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ENERGY MANAGEMENT WITH THE BIG PICTURE IN MIND

A blueprint to integrate electricity and sustainability goals

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Executive summary

Managing energy portfolios for commercial and industrial facilities has never been easy. And yet, in recent years, it's grown more complex with additional responsibilities added to the job. These days, as an energy manager, you must manage energy procurement — your traditional role — while also helping achieve renewable and sustainability goals. Last year, corporations signed on for a record amount of renewable energy, spurring $20-$30 billion in project development.

Sustainability is becoming an integral piece of corporate strategy that ties directly to business success, reduced risks, and reputational value. Sustainability is a philosophy that underpins and facilitates value creation across every aspect of the business. For the 63 percent of businesses with formal resource goals, energy decisions once based solely on price are now also based on an expanded level of risk associated with the increasing ferocity and frequency of climatic events, which can undermine reliability. According to the Galvin Electricity Initiative, the U.S. is at the top for power outages among nine industrialized countries.

With the emergence of the Task Force on Climate Related Financial Disclosures or TCFD, the climate risk conversation has expanded to include addressing existential threats posed by climate change to a company's ability to thrive long term. The task force is comprised of 31 members from across the G20 that represent both preparers and users of financial disclosures, and is chaired by Michael R. Bloomberg, founder of Bloomberg.

Concerns about energy resilience only serve to further complicate your organization's energy plans. Natural disasters brought on by climate change are heightening business continuity risk. Power disruptions can quickly shut down a business, especially in the hurricane-prone zones within the U.S.

While renewable energy and sustainability obligations make sense — and underscore the business world's commitment to address climate change — there is no denying that you, as an energy manager, face new pressures. At the same time, you must still fulfill your conventional responsibility of procuring energy at the lowest possible cost. Energy can account for a significant portion of operating expenses and affect the price competitiveness of your company's products and services. Your decisions can cost — or save — your firm a significant amount of money.

Adding to this medley of choices, refinements are emerging in monitoring, measuring, and analyzing consumption data, creating greater volumes of information for energy managers to sort, understand, and apply to their operations. Meanwhile, demand-side management, too, has taken on a new level of complexity, evolving from simple reduction of energy use to making load flexible so that it can respond to market and facility needs. Flexibility helps facilities achieve lower costs and reduce environmental impact, but again, it represents an added element to the energy manager's job.

Fortunately, technology and innovation — from smart meters to energy storage systems to virtual power purchase agreements — can help you achieve price and sustainability goals. Unfortunately, all of these products and services bring a wide range of vendors and nuanced offers to your door. Why is this a problem? Each brings a value proposition that offers a single solution to a single problem, as if one element of your energy operation does not affect the other. It's a symphony of advice without a conductor.

You're well aware that piecemeal solutions create missed opportunities — and possibly new problems. The various aspects of your energy plan — supply, sustainability, resilience — are inextricably intertwined. So how do you manage them as one? How do you integrate conventional supply choices and less conventional sustainability planning to create a whole that is greater than the sum of its parts? NRG Energy has been helping customers with this exact problem, and while most solutions are tailored to our customers' needs, in this paper, we will layout a basic blueprint of how we have helped our customers achieve all their energy goals.

Part I: Elements of corporate energy planning

In an effort to be comprehensive, we have listed the resources that must be considered in a successful energy plan.

ELECTRICITY SUPPLY

Where businesses can choose their electricity suppliers (nearly half of the states in the U.S.), a myriad of contractual arrangements are available to consider. Some are distinguished by price, risk, and term length; others by type of power, such as renewable or conventional; and many a mix of the two. Knowing which costs a supplier can (and cannot) pass-through is essential before executing any transaction. Term structure is also important: are your agreements aligned in such a way that you can capture market anomalies?

Understanding the choices represents half the equation; the other half requires deep knowledge of your facility's risk tolerance, particularly in light of price spikes driven by extreme temperatures. A fixed price contract will offer budget assurance, but no upside in a favorable market; an indexed or variable contract offers the upside but also exposes your operation to wholesale market price spikes. For businesses seeking a middle ground, block and index strategies combine fixed-price protection with variable-pricing. This approach offers you the opportunity to purchase and stack blocks of electricity to create a portfolio customized to your business's energy needs and risk threshold.

How high can wholesale power market prices spike? Texas offers a good example. Consider what happened August 15, 2019, a hot day when electric demand was high and wind power output low. Prices reached a market cap of $9,000/MWh, 300 times the average price of $30/MWh.

RENEWABLE SUPPLY

With sustainability goals elevated to a corporate priority, it's not enough to consider price, risk, and contract arrangements alone. Where possible, the source of the generation must also be configured into your strategy. Are Green-E Renewable Energy Certificates (RECs) sufficient? Or can you source directly from a project through your supply agreement?

Renewable supply is also not available in many markets, so understanding the barriers to entry and potential costs in various markets is critical to making the right decision. For example, a renewable supply option in ERCOT may prove cost-effective while the same type of offer in PJM may cost more. Understanding the options in various markets and the timing of when options may become available will greatly contribute to your organization's energy plan.

ONSITE SOLAR

Onsite solar can be extremely rewarding when implemented correctly. The challenge is that it only makes economic sense in a few markets and only for a specific customer demographic, one with investment grade credit, large open spaces available, and a long-term energy plan To add to the complexity, many onsite programs will require the monetization of RECs to achieve profitability. Regardless of these considerations, onsite solar offers a highly visible symbol of a company's commitment to clean energy, and therefore often serves as a desirable component of any energy plan.

Finding the right opportunities at the right time and being able to act quickly is critical to a successful onsite solar strategy.

New Jersey's Transition Renewable Energy Certificate (TREC) program created a flurry of activity with customers receiving offers for onsite solar power purchase agreements (PPAs) that deliver energy for free, or even pay customers to use power.

COMMUNITY SOLAR

Unlike onsite solar, community solar allows a business to support local solar projects without making changes to its facility or operations. Further, customers are guaranteed savings under these programs where there are favorable state rules. Businesses can further optimize their energy procurement strategy by signing a subscription agreement for community solar, lowering costs without changing or affecting third-party supply arrangements.

Basically, community solar is an additive layer to your energy procurement plan that guarantees savings. The downside is that not all states have enacted appropriate legislation yet, and corresponding regulation, to create attractive programs. At the time of publishing this white paper, only four states met this threshold for most commercial and industrial businesses: Maine, Massachusetts, Minnesota and New York. In these markets, businesses can capture 10-30 percent savings on their electric spend by doing nothing more than signing an agreement.

How community solar works

Step 1

Offsite solar facility generates electricity which is then delivered directly to the utility

Step 2

The utility awards bill credits for electricity delivered by the solar facility

Step 3

Customers subscribed to the projects receive the bill credits and remit a percentage to the developer

The arrangement is contractual; it does not involve the delivery of energy to your site. Instead, you participate as a subscriber to the project.

Participation in community solar offers not only financial advantage, but also sustainability benefits. By providing financial support for the solar project, you are helping to displace fossil fuel generation on the grid with new renewable generation. If it's important for you to receive renewable energy credits from the project, it's crucial to ascertain your rights to them contractually. In some cases, the owner maintains the RECs.

Community solar is a rapidly growing segment of the solar industry and an option particularly well-suited for businesses that lack rooftop or outdoor space that can accommodate solar energy, such as those leasing their space or with shaded roofs. It's a popular option experiencing rapid growth in the U.S. From 2010 to 2018 cumulative capacity rose 130 percent and an additional 500 MW came online in 2019, bringing total capacity to 2.56 GW as of the end of 2019. The Solar Energy Industries Association forecasts that the U.S. will add 3.4 GW of community solar over the next five years.

Value of the Right Advisor

Implementing a community solar program can be challenging for those new to the process. Each state has a highly nuanced market and timing is limited. Relying on the developer for guidance isn't always the easiest or best approach because the development community is fragmented — some developers focus on only certain regions or states and have their own approach to the process. A quality advisor can homogenize this effort across states, developers, and projects. Your time is limited and every hour counts. NRG has been helping customers with market identification, project due diligence, developer interface, contract templating, contract negotiations, risk-mitigation (such as term length), and economic analysis. There services have made community solar much more accessible for energy managers with a lot on their plate—and all of this, without value erosion to your operation.

UTILITY SCALE RENEWABLE AGREEMENTS (E.G. VIRTUAL POWER PURCHASE AGREEMENTS)

Virtual Power Purchase Agreements (VPPAs) have become the primary tool used by large commercial and industrial operations to achieve renewable energy goals. This is because VPPAs are typically the only way that most larger facilities can garner RECs for all of their sites to achieve ambitious renewable energy goals. Indeed, In the U.S., VPPAs resulted in 19.5 GW of corporate renewable procurement transactions in 2019, a 40 percent increase from 2018. The diversity of customers adopting VPPAs offers further evidence of their growing acceptance. Today, a range of industries from retail goods to healthcare and financial services participate in VPPAs, including: Lowe's, Ecolab, Target, Estée Lauder, McDonald's, Clorox, Walmart, Honda, AT&T, Apple, and Gap.

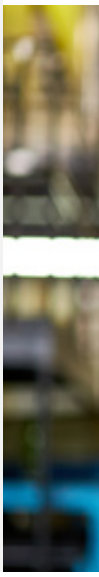
In financial terms, VPPAs are 'contracts for differences' based on a fixed and floating price of power. No physical delivery of power occurs in most agreements. Instead, the parties — you and the project developer — agree upon a fixed price for electricity. The developer liquidates the power into the wholesale grid so that the rise and fall of wholesale power prices in reference to your fixed price determines whether the developer pays you or you pay the developer. Savings are not guaranteed; in fact, many VPPAs end up costing customers millions in wholesale market settlements. Needless to say, success with a VPPA requires rigorous analytics and market experience.

Value of the Right Advisor

Entering into a VPPA agreement is a serious commitment and perhaps the riskiest proposition of any element presented in this white paper. Yet, for many companies, taking the plunge is not an option; it is their only avenue to secure the RECs they need. For that reason, it is important to select an expert with the proper experience in both structing agreements and evaluating project economics. For example, the average VPPA participant is not interested in earning the maximum amount of revenue from a VPPA transaction; rather, they are interested in securing large quantities of RECs and not losing money. With this in mind, NRG created a unique contract structure lowering the contract price in exchange for a percentage of the upside. This offers the bonus of more closely aligning the interests of the VPPA participant and the project developer.

An experienced advisor also adds value by performing critical economic analysis using a variety of methods. Historical performance analysis, fundamental curve comparisons, and market curve comparisons are just the beginning. These studies are rarely deadly accurate, so a good advisor will also perform a probability analysis through simulations (e.g. a Monte Carlo risk analysis). Understanding risk is not simply a function of comparing two data sets; it is critical to understand the potential shifts in volatile wholesale markets.

Additionally, an advisor with comprehensive experience will be able to adapt best to emerging market trends such as the inclusion of battery storage. While the advisor's fee does increase cost to the customer, the cost (usually a 0.5 to 1.0 percent premium) can be easily offset by unlocking savings and undertaking risk mitigation.



ADVANCED METERING/BILLING

Today nearly 10 million smart meters are used in the commercial sector and as of 2019 more than 446,871 in the industrial sector (EIA). Among other things, these meters track utility charges, determine where savings are possible, verify expected savings from energy efficiency, and track power quality. Because they provide bi-directional information, they allow both energy providers and energy managers a near real-time view into consumption patterns, while at the same time allowing energy users new abilities to participate in their energy management.

Smart meters collect details about energy usage not possible with conventional meters, and they do so every 15 minutes. As a result, they create a deluge of raw data never before managed by the energy industry and increasingly refined billing information.

Value of the Right Advisor

Data is only as good as the data analytics applied. An experienced advisor will capture what's pertinent on your bill — perhaps average monthly temperatures, usage and demand, taxes and credits, or other ancillary costs — and study them for anomalies that may signal overspending. If your advisory service is part of a company that manages electric supply — as NRG does — and you're located in a deregulated state, the advisory service will isolate that portion of your billing that solely reflects supply costs. Armed with that information, the advisor can recommend changes in your power procurement strategy to save your operation money.

The advisor also can see untapped opportunities for demand response or perhaps demand charge management. Evidence may appear that indicates automation will open up cost savings opportunities. For example, alerts can be set to flag incidents where spending exceeds a set threshold. The advisor will investigate the cause. Excessive energy use can indicate equipment failure or unmet maintenance needs. Addressing them can end the escalation in energy use and lower your bills. Finally, combining smart meter technology with backup generation systems can help you change the way you buy electricity, capitalizing on attractive procurement opportunities and using the generating assets to reduce risk during periods of high cost.

At NRG, all of these benefits result from a synergy between our advisory service and utility billing management services, supply procurement, and other relevant divisions.

Number of AMI installations by sector, 2018

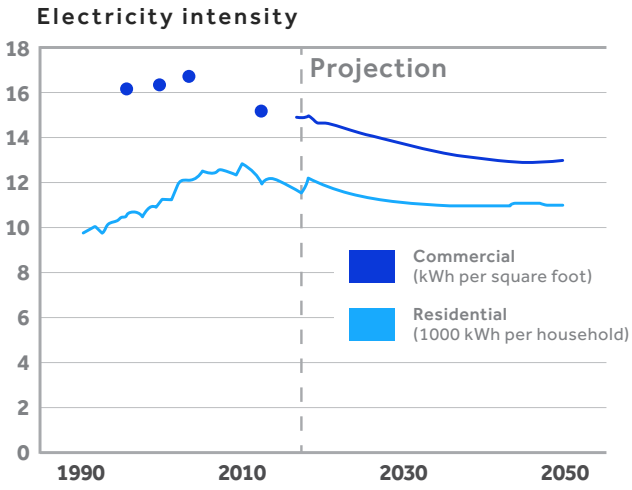
Residential	Commercial	Industrial	Transportation	Total
76,498,388	9,932,993	411,287	1,489	86,844,157

Credit; US Energy Information Administration

ENERGY EFFICIENCY

Energy efficiency is credited with contributing to a profound economic change underway, the decoupling of energy and GDP growth. In the past, when economies grew so did energy use. Now analysts see that changing as lighting, appliances, equipment, buildings, and manufacturing processes are made more efficient — able to do more work with less energy.

In keeping with this shift, the energy intensity of buildings — the amount of electricity consumed per square foot of commercial floorspace — appears to be declining. The U.S. Energy Information Administration forecasts an average decrease of 0.4 percent per year from 2018 through 2050.



Credit: US Energy Information Administration, Electricity intensity of U.S. homes and commercial buildings decreases in coming decades

For businesses, energy efficiency provides growing opportunities to reduce costs. Energy efficiency measures also can offer attractive rental and sales premiums to building owners. LEED buildings, for example, achieve 15.2 to 17.3 percent rental premium and a 10 to 31 percent sales premium over similar non-rated buildings, according to the U.S. Department of Energy. The building is more valuable since it is a better energy performer, which can lead to higher rents.

Before embarking on an energy efficiency project, it's crucial to understand your building's current and historical energy consumption. To quote an adage, you can't manage what you don't measure. A professional energy auditor will collect this information on your behalf and will examine your building envelope and systems for energy savings opportunities. An experienced auditor becomes particularly important for businesses that are in cities with local energy laws, such as New York City, where buildings must disclose their water and energy use publicly on an annual basis and submit a full ASHRAE Level 2 audit report and retro-commissioning study every ten years.

What Does an Energy Audit Entail?

Preliminary Energy-Use Analysis (PEA)

The first step is a pre-audit analysis performed to assess the potential for improved energy performance and to determine whether a further energy audit is needed. During the PEA process, analysis of historic utility usage, peak demand, and cost data leads to the development of the Energy Cost Index (ECI) of a building (expressed in $/ft²) and Energy Use Intensity (EUI) of the building (expressed in kBtu/ft²). These metrics are then measured against similar buildings to gauge comparative performance. Monthly energy usage and interval data is also reviewed to identify energy use anomalies and behavioral modification opportunities. PEAs provide valuable insight that allows both advisor and customer to prioritize areas to focus on during an onsite audit.

Energy Audits

An energy efficiency engineer can perform audits to identify energy conservation measures. To develop comprehensive recommendations, the auditor undertakes a full facility walk-through to observe and record operations and existing equipment. The auditor also collects utility bills (gas, electric, and water at a minimum) for a 12 to 36 month period to support further offsite analysis on each facility's energy/demand rate structures and usage profiles. All collected information is then used to develop a detailed financial analysis for each energy conservation measure based on implementation cost estimates, site-specific operating cost savings, and the customer's investment criteria. In addition, the auditor provides a list of measures that were evaluated but ultimately rejected, including background context and reasoning. The report also includes information on any available incentives/rebates, waste management recommendations, operations and maintenance recommendations, and a greenhouse gas emissions analysis to support any sustainability goals.

Value of the Right Advisor

Your success with energy efficiency can translate into success in other areas of your operation. An advisor with reach into all aspects of energy planning will look at the full picture to help you determine how to apply cost savings achieved through energy efficiency. Perhaps an investment in additional energy efficiency measures makes sense. Or, you may want to apply cost savings to help you fulfill other energy goals; renewable energy, for example, to help you meet sustainability goals, or installation of an energy storage system or backup generation, if you are seeking greater resilience.

Part of a comprehensive energy company that offers a range of services, our advisors can see where one effort in your operation can benefit another to create a more reliable, efficient and cost-effective energy strategy overall.

DEMAND RESPONSE

Demand response, incentives provided to encourage energy users to reduce use of grid power at key periods, also has grown in recent years. Today the U.S. has 28 GW of demand response from wholesale market programs (just under 6 percent of peak demand) and 35 GW from retail programs. The programs are growing in sophistication as businesses employ virtual power plants (aggregated energy storage) and other distributed energy resources, such as asset-backed demand response, which allow them to reduce their use of grid power.

Demand response takes strain off the grid during periods of peak demand, allowing utilities and grid operators to avoid reliance on last resort emergency generators that are often highly polluting. As a result, it offers tremendous sustainability benefits. The International Energy Agency sees demand response becoming increasingly important as part of sustainable development in the coming decades.

Coupled with energy efficiency measures, demand response allows a customer to think strategically about energy consumption, costs, emissions profiles, and public sustainability commitments. Essentially, demand response can provide both resource adequacy and emissions reductions when it is strategically deployed. As a result, demand response helps the facility achieve the dual benefits of power system reliability and protection of public health during periods of peak electricity demand.

Customers pairing behind the meter generation with demand response can accomplish sustainability goals while helping the grid stay in balance. Dispatching clean resources during peak hours reduces grid load and lessens the likelihood that the grid operator will need to deploy higher emission fossil fuel generation to maintain grid stability.

Value of the Right Advisor

Creating an effective demand response program requires an understanding of your facility's mission critical operations and your energy resources. What times and days can you participate in demand response? When is it counter-productive to reduce or shutdown operations? Would you be best served by installing backup generators or energy storage for participation in demand response or by reducing your business operations? How might you use demand response to help reduce emissions and contribute to sustainability achievements?

By partnering with an advisor that not only works in demand response, but also distributed energy resources and sustainability, you open up the broadest avenue of benefits for your facility. NRG, which has expertise in all of these energy services and technologies, is that kind of provider.

BACKUP GENERATION

Power outages can be costly for business. Long outages interrupt service and production; momentary outages can force the shutdown and rebooting of equipment. Unfortunately, both long and short outages appear to be on the rise due to severe weather, wildfires, and electric grid disruptions. Millions of Californians lost power in August 2020 when the state experienced its first rolling blackout in two decades, brought on by climate change and power supply planning issues. This came on top of a series of power safety power shutoffs by utilities in the state to keep electrical equipment from sparking wildfires — events that also left millions of Californians in the dark. Meanwhile, along the U.S. coasts, severe hurricane seasons have been marked by storms that have flooded utility equipment and taken down power lines. The most severe of these storms occurred in Puerto Rico, where Hurricane Maria destroyed much of the island's grid in 2017, causing the longest power outage in U.S. history, lasting a year for some. Even the Midwest has not been spared, with a derecho sweeping the corn belt in August 2020, which has been described as the most costly thunderstorm in U.S. history.

Understandably, these events cause commercial and industrial facilities to look more closely at backup generators.

But what kind of generator is appropriate for your facility. Should it be fueled by diesel or natural gas? Can it serve purposes beyond providing emergency power? For example, as we discussed earlier, can it come into play for demand response? And how can you ensure your generator is maintained properly so that it's working properly when you need it?

Value of the Right Advisor

The right advisor can offer valuable insight into types of generators or resources most appropriate for your facility. What fuel makes the most sense? What loads are critical so require backup? How much capacity is appropriate? An NRG advisor brings a broad understanding of all aspects of energy planning, so can help you discern how backup generation fits into your energy picture.

Part II: Coordinating it all

In Part I we have identified six basic elements that should factor into all energy plans. While other elements could certainly be added, these six — electric supply, renewable supply, billing and metering, energy efficiency, demand response, and backup generation — capture the most frequently used products. Picking an energy partner that can help orchestrate all of these elements is critical as some efforts may hamper your ability to implement others. How much energy you save through efficiency influences how much you buy through procurement. Plans for each must be coordinated, especially when considering long-term contracts. Adding renewables can further complicate decisions.

We've discussed some of the key elements an energy manager must consider. But it's likely that not any of these elements alone keep you up at night. The big question is how can they work together? How can you ensure that none work counter to another? Or conversely, are there synergies that can create even more cost savings or further your sustainability goals — or do both? You don't need to figure all of this out on your own. An energy advisory service can help with *the right* advice, management and implementation.

TO DO SO EFFECTIVELY, AN ADVISORY SERVICE MUST:

- Offer all of the services that may benefit your operation, including distributed energy resources, demand response, energy efficiency, and sustainability planning. Everything starts at a well-researched and principled strategy, steeped in impact assessment and cost recovery. The advisor must understand and be able to speak to best practices, emerging trends, forecasts, and how that translates into market opportunities.
- Bring deep experience in supply contracting (both renewable and fossil fuel) and wholesale markets.
- Be able to leverage distributed energy resources in wholesale markets and undertake load management.
- Manage billing and leverage data and analytics to inform its supply and demand side teams, so that they can generate greater cost savings for your operation.
- Bring a holistic view to energy audits to identify not only energy savings measures, but also ways to pay for them through other energy programs that benefit the facility.
- Have the depth and capability to be flexible and adapt to your company's specific needs.

Most important, your advisory service must have the depth and breadth of energy experience and expertise to see where one element of your energy strategy can boost another. Here are four specific ways a holistic advisory service may be able to help:.

1. Structure contracts to leverage regulatory and market changes

Supply contracts are not only about commodity price. They also must minimize your company's exposure to market or regulatory changes, two areas of risk in energy. The contract structure also must allow you to take advantage of other services, such as demand response or community solar, so that you can extract more value, especially if you are adding distributed energy resources and load management to your energy operation.

2. Show you exactly what you're spending and saving...offer ways you can save more

An accomplished energy advisory service will dive deep into your energy budget to assure it's accurate based on a detailed study of your spending history. The advisor also will use billing analysis to determine if your supply contracts are structured correctly for your operation and look at non-supply charges, such as demand charges, ancillary services, regulation, and taxes, to uncover potential savings.

3. Looks for savings from one service to pay for another

An advisory service should include auditors who will use the time auditing your facilities to do two jobs in one. They will look not only for energy savings opportunities — such as lighting retrofits — but also other cost savings or revenue generating possibilities. For example, if you express concern about reliability, the auditors will notify their advisory service's energy storage team, who may help you install a battery energy system. That may lead to your advisor's supply team finding ways to leverage the battery in the market to reduce supply costs. You may choose to use the savings to pay for capital projects recommended in the energy audit, which can lead to more energy and cost savings, creating a virtuous cycle within your energy plan.

4. Simplify sustainability efforts and renewables contracting

Your company may want to procure solar energy to meet sustainability goals. But between the solar farm and your company are complex retail and wholesale markets. What kind of contract makes the most sense for your operation? A physical PPA, a virtual PPA, or community solar? How do you decide? An advisor experienced in solar contracting can help.

Part III: Your Next Step

Today's energy technology revolution may make your energy management job more interesting, but it's not making it easier. Energy management is clearly growing in complexity as the industry innovates to meet tomorrow's challenges and create a more sustainable world. It's nearly impossible for an energy manager to be an expert in all of the services and products now available. But it is possible to form a partnership with an advisory service that is. With decades of experience in every aspect of the market – supply, demand, billing, sustainability, and renewables — NRG brings a synchronous approach to your energy plans and operations. Our job is to make your job easier. We want to help you realize your energy goals at the lowest possible costs.

Contact us:
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About NRG Energy, Inc.

At NRG, we are redefining power by putting customers at the center of everything we do. We create value by generating electricity and serving over 3 million residential and commercial customers through our portfolio of retail electricity brands. A Fortune 500 company, NRG delivers customer-focused solutions for managing electricity, while enhancing energy choice and working towards a sustainable energy future. More information is available at nrg.com. Connect with NRG on Facebook, LinkedIn and follow us on Twitter at @nrgenergy.