Executive Summary

Team G22

The City of Houston has always been defined by its relationship with energy. While the historic relationship has depended on the oil and gas industry, there has been a recent pivot in direction. Mayor Annise Parker is at the forefront of this pivot, helping to establish energy efficiency and environmental conservation as core pillars for the future of Houston.

Within the context of this energy efficiency strategy, the local government has recently implemented a number of policies and procedures to encourage and support private building owners to upgrade their buildings for energy efficiency. While these policies have helped Houston be recognized as a top city by the EPA and these policies have helped Mayor Parker win the 2011 Climate Protection Award, they have not been as successful as desired in compelling commercial buildings to invest in energy efficiency projects.

As a result, the below paper aims to identify both enhancements to existing programs and new programs that would work together to help the City of Houston reach its energy efficiency goals within the commercial building stock. The key recommendations areas are outlined below and break down into policy recommendations, financial strategies, and engagement and communication mechanisms.

Policies:

- **Permitting** – Provide incentives for LEED & Energy Star
- **Incentivize Demand Response** – Mandate real-time energy pricing
- **Require Individual Tenant Metering** – provides key benchmark and progress information
- **Taxes** – Increasing "sin" and luxury tax on worst offenders to fund energy efficiency strategy

Financial Strategies:

- **Groupon-it** – Partner with public and commercial real estate leaders to negotiate exclusive rights in exchange for significant discounts on energy efficiency products and services.
- **Revolving Fund** – Funded by tax policies, make the EEIP program scalable and sustainable.
- **Green Bond** – Backed by the City and sold on the open market, this financing would eliminate the up-front capital costs that often deter building owners. Ultimately, building owners pay no up-front capital and immediately recognized monthly operating savings.

Engagement and Communication Mechanisms:

- Education
- Winning the People

Forecasted Results

	Building Owners	The City of Houston
NPV	$74,293.84	$46,329,804.20
Energy Efficiency	30%	30% for 30%

Costs	No up-front capital costs. Immediate recognition of operational savings.	All programs fund themselves. A key consideration was keeping city costs flat

Goal Statement

The City of Houston's goal is to increase the energy efficiency of its commercial real estate. These recommendations aim to help create an environment that further supports the business case of energy efficiency in order to compel increased investment in energy efficiency projects. Further, the scope of these recommendations goes beyond the policy and financial strategies to include implementation overviews and communication plans with the general populous.

Commercial Real Estate Landscape – Who are the key Players?

Before diving into recommendations, it is critically important to understand the key players. The case mentions that as of 2009, there was 266 million square feet of commercial real estate in Houston. As of 2008, the below 5 firms represented 31% of this total commercial real estate market.[i] Thus, it is imperative to include these organizations in the decision making process and gain their buy-in to policies that will promote energy efficiency throughout the city. In particular, Prologis and Hines have deep commitments to sustainability advertised on their website and should be key partner organizations for the City of Houston.

Name	# Buildings	# Square Ft	% Commercial Real-Estate Market	Commitment to Sustainability/ Environmental Stewardship
PM Realty Group	150	31,000,000	12%	No
Weingarten Real Estate	103	16,100,000	6%	No
Prologis	96	11,000,000	4%	Yes
Crescent Real Estate	6	10,300,000	4%	No
Hines	16	13,300,000	5%	Yes
Total of Top 5 Firms	371	81,700,000	31%	
Total Commercial Office Space		266,000,000		

Policies

Permitting

One of Houston's specific energy efficiency goals it to have the most Energy Star and LEED certified buildings of any city in the country. However, Houston is already well behind other major metropolitan areas like Los Angeles that have mandatory codes requiring that all new buildings be LEED Certified. As a result, it will be a steep uphill battle for Houston, which is why incentives are needed.

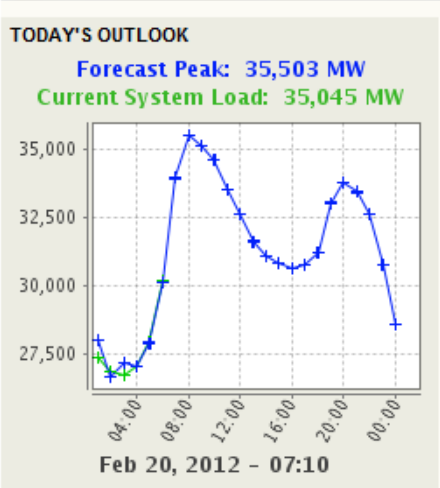
Currently, Houston has a LEED incentive Program which helps approve LEED certified buildings quickly with limited waiting time. In addition, there is also the EEIP fund that pays 20% of the upfront cost of a project; however, the fund only has 3 million dollars which is nowhere near enough to fund a scalable number of projects. As a result, if Houston wants to move up in this goal, it will need to provide more incentives through city codes, specifically through permitting.

In Gainesville, FL the county is providing fast track building permit incentives and a 50% reduction in the cost of building permit fees for private contractors who use LEED.[ii] An incentive like this could help increase the number of LEED certified or Energy Star buildings by

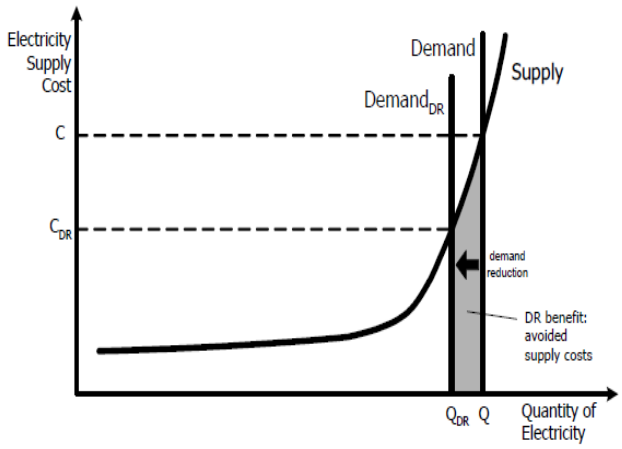
reducing the permitting costs and speeding up the city acceptance process. Currently, to build a commercial structure that is over one million dollars, permitting costs equal "$3,400.91 for the first $1,000,000 plus $2.83 for every additional $1000 in valuation or fraction there of."[iii] A reduction of permit fees by 50% would help reduce costs. Another possible solution could be an imitation of the policies of Issaquah, WA. This town allowed "projects achieving LEED certification to be placed at the head of the building permit line."[iv] This helps increase the time to market for a building, providing a revenue incentive that would help increase LEED or Energy Star rated buildings in Houston.

Real-time Energy Prices

Real-time energy prices provide incentives to customers to use less energy when it is more expensive, during periods of peak demand. Furthermore, real-time energy prices create a market for demand response programs, which can represent a significant energy efficiency opportunity for the City of Houston. Demand response, as defined by the Department of Energy, is "active participation by retail customers in electricity markets, seeing and responding to prices as they change overtime".[v] Below is the energy (load) demand forecast for ERCOT, the regional ISO that is responsible for keeping the electricity supply and demand in line in the Houston area. As can be seen from the graph on the left, there are significant spikes in the day, usually during transition times in the morning and late afternoon.



Ercot Load Forecast 2.20.12[vi]



Department of Energy: Benefits of Demand Response, Feb 2006.[vii]

As can be seen by the graph on the right, during these times of peak demand, energy prices spike. Demand response, which can provide an incentive for commercial buildings to use less energy during these peak times, can dramatically reduce the marginal cost of electricity to consumers when energy prices are highest and can create an atmosphere where the "dirtiest" power plants on the margin can be retired. As a result, customers save money and the energy that is used comes from significantly cleaner sources, including renewables and cleaner, more efficient power plants. According to FERC, if the State of Texas were to expand its "Business as Usual" for demand response by mandating real-time energy prices, the peak demand reduction could be 8% by 2014[viii], which represents a significant energy efficiency win for the City of Houston.

Individual Metering and Access to Information

What gets measured gets managed. Unfortunately, it is not always easy to individually measure and understand energy use. This is especially true for organizations that occupy only a portion of a commercial real estate property and do not have an individually metered zone. As an important, actionable policy, the City of Houston should require greater direct metering, in order that they can begin to understand their energy use. This policy recommendation is based off of a best practice from New York[ix]. (Costs associated with this initiative will be financed through the luxury tax program below). As will be described in more detail later, this individual metering is a core requirement in order to roll-out a more comprehensive engagement and communication plan.

Luxury Tax on buildings that fail to comply with 30% reduction goal by 2017

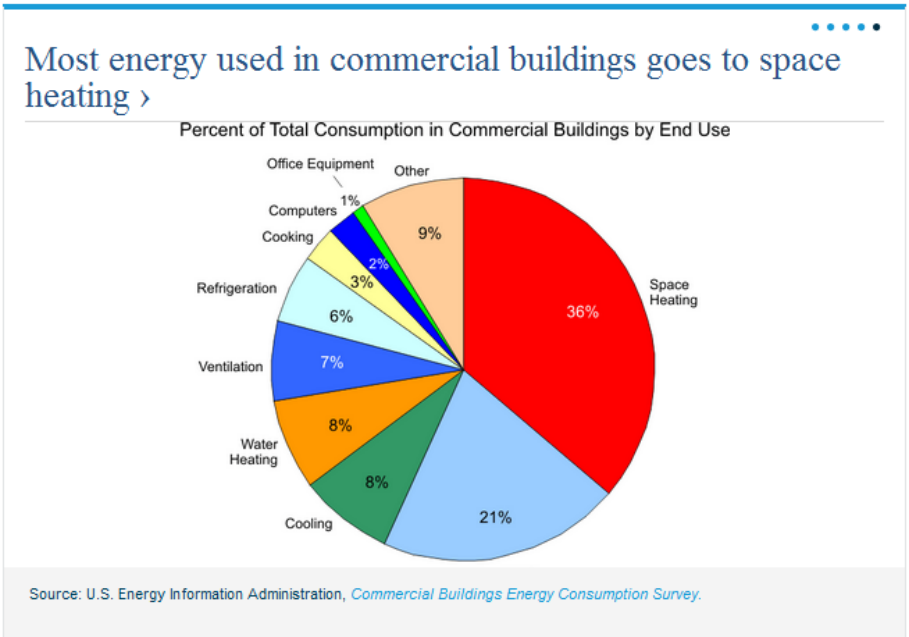
The City of Houston has a clear goal of reducing the energy efficiency of its commercial building stock by 30%. Thus, the city should employ a "stick" if this goal is not met in the form of a luxury tax. This luxury tax would specify that for all commercial real estate buildings that do not reduce their energy demand by 30% under a standard baseline taken today, they will incur a luxury tax equivalent to a 10% premium surcharge on their electricity bills. Similar to the EEIP program, this luxury tax would require an audit today to understand each buildings current electricity use so that a reasonable baseline is established so that organizations can set clear energy efficiency goals with the luxury tax in mind.

This luxury tax would provide the revenue for a revolving fund that can be used to further promote energy efficiency throughout the city, including job creation by expanding the city's staff dedicated to energy education, as well as a dramatic increase in the educational materials provided to users to help compel people towards more energy efficient practices. This would serve as a continuation of the "Green City" campaign.

Financial Strategy

Groupon-It

Conventional commercial buildings could utilize energy more efficiently and reduce energy consumption by ten percent if specific poor habits were changed by the building users. For example, turning off the lights that are not in use and keeping windows and doors closed to eliminate excess heating and cooling. However, there are sophisticated ways to improve building envelops by improving lighting, insulation and heating, ventilation, and air conditioning systems.



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Older buildings that use inefficient lighting systems could simply replace conventional lighting systems with compact florescent lighting systems to increase efficiency and reduce energy consumption. In addition, installing occupancy sensors and automated systems offers an additional layer to eliminating unwanted energy usage. Energy Star Commercial LED lighting reduces energy cost, maintenance cost, cooling cost by using at least 75% less energy than incandescent lighting, lasting 35 to 50 times longer, and producing very little heat.

Insulation retrofit including weather sealing, weather stripping and replacement of old windows and doors with new high performance options not only reduces energy consumption, but also adds to user experience by eliminating unwanted outside noise, heat and cold drafts.

A HVAC system, possibly the most expensive investment, controls building temperature. Effectively controlling the output of a HVAC system could reduce the energy consumption. Installing a continuous environmental management system, which automatically adjusts building temperature settings to scheduled outputs and monitors energy consumption, could use building energy smarter and more efficiently.

We believe there is a significant opportunity for the city of Houston to achieve lower cost by bundling the applications of participants in the program and throughout its own public building stock. By creating a steering committee of both public and commercial real estate leaders, like Prologis and Hines, significant discounts could be negotiated in exchange for exclusive sales rights with leaders in the manufacturing of these types of building efficiency products. We recommend targeting companies such as Siemens, Honeywell, and Johnson Controls, and do an RFP for providing them with the opportunity of a large influx of business with relatively low sales and administrative cost. With this strategy, we conservatively believe it is reasonable to negotiate capital cost discounts of 25%. This will provide a mutually beneficial relationship for both the private sector and the city to work together towards their goal of energy efficiency.

Green Bonds

In order to truly incentivize significant change in the efficiency of energy use in Houston, the city must have a clear goal and a plan to make the process easy and economically rewarding

for the owners of commercial real estate. In order to achieve this goal, we have created the City of Houston 30 for 30 energy efficiency initiative. This program aims to achieve a thirty percent reduction in energy consumption for thirty percent of the commercial real estate in Houston, all while requiring no up-front capital investment from the owners of buildings. The thirty percent goal for the program will be based on a thirty percent reduction from the average Class B building electricity use today. This will provide a level playing field for all buildings and applications for the program will be assessed based on the viability of the potential to meet the benchmark. The 30 for 30 initiative will also have the potential to generate revenue for the City of Houston by using innovative methods to lower costs, raise revenue and leverage the capital available through financial markets.

Our model uses an estimated $2.00 per square foot as the baseline cost for retrofitting buildings for increased energy efficiency. The program will provide a seventy five percent reduction in the cost of retrofitting buildings by negotiating a twenty five percent discount with exclusively approved suppliers for the bulk order of the whole program and a twenty five percent subsidy funded through a bond backed by future revenue from higher city taxes on tobacco products and alcohol. An additional $0.50 per square foot reduction in the price will be achieved by utilizing a federal tax incentive. The IRC 179D (IRS 2012) will provide a $0.60 per square foot tax deduction and we will assume that $0.10 will be lost in the process of accessing this capital through the tax equity markets. The remaining twenty five percent of the cost, which will be $0.50 per square foot, will be funded by a city bond that will be known as the "Green Bond" which will significantly lower the requirement for upfront capital from building owners. As a result, the 30 for 30 initiative will be a very attractive opportunity for the private sector to partner with the City of Houston and align all parties towards common goals in energy efficiency.

The organization of the initiative will proceed through various stages:

1. Houston must use its investments in public buildings to compile a list of acceptable companies with which to partner and estimate costs per square foot for a 30% reduction in energy.
2. Publicly announce the total amount to be raised for investment in the program. This number will be an estimate of the cost to achieve the 30% reduction in 30% of commercial buildings in Houston.
3. Publish instructions detailing the process for owners of commercial real estate to be approved for participation in the program.
4. Applications will be bundled and the green bond will be brought to market.
5. The individual applications will be funded and the efficiency projects will begin.

The first step will be setting up a list of preferred vendors and private industry partners for the program. The City can use its current investments in retrofitting public buildings to gain an understanding of the potential costs and results from energy efficiency investments. Additionally, these investments in local public buildings should be used as a broad request for proposal process with the goal of compiling a list of approved vendors and partners. Companies will compete in both the price and quality of products and services they offer in order to be chosen as part of this approved list. The result will be better service and lower prices for the City of Houston while building the foundation for the 30 for 30 green initiative.

With the approved list of partners in place, the City of Houston will announce the overall target dollar amount for the entire program. This amount will provide a clear ceiling for the size of the commitment from the city and will provide an incentive for building owners to apply quickly to take advantage of the limited opportunity.

The process for owners to participate will be simple. A building owner will begin by contacting one of the approved partners of the program. The company will be able to explain the benefits of working within the program to receive a full energy audit (partners will include the cost of the audit in the application for funding from the 30 for 30) and discounts from manufacturers of energy efficient equipment as well as a subsidy. The subsidy will be financed through the "Efficiency Bond" backed by revenues from city taxes on tobacco and alcohol. After a detailed study, the partner company will submit an application on behalf of the owner of the building providing an assessment of the opportunity to increase efficiency and a request for a certain amount of funds. These requests will be subject to the approval of the City of Houston and will be collected until they amount to the total amount budgeted for the program.

The City of Houston will then proceed to partner with a large investment bank to bring the "Green Bond" to market with the most advantageous terms possible. The goal will be to raise the entire amount needed by offering a coupon of 6.00% maturing in fifteen years. Once the funds have been collected they will be distributed to each individual applicant with a 9.00% interest rate. The city will keep the spread as a source of revenue and a tool to offset any potential losses from defaults. Owners of buildings will be required to submit a final report of what was purchased and installed with the funds.

In order to provide a more significant incentive for energy efficiency and a source of funds for education and outreach efforts, the City of Houston will implement a luxury tax program for energy consumption at commercial buildings. The tax will be applied at a rate of ten percent of the value of thirty percent of current energy consumption. In other words, the program will target the current consumption that represents the target thirty percent of reduction in commercial real estate buildings. If participants in the 30 for 30 initiative meet the goal they will not pay any luxury tax on electricity. The maximum electricity consumption that will be permitted without additional taxes will be seventy percent of current consumption rates. This will act as an additional incentive to participate in the 30 for 30 initiative, the tax will provide funds for effective stakeholder engagement and education and if all commercial buildings meet the thirty percent reduction goal no additional taxes will be paid by anyone and the stakeholder engagement program will wind down. The tax will be applied after a two year grace period to allow ample time for buildings to make changes and invest in energy efficiency.

We have assessed the viability of the program by assuming a total electricity cost per square foot of $0.20 and total square feet of commercial real estate in the city to be 266 Million. Exhibit 1 shows that the efficiency bond will have a target of $40 Million which will result in a required monthly payment of $286,572.42. The appropriate authorities at the City of Houston should work to develop a plan to raise tax revenues from tobacco and alcohol by this amount to offset the cost of the bond. The green bond will raise $39.9 Million and will pay a coupon of 6%, which is a competitive rate. Exhibit 2 shows that the City will achieve an NPV of over $8 Million by charging an extra 3.00% in interest to participants in the program. Exhibit 3 provides an example of a 500,000 square foot building participating in the 30 for 30 initiative with an expected **NPV of $74,294**. Finally, Exhibit 4 shows the overall NPV of the benefits that owners of commercial real estate in Houston will receive. With very minimal investment of time and money, owner will receive a total **NPV of $46,329.804**. The 30 for 30 initiative provides this significant benefit to citizens while generating revenue for the city.

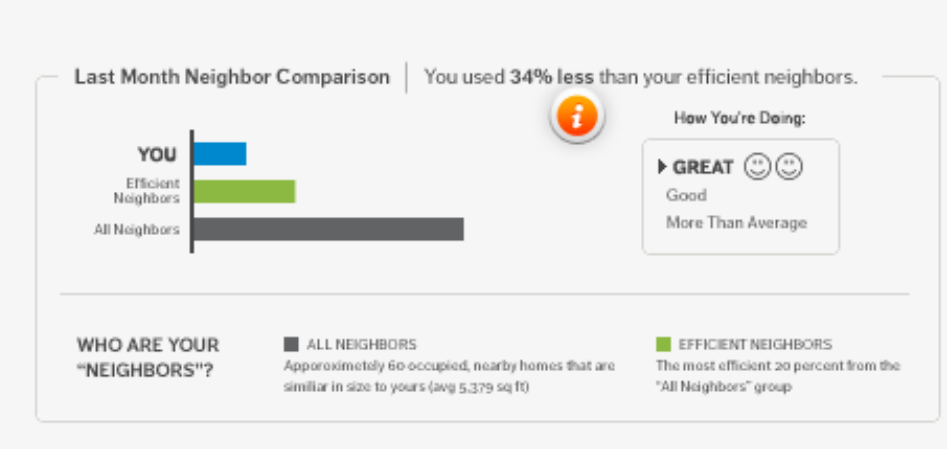
Engagement and Communication Mechanisms

Education

The key recommendation for increasing energy efficiency education is to better present the information that already exists in actionable ways. Houston already has many great resources to help educate its citizenry about ways to become energy efficient, sustainable, and a steward of nature. The Green Resource Center is a tremendous place to find information. Their mission statement, "To enable the public to experience and learn more about energy, water, and material conserving design and construction; also known as Green Building"[xi] is a great way to welcome anyone to learn more about green buildings. One current flaw issue is that the resource center has "too much" good information; hence, it seems difficult to navigate and find specific information. Owners' of commercial buildings in Houston are business people looking for information that can be discovered, digested, and understood quickly and easily.

Thus, it is critical that the copious amounts of energy data be translated into actionable information and presented in clear, understandable, and entertaining ways. There is a DC startup, OPower, who specializes in this conversion of utility data into actionable information for everyday customers. Opower's model is predicated on the idea of American competition – comparing residential energy use against like-characteristic neighbors. Simply by comparing energy use and presenting information in compelling, actionable ways, for no cost, Opower has motivated a measurable reduction of 2-3% energy use across residential home owners throughout their partner regions in the US. If Houston were able to better capture energy data through requiring more individual metering, they could partner with an organization like Opower to roll-out an engagement program, displaying energy use across buildings and inspiring efficiency.

As part of the metering roll-out strategy, individual meters can be set up for each tenant and an organization like Opower can help the business of Houston understand their energy use benchmarked against peers. Once benchmarks are established and available, organizations can focus on educating their employees about energy efficiency and begin to use the data to drill-down and learn what causes high use and what can be avoided. This data can then be used as "office energy report" just like the home report many homeowners receive from Opower. This report would pinpoint how much energy is being used by that floor and it would give options of how to improve energy efficiency.



[xii]

Best practice information would come from the Green Resources Building, and if a manager of the building or an employee was more interested in energy efficiency, they could be directed to the actual resource center.

The individual metering installation will all be funded through the EEIP. We are proposing a change to how the EEIP is used now. Instead of being used as a discount fund for energy efficient projects, the EEIP would be modified into an education and metering implementation fund. The original purpose of the EEIP was commendable, but the amount of

money that would come out of that fund for each approved project makes it unsustainable in its current form. Thus, instead of discounting a small number of projects, this program can educate a large number of employees and managers on energy efficiency and the fund itself is sustainable. Through this, more projects would be created through better understanding of potential energy solutions, and more employees and managers would be behind these ideas, which would guarantee safer passage through company budgets.

As one other significant component, based on the changing demographics in Houston, all energy and energy efficiency information should be published in both English and Spanish.

The only way a commercial building will be able to access this opportunity is to enter the Green Office Challenge. The challenge is a great way to bring many organizations together to become more energy efficient. Further, although it is outside of the scope of this case, this employee education will have a spillover effect into how employees manage energy in their personal lives and homes, which will help Houston meet its greater goal of increased energy efficiency throughout the city.

Winning the People

In order to sustain long-term energy efficiency success, it is imperative to keep the population of Houston engaged and actively thinking about energy efficiency. The Green Office Challenge should be the basis for galvanizing the city of Houston towards this energy efficiency thought process. Having a media blitz of coverage of the event the day it starts with TV, newspapers, radio, and government making this their number one story would bring enormous attention to this initiative. As the challenge continues throughout the year, it is important to continue to ensure the media is informed about the challenge and is creating stories every month about organizations in the challenge and keeping the competition relevant in the minds of the residents of Houston. According to the Green Office Challenge website, many newspapers had coverage of the event, but only one TV station, Channel 39 had coverage of the challenge[xiii].

The city of Houston can partner with the University of Houston and Rice University, which both have significant sustainability departments, to bring about more student engagement to the city. Perhaps bringing students as assistants during the energy educational and metering implementation sessions and the audits will help instill a sense of community between the universities and the city. Another partnership with universities could be city sponsored classes for energy efficiency. Conrad Hilton is already doing this for the Hilton College at the University of Houston. The class "HRMA 4353 Leadership in the Hospitality Industry, students will come up with an education campaign to persuade Hilton College students to become green commuters and reduce carbon emissions caused by traveling to campus."[xiv] The city of Houston could sponsor a consulting class where college students help commercial buildings become more energy efficient. The buildings that they help could also be part of the Green Office Challenge.

As the Green Office Challenge comes to an end, the city of Houston will do final energy audits to determine how energy efficient the commercial buildings have become. A special event could be held where the entire city holds a day long festival about energy efficiency and awards the most energy efficient buildings. In keeping with the spirit of Texas, a recommendation is to make this event a chili cook-off, where the Mayor will cook chili for those people involved in the best green-building projects. All city officials will be in attendance to congratulate and meet the people. The organizations that were part of the challenge would be allowed to advertise at the event and be free sponsors to the event. Every participant in the challenge could have a booth

that not only advertised their business, but showed the ways they made their buildings more energy efficient. The event would attract thousands of people due to all the organizations involved and the populace of Houston. Within the awards ceremony, this chili cook off would be held to bring in even more people to the festival who may not be well versed in the Houston energy efficiency initiative.

Providing residents of Houston the opportunity to contribute to energy efficiency initiatives is the optimum way to keep the population engaged. We want to make everyone in the city feel like they are contributing something to Houston's energy efficiency initiatives.

Conclusion

The city of Houston wants to be the most energy efficient city in the United States. Houston has been able to maintain this pledge by creating hundreds of Energy Star and LEED projects around the city. This undertaking has been successful with city owned buildings, but commercial buildings have been lagging. For most commercial buildings, cost has been the main deterrent. Retrofitting or building new LEED structures has been an expensive process. Now, with the plan that we have set forward with our 30 for 30 energy efficiency initiative, Green Bonds, and negotiating cheaper prices on retrofits through bulk city purchases, we have essentially put to rest the argument about cost. In addition to the reduction in costs and the increase in savings, we have attached an educational and community involvement strategy that will guarantee the long term success of Houston's energy initiatives. By educating the employees about energy efficiency and involving the community through university partnerships, media coverage, and the awards ceremony festival, we are helping to develop a more educated and more passionate populace towards the goals of energy efficiency. Ultimately, through this combination of policy, finance, and employee engagement programs, the City of Houston will be better poised to meet its lofty energy efficiency goals for commercial real estate.

Exhibit 1: Subsidy Bond with $40M Target

Efficiency Bond	
Total subsidy	$40,000,000
Interest	6.00%
Maturity	20 years
Monthly payment	$286,572.42

Exhibit 2: City Spread on Financing. This mitigates default risk.

Green Bond	
Ceiling	$39,900,000
Interest	6.00%
Maturity	15 years
NPV	$8,057,467.86

Exhibit 3: NPV on Retrofit on 500K sq. ft. Building

Owner NPV	
Final Retrofit cost per sq ft	$0.50

Monthly energy cost sq ft	$0.20
Building sq ft	500,000
Cost	$250,000
Monthly green bond payment	$2,535.67
NPV	$74,293.84

Exhibit 4: NPV on 30 for 30 Program throughout Houston commercial real estate market

Total NPV	
Final Retrofit cost per sq ft	$0.50
Monthly energy cost sq ft	$0.20
Building sq ft	79,800,000
Cost	$39,900,000
Monthly green bond payment	$404,692.37
NPV	$46,329,804.20

Resources

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