ENERGY

EDF ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

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Buildings burning No. 6 oil emit more than 20 times as much soot pollution as buildings burning natural gas or ultra low sulfur No. 2 oil.

Switching to a cleaner heating fuel

A STEP-BY-STEP GUIDE TO HEALTHIER AIR

Buildings burning the two dirtiest types of heating oil (No. 6 and No. 4) are responsible for more toxic soot pollution than all of New York City's cars and trucks combined. Converting a relatively small number of buildings to cleaner fuel can have a big impact, however, as 86% of the City's heating oil soot pollution is produced by the nearly 10,000 buildings burning residual oil. Cleaner substitutes are readily available, and switching to No. 2 oil or natural gas can reduce soot pollution by up to 95%. What's more, natural gas is roughly 30% less expensive than No. 6 oil at current prices and produces 25% less CO_2 upon combustion.[1]

"When I learned that our building was on EDF's dirty building list, our Board decided that it made good business sense to convert to natural gas and stop polluting the air we all breathe."

–Jerry Cohen, Coop Board Member, New York, NY

The following five steps provide a road map for buildings to reduce their fuel costs, increase efficiency, and mitigate environmental impacts, with the ultimate goals of lowering operating expenses and accelerating the payback of capital expenses necessary to switch away from the dirty fuels of the past.

Step 1: Assess the costs of cleaner fuel options (fuel analysis)

Building managers can hire an engineer, use their own staff, or seek guidance from fuel providers and/or their local gas utility to estimate the cost of converting to No. 2 heating oil, natural gas, or a combination of both fuels. This *fuel analysis* will allow owners and their representatives to make informed decisions regarding the best fuel options for their buildings. In most cases, the owner's decision will be based on a comparison of the upfront *capital* investment and the estimated *operational* expenses for the three fuel options. The upfront capital investment and payback period for the different fuel options will depend on several building-specific factors, such as the type of chimney, type of burner, type of fuel tank, and distance to the main gas line. Please reference the EDF fuel analysis checklist below for more information about these variables and how to analyze them.

Step 2: Decide on a fuel type

The results of the fuel analysis will help the building owner decide which fuel option is best for the building:

- Only No. 2 heating oil
- Only natural gas (also called "firm" gas) or
- Natural gas and No. 2 heating oil (also called "interruptible" or "temperature controlled" natural gas).

Yuki Kokubo

No. 2 oil (left) and No. 6 oil (right). No. 6 oil is the final by-product of the refining process—unrefined sludge.

As of March 2011, natural gas prices are about 30% lower than No. 6 oil prices and are predicted to stay lower than oil prices for the next 10 to 20 years. Building owners should consider the long term when reviewing their fuel options. Often the upfront *capital* investment is higher for natural gas, but the payback periods can be extremely fast because of lower fuel prices, reduced maintenance and ancillary costs, and the potential inclusion of efficiency measures (which in turn often qualify for utility rebates and/or tax incentives). In contrast, No. 2 oil requires a relatively small *capital* investment, but its price is typically 5-10% higher than that of No. 4 or No. 6. Buildings can potentially offset this increase in fuel expenses when switching to No. 2 heating oil by investing in efficiency measures. Like a gas conversion, switching to No. 2 oil can also reduce maintenance costs and associated staff time.

See Tables 1-A and 1-B on page 3 and Tables 1-C and 1-D on page 4 for comparisons of potential savings.

Step 3: Ensure complete bidding specifications

Once the building owner decides on one of the three cleaner fuel types, the building will need to hire a heating system contractor for the changeover. Detailed specifications should be submitted to prospective contractors for competitive bidding.

Use the attached checklists to ensure that all the necessary items are included in bidding specifications. We also recommend that building owners consider efficiency measures and include them in the bidding specifications. Potential energy-saving improvements include burner controls, heat management systems, radiator shut off valves, radiator steam traps, and separate hot water heaters for summer months (for more information see Chapter 5 of EDF's *Bottom of the barrel* report at edf.org/cleanheat).

Step 4: Allocate necessary funds, secure financing for fuel conversion and/or seek incentives

Building owners can pay for the conversion with reserve funds, assessments on the owners or shareholders, or a loan. In addition, EDF is currently working with financial partners to develop a financing solution that allows a third party to pay for the conversion in exchange for a building's future savings. This would allow building owners to convert to a cleaner fuel without incurring additional debt or taking the risk that expected savings are realized. A regularly updated list of incentives and financing opportunities is available at edf.org/cleanheat.

Step 5: Hire a contractor to conduct fuel changeover

When reviewing the bids, building owner should ensure that the prospective contractors have included all required items as per the bidding specifications. If the building switches to natural gas, the managing agent or engineer will need to supervise the work closely to ensure that the plumber and the utility company work hand-in-hand to avoid project delays.

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No. 6 oil is so dirty that it requires almost daily burner and strainer maintenance by building staff. Once a building switches to natural gas or No. 2 oil, about 100 hours of building staff time will be freed up annually to perform other work in the building which is worth thousands of dollars.

Table 1-A
Potential annual savings from converting from No. 6 heating oil to natural gas[a] (Con Ed)

Gallons No. 6 oil burned per year	Annual heating cost[b]	Equivalent therms of natural gas	Heating cost with natural gas—firm[c]	Total annual savings—firm	Heating cost with natural gas—interruptible[d,e]	Total annual savings—interruptible
50,000	$162,000	75,000	$103,125	$58,875	$95,625	$66,375
75,000	$243,000	112,500	$154,688	$88,313	$143,438	$99,563
100,000	$324,000	150,000	$206,250	$117,750	$157,500	$166,500
125,000	$405,000	187,500	$257,813	$147,188	$196,875	$208,125
150,000	$486,000	225,000	$309,375	$176,625	$236,250	$249,750
175,000	$567,000	262,500	$360,938	$206,063	$275,625	$291,375
200,000	$648,000	300,000	$412,500	$235,500	$315,000	$333,000
250,000	$810,000	375,000	$515,625	$294,375	$393,750	$416,250

a Savings can be further increased with the addition of energy efficiency measures.

b Based on a March 2011 quote from Castle Oil Corp. of $3.10/gallon plus 4.5% tax.

c Based on Consolidated Edison's average prices for firm natural gas from 2010, including price of commodity, delivery and taxes: $1.35-$1.40 per therm.

d Based on Consolidated Edison's average prices for interruptible natural gas from the 2010 heating season, including price of commodity, delivery and taxes. Buildings using less than 100,000 gallons/yr: $1.25-$1.30 per therm. Buildings using more than 100,000 gallons/yr: $1.05 per therm.

e Cost does not account for additional oil use when gas service is interrupted (e.g. for a 100-unit building using No. 2 oil as a backup fuel that experiences 4 days of interruption in a given year, this cost amounts to roughly $2,500 annually for oil usage at current prices).

Table 1-B
Potential annual savings from converting from No. 4 heating oil to natural gas[a] (Con Ed)

Gallons No. 6 oil burned per year	Annual heating cost[b]	Equivalent therms of natural gas	Heating cost with natural gas—firm[c]	Total annual savings—firm	Heating cost with natural gas—interruptible[d,e]	Total annual savings—interruptible
50,000	$164,500	75,000	$103,125	$61,375	$95,625	$68,875
75,000	$246,750	112,500	$154,688	$92,063	$143,438	$103,313
100,000	$329,000	150,000	$206,250	$122,750	$157,500	$171,500
125,000	$411,250	187,500	$257,813	$153,438	$196,875	$214,375
150,000	$493,500	225,000	$309,375	$184,125	$236,250	$257,250
175,000	$575,750	262,500	$360,938	$214,813	$275,625	$300,125
200,000	$658,000	300,000	$412,500	$245,500	$315,000	$343,000
250,000	$822,500	375,000	$515,625	$306,875	$393,750	$428,750

a Savings can be further increased with the addition of energy efficiency measures.

b Based on a March 2011 quote from Castle Oil Corp. of $3.15/gallon plus 4.5% tax.

c Based on Consolidated Edison's average prices for firm natural gas from 2010, including price of commodity, delivery and taxes: $1.35–$1.40 per therm.

d Based on Consolidated Edison's average prices for interruptible natural gas from the 2010 heating season, including price of commodity, delivery and taxes. Buildings using less than 100,000 gallons/yr: $1.25–$1.30 per therm. Buildings using more than 100,000 gallons/yr: $1.05 per therm.

e Cost does not account for additional oil use when gas service is interrupted (e.g. for a 100-unit building using No. 2 oil as a backup fuel that experiences 4 days of interruption in a given year, this cost amounts to roughly $2,500 annually for oil usage at current prices).

Table 1-C
Potential annual savings from converting from No. 6 heating oil to natural gas[a] (grid)

Gallons No. 6 oil burned per year	Annual heating cost[b]	Equivalent therms of natural gas	Heating cost with natural gas—firm[c]	Total annual savings—firm	Heating cost with natural gas interruptible[d,e]	Total annual savings—interruptible
50,000	$162,000	75,000	$103,125	$58,875	$82,500	$82,000
5,000	$243,000	112,500	$154,688	$88,313	$123,750	$123,000
100,000	$324,000	150,000	$206,250	$117,750	$165,000	$164,000
125,000	$405,000	187,500	$257,813	$147,188	$206,250	$205,000
150,000	$486,000	225,000	$309,375	$176,625	$247,500	$246,000
175,000	$567,000	262,500	$360,938	$206,063	$288,750	$287,000
200,000	$648,000	300,000	$412,500	$235,500	$330,000	$328,000
250,000	$810,000	375,000	$515,625	$294,375	$412,500	$410,000

a Savings can be further increased with the addition of energy efficiency measures.

b Based on a heating oil No. 6 quote from Castle oil in March 2011 at $3.1/gallon plus 4.5% tax.

c Based on National Grid's average prices for firm natural gas from 2010, including price of commodity, delivery and taxes: $1.09 per therm.

d Based on National Grid's average prices for interruptible natural gas from the 2010 heating season, including price of commodity, delivery and taxes: $1.1 per therm.

e Cost does not account for additional oil use when gas service is interrupted (e.g. for a 100-unit building using No. 2 oil as a backup fuel that experiences 4 days of interruption in a given year, this cost amounts to roughly $2,500 annually for oil usage at current prices)..

Table 1-D
Potential annual savings from converting from No. 4 heating oil to natural gas[a] (grid)

Gallons No. 6 oil burned per year	Annual heating cost[b]	Equivalent therms of natural gas	Heating cost with natural gas—firm[c]	Total annual savings—firm	Heating cost with natural gas interruptible[d,e]	Total annual savings—interruptible
50,000	$164,500	75,000	$103,125	$61,375	$82,500	$58,500
75,000	$246,750	112,500	$154,688	$92,063	$123,750	$87,750
100,000	$329,000	150,000	$206,250	$122,750	$165,000	$117,000
125,000	$411,250	187,500	$257,813	$153,438	$206,250	$146,250
150,000	$493,500	225,000	$309,375	$184,125	$247,500	$175,500
175,000	$575,750	262,500	$360,938	$214,813	$288,750	$204,750
200,000	$658,000	300,000	$412,500	$245,500	$330,000	$234,000
250,000	$822,500	375,000	$515,625	$306,875	$412,500	$292,500

a Savings can be further increased with the addition of energy efficiency measures.

b Based on a heating oil No. 4 quote from Castle oil in March 2011 at $3.15/gallon plus 4.5% tax.

c Based on National Grid's average prices for firm natural gas from 2010, including price of commodity, delivery and taxes: $1.09 per therm.

d Based on National Grid's average prices for interruptible natural gas from the 2010 heating season, including price of commodity, delivery and taxes: $1.1 per therm.

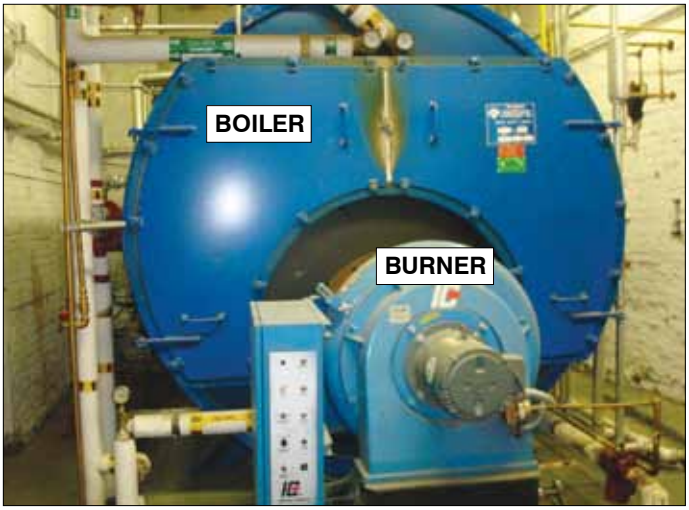
e Cost does not account for additional oil use when gas service is interrupted (e.g. for a 100-unit building using No. 2 oil as a backup fuel that experiences 4 days of interruption in a given year, this cost amounts to roughly $2,500 annually for oil usage at current prices).

FUEL ANALYSIS DETAILS

The goal of the fuel analysis is to determine the upfront *capital* investment and *operational* savings/increases for each cleaner fuel option (No. 2 heating oil only, natural gas only, or both). If the fuel analysis is done in-house (i.e. not by an engineer), the person doing the analysis will need to compare the pricing on the three fuel options described here. If the building owner hires an engineer to do the fuel analysis, we recommend that the engineer be given this document as a guide.

For natural gas conversions, (a) a load letter needs to be submitted to the utility company (Con Edison or National Grid),[2] and (b) for buildings with masonry chimneys, a chimney company will need to inspect chimney bricks to certify that they are gas tight.

Filling out the checklists at the end of this document will help determine the upfront capital investment, savings, and payback period.



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Boiler and dual-fuel burner for a 90-unit residential building burning No. 6 oil. Dual fuel burners typically do not need to be replaced when switching to a cleaner fuel.

A. No. 2 heating oil conversion

To determine the necessary cost of switching to No. 2 oil, the following *capital* investments may be necessary:

1. Boiler/burner: Determine whether a new boiler and/or burner is needed to burn No. 2 oil. If no new equipment is needed, determine the costs to tune the burner and remove unnecessary equipment (e.g. No. 6 oil pre-heater).

2. Oil storage tank: Determine if a new oil tank is needed. If the building has an underground storage tank (i.e. at least part of the tank is buried) and the tank fails the tightness test, it will need to be replaced or re-lined. Replacing it with an above-ground tank is cheaper than with a new underground tank. Unlike No. 6 oil, which is viscous, No. 2 heating oil is a liquid that can easily leak if the underground storage tank is not up to code.

3. Efficiency: Chapter 5 of EDF's heating oil report (edf.org/cleanheat) lists several measures to reduce fuel consumption and save money. At a minimum, a building should investigate the benefits of a heat or energy management system (EMS) that includes indoor temperature sensors strategically placed in some apartments or offices to reduce excess heating. An EMS typically reduces fuel consumption by at least 15% and can achieve savings as high as 30% in particularly overheated buildings.[3] Buildings should also consider the following to improve their efficiency:

- Proper burner tuning and burner controls
- Proper draft controls
- Balancing heat system properly, and possibly installing heating zones
- Heat or energy management system or indoor thermostats in apartments that send signal to burner when to send up steam
- Steam trap replacement
- Radiator shut off valves
- Pipe and boiler insulation
- Performing an annual combustion efficiency test

To determine the potential annual *operating* savings/increases, the following need to be calculated:

4. Operating cost difference: Fuel costs can be estimated by examining the last three years of heating bills to determine average annual fuel consumption. Compare the per gallon prices, based on current and estimated future pricing. The price of No. 2 oil is generally 10–15% higher than No. 6 oil. Also, absent efficiency gains, switching to No. 2 oil may require an increase of approximately 2–5% in gallons purchased to compensate for its smaller heat factor.

5. Maintenance and electricity savings: A building burning No. 6 oil typically requires three major boiler cleanings per year. Switching to No. 2 usually eliminates the need for one of these cleanings, generating approximately $500/year in savings.[4] In addition, daily burner cleanings are no longer required, allowing the superintendent to devote more time to other building issues. Finally, No. 2 oil does not need to be electrically heated and circulated, creating electricity savings of approximately $2,000–$4,000. A heating system specialist can help calculate the exact savings.

B. Natural gas conversions

To determine the capital investment needed for a natural gas conversion, the following costs need to be estimated:

1. Delivery of natural gas: Not every building has easy access to natural gas lines. If the building already has a sufficient gas connection, then the cost of this item is zero. If not, the costs of extending the network can be several hundred thousand dollars. However, this cost can almost always be brought down – or even eliminated – when neighboring buildings form a "cluster" and convert to gas at the same time. Once a building (or cluster of buildings) has submitted a load letter and provided historical oil consumption data to the utility company (Con Edison or National Grid), the following questions can be addressed:

- What will be the cost for the utility company to bring sufficient gas capacity to the property line to heat the building(s) for both firm and interruptible service?
- Is the building in a high-pressure or low-pressure gas area?
- Is the utility providing conversion incentives to convert to gas? Is the utility providing high efficiency rebates (gas and/or electric) which could further reduce the building's energy bill?

2. Gas booster: The utility company will inform the building if it is in a high-pressure or low-pressure gas area. In low-pressure gas areas, the building will need to install a gas booster.

3. Masonry chimney: For masonry chimneys, a chimney specialist can determine if the chimney requires a liner[5] to prevent condensation from eroding the masonry (chimney inspection costs approximately $1,000–2,000).[6] If necessary, installing a chimney liner costs roughly $10,000 per floor.[7]

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When switching to natural gas, a chimney liner is required for masonry chimneys. A chimney inspection will determine if a liner is necessary. Most buildings with pre-1950 masonry chimneys, as shown in the picture above, will need to install a chimney liner.

4. Boiler/burner: See "A.1." If a dual fuel burner is already in place, typically no new burner is required.

5. Plumbing/gas train: Costs for running the needed gas line inside the building from the property line (utility gas entry point as determined by the utility) to the burner.

6. Oil storage tank: Buildings with underground storage tanks that need to be retired might prefer to burn gas only (firm gas) because no oil tank is needed. Otherwise, such buildings will need to invest in a new oil tank in order to store oil. Buildings with an underground oil tank in good condition might prefer to hold onto the oil tank and burn gas and oil (interruptible or temperature controlled gas service) (see "A.2"). Buildings with an existing oil tank that first want to burn gas only and later switch to gas and oil, will have to seal their oil tank for the duration of the firm gas period to comply with fire code regulations.

7. Efficiency: See "A.3".

To determine the annual *operating* savings, calculate the following:

8. Maintenance and electricity savings: See "A.5".

9. Operating cost difference: Collect the oil delivery data over the past 2-3 years to determine the average number of gallons of No. 4 or No. 6 oil used annually. To estimate the annual amount for therms needed if the building switches to natural gas, multiply annual gallons burned of oil by 1.5 (# of gallons of oil times 1.5 = # of therms).[8] For example, a building burning 50,000 gallons of No. 6 oil annually would require roughly 75,000 therms of natural gas per year. If efficiency measures are being considered, their fuel savings should be taken into account (see "A.3").

C. Firm vs. interruptible gas service

By choosing firm gas service, the customer receives certain entitlements in return for agreeing to use only natural gas for the building's heating needs. In most cases, the utility will provide up to 100 feet of gas line extension for free, which may significantly reduce or eliminate the cost of conversion. If interruptible gas is chosen, Con Edison does not provide customer entitlements, and any associated capital costs to the property line are the customer's responsibility. However, in the Con Edison service area, the interruptible rates are more favorable than firm rates; in general, the greater the heating load the more favorable the interruptible rate. Building owners should confer with their utility company to determine which option is best for them.

FUEL ANALYSIS DETAILS CHECKLIST

No. 2 heating oil analysis

The following items should be priced out when conducting the fuel analysis for a possible switch to No. 2 heating oil. Price quotes from 2–3 licensed contractors should be sufficient for the initial fuel analysis. Once the building owner has decided on a fuel option, an engineer usually writes up specifications for contractors to base their bids on.

Instructions: In the checklist below, if you answer the "Action" column with "Yes," fill in the necessary capital investment (shaded in orange). Quantify the expected annual savings and add them in the yellow column. Add up all capital investments and divide them by the annual savings to determine the payback period.

Item	Action	Yes	No	Capital investment	Annual savings
Boiler	Is replacement necessary?				
Burner	Is replacement necessary?				
	If replacement not necessary, is tuning required?				
Oil tank	Is a new tank required?				
	Is cleaning of the existing tank required?				
Efficiency	Are efficiency measures[9] considered?				
Pre-heater and pump	Removal of pre-heater equipment and circulating pump (No. 6 oil only)?				
Separate hot water heater	Is there space in the basement and if yes, how much would it cost?				
	Anticipated electricity savings as pre-heater/ pump no longer needed (No. 6 oil).				$2,000–$4,000
Oil usage	Taking efficiency measures into consideration, calculate the annual savings in fuel costs.[10]				
Maintenance	Calculate savings from reduced maintenance requirements.				$500–1,000
Various costs					
Total	**Investment and anticipated savings[11]**				

FUEL ANALYSIS DETAILS CHECKLIST

Switch to firm gas (burning natural gas only)

Instructions: In the checklist below, if you answer the "Action" column with "Yes," fill in the necessary capital investment (shaded in orange). Quantify the expected annual savings and add them in the yellow column. Add up all capital investments and divide them by the annual savings to determine the payback period.

Item	Action	Yes	No	Capital investment	Annual savings
Boiler	Is replacement necessary?				
Burner	Is replacement necessary?				
	If replacement not necessary, is tuning required?				
Utility gas line	What, if anything, is the utility company charging to bring gas service to the point of entry?				
Plumbing work	Plumbing work within building required?				
Chimney liner	Inspection of chimney required?				
New chimney liner	Is a new chimney liner required based on inspection?				
Gas booster	Is a gas booster required?				
Oil tank	Is a switch to interruptible considered at a later time? Costs of sealing tank?				
Efficiency	Are efficiency measures[12] considered?				
Pre-heater and pump	Removal of pre-heater equipment and circulating pump (No. 6 oil only)?				
Separate hot water heater	Is there space in the basement and if yes, how much would it cost?				
	Anticipated electricity savings as pre-heater/ pump no longer needed (No. 6 oil).				$2,000–4,000
Fuel usage	Taking efficiency measures into consideration, calculate the annual savings in fuel costs.[13]				
Maintenance	Calculate savings from reduced maintenance requirements.				$500–1,000
Rebates	Utilities /other entities rebates/grant (list as *minus* in Capital investment column)				
Total	**Investment and savings**				
Payback	**# years to recoup investment (divide investments by savings)**				

FUEL ANALYSIS DETAILS CHECKLIST

Switch to interruptible gas (burning natural gas and oil)

Instructions: In the checklist below, if you answer the "Action" column with "Yes," fill in the necessary capital investment (shaded in orange). Quantify the expected annual savings and add them in the yellow column. Add up all capital investments and divide them by the annual savings to determine the payback period.

Item	Action	Yes	No	Capital investment	Annual savings
Boiler	Is replacement necessary?				
Burner	Is replacement necessary?				
	If replacement not necessary, is tuning required?				
Utility gas line	What, if anything, is the utility company charging to bring gas service to the point of entry?				
Plumbing work	Plumbing work within building required?				
Chimney liner	Inspection of chimney required?				
New Chimney liner	Necessary based on inspection?				
Gas booster	Is a gas booster required?				
Oil tank	Cleaning or replacement required?[14]				
Efficiency	Are efficiency measures[15] considered?				
Pre-heater and pump	Removal of pre-heater equipment and circulating pump (No. 6 oil only)?				
Separate hot water heater	Is there space in the basement and if yes, how much would it cost? ADD FN re; fuel savings				
	Anticipated electricity savings as pre-heater/ pump no longer needed (No. 6 oil).				$2,000-$4,000
Fuel usage	Taking efficiency measures into consideration, calculate the annual savings in fuel costs.[16]				
Maintenance	Calculate savings from reduced maintenance requirements.				$500-$1,000
Rebates	Utilities /other entities rebates/grant (list as *minus* into Cap. Invest. Column)				
Total	**Investments and savings**				
Pay-back	**# years to recoup investment (divide investments by savings)**				

1 *The bottom of the barrel: how the dirtiest heating oil pollutes our air,* December 2009, pages 4-6, online resource available at: www.edf.org/cleanheat.

2 The most important information is the current (if any) incremental and total estimated heating load (CFH), the annual oil usage for the previous 2–3 years and the building address.

3 See USE Controller at http://www.use-group.com/products/use-controller/ or Heat Timer Platinum at http://www.heat-timer.com/en/ProductDetail.aspx?Id=38.

4 Based on an approximate quote from Mark R. Huber, Abilene, Inc., Brooklyn, NY.

5 Check with an engineer if a type B gas vent can be installed instead of a chimney liner and if such a gas vent is cheaper than a chimney liner.

6 Based on an approximate quote from Mark R. Huber, Abilene, Inc. , Brooklyn, NY. Buildings built after 1960 were required to install chimney liners, so these buildings will most likely not require any additional work unless the liner has cracks and requires replacement.

7 Based on an estimate by Jeffrey Eichenwald, Startech Engineering P.C., New Hyde Park, NY.

8 No. 6 oil: 150,000 BTU/gallon.
No. 4 oil: 145,000 BTU/gallon.
Natural gas: 100,000 BTU/therm.

9 e.g. Heating energy management system (EMS), steam trap replacement (e.g. see www.spiraxsarco.com/us), radiator shutoff valves, separate hot water heater (e.g. by Lochinvars), boiler/burner controls (e.g. see www.atiofny.com), and steam and hot water pipe insulation in boiler room and throughout the building. For an EMS alone, savings can vary between 10 and 30%. For oil burning buildings also look into installing a Fitch Fuel Catalyst which should help reduce fuel consumption between 8-12% with a pay-back period around 12 months. The Fitch Fuel Catalyst has further been shown to reduce greenhouse gases and particulate matter emissions (see www.fitchfuelcatalyst.com/products/heating). See EDF report chapter 5, edf.org/cleanheat. If no efficiency measures are taken when switching to No. 2 oil, the annual fuel costs will likely be higher than in previous years.

10 Take average No. 4 or No. 6 oil usage over past 3 years; reduce the number of gallons by the % reduction anticipated due to efficiency measures; add about 3% due to lower heat content of No. 2 oil to determine the # of gallons of No. 2 oil burned after the conversion; and multiply the #of gallons by the price per gallon. Compare the anticipated fuel costs for No. 2 oil to the average fuel costs over the past 3 years, including taxes.

11 When switching to No. 2 oil, efficiency measures are crucial to generate fuel savings, as noted above. Note that freed-up staff time due to reduced maintenance can create value for a building.

12 e.g. Heating energy management system (EMS), steam trap replacement (e.g. see www.spiraxsarco.com/us), radiator shutoff valves, separate hot water heater (e.g. by Lochinvars), boiler/burner controls (e.g. see www.atiofny.com), and steam and hot water pipe insulation in boiler room and throughout the building. For an EMS alone, savings can vary between 10 and 30%. See EDF report chapter 5, edf.org/cleanheat. If no efficiency measures are taken when switching to No. 2 oil, the annual fuel costs will likely be higher than in previous years.

13 Take average No. 4 or No. 6 oil usage over past 3 years; reduce the number of gallons by the % reduction anticipated due to efficiency measures. To determine # of therms needed: # of reduced gallons times 1.5 = # of therms needed in future. Get pricing per therm from your utility company and outside vendors for firm gas (there will be price for commodity and one for transportation). The commodity can be bought from any distributor including the utility company, but the utility company is always the one charging for transportation as the gas goes through its gas lines. Include taxes as well.

14 Removal if building decides to burn natural gas only (firm gas) and does not want to switch to interruptible gas service (building burns gas and oil) at a later point.

15 e.g. Heating energy management system (EMS), steam trap replacement (e.g. see www.spiraxsarco.com/us), radiator shutoff valves, separate hot water heater (e.g. by Lochinvars), boiler/burner controls (e.g. see www.atiofny.com), and steam and hot water pipe insulation in boiler room and throughout the building. For an EMS alone, savings can vary between 10 and 30%. See EDF report chapter 5, edf.org/cleanheat. If no efficiency measures are taken when switching to No. 2 oil, most likely the annual fuel costs will be higher than in previous years.

16 Take average No. 4 or No. 6 oil usage over past 3 years, reduce the number of gallons by the % reduction anticipated due to efficiency measures. To determine # of therms needed: # of reduced gallons times 1.5 = # of therms needed in future. Get pricing per therm from your utility company and outside vendors for interruptible gas (there will be a price/therm for commodity and one for transportation charged by the utility company). The commodity (gas itself) can be bought from any distributor. For about 4 days/year the utililty company will require the building to burn No. 2 heating oil instead of gas. To factor the annual oil costs for an average of 4 days, you will need to figure out how much oil the building needs for a winter day. Get the current and anticipated price for No. 2 oil to determine those costs. Include taxes as well.

Isabelle Silverman

San Remo building burning No. 6 heating oil.

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