I. The continuing failures of electricity grids will seriously inflate costs.

A. Today’s grids are no different than they were 50 years ago.

B. Their monopoly status gave utilities no incentive to invest in research and development – and so they didn’t.

C. Environmental protection regulations and plain old NIMBY have restricted the construction of new power lines.

D. Investments in new transmission lines have been stifled, often requiring the use of eminent domain to obtain right of way.

E. While wind farms have flourished in many states, the power often cannot get to the urban locations that need it most. For example, nine percent of New York State’s power is generated by wind but none of it gets to New York City.

F. Any new construction of transmission lines or power plants will increase the costs of electricity.

II. Fuel costs are extremely volatile

A. Oil costs were quite high 2-3 years ago, at well above $3 a gallon. Although costs came down significantly to $1.50 a gallon, they have since crept back up to $2 a gallon.

B. Gas remains a lower cost fuel option but pipeline limitations and environmental safeguards to regulate fracking will drive costs up over time.

C. Of course, fuel costs rise during very cold or hot climate extremes. Unfortunately, these spells are occurring more frequently due to global warming, with some locations especially affected.
III. **Cooperatives need to fend for themselves.** Given higher costs and prospective service disruptions, cooperatives are advised to strengthen their own resources. (New York City has not yet fully recovered from the destruction of Hurricane Sandy in 2012.) 2017 hurricanes in Texas and Florida and Porto Rico.

A. Since all buildings are different, each will have its own unique recipe for success.

B. Nevertheless, there is a process that all multifamily buildings should undertake.

C. Beyond the general process, there are many opportunities that a building should explore.

IV. “You can't manage what you can't measure.”

A. Collect your energy data and sort it according to usage and costs.

B. Sort costs for electricity from other fuels (oil, natural gas and steam) used for thermal purposes. (Picture 1) (The end of fossil fuel)

   1. Space heating
   2. Hot water
   3. Air conditioning, when a central AC system is powered by steam or natural gas.

C. Sort electricity according to:

   1. Usage in public space and apartments
   2. Base usage (lighting and appliances), and where appropriate, electric use for air-conditioning or heating (space and/or hot water)

D. Separate thermal use by end use.

   1. Hot water (Picture 2)
   2. Space heating
   3. Air-conditioning, where appropriate

E. Each end use should be sorted by usage and costs to determine where the energy dollars are going.

   1. For electricity, usage is measured in kilowatt hours
   2. For gas, therms
   3. For oil, gallons
   4. For district steam, mlb’s (1,000 pounds of steam)
V. **Sustainability is not a spectator sport.** Undertake two immediate actions to establish a sustainable building.

A. Form a “green” committee of at least one board member and additional shareholders interested in energy efficiency (and saving money). Actions:
   1. Understand data collection and prepare simple analysis.
   2. Review previous financial statements to identify trends and cost volatility.
   3. Research green products, concepts and technologies.
   4. Maintain energy end-use database.
   5. Recommend implementation priorities to the board of directors.
   6. Arrange presentations by professionals regarding efficiency measures and technologies.

B. Retain a qualified energy consulting firm to conduct an energy audit
   1. Review report for completeness and accuracy.
   2. Ask whether the practitioner will present findings to the board of directors.
   3. Determine whether the firm can assist in developing an implementation strategy.

HUD may require these audits shortly

VI. Recommendations for a cooperative to investigate

A. The building envelope should be as tight as possible.
   1. Windows, if old (first generation especially) and single-paned, should be considered for replacement.
   2. Roofs should be well insulated. (After a snowfall, roofs that are well insulated will not allow snow to melt.)
   3. Walls should be investigated to determine whether insulation is feasible.

B. Heating system/cooling system
   1. Efficiency tests should be conducted and necessary tune-ups performed.
   2. Ultrasound studies can assess a system’s remaining useful lifespan if they are more than 25 years old.
   3. Pipes and boiler jackets should be insulated.
4. The boiler room should not be too hot in the winter. Heat should go to the apartments and common areas rather than remain in the boiler room.

5. Review over-heating and under-heating issues. Open windows during the winter represent a serious heat loss. Due to the frequency of this practice in New York City, it is often said that windows are our thermostats.

6. Develop a heat-distribution balancing process and monitoring systems.

7. Investigate separate domestic hot water heaters.

C. Electricity

1. The energy audit should indicate performance of various pumps, motors and lighting. LED lighting should be implemented where possible.

2. Install advanced meters for public areas to determine electricity usage patterns, which are also called load curves.

3. Review electricity billing to determine whether costs can be lowered by reducing peak usage.


5. Assure that shareholders pay for the electricity they use (that is, are not master-metered whereby they pay a set portion based on apartment size).

VII. Cutting-edge opportunities

A. Onsite power generation

   1. Renewables (for example, photovoltaics) for low-rise buildings (Pictures 3 & 4)
   2. Cogeneration (or combined heat and power) (Picture 5)
   3. Fuel cells

B. Geothermal energy

C. Electricity storage

D. Preliminary review should include identification of existing applications, available incentives, space considerations, and costs and savings.

E. Retain an experienced professional to prepare specifications and facilitate implementation, as needed.
F. Smart Apartments will be the future in building and retrofitting turnovers.

   A. Smart Thermostats
   B. Smart Room Sensors
   C. Smart Locks
   D. Smart Appliances
   E. Smart Lighting

VIII. Other

A. Catch Rainwater