Energy and Real Estate:

How changing energy requirements impact real assets.

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Introduction

The energy landscape in the US continues to rapidly evolve, and the effects of these changes are already being felt throughout the real estate sector. While the long-term nature of real estate means that the industry often lags when adapting to new trends, changing government policies and technologies will clearly create competitive advantages for investors that proactively manage their assets to keep pace with new energy requirements.

At the core of these energy shifts are two global megatrends: climate change and digitization. At a time when world governments are attempting to combat increasing temperatures with policies that promote energy efficiency and decarbonization, the rise of artificial intelligence, machine learning, and supercomputing are increasing the power requirements of today's society.

The Department of Energy estimates that the average data center consumes 10 to 50 times the energy per square foot of a typical commercial office building, and collectively data centers already account for 2% of the country's electricity use.[1] Going forward, data centers are only projected to increase their share of electricity consumption with demand projected to double by 2030.[2]

With energy consumption on the rise, governments will be forced to enact policies that mandate cleaner energy production and improved efficiency, while penalizing those that do not meet the new requirements. In the US, we are already seeing a push towards these types of initiatives as demonstrated by the proposals laid out in the Inflation Reduction Act and the formation of the National Building Performance Standards Coalition.

While real estate owners certainly face risks and costs associated with transitioning to a low-carbon economy, these same risks can also present opportunities for real estate investors, if thoughtfully considered with an eye towards the future. The goals of this white paper are to:

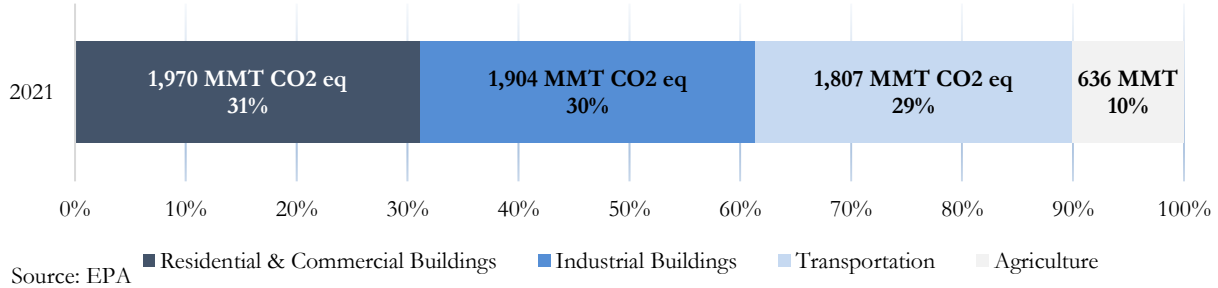
1) identify major trends in energy production and consumption;
2) discuss potential impacts on real estate;
3) develop strategies for mitigating risks in real estate development, acquisition, and operations; and
4) examine opportunities to capitalize on changing energy trends in real estate.

Energy Consumption Trends

Commercial Real Estate as an Energy Consumer

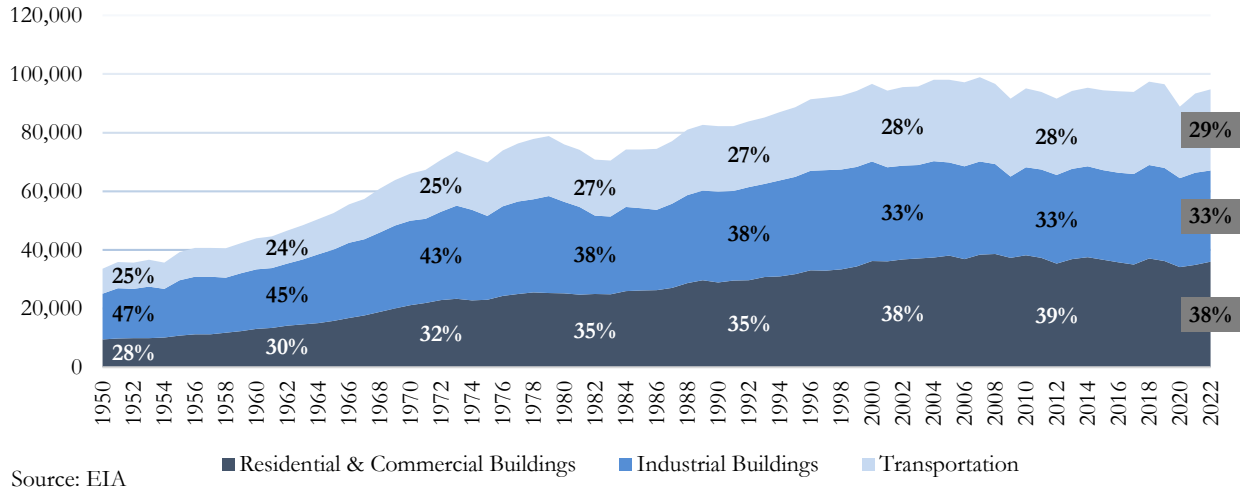
Most people do not immediately think of commercial real estate when they think of energy-intensive carbon-emitting industries. Most people tend to envision plumes of black smoke billowing from the exhaust pipe of a semi-trailer truck or the chimney of a manufacturing plant. In actuality, residential and commercial buildings are the largest energy consumers and greenhouse gases emitters in the country – larger than both the transportation and industrial sectors.[3]

Figure 1: US Greenhouse Gas Emissions by Sector (MMT CO2 eq)



Source: EPA

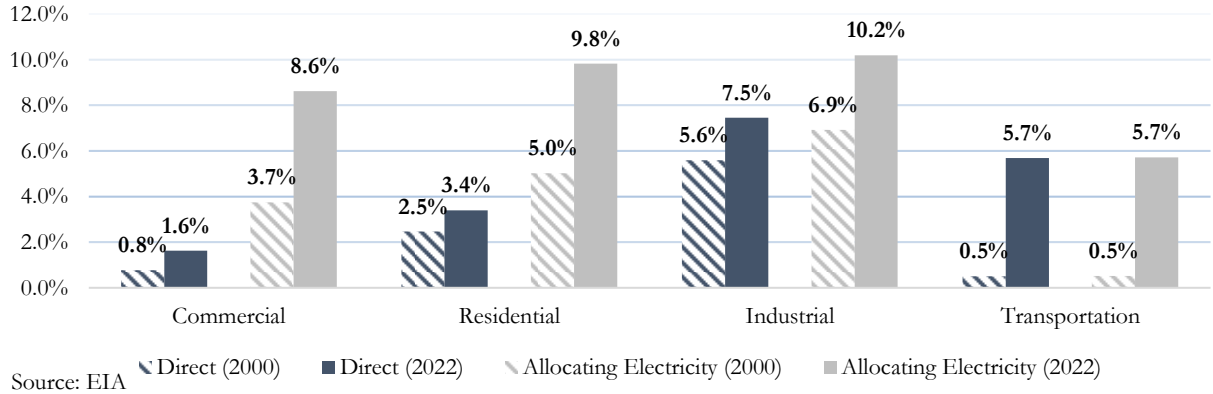
Figure 2: US Energy Consumed by Sector (Trillion Btu)



Source: EIA

As you might expect, each sector tends to draw from different energy sources. The transportation sector relies almost entirely on petroleum (89%), while the industrial sector utilizes mainly natural gas (35%) and petroleum (27%). Residential and commercial buildings have similar breakdowns, with both relying mostly on electricity to power buildings (68%) and natural gas to heat them (24%).[1] Notably, the commercial sector has been slower than any other building type in its adoption of renewable energy (even after allocating the portion of electricity supplied from renewable sources).

Figure 3: Proportion of Energy Consumption from Renewable Sources



Source: EIA

While the industrial and transportation sectors have both made significant strides to incorporate renewable energy sources over the past few decades, the residential and commercial sectors still lag woefully behind. Even today, commercial buildings only draw 1.6% of their total energy consumption directly from renewable sources.

Importantly, the shifts towards clean energy in the industrial and transportation sectors did not occur on their own; there has been great public scrutiny of these industries, as well as legislation enacted aimed at reducing their carbon emissions. We expect that as commercial real estate continues to rely primarily on fossil fuels and nonrenewable sources, the sector will inevitably come under similar public scrutiny resulting in new legislation aimed at the industry – and we are already beginning to see this trend develop.

[1] This electricity consumption allocation includes the electrical system energy losses associated with the generation, distribution, and transmission of electrical energy.

Energy Policy on Real Estate

Paris Climate Accords

The Paris Accords was a landmark international treaty focused entirely on climate change. The primary goal of the agreement was to increase the global response to the threats of climate change, and 196 parties representing approximately 98% of global carbon emissions ratified the agreement back in April 2016.

The agreement lays out specific climate goals for limiting the rise in global temperatures, but it also looks to incentivize finance flows that create a pathway towards low greenhouse gas emissions and climate-resilient development. While the Paris Accords were widely considered to be a positive step towards combatting climate change, the most prevalent critique has been that the agreement was not sufficiently binding and does not penalize parties for noncompliance.

While the scope of the Paris Accords was quite broad, the implications directly impact real estate. The World Green Building Council has said that to meet the climate goals set out in the Paris Accords, the real estate sector must be net zero carbon by 2050, which would require that all new buildings and 20% of the exiting building stock be zero-carbon-ready as soon as 2030.[4]

Executive Order 14057

In alignment with this goal of reaching net zero carbon emissions by 2050, President Biden set forth Executive Order 14057 in December 2021, which committed the federal government to achieving various emission-related energy goals over the near- and long-term, with clearly defined targets for its own real estate portfolio.

Amongst other goals, the federal government commits to achieving:

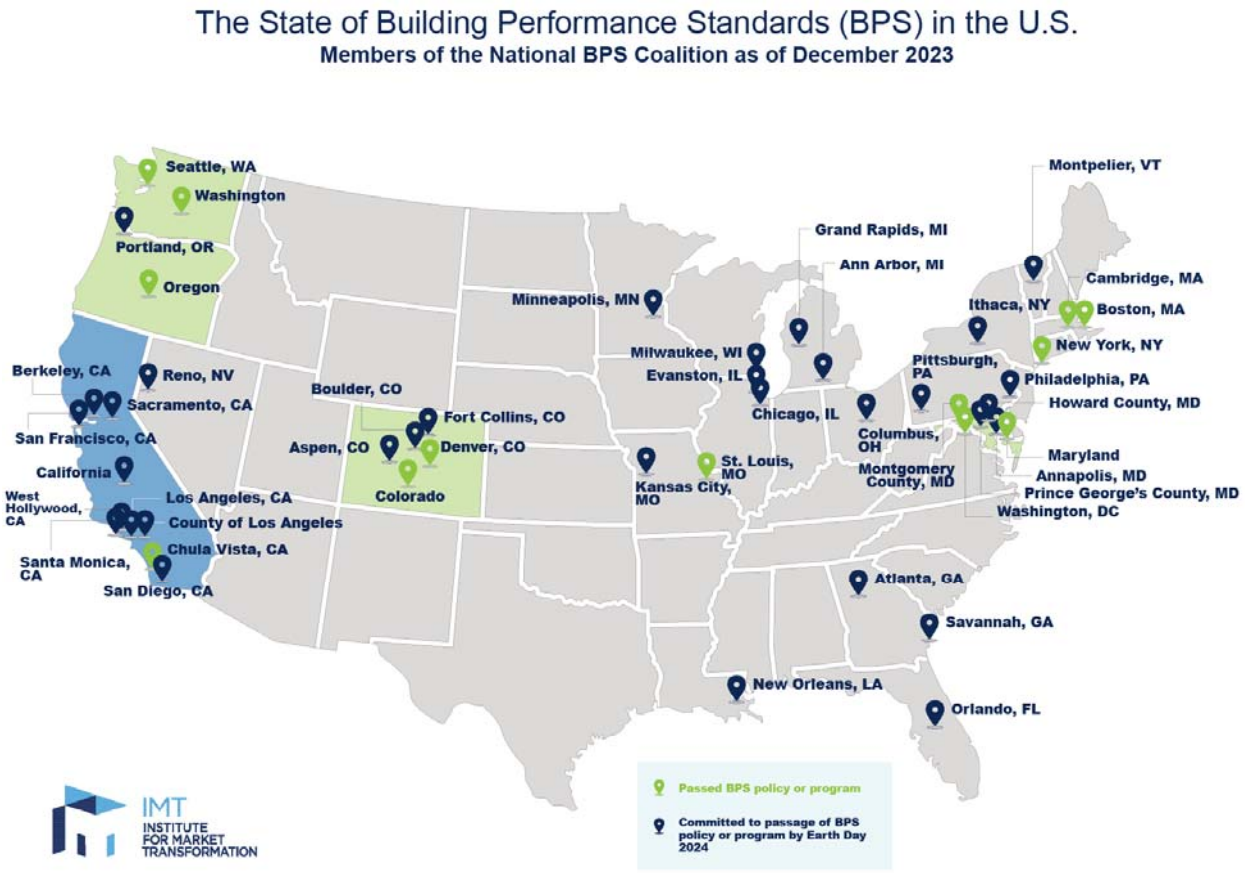
i. 100% percent carbon pollution-free electricity on a net annual basis by 2030;
ii. 100% zero-emission vehicle acquisitions by 2035;
iii. a net-zero emissions building portfolio by 2045, including a 50% emissions reduction by 2032;
iv. a 65% reduction in GHG emissions from federal operations by 2030 (from 2008 levels); and
v. net-zero emissions from federal procurement, including a Buy Clean policy to promote use of construction materials with lower embodied emissions.[5]

As a result of these mandates, landlords aiming to attract or retain federal government tenants need to proactively look to facilitate these goals. Federal government landlords should explore the potential for electric vehicle fleets in their parking facilities, as well as green energy generation and storage on their rooftops, parking structures, and adjoining land. Considering the long-term nature of most federal government leases, these types of capital improvements are going to become top of mind for government leasing authorities within the next five years to meet the timeline outlined in this executive order. Landlords that can help facilitate these types of capital improvements will be far better positioned to secure these government leases going forward.

We also want to point out that while the commitments in this executive order pertain specifically to the operations of the federal government, the White House also issued them to serve as an example for the rest of the country to follow. It would stand to reason that other state and local governments would look to adopt similar requirements, and private corporations may find themselves subject to these types of restrictions as well.

National Building Performance Standards Coalition

Shortly after this executive order, the Biden administration launched the National Building Performance Standards (BPS) Coalition. The coalition focuses entirely on real estate and aims to reduce building carbon emissions by implementing performance requirements related to energy use and efficiency at the state and local levels. Currently 45 members make up the coalition, including numerous cities and counties, as well as the states of California, Washington, Oregon, Colorado, and Maryland.



The primary functions of the National BPS Coalition are to design and implement programs and policies that address the energy and climate needs in buildings. The coalition is meant to help identify the requisite building performance standards in order to develop the policies needed to reach the country's emissions goals. By joining the coalition, members commit to developing and implementing BPS policies within their jurisdiction by April 22nd 2024 – Earth Day 2024.

Because these BPS policies are implemented at the state and local levels, no two are quite the same. Real estate owners and investors must be aware of whether their assets fall within a jurisdiction that has a BPS policy in place or is likely to pass one soon. If there is a BPS policy in place, owners must understand the requirements and timeline for compliance, as well as the capital costs to meet these requirements (potentially weighed against the cost of non-compliance).

In general, the effects of any BPS policy will not be immediate; however real estate owners should consider capital planning for the near term to start meeting these requirements. If a property is required to meet a performance standard by 2030, the improvements will need to be in place at least one year ahead of time to generate the data needed to demonstrate the building complies. Additional lead time associated with planning, financing, and installation means that owners need to start evaluating upgrades within the next few years.

To date, nine cities and counties have already implemented BPS policies, which can be used to guide expectations for future BPS legislation as other jurisdictions begin rolling out their plans. Most begin by requiring energy consumption reporting within the next two to three years, followed by actual energy efficiency and carbon emissions targets starting around 2030 that become progressively more aggressive over time. Some

policies have offered early adopter incentives for those that reach performance compliance sooner than the designated timeline. We have also seen that many include penalties for non-compliance, both for failure to report (fixed fees) and underperformance relative to the policy targets (levied on a per-square-foot basis).

Inflation Reduction Act

In August 2022, President Biden signed into law the Inflation Reduction Act of 2022 (IRA) in an effort to fight rising inflation. However, probably the most significant component of the legislation is the $369 billion of government spending authorized for energy security and climate change, which represents the largest climate change investment in US history. Proponents of the IRA estimate that these investments will help reduce carbon emissions by roughly 40% by 2030 (from 2005 levels).[6]

The IRA offers corporations, individuals, and state and local governments a slew of opportunities to leverage federal funding to decarbonize the built environment. These opportunities include:

i. incentives and rebates for energy efficiency upgrades to new and existing buildings;
ii. incentives for onsite renewables, energy storage, microgrids, and EV charging infrastructure;
iii. grants for climate mitigation, environmental justice, and coastal resilience;
iv. federal green building upgrades, technology, and low-carbon material procurement; &
v. grants for affordable housing upgrades and building energy codes.

Corporate Tax Credits

The primary incentives used within the IRA are tax credits. Corporations will be the biggest target recipient of these tax credits, and McKinsey estimates they will receive up to $216 billion – more than half of the overall federal spending package.[7]

These tax credits are meant to stimulate private investment in clean energy, transport, and manufacturing, and are available to landowners and tenants. The primary IRA tax incentives related to commercial real estate are[8]:

- **Section 48: Clean Electricity Investment Tax Credit**
  Investment tax credit (ITC) expanded through at least 2032 for clean energy investments such as rooftop solar, ground-source heat pumps, and energy storage. Most projects receive a tax credit equal to 30% of the investment.
- **Section 179D: Tax Deduction for Energy Efficient Commercial Buildings**
  Expanded tax deduction for commercial building efficiency improvements projects. The deduction was increased from $1.80 PSF to a sliding scale of $2.50 to $5.00 PSF depending on the magnitude of the improvements. Projects must achieve 25-50% better performance than applicable ASHRAE standards. This tax deduction is available indefinitely, and adjusts annually for inflation.
- **Section 30C: Alternative Fuel Vehicle Refueling Property Credit**
  Tax credit for EV charging systems and other alternative fuel infrastructure through 2032. The tax credit is equal to 30% of investment costs, up to $100,000 per charging/fueling unit. Starting in 2024, eligible properties must be in defined rural or low-income census tracts.

Greenhouse Gas Reduction Fund

The IRA also created a new $27 billion greenhouse gas reduction fund to create a "green bank" for the EPA to help finance clean energy projects. Net-zero emission buildings are one of the priority areas for this fund, which targets projects, activities and technologies that either 1) retrofit an existing building to contribute to it being net-zero, or 2) construct new net-zero emissions buildings in low-income and disadvantaged communities.

Federal Buildings Fund

Section 60502 provided the GSA Federal Buildings Fund an additional $250 million in FY2022 to convert GSA-owned or -managed buildings to high-performance green buildings, where federal government agencies

are housed. In addition, over $3.0 billion in funds were provided to GSA to help implement innovative technologies in federal facilities and acquire low-carbon materials for new construction and buildout projects.

Department of Energy Loans

Under the IRA, the Department of Energy received increased lending authority through its Loan Programs Office (LPO). The legislation expanded the scope of its *Title 17 Clean Energy Financing Program* for clean energy infrastructure to include projects that reinvest in legacy energy infrastructure. It also provided additional loan authority and funding available for projects involving innovative energy technologies.

Through these programs, borrowers can achieve more favorable lending terms by leveraging the credit of the US Treasury so long as the projects satisfy a few basic criteria. Borrowers can access direct loans from the US Treasury Federal Financing Bank that are 100% guaranteed by the DOE, or else they can receive partial DOE guarantees of commercial debt.

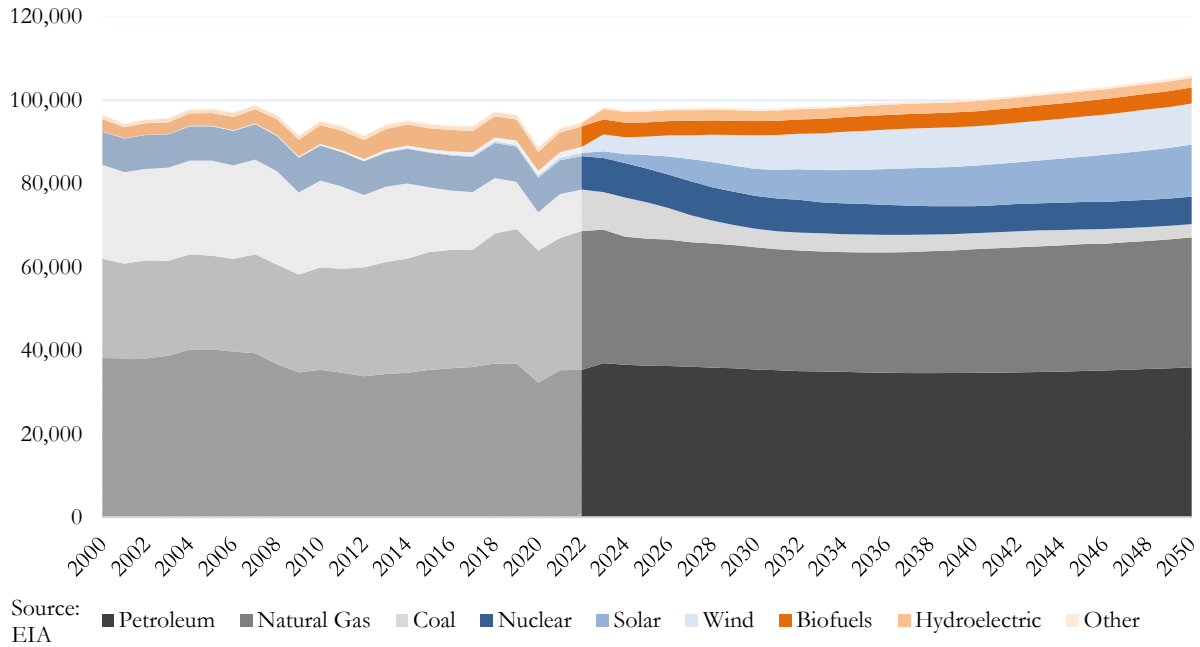
There are four project categories within this loan program: Innovative Energy; Innovative Supply Chain; State Energy Financing Institution-Supported; and now Energy Infrastructure Reinvestment. There is no minimum eligible project size, but LPO typically finances projects of at least $100 million, so they generally only provide projects for large-scale energy projects.

The Future of Energy Consumption

Energy Consumption Projections by Source

Looking ahead to the future, total energy consumption over the next 25 years is projected to rise, but only slightly – at least here in the US. The US Energy Information Administration (EIA) projects that total national energy consumption will rise from the current level of 99.2 quads (quadrillion Btus) to 105.9 quads in 2050, which translates to average growth of only 0.2% per year. The EIA reasons that population growth, increased regional manufacturing, the rise of data centers, and higher living standards will be largely offset with advances in energy efficiency.

Figure 4: US Energy Consumed by Fuel Source
Historical and Projected (Trillion Btu)



While total consumption levels are not projected to change drastically, the sources of this energy will look very different in 2050 as the US government pursues its energy goals. Our use of conventional energy sources (i.e. petroleum, natural gas, and coal) is expected to decrease by 12% between now and 2050, while alternative energy sources will nearly double over the same timeframe. The share of alternative energy consumption is expected to grow from approximately one-fifth (20%) today to one-third (33%).

Of these alternative energy sources, solar and wind have by far the greatest growth projections. By 2050, wind power is expected to grow 2.5-fold while photovoltaic (PV) solar power consumption is expect to grow more than 10-fold. The rapid rise of these two energy sources should not be surprising, given the public attention and policy aimed at promoting these clean energy sources.

Overview of Energy Sources

To help define some of the common energy sources used throughout this whitepaper, we offer descriptions below. Generally, energy sources are divided into two main groups: conventional and alternative. Conventional energy sources consist of the most commonly used sources, which for purposes of this report are petroleum, natural gas, and coal. Alternative energy sources account for everything else and are typically much cleaner but present their own strengths and weaknesses.

Conventional Energy Sources

- **Petroleum/Oil (37.3% share, -0.1 % CAGR through 2050)**
  Petroleum products are made from crude oil and are fossil fuel energy sources. After oil is extracted from the ground, it is sent to refineries and separated into useable products such as gasoline, distillates, and jet fuel. The majority of petroleum products are consumed by the transportation sector, followed by the industrial manufacturing sector.
- **Natural Gas (35.2% share, -0.2% CAGR through 2050)**
  Natural gas is another conventional fossil fuel energy source comprised of many different compounds, the largest of which is methane. Natural gas is welled from underground before being sent to processing plants, distribution companies, and then finally to consumers. Natural gas is primarily used for heating and electricity generation and is consumed relatively equally by all building sectors (but particularly residential and commercial).
- **Coal (10.4% share, -3.9% CAGR through 2050)**
  Coal is the last of the conventional fossil fuel energy sources; it is a combustible black sedimentary rock that is high in carbon and hydrocarbons and burned to release energy. Coal is the most abundant fuel source in the US, as one-fourth of all known coal in the world is found here. Coal is used almost exclusively to generate electricity in the US.

Alternative Energy Sources

- **Nuclear (8.5% share, -0.8% CAGR through 2050)**
  Nuclear energy is considered an alternative energy source, though it is not renewable as the Uranium atoms used in most nuclear power plants are rare and non-renewable. Currently, all nuclear power plants use nuclear fission, whereby an atom is split, releasing large amounts of energy in the form of heat and radiation. Although it is not renewable, nuclear energy is still far cleaner than conventional fossil fuel energy sources, as it releases no greenhouse gases – though the radiation can have dire consequences if mismanaged.
- **Solar (0.8% share, +8.7% CAGR through 2050)**
  Solar energy is energy derived from the sun. It is currently the third largest source of renewable energy in the US behind wind and hydroelectric, but by 2040 it is projected to be the largest by a substantial margin. Solar photovoltaic systems exist in the form of solar farms, which generate large amounts of power for the grid, however individuals or real estate owners can also install smaller systems on their own real estate

assets to help supply some or all of their individual electricity consumption. Excess power generation can be sold back to the grid for power.

- **Wind (1.6% share, +3.4% CAGR through 2050)**
  Wind energy is currently the second largest renewable energy source behind biofuels, and has the second highest growth projections behind solar. Like solar, wind power is completely clean, renewable and primarily used to generate electricity. There are three main types of wind turbines: land-based, offshore, and distributed. The majority of wind turbines are land-based, as they are very cost-effective. Offshore wind turbines installed over oceans or lakes are newer, but continuing to grow. Two major benefits of offshore wind farms are that they do not take up buildable land, and they can be much larger in scale (think blades as long as football fields). Finally, distributed wind turbines are smaller-scale turbines, used to provide energy for individual buildings or small communities.
- **Hydroelectric (0.9% share, -0.2% CAGR through 2050)**
  Hydroelectric power or hydropower uses the force of flowing water in streams and rivers to produce mechanical energy in the form of electricity. Hydropower plants need to be located near a flowing water source and function similar to wind turbines. At these plants, flowing water is directed though pipes to turn the blades of a turbine and produce electricity. There are two types of hydroelectric facilities: run-of-the-river systems and storage systems. In run-of-the-river systems, the river's force perpetually spins a turbine and generates electricity constantly. In storage systems, water accumulates in reservoirs created by dams and is released through turbines to generate electricity on demand.
- **Biofuels (5.1% share, +0.3% CAGR through 2050)**
  Biofuels or biomass is defined as renewable energy from plants and animals. It is currently the largest renewable energy source, though does not have quite the same growth potential as wind or solar. Biofuels are used for a number of applications, such as heating, electricity, and transportation fuel. Examples of biofuels include: wood and wood processing waste, agricultural crops and waste materials, biogenic materials in municipal solid waste, and animal manure.
- **Other Alternative Sources**
  Without spending too much time on it, there are other smaller alternative energy sources that are more limited in their usage and applications. Geothermal energy is one notable example, which utilizes heat from inside the earth to create power.

Electricity Power Generation

It should be noted that all sectors use electricity in varying capacities, however electricity is still considered a secondary energy source because it requires other primary energy sources to produce. When we evaluate the energy consumption of various economic sectors, we need to analyze their electricity consumption and consider what primary energy was used to produce the electricity.

There are unavoidable inefficiencies with electricity production, due to the energy losses associated with the generation, transmission, and distribution of electricity. In fact, almost two-thirds of the primary energy used to create electricity is lost by the time it reaches the end consumer, primarily due to heat waste that occurs throughout the process.

From an energy consumption standpoint, this means that nearly three times the primary energy is needed to produce the end-user electric power consumed. Along the same lines, this also means from a carbon emission perspective, transitioning energy sources from fossil fuel sources to electricity will only reduce net emissions if the electricity is produced by mainly alternative sources (at least two-thirds from clean primary sources). This is why it will be critical for the US government to promote policies that encourage electricity generation from renewable sources, as the country aims to achieve net zero carbon emissions by 2050.

Emerging Energy Sources

We will also highlight two small but emerging energy sources, which are still in their nascent stages:

- **Fusion Energy**
  Fusion energy is a subcategory of nuclear energy. Rather than utilizing fission energy, there is emerging technology to generate energy from fusion reactions (the combining of atoms). Scientists are excited about the prospects of fusion energy because its sources of fuel (hydrogen and lithium) are widely available, and the process does not generate any long-lived radioactive waste. However fusion energy is still far from becoming commercially feasible. Only in December 2022 did a team in Livermore, CA first achieve fusion ignition, meaning the reaction they created produced more energy than it took to generate. Still this is just the first step in a long research process, and major advancements and infrastructure will be required before fusion energy is ready to be scaled for public consumption.
- **Ocean Energy**
  Ocean or marine energy uses the kinetic and thermal energy of seawater, such as waves or currents, to produce electricity or heat. Ocean energy systems are also very early in their development process, but new prototype wave, tidal current, and salinity devices are in research and development. There is certainly a tremendous deal of power and energy contained within our oceans, however the technology to extract this power has yet to be widely commercialized.

Risks of Conventional Sources

It almost goes without saying at this point, but there are obvious risks to continuing with our current usage of conventional energy sources. Not only are these resources finite and diminishing, but the harmful greenhouse gases they produce are the chief contributors to global climate change. With temperatures rising across the globe, we are seeing increased instances of severe weather events (fires, tropical storms) and huge damage to our environment and ecosystems. Governments across the world recognize these issues and are committing to alternative energy sources and new policies and technologies to combat climate change and protect our planet.

Real Estate Implications

Transition Risk

As the US shifts away from fossil fuels and towards a low-carbon economy, the real estate industry will certainly face associated transition risks. Landlords will be faced with new energy and efficiency requirements, not only from new legislation, but also from public sentiment as tenants come to expect a certain level of energy capacity and efficiency.

In order to navigate these risks, real estate owners must continue to track energy policy changes, consumer sentiment, and technological advances in order to make informed decisions about how best to deploy capital and maximize performance. Certain assets and asset types will face greater risks than others, based on a number of factors including:

- geographic location;
- proximity to resources;
- local political climate;
- building configuration; and
- asset type and energy consumption intensity.

Energy Exposure by Property Types

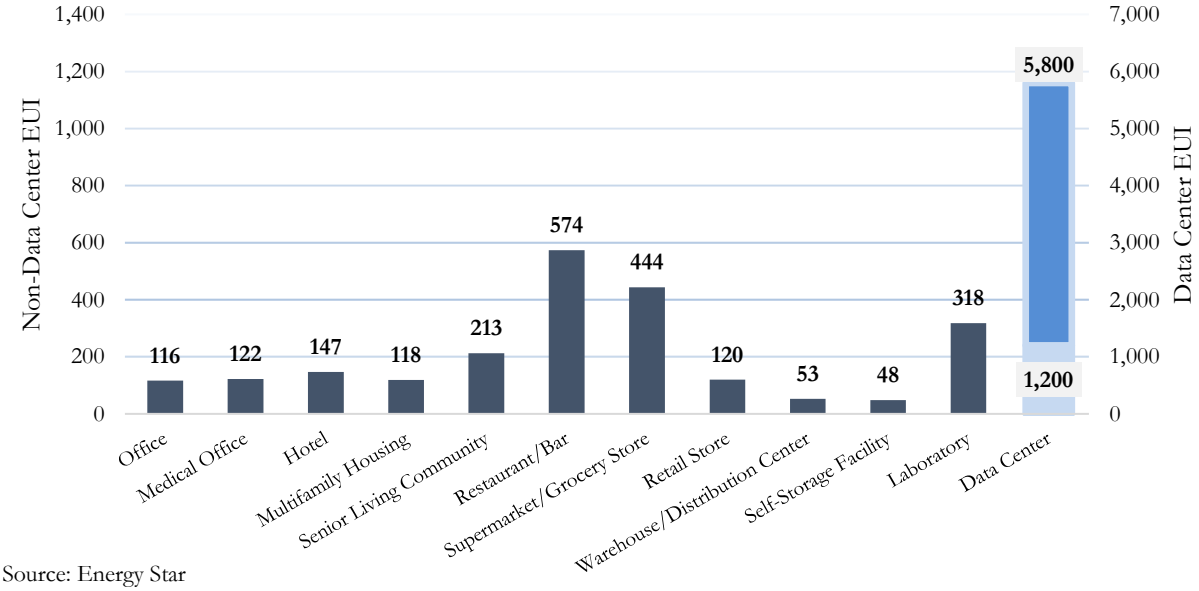
As discussed previously, each sector consumes energy in different ways; the energy sources for industrial vary from residential, which vary from commercial. There are even further distinctions as we drill down to the specific property types within these sectors.

Energy Use Intensity (EUI) is the preeminent metric used to monitor and benchmark energy consumption amongst real estate assets. It is calculated by dividing the total annual energy consumption of a building by its total gross floor area. Importantly, the key metric to track (and what is used by Energy Star and the EPA) is Source EIU, which is not quite the same as Site EIU.

Site EIU combines the building energy consumption for both primary and secondary sources such as electricity, so the total annual consumption in the numerator matches the utility bills received by the property. However, this approach neglects the energy impact and inherent energy loss required to produce, transmit, and deliver any secondary energy. In effect, Source EIU adjusts the energy consumption from secondary energy sources to reflect the total primary energy consumed by a building.

Energy Star (the program run by the Environmental Protection Agency and Department of Energy to promote energy efficiency) tracks Source EUIs across property types.

Figure 5: US Median Source EUI by Property Type (kBtu/sf)



Source: Energy Star

Unsurprisingly, industrial warehouse and distribution centers and self-storage exhibit some of the lowest Source EUIs of all product types at approximately 50 kBtu per square foot. The next lowest energy-intensive property types include standard office, retail, and multifamily, which all have Source EUIs within a range of 100 to 125. Hotel properties are not far behind at 150 kBtu per square foot, and some of the most energy intensive retail uses (restaurants/bars and supermarkets/grocery stores) can exceed energy consumption of 500 kBtu per square foot. Data centers, however, are so energy intensive that they cannot even be shown on the same scale.

The Department of Energy estimates that the average data center consumes between 10 to 50 times the energy per floor space of a standard commercial office building, which puts their estimated Source EUI in the range of 1,200 to 5,800 kBtu per square foot. Unfortunately, EUI statistics for data centers are notoriously unavailable. The EIA attempted to calculate Source EUI for data centers using their Commercial Energy Consumption

Survey (CBECS) but were unable to publish meaningful results due to the small sample size and low cooperation rates amongst participants. Data centers themselves tend not to track EUI but focus on Power Usage Effectiveness (PUE) as their main efficiency metric.

Rising technologies and trends such as artificial intelligence, cloud computing, machine learning, and content streaming are all stretching the global need for data centers. A report from Newmark estimates that US data center demand will grow from 17 gigawatts in 2022 to 35 gigawatts by 2030, which implies that data center energy consumption will also double over this period without further efficiency improvements.

Strategic Approaches to Changing Energy Requirements

Acquisition Considerations

Energy Risk as an Acquisition Selection Factor

When evaluating real estate acquisition opportunities and fund strategies, it is critical that investors consider energy factors while identifying target markets, product types, and individual assets. Policymakers and academics have developed two frameworks for evaluating our country's energy outlook: energy vulnerability and energy resilience.

Energy vulnerability is a measure of risk; it describes the likelihood that an energy system fails to meet the needs of its users. Examples of energy system failures could include power outages, inadequate power supply, or unaffordable power costs. Energy resilience is related to vulnerability, but the converse; it refers to the ability of an energy system to withstand, recover, and importantly to adapt to disturbances to the system.

Several public and private institutions have attempted to quantify energy vulnerability by creating energy vulnerability indexes (EVIs). Essentially these groups have developed their view of the key metrics for assessing energy vulnerability, along with weights to determine which metrics they believe are most important for their specific considerations. The majority of these indexes have been created at the national level; however the same principles can be applied at the regional or asset level using different data sources.

Energy Vulnerability Pillars	Regional Metrics	Building Metrics
Electricity Self-Sufficiency	Net Electricity Consumption by Sector Energy Generation Projections by Source and Scenario[2]	Net Electricity Consumption On-Site Electricity Generation
Alternatives to Fossil Fuels	Rooftop Solar Technical Power Generation Potential by Sector Wind Technical Power Generation Potential by Type	Rooftop Solar Power Generation Distributed Wind Power Generation
Energy Accessibility	Electricity and Natural Gas Expenditures by Sector Household Energy Burden Levelized Cost of Energy	Cost of Electricity Cost of Natural Gas

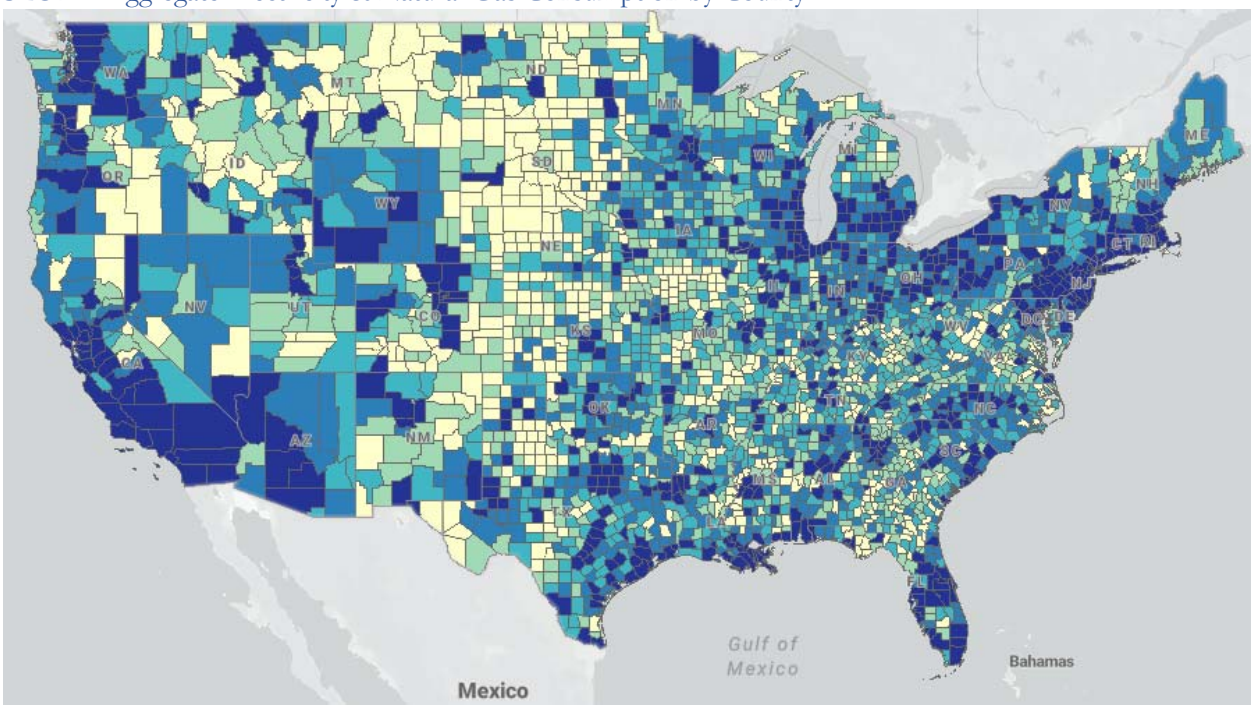
[2] NREL has prepared its 2023 Standard Scenarios to model a range of possible electricity generation futures. The projections reflect progress in technology cost and performance, and updated assumptions regarding the impacts of the Inflation Reduction Act.

Energy Efficiency	Net Electricity and Natural Gas Consumption per Square Foot Degree Day Projections Commercial Electricity and Natural Gas Savings	Site/Source EUI Upgraded Site/Source EUI Identified Opportunities for Energy Efficiency Upgrades Energy Star Score
Energy Policy	BPS Requirements/Penalties Clean Energy Jobs by Source	BPS Requirement Compliance BPS Compliance Cost

To support local energy planning efforts, the National Renewable Energy Laboratory (NREL) has developed the State and Local Planning for Energy (SLOPE) online platform to track and aggregate energy-related data at the state and regional level.

All of the regional metrics listed above (and more) can be mapped and overlain using GIS software to visualize regional energy trends and help differentiate target markets or areas of risk. These metrics can also be grouped, indexed, and weighted to create an all-encompassing proprietary regional energy vulnerability index.

SLOPE: Aggregate Electricity & Natural Gas Consumption by County



A similar approach can also be taken at the asset level to create a proprietary building EVI, or else other benchmarking tools are readily available.

For example, the Department of Energy has developed a Building Energy Asset Score to assess the physical and structural energy efficiency of commercial and multifamily residential buildings. The Asset Score tool is free to use and generates a nationally standardized energy efficiency rating, while also identifying opportunities to invest in energy efficiency upgrades. Similarly, Energy Star has created its own scoring system to help compare the energy consumption between similar buildings nationwide.

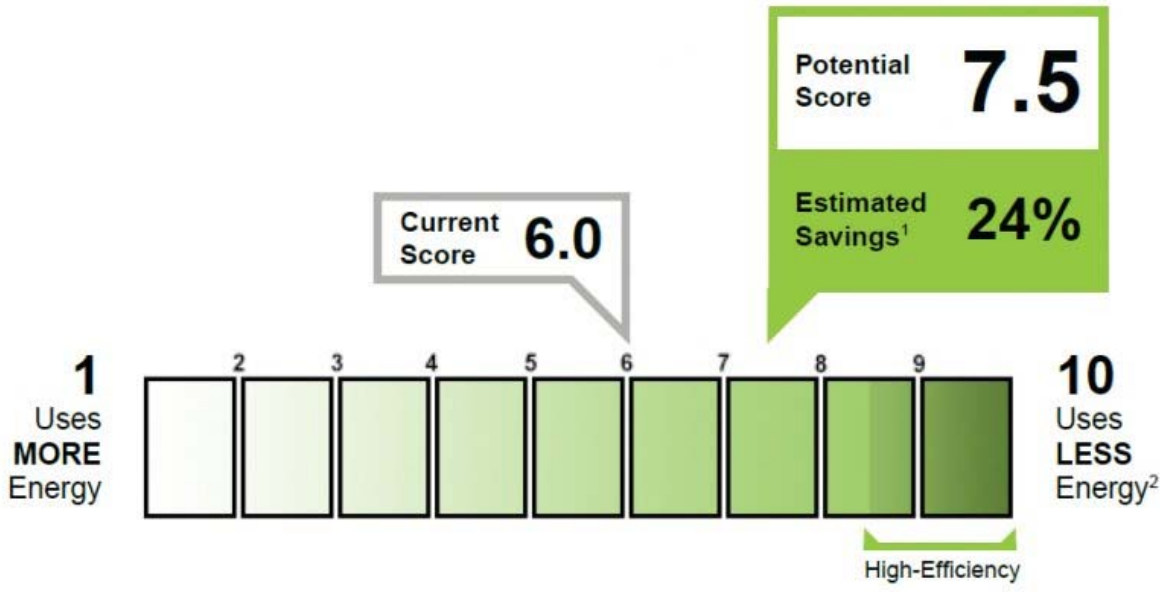
Rescuing Energy Stranded Assets

With increasing energy regulations and requirements, older unrenovated buildings will begin to face higher operating costs as a result of poor energy efficiency and potential penalties for noncompliance with BPS policy requirements. Certain investors will not have the means or the appetite to invest in the capital projects required to update these assets. For energy stranded assets, there are potential value-add opportunities for accretive energy retrofits that should be considered at underwriting to unlock value.

Before any acquisition, we recommend conducting a full energy audit to understand what opportunities are available to increase efficiency, electricity generation, and power storage. Ocean West has developed a comprehensive due diligence energy checklist to not only evaluate each property's current energy status, but to also assess the site's suitability for future energy improvements.

At a minimum, tools like the Building Energy Asset Score or the Energy Star Score can be utilized to provide a cursory overview of a property's potential for energy efficiency improvements.

Department of Energy Building Energy Asset Score



Utility expenses are one of the most expensive operating expenses, along with property taxes, and both are typically categorized as "uncontrollable" expenses; however there are certainly ways to reduce energy consumption, which directly result in higher operating income and unlock value.

Even in triple-net lease scenarios where the tenant pays utilities directly, increased energy efficiency measures tend to generate higher rents and appeal to a broader range of tenants – especially those with ESG initiatives or mandates. In some cases, tenants may be willing to contribute financially to energy efficiency capital projects if it benefits them financially and helps them meet their ESG targets. These types of conversations can be started during the due diligence acquisition phase during tenant interviews.

Direct Investment in Energy Real Estate

So far, this paper has only discussed the potential energy impacts and opportunities on commercial and residential buildings, but there is an also an opportunity to develop or invest in energy real estate, solely devoted to power production. Given the growth potential of the solar and wind power and the government incentives to promote the industries, these are the most likely candidates for energy real estate investment. While these

investments obviously occupy real estate, they are more often considered infrastructure investments with stable and long-term returns.

Real estate owners with suitable land can always lease land directly to third-party renewable developers, but this is usually not the most lucrative venture. To develop and operate these infrastructure assets, owners must first confirm that the site is suitable based on: proximity to grid infrastructure; level of sunlight/wind; site area; topography; soil quality; and regulatory landscape. On top of this, the owner will need to obtain all necessary licenses and permits during pre-construction, which can take multiple years.

However after navigating the due diligence and pre-construction phases, there are multiple incentives provided to renewable energy developers, both in the form of tax credits (up to 30% of costs) and loan financing and guarantees. Through the Title 17 Clean Energy Financing Programs, borrowers can access direct loan from the US Treasury's Federal Financing Bank backed by 100% DOE guarantees, or borrowers can receive partial DOE guarantees of commercial debt. The interest rate for FFB loans backed by a DOE loan is based on the US treasury curve, plus a 0.375% liquidity spread and risk-based charge. There is technically no minimum size for projects to qualify for these loans, but typically these projects start at $100 million or more.[9]

Operational Strategies

Federal and Local Incentives

From an operational standpoint, an obvious avenue that asset managers need to explore are the federal and local incentives aimed at incentivizing green building operations. Many of the federal incentives included in the Inflation Reduction Act have been discussed at length in previous sections, however new policies will continue to be implemented that real estate owners must continue to track.

Most current incentives are in the form of tax credits, which can help justify the cost-benefit analysis for renewable energy generation, energy storage, and energy efficiency measures. These public incentives often stack as well, meaning landlords can access multiple funding sources for the same investment.

For example, a commercial building that is looking to renovate with rooftop solar and EV charging stations could receive up to a $5.00 per square foot in tax deductions for commercial building energy efficiency improvements (Sec. 179D), low-interest project financing from the Greenhouse Gas Reduction Fund, and 30% investment tax credits for rooftop solar improvements (Sec. 48) and EV charging infrastructure (Sec. 30).

Green Lease Management

In addition to the federal incentives, asset managers can begin to prepare for the energy transition by modifying leases on a go-forward basis to create "green leases." While energy efficiency upgrades often in the best interest of the building and tenant long-term, the incentives between landlord and tenant are not always aligned to encourage their implementation.

The Institute for Market Transformation (IMT) has outlined numerous ways that landlords can construct green leases and encourage energy efficiency measures.[10] Some examples include:

❖ **Pass-Through Clauses**

Clauses that reduce and eliminate the split-incentive caused by typical leases between landlords and tenant involving cost-reducing capital expenditures.
Example: *All costs of any capital improvements made to the building that reduce the building's energy expenses, shall be cost capitalized and hereafter amortized as an annual Operating Expense under generally accepted accounting principles, only the yearly amortized portion of which shall be included in Operating Expenses. In no event shall the charge for yearly amortization be more than the actual reduction in Operating Expenses.*

❖ **LEED and Green Globe Clauses**

Clauses that require energy efficiency certifications in the design and construction of leased space throughout a building.
Example: *Any and all Tenant Improvement Work and/or Alterations will be performed in accordance with Landlord's sustainability practices that Tenant has accepted as part of the lease agreement, including any agreed upon third-party rating system concerning the environmental compliance of the Building or the Premises, as the same may change from time to time.*

❖ **Purchase of On-Site Renewables Clauses**

Clauses that facilitate the installation of on-site renewables such as solar panels or wind turbines.
Example: *Tenant shall be entitled to place electrical generating equipment on the Building's roof pursuant to the terms and conditions set by the Landlord. All of the terms of this Lease shall be applicable to Tenant's Generating Equipment as if the Generating Equipment were part of the Premises, but Tenant acknowledges that the Generating Equipment is not part of the Premises.*

❖ **Net-Zero Clauses**

Clauses to address the energy targets of the landlord and tenant.
Example: *The Parties agree in the original lease to incorporate all energy saving measures necessary to achieve net zero energy, with the understanding that net zero may not be achievable initially. On that basis, the parties agree to periodically (every x years) assess and review the incremental progress/movement towards net zero energy use as measured by the actual usage numbers. The Parties agree, in good faith, to discuss future potential lease amendments and distribution/assignment of cost savings, along with possible lease cost adjustments, based on the resulting information.*

New Technology

Finally, there are numerous technological solutions that can help create greener buildings, and more are being brought to market constantly. Landlords and asset managers that are able to incorporate these technologies and brand themselves as "green buildings," will not only achieve higher energy efficiency and lower operating costs, but they will also be able to attract a growing number of tenants prioritizing ESG initiatives.

The Department of Energy's Building Technologies Office (BTO) focuses on developing and bringing to market innovative and cost-effective energy solutions. The BTO is primarily involved in the earliest research & development stages, prior to launch and deployment, so it can provide a comprehensive look into the pipeline of future technologies.

The BTO funds technology projects related to:

Research & Development	**Data**	**Building Standards**
Advanced Lighting	Data & Design/Decision Tools	Code Compliance
Building Energy Modeling	Data Analysis & Modeling Tools	Code Development and Analysis
HVAC & Appliances		Efficiency Guides & Programs
Sensor and Controls	**Technology**	Workforce Development
Thermal Energy Storage	Market Transformation	
Transactive Controls	Systems Validation	
Window & Building Envelope	Demonstration & Deployment	

Through 2021, BTO has funded 252 specific technologies – 41 of which are available commercially, and 128 of which are expected to be commercialized within the next five years. Examples of currently commercial new technologies since 2018 include:

HVAC:	Next Generation Rooftop Unit (Trane) Modeling Tools for Flammability Ranking of Low GWP Refrigerant Blends (National Institute of Standards and Technology) Hydrogen/Metal Hydride Based Heat Pump System (Xergy)
Windows:	Triple Glazing with Thin Non-Structural Center Glass (Lawrence Berkeley National Laboratory) Energy-Control Low-e Retrofit Window Film (Eastman Chemical Company)
Building Envelope:	Precast Concrete molds Using 3D Printing (Oak Ridge National Laboratory) IC Solar Envelope: Energy-Efficient Facades for Green Buildings (HeliOptix) Ai Barriers 3M 3015 (3M)
Lighting:	Pixelligent Light Extraction Paterials (Pixelligent) OLEDWorks Brite 3 OLED Lighting Panels (OLEDWorks Finelite FineTune Tailored Control System (Finelite) Lucent Optics Ultra-Thin Flexible LED Lighting Panels (Lucent Optics)
Building Controls:	Energy-Harvesting, Self-Calibrating Wireless Sensors (Molex)
Energy Modeling:	VOLTTRON: Controller for Energy Systems (Pacific Northwest National Lab) EcoStruxure IT Advisor CFD (Schneider Electric R&D Center) Ladybug Tools: CAD-Integrated Building Performance Simulation Platform (Ladybug Tools)

While this list is by no means meant to be comprehensive, it at least demonstrates the speed at which new technologies are being introduced to the market and the types of efficiency problems they are looking to improve upon. Commercial real estate managers need to stay apprised of new technologies as they are released and maintain a network of contacts within the proptech space to help evaluate the efficacy of these products.

In addition to new energy efficiency technology, managers must also be committed to data technology that allows them to benchmark their portfolio and identify issues when they arise.

Conclusions

In summary, real estate buildings will need to become more efficient and less reliant on fossil fuels in order to meet our national energy goals, and new energy policies and legislation for commercial real estate are eminently coming. Penalties for non-compliance are likely to increase as the urgency to reduce carbon emissions continues to swell.

Real estate investors and managers must begin to consider energy factors and transition risks when developing their acquisition strategies and business plans moving forward. The impacts of changing policy will not go into effect overnight, but real estate investors and managers need to begin evaluating opportunities to upgrade energy efficiency in the near-term.

There are a variety of federal and local government resources to help building owners transition to a low-carbon economy, and more incentives will likely continue being offered. Still there are many ways that commercial real estate owners can begin to prepare for the coming changes, but they require much attention and forethought.

Contact

For more information contact:

John Weiss
Assistant Vice President
jweiss@oceanwestcp.com

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