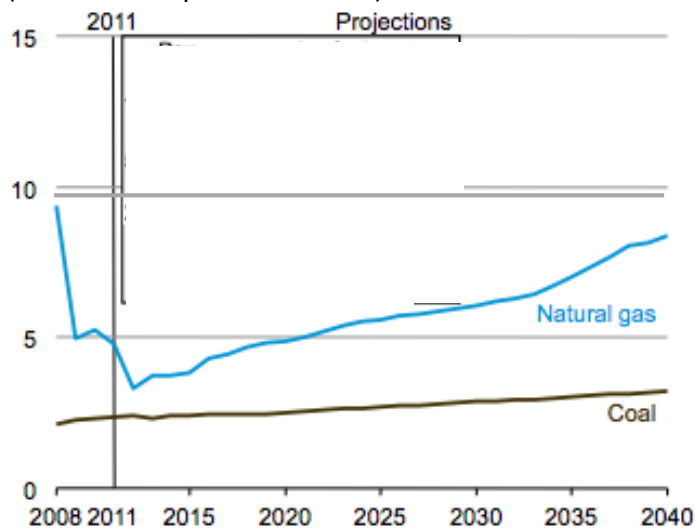
---

<sup>5</sup> Residential electricity bills charge for line maintenance and T&D infrastructure support on a per kWh basis. As residential solar installations grow, many people pay for less supplied electricity from the utility, and therefore avoid paying for their share of maintenance of T&D infrastructure. The utility is then forced to charge remaining electric customers (typically poorer populations who have not installed solar) for the maintenance costs avoided by residences with solar. Solar residences benefit and use the cables running to and from their houses as they sell energy back to the grid via net metering, but do not pay their share of costs – creating, in effect, a net-metering subsidy.

<sup>6</sup> Growing U.S. midcontinent and Canadian oil production has already overwhelmed transportation infrastructure needed to move crude oil from Oklahoma (where The West Texas Intermediate (WTI) price is quoted, to the Gulf Coast. The WTI discount to Brent is expected to decrease over time as additional pipeline projects are built. Reference case projections show Brent prices declining to \$96/bbl in 2015 and then growing steadily to \$163/bbl in 2040 as a result of demand increases and supply pressures. Oil volatility has averaged about 30% annually over the past 20 years. EIA

<sup>7</sup> EIA

**Average delivered fuel prices to electric power plants in the EIA Annual Energy Outlook 2013 Reference case, 2008-2040**  
(2011 dollars per million Btu)



We outline some examples of hydrocarbon pricing volatility in the following segment deeper-dives. Over the longer term, energy efficiency and clean energy offer a hedge against these volatile markets.

### ***Available Financing***

Lease financing models and Energy Service Companies (ESCOs) allow customers flexibility in their purchase decisions and possible win-win investments for all parties (buyers, sellers, financiers, installers). Leasing programs dominated the market in 2013 but new loan structures by certain banks and private firms are now entering the market.

Property Assessed Clean Energy (PACE) commercial is increasingly being adopted by states. Philips recently announced a “lighting-as-a-service” model that will allow the Washington Metropolitan Area Transit Authority to install 13,000 LEDs at no upfront cost. (The project will be paid for through \$2 million of annual energy savings and a 10-year maintenance contract with Philips.<sup>8</sup>) REIT financing for energy efficiency and clean energy is another interesting model (*e.g.*, Hannon Armstrong).

### ***Split Incentives***

The U.S. energy efficiency market is growing at approximately 10% per year but is inhibited by split incentives. Commercial and residential customers are slow to adopt energy efficient technologies because the burden of paying the electric bill resides with the tenant, while facilities upgrades are the responsibility of landlords. This leaves

---

<sup>8</sup> Greentech Media

demand for retrofits and onsite clean energy investment with tenants but landlords are not incented to respond.

## **Segment Deeper-Dives/Investment Opportunities**

### ***Coal***

Coal accounted for 37% of U.S. electricity generation in 2013 (down from 51% in 2003).<sup>9</sup> Coal is now down to 18% of total energy consumption in the U.S. and falling.<sup>10</sup>

U.S. Coal usage rates are falling due in part to increasing regulation on power plant emissions, in addition increasing natural gas supply and resultant low natural gas prices. For many coal facilities, it is more economical to shut down (*e.g.*, Kentucky where jobs dropped to their lowest numbers in 2011 since the 1920's, with slightly over half of the mines still in operation)<sup>11</sup> or convert to natural-gas fired generation (with natural gas prices below \$4 per MCF and some coal contracts expired).

TVA recently announced its closure of eight legacy coal power generating facilities. Some of Kentucky's market share is being taken by lower grade coal mined in Wyoming and Illinois because it is easier to access (a price difference of roughly 40%). However, even this coal is experiencing declining U.S. demand due to strong competition from natural gas. As U.S. coal demand weakens, most mined coal is being forced to find export markets, predominantly in Europe and China where energy demands are high and natural gas is more expensive.<sup>12</sup>

NewWorld does not see investment opportunities in coal, though there may be opportunities for cooling coal generation plants with more efficient technologies. For more information on this, please see the NewWorld Note, entitled From Trend to Opportunity: Water Resources and Reclamation.

### ***Natural Gas***

Deregulation of the natural gas industry from the 1980's incited renewed investment interest in natural gas production. Today natural gas generates approximately 30% of the nation's electricity and accounts for 27% of the total U.S. energy supply, up from 17% in 2003. This growth trend continues but rapid switching from coal-fired electricity generation to natural gas is slowing.

Black & Veatch's Chief Geoscientist in the natural gas and power fuels group believes that coal-to-gas fuel switching likely peaked in 2012. He believes that supply is now more balanced with demand, and projects that coal-to-gas switching in 2013 will decrease 10% to 15% from 2012 levels. Part of this decline is forecast to come from low

---

<sup>9</sup> Institute for Energy Research; [IEA and National Geographic](#)

<sup>10</sup> Coal is anticipated to be the world's largest source of energy by 2017.

<sup>11</sup> Wall Street Journal

<sup>12</sup> IEA

prices in this capital-intensive industry, leading to lower margins and therefore reduced investor appetite.

Shale gas production has begun to level out and decline, evidenced by declining rates of output and demand insensitivity to incremental price increases. From December 2008 to 2011, U.S. shale gas output grew at a CAGR of 43.5%, then fell and flat-lined at 11.1% from December 2011 to June 2013.<sup>13</sup> The Marcellus and Eagle Ford basins appear to be the only regions where natural gas production continues to grow, but together they account for less than a fifth of total market output with non-shale output accounting for 60% of total production.

Royal Dutch Shell announced a \$2 billion write-down on North American unconventional assets as near-term results were falling far short of expectations. Low natural gas prices are not sufficient to encourage continued extraction. As supply in the market dwindles, prices should rebound and producers should reenter. Most industry analysts suggest that \$5/MMBtu is the needed price for increased activity.<sup>14</sup> Even at \$5/MMBtu, natural gas is an attractive option for electricity generation.

Regardless of the future of prices at the well-head, energy efficiency and clean energy investments are being made by customers facing utility bills (including T&D costs), not wholesale Henry Hub prices. Natural gas suffers from a lack of distribution infrastructure reaching into the basins where wells are most active. Insufficient infrastructure has also come to mean that excess gas needs to be flared in some regions until pipelines can be built to transport and sell it to generation facilities (*e.g.*, North Dakota producers are flaring approximately 29% of the natural gas produced as a by-product of oil wells). Pending lawsuits on the part of landowners leasing mineral rights to O&G companies may change the economics of this trend by mandating royalties on flared gas, but in the meantime, mined gas is being released, flared or completed<sup>15</sup> while providing little or no value or income to stakeholders.

NewWorld opportunities exist in natural gas efficiency plays and water reclamation and reuse technologies in hydrofracking.<sup>16</sup> For example, NewWorld is currently considering an investment in Project Boost—a company that has designed a proprietary system that injects hot, high pressure air into the combustion chamber of a gas turbine to increase its power output by 10% to 20% at peak load.<sup>17</sup> Project Boost provides a modular, bolt-on solution that is 20% to 50% less expensive than available alternative solutions, such as inlet chilling or new peaking plant construction, uses proven components, and can be installed in several days. Three leading U.S. power plant owners are working toward placing purchase orders in the next several months.

---

<sup>13</sup> From December 2012 to June 2013, natural gas output grew at a 5.5% annualized rate. – 13D Research

<sup>14</sup> [Bloomberg](#)

<sup>15</sup> EPA recently regulated natural gas emissions from fracking wells with a mandate to capture natural gas and use various combustion and completion technologies to reduce volatile organic compound (VOC) emissions instead of venting or flaring unused natural gas.

<sup>16</sup> For water reclamation and reuse technology investment opportunities, see NewWorld's companion Note, From Trend to Opportunity: Water Resources and Reclamation.

<sup>17</sup> Natural gas fired turbines are less efficient at higher temperatures and higher altitudes.



Other investment opportunities may be in companies that provide alternatives to flaring in the form of onsite natural gas conversion to products such as fertilizer or fish food. For additional information on frackwater-related investment opportunities, see NewWorld's companion Note on Water Resources and Reclamation.

### ***Nuclear Power***

Many U.S. nuclear facilities have been shutting down and no new units have been built since 1996.<sup>18</sup> The U.S. has 104 nuclear plants that generate 19% of U.S. electricity and 8.5% of total energy deployed<sup>19</sup>, which will fall as capacity continues to decline.

Recent nuclear shutdowns have been predominantly due to old plants reaching their lifecycle limits, and incentives for reinvestment do not exist in the environment of low wholesale electric costs.<sup>20</sup> Maintenance costs on old plants are also increasing as Fukushima has increased safety precautions and, therefore, retrofit and upgrade investments.

A primary killer of new nuclear is that private investors lack incentives to invest because of the large capital needs and long investment horizons. The Energy Policy Act of 2005 attempted to ease regulatory burdens on nuclear permitting and provide loan guarantees of up to 80% of a project's cost, plus a production tax credit, but could not generate private investment. The only new permitted nuclear plants are those funded by governments and quasi government entities (*e.g.*, Tennessee Valley Authority) and utilities where development costs can be covered by rate payers. Any increase in nuclear capacity will need to be based on a shift in national strategy for energy independence, not on economics.

Similar to coal, NewWorld does not see investment opportunities in nuclear, though there may be opportunities for more efficient cooling technologies. For more information on this, please see the NewWorld Note, entitled From Trend to Opportunity: Water Resources and Reclamation.

### ***Hydro Power***

Small hydro is gaining regulatory support. President Obama recently signed the Hydropower Regulatory Efficiency Act of 2013 and the Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act, which are set to streamline and ease federal regulatory process requirements for certain types of hydroelectric projects.

Run of river (low-head) hydro does not interfere with river ecosystems, and installations in non-natural waterways, such as irrigation canals, are attractive and more easily permitted locations for hydropower. Distributed, on-site hydropower is attractive in that,

---

<sup>18</sup> [Congressional Research Service](#)

<sup>19</sup> Institute for Energy Research

<sup>20</sup> Most nuclear facilities in the U.S. average 25-30 years old and are rated for 40-year lifespans.

depending on its scope, it may not suffer as intensive T&D costs as large-scale hydropower from remotely-located dams.

Large-scale hydropower is close to maximum capacity in the U.S., but additional opportunity exists in small-scale hydropower.

Investment opportunities in hydropower are in small-head projects or installation companies that effectively avoid common objections, such as damaging ecosystems and impeding migratory fish patterns. NewWorld has investigated several companies that offer such solutions, but none that are at sufficient scale to fit its investment strategy, yet.

### ***Wind***

Wind is contributing to a growing portion of U.S. electricity production, and is one of the most efficient forms of electricity generation, because it produces no waste heat. Wind capacity in the U.S. is now over 60,000 MW; however, growth in cumulative capacity has slowed owing to uncertainty around the PTC as discussed in the Government Subsidies section above.

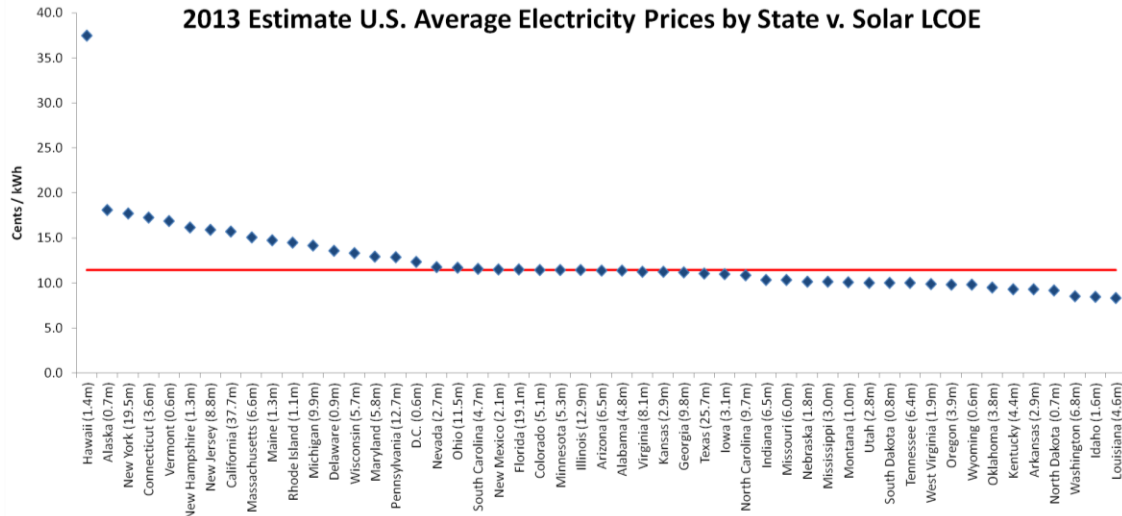
NewWorld believes that wind is better developed and managed at utility-scale and, is therefore, too asset heavy for growth or asset-light infrastructure investments. NewWorld does see possible growth opportunities in wind companies that offer wind services such as remote monitoring and diagnostics equipment and/or support technicians,

### ***Solar Power and Energy Efficiency***

Distributed solar power is increasingly attractive as costs for electricity from traditional energy sources (coal, nuclear, natural gas and hydro) increase due predominantly to T&D. Residential and commercial scale solar projects can deliver “free” electricity, which can dramatically reduce total electricity costs, particularly in high-electricity use applications and to the extent they displace peak demand charges, which are typically mid-day in the sunniest (relevant to solar), hottest (relevant to efficient air conditioning units) summer months.

#### ***Solar Power - Residential***

Residential solar installations and commercial-scale solar projects are growing rapidly in number. At \$0.11/kWh, solar can compete on cost with residential retail electricity rates in a majority of the U.S., due to decreasing solar LCoE versus increasing retail electricity rates.



Attractive investment opportunities exist in the residential solar installation market, which is less than 5% penetrated today. New models of financing for both residential and commercial installations are facilitating this growth. Residential lease terms are being driven by customer demand and are now standard at 20 years with purchase options at the end of the lease.<sup>21</sup> Commercial projects can be funded through traditional equity approaches and now also crowdfunding (*e.g.*, Mosaic).

Some utilities are already investing in the space to maintain sources of revenue as some forecasts suggest they may be disintermediated by energy efficiency and distributed solar to the point of providing only base-load power.<sup>22</sup> Constellation, for example, has co-invested with NewWorld in Astrum Solar, a leading residential solar installation company in the Northeast.

### ***Solar Power – Commercial***

Innovative funding models and stable return profiles are driving risk-mitigated capital into solar project YieldCos. 20-year PPAs on assets with no moving parts and a free fuel source (sunlight) are increasingly attractive for both individuals seeking to invest in commercial solar through crowdsourcing platforms like Mosaic or for pension plans seeking stable returns on their capital over a long time horizon. YieldCos provide stable, long-term cash flows and are as easy to purchase as stocks or bonds.<sup>23</sup> They also provide financing at a lower cost of capital, thereby lowering the Levelized Cost of Energy (in cents per kWh). Master Limited Partnerships (MLPs) and Real Estate Investment Trusts (REITs) are also being used to finance these developments.

<sup>21</sup> Disclosure requirements mandate that lease terms be on the cover of a lease agreement. Previous 25-year terms were more beneficial to customers but residential buyers see a 20-year term as more appealing.

<sup>22</sup> 13D Research

<sup>23</sup> Rocky Mountain Institute

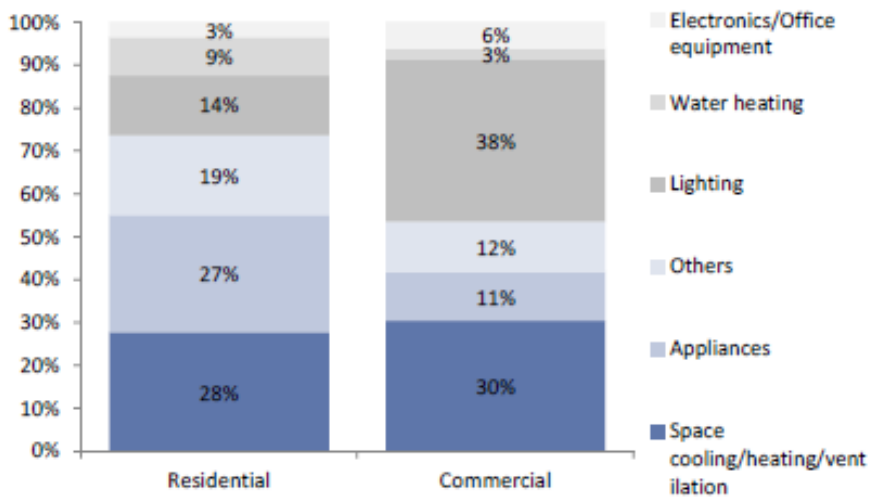
Investment opportunities exist in commercial solar project equity and structured equity. NewWorld has already invested in seven commercial scale solar projects in the Northeast and sees other investments in the space as attractive, with possible near-term exits of the aggregated portfolio to parties interested in YieldCos.

***Energy Efficiency – Residential***

NYSERDA recently raised \$24.3 million to finance loans for energy efficiency upgrades for residential consumers. To date, drivers of residential energy consumption are principally space cooling and heating and appliance loads. Enlightened customers are making more energy efficient purchases, thanks to programs like Energy Star, but most purchasers seem to need the added incentive of state-sponsored audits and incentive programs that typically suggest improving home insulation. Lighting solutions are gaining traction as they become more cost-competitive with traditional options. Home controls and energy meters are attractive in that they have high margins, but offer little value unless customers are willing to change behavior to make an effort to review and act on their energy data.

**Power usage is concentrated in a few key segments...**

Electricity used by category



Source: EIA, Goldman Sachs Global Investment Research.

***Energy Efficiency - Commercial***

Rational economic decision making is driving energy efficiency purchases. 30% to 70% of most commercial consumers’ electric bills are comprised of demand-related charges.<sup>24</sup> Reducing these demand charges through energy efficiency appliance upgrades can sometimes provide more economic value to customers (EVC) than energy savings alone. Major companies are focused on improving margins by reducing costs associated with

<sup>24</sup> [USDA](#)

their electricity bill, increasing sales, and improving their brand value by investing in energy efficiency retrofits.<sup>25</sup>

For example, Walgreens has set a goal to build a net zero energy retail store and is pushing its air conditioning suppliers to provide energy efficient options. Macy's has reduced its energy consumption by 37% since 2002 by installing solar on its store rooftops and retrofitting stores with LED lighting (which makes clothes look more appealing on the rack and on a customer), thus increasing sales, saving money, and improving brand image. Walgreens and Macy's are just a few of 300 corporate, state/municipal, education, and industrial partners in the DOE's Better Buildings Challenge, which seeks to cut energy use by at least 20% by 2020 in over 200 million sq. ft. of building space. Walmart, Costco, IKEA, McGraw Hill, Johnson & Johnson, and FedEx are the top commercial adopters of solar installations.<sup>26</sup>

Investment opportunities exist in growth companies with high EVC, backwards compatibility (ability to fit into existing downstream infrastructure without much disturbance), and 2 to 5-year payback periods. Some commercial customers are still focused on near-term (less than 2-year) paybacks, even though such decisions are often irrational because major returns on investment can be achieved with just slightly more patient capital. NewWorld can support companies facing short-term-biased customers by matching product sales with appropriate financing sources (*e.g.*, Green Campus Partners) and ensuring that marketed payback is economic for commercial accounts. Companies in the commercial space may be installation contractors, consultants, or intelligent energy management systems.

### ***Energy Efficiency – Industrial***

Energy efficiency helps ameliorate a primary energy concern for industrial facilities: power outages. More efficient devices can be maintained through backup generators if supply to a high-need industrial customer is interrupted. For example, hospitals and food processing facilities require uninterrupted and reliable energy. Healthcare facilities are the second-most energy-intensive buildings (energy accounts for roughly a quarter of a hospital's operating cost), next to food-services facilities. (One hospital bed uses as much heat and electricity as two new family homes.<sup>27</sup>) Energy efficient appliances allow hospitals to continue running life-saving equipment, in addition to lighting, air conditioning, etc., without having to upsize their backup generators. Industrial facilities in nations like Mexico with intermittent, unreliable power supplies also benefit from less energy intensive appliances which supplement more reliable backup generation.

Investment opportunities exist in products that offer solutions to multiple problems. Super-efficient air conditioning, such as Coolerado, provides cooling using 40% to 90% less electricity than traditional AC units, supplies fresh air, improves Indoor Air Quality

---

<sup>25</sup> Piper Jaffray found that customers care more about efficiency and quality than price, and customer satisfaction which is often increased by better, LED-lit, facilities.

<sup>26</sup> Solar Energy Industries Association (SEIA)

<sup>27</sup> Schneider Electric

(IAQ), and can operate in recirculating or Energy Recovery Ventilation (ERV) modes, without using chemical refrigerants and while creating less noise. A product with such combined functionality and backwards compatibility to existing building infrastructure is a highly attractive solution for hospital applications and other high-energy use facilities.

Companies that do not have any technology risk may manufacture, market and sell products in direct energy saving equipment, and monitoring and optimization solutions, technologies that increase product life. Financing systems for energy efficiency have, by definition, low technology risk and tend to have recurring customers and positive EBITDA—and are interesting investment opportunities.

### ***Energy Efficiency – Government***

Utilities are promoting energy efficiency programs because increased energy efficiency reduces peak power demand and, therefore, reduces pressure to build additional peak power plants.

Major cities have announced energy efficiency goals and/or signed onto the Better Buildings Challenge (a voluntary federal program aimed at reducing electricity consumption 20% by 2020) out of cost necessity and interest in protecting against natural disasters. City participation is essential in developing long-lasting solutions alongside private and utility participation (*e.g.*, fuel-cells powered by methane produced by wastewater treatment plants). Some forward-thinking utilities like San Diego Gas and Electric (SDG&E) and American Electric Power (AEP) have already begun to capitalize on this demand by investing in renewable products. Others like Pacific Gas and Electric (PG&E) are offering significant rebates for the use of energy efficient products. However, municipal government bankruptcies are an unfortunate and growing trend, which is potentially damaging for contracted service and product suppliers.

In addition to energy efficiency measures, some cities are beginning to invest in microgrids. Microgrids are small-scale, distributed utilities that provide electricity to a specific, local community. Microgrids are typically supplied by renewable sources (solar). Security is one driver of increased micro-grid development. Traditional electric grid infrastructure was designed for reliability, but with increasing cyber-security threats, many military bases, for example, are seeking self-sufficiency which necessitates both onsite generation and energy-efficiency products to reduce total demand.

Investment opportunities exist in large-scale impact energy efficiency. Major sources of power reduction such as super-efficient air conditioning and as well heating efficiency technologies are high value opportunities for government-related entities, especially military bases focused on energy independence.

\*\*\*

In summary, below is a listing what NewWorld judges to be appropriate guidelines in considering investing in opportunities in the clean energy and energy efficiency markets.

Invest in existing products and technologies for the most impact on energy efficiency and clean energy. Numerous technologies exist that offer increased productivity and reduced cost in the clean energy and energy efficiency space—many of which are rapidly gaining traction. Solar panels have become commodities and energy efficiency products, for the most part, are focused on “unsexy” innovations to old technologies (*e.g.*, air conditioners and lighting). In part, this is because standard appliances constitute the majority of power usage. For residential and commercial customers, better insulation, more efficient heating and cooling, and improved lighting efficiency would dramatically reduce overall energy consumption.

Invest without relying on future government subsidies. Though some states have aggressive energy targets and the federal government has worked to facilitate some energy efficient purchasing decisions, helpful programs are still lagging behind best-in-class and innovative solutions. This is in part systemic: entrenched industry players influence Energy Star, for example, because it is natural for government rating agencies and regulators to draw insights from industry leaders already working in the space, but this also makes the program inherently resistant to adopting innovative and disruptive solutions not already incorporated by the represented industry leaders. Energy Star programs are limited to only rating appliances that conform to standards set by outdated industries, and are missing innovative technologies that could drastically change the energy landscape.<sup>28</sup>

Recognize that clean energy and energy efficiency adoption is limited by complexity. Clean energy and energy efficiency technologies have surpassed many gating tests: reliability, commoditization, and cost-competitiveness. What remains are business development challenges surrounding market channels and customer education. Customers now interested in actively purchasing in the space have to work hard to seek out the right solutions for their applications. Lighting a retail facility, for example, often requires a consultant to measure glare, angles, temperature, etc., so the purchaser receives the most electricity-efficient light for their store and the one that makes their product look the best or the their employees work the most effectively. Some residential solar installers and service providers are making clean energy purchase decisions easier by managing the complexities of rebates, leasing, engineering and installation. However, it is still often an uphill effort to educate and familiarize channel partners and customers with the breadth of alternatives now available.

Acknowledge the need for significant growth capital. Many clean energy projects, related companies and energy efficiency companies are in need of capital in order to reach effective scale. They have already succeeded in surpassing the issues of complexity noted above, have proven technologies, do not rely on government subsidies, and are selling in rapidly growing markets. However, they often need business development capital to improve sales channels and sell to change-resistant customers.

---

<sup>28</sup> Coolerado cannot be reviewed by Energy Star because Energy Star does not have metrics in place for compressorless air conditioners. Coolerado is up to 90% more efficient than traditional DX air conditioning units.

NewWorld is positioned to offer this support to growing companies in the clean energy and energy efficiency markets.

*This document does not constitute an offer to sell or the solicitation of an offer to buy any securities and may not be used or relied upon in connection with any offer or sale of an interest in NewWorld Capital Group, LLC ("NewWorld" or the "Firm") and/or NewWorld Environmental Opportunities Fund, L.P. (the "Fund") and/ or any other possible investment opportunities or co-investment opportunities related to the Firm or Fund ("pre-Fund"). The information set forth herein does not purport to be complete. A private offering of interests in any such opportunities would only be made pursuant to a relevant Confidential Private Placement Memorandum or a relevant Investment Memorandum (the "Memorandum") and /or relevant subscription documents, which would be furnished to qualified investors on a confidential basis at their request for consideration in connection with such offering. The information contained herein will be superseded by, and is qualified in its entirety by, reference to any Memorandum and/or other such documents, which contains additional information about the investment objective, terms and conditions of an investment and tax information and risk disclosures that are important to any investment decision. No person has been authorized to make any statement concerning any possible investment opportunity other than as set forth in the relevant Memorandum and any such statements, if made, may not be relied upon.*

*The information herein is provided for discussion purposes only, and may not be relied on in any matter as legal, tax or investment advice. Prospective investors should make their own investigations and evaluations of the information contained herein and should consult their own attorneys, business advisers and tax advisers.*

*This document is intended for authorized recipients only and must be held strictly confidential. This document may not be reproduced or distributed in any format without the express written approval of NewWorld.*

*Except where otherwise indicated herein, the information provided herein is based on matters as they exist as of the date of preparation and not as of any future date, and will not be updated or otherwise revised to reflect information that subsequently becomes available, or circumstances existing or changes occurring after the date of preparation of this presentation. Some information contained in this presentation has been obtained from sources external to NewWorld. While such information is believed to be reliable for the purposes used herein, neither NewWorld nor any of its affiliates, members or employees assume any responsibility for the accuracy of such information.*

*Certain information contained in this presentation constitutes "forward-looking statements," which can be identified by the use of forward-looking terminology such as "may," "will," "should," "except," "anticipate," "project," "estimate," "intend," "continue," or "believe," or the negatives thereof or other variations thereon or comparable terminology. Due to various risks and uncertainties, actual events or results or the actual performance of any security may differ materially from those reflected or contemplated in such forward-looking statements.*