Deutsche Bank
Asset Management

# U.S. Building Energy Efficiency Retrofits:
## An Investor's Perspective

May, 2012

Passion to Perform

# *Impact to U.S. economy by energy savings, investment market size, climate & employment. Savings value more than $1 trillion over 10 years*

| | Residential | Commercial | Institutional | Total |
|---|---|---|---|---|
| **Economic/Financial Impact** | | | | |
| Energy Savings (Trillion Btu) | 1,892 | 848 | 293 | **3,033** |
| Total Investment ($ Bn) | 182 | 72 | 25 | **279** |
| **Social Impact** | | | | |
| Cumulative Job Years Created (# FTEs over course of investment program, '000s) | 2,152 | 857 | 296 | **3,305** |
| **Environmental Impact** | | | | |
| Greenhouse Gas Emission Reduction (million metric tons of $CO_2$ mitigated per year) | 382 | 175 | 59 | **616** |

*Source: Rockefeller Foundation, 2012. McKinsey, Unlocking Energy Efficiency in the U.S. Economy (2009); Center for American Progress, The Economic Benefits of Investing in Clean Energy (2009); Energy Information Administration Commercial Building Energy Consumption Survey 2003, Residential Energy Consumption Survey 200. Note: Analysis is based on an assumption of 30% energy savings in buildings built before 1980. Category impact information represents an aggregation of the values calculated for the segments associated with that category. TBtu = Trillion Btu.*

# *Taxonomy of real estate sector*

| Category | | |
|---|---|---|
| Residential | Commercial | Institutional |

| Segment | | | | | | |
|---|---|---|---|---|---|---|
| Single family | 2-4 Unit Building(1) | Food Sales | Food Service | Lodging | Education | Health Care |
| 5+ Unit Building(1) | Mobile Home | Mercantile | Office | Public Assembly | Public Order & Safety | Worship |
| | | Service (other than retail & food) | Ware-House/ Storage | Other | | |

*Source: Rockefeller Foundation, 2012. Energy Information Administration; OHcp/INC/COWS analysis.*
*Note: (1) 2-4 and 5+ units are classified as Multifamily. Market size and segment characteristics data is captured separately; all other information and analysis are combined. Due to the limitations of publicly available data at the segment level, this Market Scan does not include any information and analysis about the 21 segments within the Industrial category (not shown).*

# *The major market segments – large investment opportunity*

| | Residential | | | | Commercial | | | | | | | | | Institutional | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Single Family | 2-4 Unit Building | 5+ Unit Building | Mobile Home | Food Sales | Food Service | Lodging | Mer-cantile | Office | Public Assem-bly | Service (other than retail & food) | Warehouse / storage | Other | Education | Healthcare | Public Order & Safety | Worship |
| **Economic/Financial** | | | | | | | | | | | | | | | | | |
| **Energy Savings (TBtu annually)** | 1,497 | 173 | 174 | 48 | 42 | 71 | 88 | 217 | 202 | 75 | 53 | 52 | 48 | 149 | 86 | 23 | 35 |
| **Total Investment ($Bn)** | 144 | 17 | 17 | 5 | 4 | 6.1 | 7.5 | 18 | 17 | 6 | 4.5 | 4.4 | 4 | 13 | 7.3 | 2 | 3 |
| **Social** | | | | | | | | | | | | | | | | | |
| **Cumulative Job Years Created (# FTEs over course of investment program, '000s)** | 1,700 | 197 | 199 | 56 | 43 | 73 | 89 | 219 | 203 | 75 | 54 | 52 | 49 | 150 | 87 | 23 | 36 |
| **Environmental** | | | | | | | | | | | | | | | | | |
| **Greenhouse Gas Emission Reduction (million metric tons of $CO_2$)** | 302 | 35 | 35 | 10 | 9 | 18 | 18 | 44 | 41 | 15 | 10.7 | 11 | 10 | 30 | 18 | 5 | 7 |

*Source: Rockefeller Foundation, 2012. McKinsey, Unlocking Energy Efficiency in the U.S. Economy (2009); Center for American Progress, The Economic Benefits of Investing in Clean Energy(2009); Energy Information Administration Commercial Building Energy Consumption Survey 2003, Residential Energy Consumption Survey 2005, Residential Energy Consumption Survey 2009; Environmental Protection Agency Online Clean Energy Resources Center; OHcp/INC/COWS analysis.  Note: Analysis is based on an assumption of 30% energy savings in buildings built before 1980. All numbers rounded to closest thousand/million/billion as appropriate; TBtu = Trillion Btu.*

# *This is a real estate investment*

A focus on serving the needs of real estate owners as the “customer” of a retrofit is required to create any kind of scale in the market

| Application of ***Capital*** | And energy-saving ***Engineering / Technology*** | To ***Real Estate*** *as the client* |
|---|---|---|
| — Seeks opportunities that meet risk-adjusted return targets with defined mechanism for investment and repayment<br>— Needs visibility into clear pipeline of projects<br>— Some financing solutions focus only here | — Existing ecosystem of large, proven investment grade providers<br>— Technology required for current retrofits are mature and field-tested<br>— Local and regional experts exist | — By definition, retrofits are OF real estate as building owners control access to assets<br>— Retrofits must provide value to building owners on acceptable terms<br>— Driven by mandate, old equipment upgrades, potential returns, or brand benefits |

*Source: DBCCA, 2012.*

# *Paybacks seem attractive across a variety of technologies*

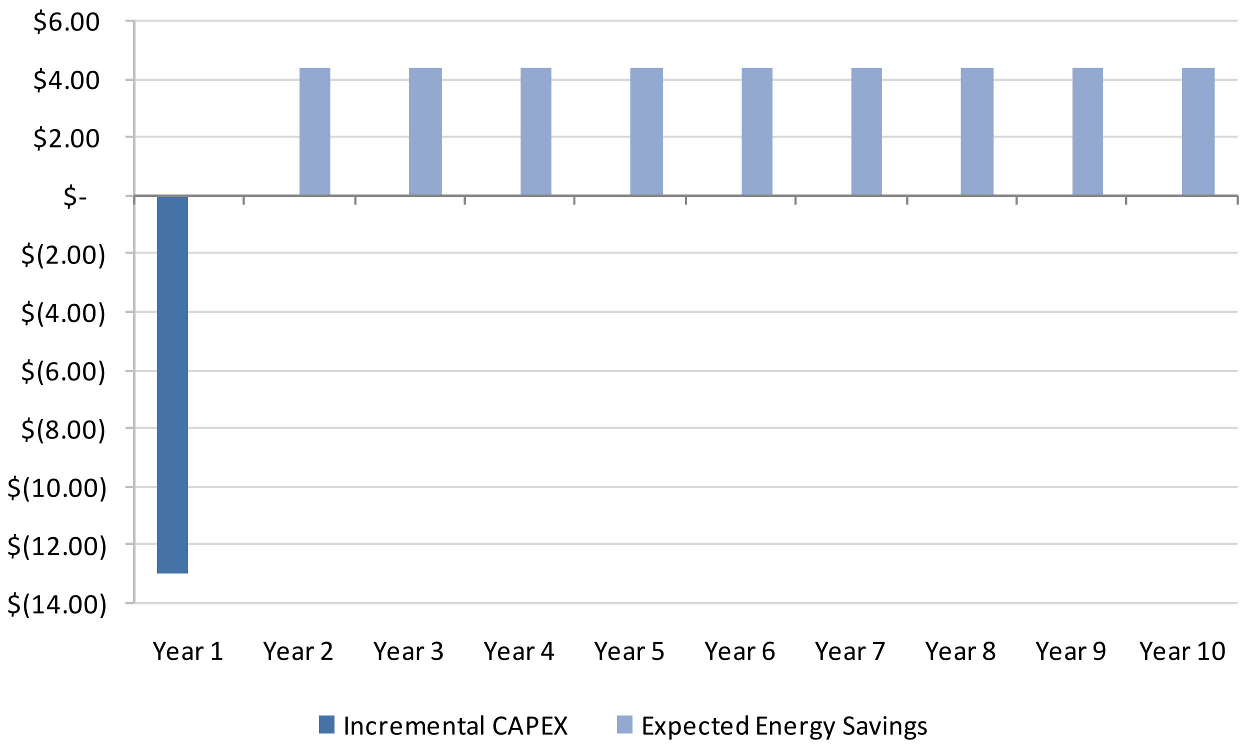
| **Controls** | **Payback (yrs.)** |
|---|---|
| Controls retrofits and control strategies | **3-4** |
| Demand controlled ventilation | **2-5** |
| **Mechanical** | |
| Variable flow primary/secondary systems with controls, VFDs | **2-4** |
| **HVAC** | |
| Constant speed air handlers to variable air volume | **2-4** |
| VAV boxes, control setpoints, box flow minimums | 5+ |
| Boiler conversions from steam to hot water | 5-8 |
| High efficiency fully condensing boilers | 6-8 |
| High efficiency VFD chiller system | 8-12 |
| **Lighting** | |
| Install controls to schedule and interior systems | **2-4** |
| Convert incandescent to CFL / LEDs | **1-3** |
| Replace exit signs with LED kits | **<2** |
| Convert T12 to high efficiency T8s with electronic ballasts | **2-5** |

- Building envelope improvements can also offer significant benefits, using technologies such as high efficiency insulation and coating materials, and high performance windows
- Occupant and operator engagement are key to realizing savings

*Source: Payback source DBCCA and Transcend Equity analysis, 2011. EIA and DOE Building Data Book, 2010, DBCCA Analysis 2011. Paybacks are pre subsidy. Payback (yrs) are based on projections and due to a number of uncertainties and assumptions, no assurance is made that payback (yrs) can or will be achieved*

# *Retrofits can offer strong returns through energy-savings driven cost reductions*

Profile of Empire State Building retrofit ($M)




Implied unlevered IRR is 30.8%*

- Incremental energy retrofit cost of $13M drives $4.4M of annual savings
- Part of larger $500M+ building renovation

*Source: Jones Lang Lasalle, 2011. Note: Costs savings are projected from current data . *Implied unlevered IRR is based on projections, and due to a number of uncertainties and assumptions, no assurance is made that implied IRR can or will be achieved.*

# *What has held the opportunity back to date?*

| Demand barriers: Challenges affecting real estate | |
|---|---|
| Split Incentives | Tenant benefits from OpEx reduction while landlord must pay for CapEx |
| Unclear Benefits | Building owner doesn't understand energy efficiency opportunities and the associated benefits. |
| Long/Complex Sales Cycle | Building owner loses interest due to a complicated, 9 -12 month sales cycle. |
| First Cost Hurdles | Upfront Cap-ex hurdle for project |
| Debt Constrained | Mortgage covenants prevent the owner from taking on debt against the building. |

| Supply-side barriers: Challenges affecting market response and scale | |
|---|---|
| Market fragmentation | Real estate market is split across multiple ownership structures and asset class segments |
| Complex project delivery | Projects require complex sales, engineering, and financial analysis |
| Underwriting | Lack of proven industry standards to evaluate projects |
| Deal size | Deals are typically relatively small (e.g. <$5M) |
| Debt Constrained | Mortgage covenants prevent the owner from taking on debt against the building. |

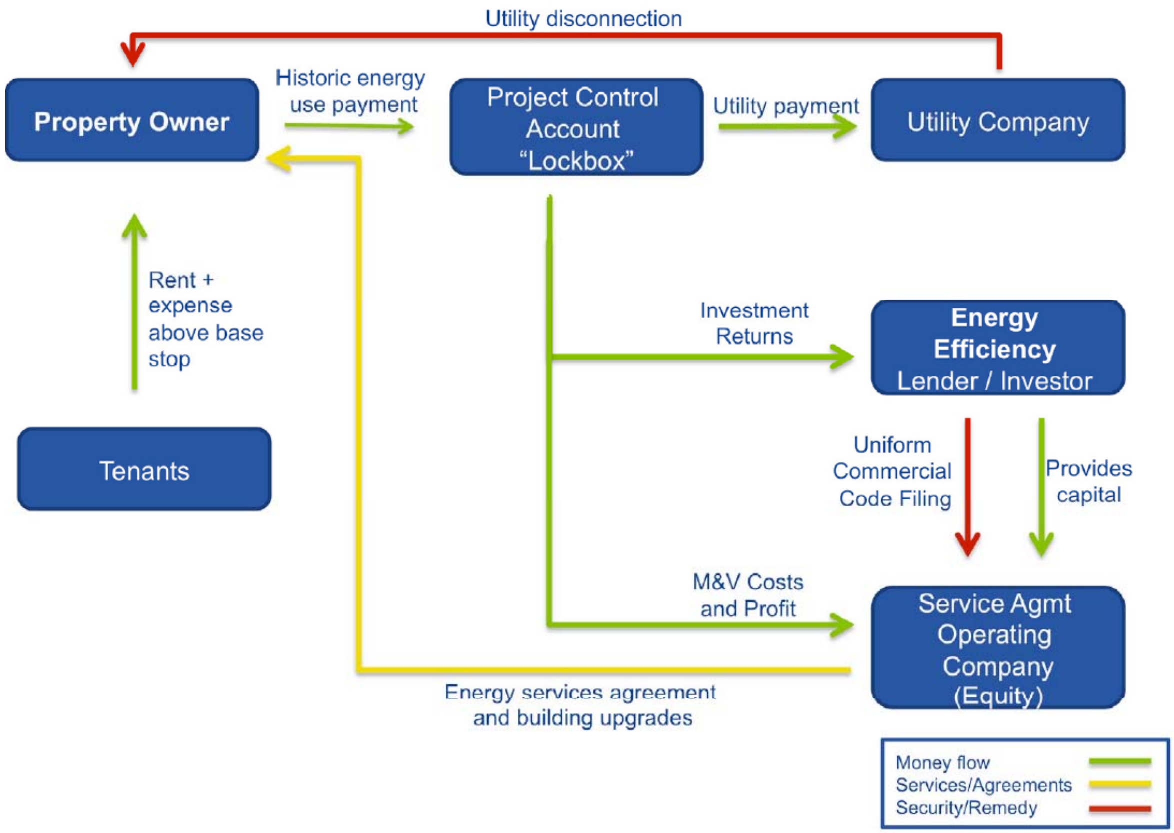
*Source: DBCCA and The Rockefeller Foundation, 2012.*

## *There are a number of possible investment vehicles at a project level, but none have yet captured a large share of the entire retrofit market*

| | **EPCs used by Energy Service Companies (ESCOs)** | **Energy Service Agreements Providers (ESA)** | **Property Assessed Clean Energy (PACE)** | **Original Equipment Manufacturers (OEMs)** |
|---|---|---|---|---|
| Description: | Firms focused on utilizing Energy Service Performance contracts to serve primarily MUSH / Government market | Emerging integrated developer / investor firms seeking to use ESA structure to fund retrofits | Emerging integrated developer / investor firms seeking to use PACE structure to fund retrofits | Manufacturers of large pieces of building infrastructure such as boilers, chillers, etc |
| Approximate Number of Players: | ~16 Majors, Approx 100 Small | 15-20+ | 10-15 | 3-5 global firms per equipment vertical |
| Approximate Deals Done: | Approx $4-6 bn / year | Approx 100-125 | +/- 100 (approx $10-20M) | Multi-billion $ – all buildings have kit |
| Approximate Pipeline: | Approx $4-6 bn / year | Approximately $500M across all firms | TBD - Depends on regulatory approval | Multi-billion $ |
| Investment Vehicle: | Debt tied to projects | Equity investment in projects, loans to projects | Loans to PACE deals | OEM loans / Equipment finance |
| Strengths | Large, established firms. Integrated service delivery | Overcomes many barriers; bilateral contract does not require regulations | Offers strong security mechanism for investors | Large, established firms. Insight into deployed technology |
| Weaknesses | Require upfront payment, high margin expectations, tied to captive OEMs. | Limited scale to date. Fragmented market, requiring owner education. | Requires regulatory approval. Limited scale to date. | Most are pure OEMs or tied to ESCOs. Limited ability to innovate new deployment structures. |

*Source: DBCCA research estimates from market review and existing relationships, 2012. NAESCO.*

# *Energy Services Agreements (ESAs) can scale quickly and meet the needs of both real estate owners and capital providers*




**Overview of ESA:**

- Bilateral contract between two commercial entities without the need for enabling legislation
- Defined structure for capital to invest and offer solutions for the energy savings potential of a building
- Allows capital to earn a risk adjusted return via the energy savings
- Addresses the key barriers and structures of commercial real estate owners
  - No split incentive – services contract
  - Project underwriting and design standardization
  - Clear solutions and benefits for owner
  - No capex for owner
  - Potential for off-balance sheet

*Source: WEF, GE Capital Real Estate, 2011.*

# *Investors prefer least policy requirements in a structure*

**Illustrative Government Policy**

- ***Mandates / Targets***
- ***Disclosure Requirements***
- ***Leadership by Example***
- ***Subsidies, Incentives, and Guarantees***

**Policy Requirements by Emerging Structures:**

- ***Energy Service Agreements (ESA):***
  - Require relatively little additional policy support
  - Clarity on lease accounting classification by regulatory bodies helps expand roll-out
- ***Property Assessed Clean Energy (PACE):***
  - Requires significant enabling legislation to create an operational framework and to overcome resistance from existing real estate stakeholders
- ***On-Bill Finance or On-Bill Recovery:***
  - Require utility involvement and significant enabling legislation
  - Public Utility Commissions (PUCs) must put in place enabling policies or mandates, with support from local regulatory and legislative bodies as needed
  - Requires active participation from multiple stakeholders in the public and private sector

*Source: DBCCA and The Rockefeller Foundation, 2012.*

# *ESAs are for retrofits what PPAs were for solar. The creation of a robust primary market must happen before a secondary market emerges.*

***Energy Services Agreement***

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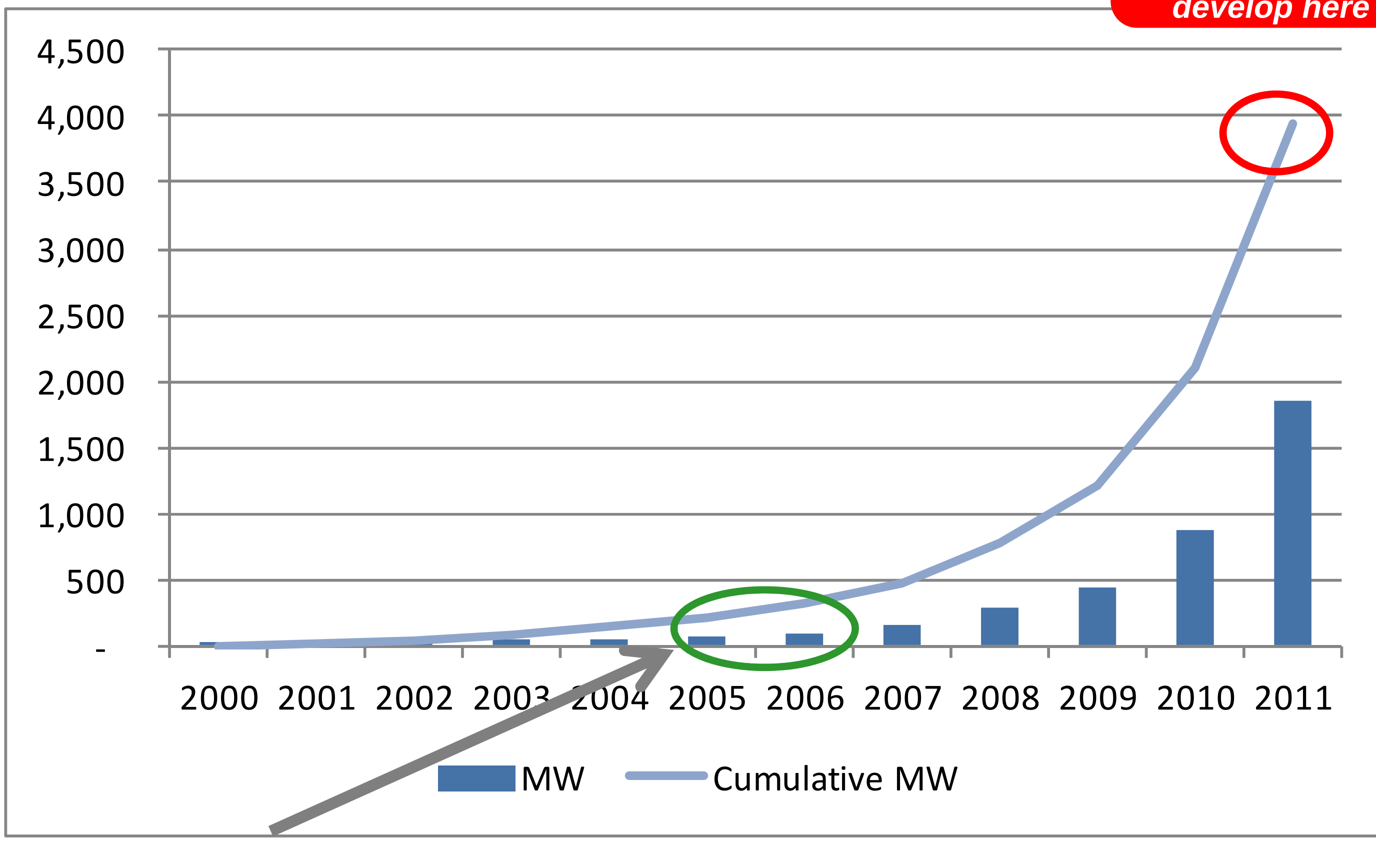
***Power Purchase Agreement***

Growth of US Solar Market




***Secondary market only starting to develop here***

***ESAs are at roughly this stage of development***

*Source: DBCCA, 2012; SEIA, 2012.*

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