Opportunity to Reduce Energy Consumption at a Publicly-subsidized Private Development:

A Case Study of the Providence Place Mall

By
Anton D. Nicholas
B.A. University of Richmond, 1993

Master's Thesis

Submitted in partial fulfillment of the requirements for the Degree of Masters of Arts in the Program in Environmental Studies at Brown University

May 1998

This thesis by Anton Nicholas

is accepted in its present form by the Center for

Environmental Studies as satisfying the thesis requirements

for the degree of Masters of Arts

Date _____ _____
Kurt Teichert, Environmental Coordinator

Date _____ _____
Tim Howe, Energy Program Coordinator
Rhode Island Dept. of Administration
State Energy Office

Date _____ _____
Harold Ward, Director,
Center for Environmental Studies

Approved by the Graduate Council

Date _____ _____
Peder J. Estrup
Dean of Graduate School and Research

ACKNOWLEDGEMENTS

The research and writing of this thesis has been a long and arduous process. I want to thank a few people for being terrific resources and advisors. Harold Ward, my advisor, guided me through the process and kept me focused. Kurt Teichert held countless discussions and information sessions about energy and baseball. Tim Howe offered his valuable advice and insight. Winnie Loeffler talked, read and edited. Finally, I thank my family and friends, especially Valerie Colas, for their advice, support through a lengthy process and for keeping me committed when it didn't seem worth it

Abstract

There is no denying that energy use at the Providence Place Mall will be responsible for some environmental damage. By decreasing its overall consumption and increasing its use of efficient and cleaner alternatives, the mall can at least limit these impacts. At the same time, taking measures to conserve energy can also result in long-term economic benefits to the developer.

The current decision process of private mall developers conflicts with these goals. The number of stakeholders makes it impossible to implement an integrated, comprehensive approach to energy use. Priorities are geared towards keeping initial investment low, managing costs and completing the project as quickly as possible. In the end, the lack of incentives for greater efficiency causes an unnecessary use of energy. Without immediate economic benefits or a vested interest in efficiency, the fundamental values and perhaps, ignorance of individual decision-makers affect the ultimate decision to spend the time, effort and investment in adopting efficient technology and methods. The only current mechanism to affect these decisions is the state building code, which is antiquated and lenient.

However, there is an opportunity for the public to effect the decision process at a many large developments like Providence Place. By leveraging substantial public financing, $220 million in the case of Providence Place, granted to most mall projects, the public can stipulate a review of more efficient and cleaner technology and practices. It is essential for

local governments to take advantage of this opportunity to assume a greater role in energy conservation and clean power. Doing so guarantees responsible energy use and also protects the public's interest in a healthy environment.

I propose in return for public financing a State, City and private sector cooperative process to review salient issues with environmental impacts such as energy use. The oversight of a public committee, and the developers desire for positive public opinion, would guarantee that private development is looking at all the issues. Rather than be a burden of costly regulation the purpose of this energy review committee would be to examine opportunities to implement energy efficient and cleaner alternatives.

In identifying cost-effective and more efficient technology and practices an energy review committee protects the public's interest in maintaining a clean and economically sound society while achieving economic benefits for the developer as well. If given proper time and consideration, a series of review workshops like these may encourage energy decisions at future publicly-funded developments like Providence Place to reflect a balance between economic growth and reduced environmental impact.

Table Of Contents

INTRODUCTION

In today's society there is a constant struggle between economic development and the successful protection of the environment. New shopping malls illustrate the clash between these two fundamental issues. The average environmentalist might say, "the best mall is a mall not built." Others suggest investing in existing retail structures for economic revitalization rather than building a new development. I will not address these ideas. This thesis is neither an affirmation of the economic benefits, nor an environmental impact study of a mall. Instead, recognizing it is possible to balance economic development with environmental protection, I will focus on the public's ability to influence developers of large-scale projects (and specifically malls) to consider energy conservation and efficiency in the overall decision process of their project. This thesis assumes that government officials have: (1) decided that a shopping center should be built for the projected economic benefits and, (2) have agreed to offer public financial assistance in order to persuade developers to build such a mall. Given these assumptions, this thesis is about the opportunity for civic involvement in the design and planning of publicly-financed development. I also recommend strategies to include energy conservation and clean power in the decision process for a shopping center.

The Issue

The argument in favor of building malls is always based on projected economic benefits. These benefits range from enhanced employment opportunities to additional investments

in infrastructure and surrounding neighborhoods associated with the development of the mall. For example, Tamara Zahn, President of Indianapolis Downtown Inc. stated, "without Circle Center we would have a major hole in our downtown both psychologically and physically."[1] In addition, given the sheer physical size of the project and the needs of mall's tenants, there are numerous secondary benefits including greater demand for local suppliers and service providers and increased tourism and overall city appeal. This last factor is most important for the overall stability of the region. "They [planners] have learned that if the central city has a bad reputation, outsiders may write off the whole region."[2]

Whereas one clear positive may be the economic benefit, one clear negative is the environmental impact of mall developments. One reasonable solution to mitigate some of this impact is through responsible energy use. Although the benefits of energy efficiency and conservation apply to all malls, I will use the urban mall as my example.

The Urban Mall

In the latter half of the twentieth century, the United States experienced the decline of the strong urban center. Migration to suburban areas led to a number of issues such as urban sprawl and the associated exodus of economic investments from the city center. In reaction to this departure, recently the U.S. began to try to re-establish its cities as centers

[1] Reese, Shelly, "Indianapolis Pins Hopes on New Mall, Will Center Revitalize Downtown?" Cincinnati Inquirer, July 23, 1995, pg. 1.

of both social and economic activity. "The goal is for the city to absorb a large portion of the state's growth, to keep the urban core healthy and to avoid urban sprawl."[3] Integral to the revitalization of the city is the redevelopment of a core downtown area. "Cities across the country are trying bold and creative ideas to transform their downtown into vibrant centers of the community."[4] Popular strategies to attract consumers back to the city include the redevelopment of depressed restaurant and theater districts, the construction of state-of-the-art professional sports facilities and in particular the strengthening of the downtown retail sector.

The movement to reestablish the retail power of the city coincides with a shift in attitude towards the once-revered suburban mall. Once thought of as free of urban problems such as crime, traffic and increased pollution, the suburban shopping mall is falling victim to these problems and losing its overall appeal. "Eternally innocent (and charmingly hopeful), we are always shocked when model cities defy their planners and, when suburbs are not immune to urban woes. That we thought malls were Nirvanas, to be hermetically sealed off indefinitely from society's rough edges, is an old American fairy tale."[5]

---

[2] Hentz, Patty, "Planning Helped Rescue Downtown Portland," The Salt Lake Tribune, January 1, 1995, pg. 5A.

[3] Ibid.

[4] Nasser, Haya El, "Entertainment Centers a Big Draw," USA Today, December 27, 1996, pg. 1A.

[5] Rich, Frank, "Not Necessarily Nirvanas," The Commercial Appeal, December 8, 1996, pg. 4B.

Although some urban planners argue for investment in existing infrastructure and buildings once home to downtown retail, many cities are turning to the retail- and entertainment-based *urban mall*. According to Rich Bradley, president of the International Downtown Association, "I think there's a recognition that the economy of the city is dependent on this kind of development."[6] These efforts intend to combine the innovation, comfort and convenience of the suburban mall in the urban location.

The Opportunity

The development of urban shopping centers requires some give and take. Cities are in constant competition for investment and new business to increase the economic stability, tax base and attract new residents and businesses to their city. For this reason the city/state/public must offer financing to lessen the risk and financial burden of development corporations or risk losing that project to another city. As Marshall Feldman, professor of community planning and economic development at the University of Rhode Island stated, "It's rare these days that a developer will build a mall in the city without this kind of subsidy."[7] If most other cities give financial assistance, Providence has no option but to do so as well or fail to attract these large-scale projects and those associated benefits. Examples of cities entering into publicly-financed downtown mall projects include Indianapolis, Indiana, Washington, D.C. and Norfolk, Virginia. These

[6] Pressler, Margret Webb, "Task Force Calls for New Downtown," The Washington Post, December 12, 1996, pg. 1A.

[7] Arditi, Lynn, "Taxpayers, developers, banks are all key to Providence Place," The Providence Journal-Bulletin, March 23, 1997, pg. 23A.

finance deals include actual capital investment from the city or substantial tax rebates and long-term tax exemptions.

Although, arguably of little risk to the public, (i.e. sacrificing taxes that would not have existed in the first place without the shopping center development) these developments receive substantial economic support to build projects that result in alterations to the environment. It is this financial support that offers the public an opportunity to stipulate responsible practices relating to energy conservation and efficiency. This kind of bargaining is essential, because left to their own devices, mall developers otherwise may make hasty decisions based purely on short term economics without considering reasonable and less harmful options. This is not necessarily assuming that the decisions otherwise would always be bad. But, public involvement can insure that developers consider good alternatives.

The Case Study

"Providence Place", the publicly-financed entertainment and retail mall currently being built in Providence, exemplifies the opportunity to reduce the environmental impact of a mall development. Providence Place provides examples of the possibilities for linking economic development of this scale with minimized environmental impact. It illustrates the barriers to, and potential measures for, energy conservation and efficiency measures at a large private development. By reviewing how the City of Providence and the State of Rhode Island handled this recent project (what was done, what could have been done),

it may be possible to establish a framework for incentives to address energy concerns for future projects in this and other cities. Therefore the end goal of this work is to offer a reasonable policy alternative to the public sector on how to influence energy use in publicly-assisted private sector development and to reduce its environmental impact.

Essential to developing realistic incentives is a comprehensive look at the issues. The majority of my research is based on a review of existing decision processes, procedures and programs for energy use, conservation and efficiency. I attempted to gather this information from published sources, and public/private individuals and organizations associated with mall developments and energy use and supply.

Chapter One answers the basic question: why focus on energy? Chapter Two looks at Providence Place and its potential for reductions. Chapter Three addresses the problems of the current decision process at a mall and the opportunity to effect change to that process. Chapter Four touches on the current approach to energy use in Providence and Rhode Island, and the incentives for the public sector to take a more active role in examining energy conservation and efficiency in the built environment. Finally in my conclusion, I discuss recommendations for establishing a review process.

CHAPTER ONE

THE ISSUE:

Energy Consumption and the Environment

"Energy use and the environment are inextricably linked"[8]

Although largely overshadowed by the projected economic benefits, one can anticipate a variety of problems that stem from such a large development. Decentralization of the downtown core, employment equity concerns and the degradation of the environment are some of the problems linked to a mall. Environmental burden is an unavoidable cost incurred in any development of this nature. The mitigation of this damage is central to this thesis. Given that the decision to develop the mall has been made, it is more productive to limit the overall negative impacts as much as possible, rather than attack the project for its adverse effects to environmental quality across the board.

The list of environmental issues affiliated with a mall is extensive. Some are more controversial than others. The most significant concerns and related consequences stem from direct impacts and issues related to excess consumption or to fulfill desired amenities. For example, there are the impacts of construction including building materials (embodied energy and resources and waste), waste production and disposal,

[8] Sheldrick, B. and A. Scott, "Energy and environment: deriving a research agenda," Environment and Planning A, V.21 (1989): pg. 1349.

hazardous and toxic run-off, and job site controls (recycling etc.). Water issues such as wastewater disposal, water consumption - toilets, sinks etc., drinking water and restaurant use, landscape water - and run-off and storm-water discharge, create additional problems. Air pollution is a growing concern. This is especially true in the urban setting because of increased traffic. But, in addition to the localized emissions from increased car traffic coming and going, solid waste generation and disposal, increased air emissions directly from the mall and indirectly from its energy sources and noise pollution also pose problems. Finally, the physical presence of the mall itself raises additional concerns about landscaping, investment in green infrastructure, parks and open space, and land–use: cleanup and protection. These are only some of the major issues.

One realistic approach to limiting this degradation is through reduced energy consumption and clean power. Addressing energy issues at a mall has attractive potential benefits on two levels: 1) Direct and indirect benefits to the environment and; 2) The potential for considerable cost savings to the mall developers and its individual tenants (See Chapter Two). It is this combination of environmental benefits and cost savings that make an examination of efficient use of energy at a mall interesting.

Consequences of Energy Use

Energy use results in environmental burdens including impacts of natural resource extraction and air, water and thermal pollution. Therefore, logically, reduced

consumption results in reduced impact to the environment. This argument is intuitive but necessary to reiterate, particularly because malls are such voracious energy consumers.

First, the extraction, transportation and burning of fossil fuels result in a number of problems. Examples include:

- Water pollution – Point and non-point runoff of current and abandoned mines, construction sites and toxic power plant effluent discharge.
- Fuel Spills and leaks - The Valdez disaster educated the world on the threat of fuel spill and its potential to destroy the environment.
- Solid Waste - Mining waste and ash disposal present a toxic and hazardous waste disposal problem.
- Land and Water Use Questions - Mining, storing and transporting oil, coal and natural gas can often result in a variety of habitat and wildlife destruction, deforestation and wetland degradation.

More significant (and identifiable) are the global ramifications of pollution from fossil fuel consumption. For every unit of energy produced by burning fossil fuels, there is a proportionate amount of air pollution created. This includes emissions of particulate matter, SO_2, NOxs and large amounts of CO_2. For every kWh of electricity generated there are specific amounts of pollution. (Table 1.1 illustrates the potential pollution from generating electricity.) The result is problems such as acid rain, urban ozone and smog and climate change. Therefore, reducing overall energy use eliminates identifiable amounts of pollution.

TABLE 1.1[9][10]

Average Pollution from Generating 1 kWh

Carbon Dioxide (CO_2)	1.5lb
Sulfur Dioxide (SO_2)	5.8 gm (grams)
Nitrous Oxides (NOx)	2.5 gm
Mercury (Hg)	0.04 mg (milligrams)
Cadium (Cd)	0.05 mg
Copper (Cu)	0.59 mg
Nickel (Ni)	1.18 mg
Silver (Ag)	0.25 mg
Beryllium (Be)	0.02 mg
Chromium (Cr)	1.30 mg
Maganese (Mn)	2.27 mg

The benefits of reducing electricity consumption are two-fold. Saving a unit of electricity means saving both fuel at the power plant and avoiding associated pollution. At the same time, electricity is the dominant source of energy for buildings in the United States. According to the Energy Information Agency[11], electricity accounted for close to 70% of

[9] US Environmental Protection Agency, Green Lights Program, 1992.

[10] These numbers are an average of the emissions for electricity produced in the United States and assume certain fuel consumption - 60% of electricity production in the U.S. is from coal and corrosponding efficiency rates. See discussion p.16.

[11] The Energy Information Agency at the Department of Energy collects surveys of end use every three

the total primary consumption in commercial and industrial buildings.[12] For this reason, commercial buildings provide an opportunity to reduce environmental damage through reduced electricity consumption.

Changing Priorities

"The so-called conventional sources of energy (oil, coal and gas) are marked by finite quantities on this planet."[13] Analysts in the seventies predicted that due to the world's dependency on non-renewable fuels, diminishing resources would continue to drive costs higher and increase anxiety and the potential for conflict amongst rivaling nations vying for the same limited resources. Therefore it was argued that it was in the best interests of all nations to reduce overall consumption. Logically this should be and eventually may still be true. However, falling energy prices in the last twenty years have made clear that this is not a short-term concern. Rather than supply, the emerging limit to fossil fuel use is the environmental consequences of fossil fuel consumption outlined above. Since regular monitoring of CO_2 began in the 1950s, carbon emissions have risen steadily and temperatures continue to rise. "The rationale for energy conservation has shifted from

---

years. The EIA calculates end use for a number of criteria including service categories (Education, Healthcare Mercantile etc.), building sizes by square feet and end use (Electricity, Natural Gas etc.). These numbers do not distinguish between individual inefficiency and efficiency but do provide an aggregate average of use in existing buildings.

[12] US Department of Energy, Energy Information Administration (EIA), Commercial Buildings Energy Consumption and Expenditures 1992: pg. VI.

[13] Kakissopoulos, Constantinos A., "Energy - guest editor's foreword", Ekistics 344 (Sept/Oct 1990): pg. 248.

reducing the risk for supply interruption to reducing the harmful environmental impacts of fuel consumption."[14]

This concept is reflected in the world's approach to global climate change. The international Earth Summit in Rio de Janeiro addressed the issue in 1992. "One result was the Convention on Climate Change, which commits its signatories, including the United States, to stabilize emissions of greenhouse gases at 1990 levels."[15] Recently most of the industrialized nations admitted they would not meet targets to stabilize emissions. By 2000, carbon dioxide and other greenhouse emissions are expected to exceed 1990 levels by as much as 13 percent.

However, the Climate Change Conference in Kyoto, Japan in December 1997, five years since the Rio conference, drafted a new international treaty to reduce overall emissions. The industrialized nations of the world agreed to "The Kyoto Protocol" on December 11, 1997.[16] The conference, born out of years of negotiation to strengthen the 1992 Climate Treaty, set legally binding targets for industrial nations. Supported by 160 nations the treaty calls for 38 industrialized nations to reduce greenhouse gas emissions, collectively, by an annual average of just over five percent below 1990 levels from 2008 through

---

[14] Anderson, William P., Pavlos S. Kanarogalou and Eric J. Miller, "Urban Form, Energy and the Environment: A Review of Issues, Evidence and Policy," Urban Studies, Vol. 33, No. 7-35 (1996): pg. 8.

[15] Vig, Norman J. and Michael E. Kraft, Environmental Policy in the 1990s, Congressional Quarterly Press, YEAR: pg. 202.

[16] "International Treaty Reached Today To Reduce Global Warming," The Associated Press Political Service, December 11, 1997.

2012.[17] That five percent below 1990 levels represents 30% below the anticipated global emissions, for the same time period.[18] As a part of that agreement, Japan, the United States and the European Union committed to reducing emissions by six, seven and eight percent below 1990 levels respectively. Although not as aggressive as the European Community's original call for 15% reductions from 1990 levels, the Kyoto Protocol importantly "establishes the foundation of an institutional framework and accompanying mechanisms for dealing with the problem [climate change] in coming decades."[19] EPA Assistant Administrator David Gardiner called the treaty, "a cost-effective, common sense approach to solving a serious problem…an insurance policy against the future impacts of climate change."

The United States Congress must still ratify the Kyoto Protocol to insure U.S. participation. While the treaty will face opposition in the Republican controlled House and Senate, it received cautious endorsement from the Clinton Administration. Vice-President Gore, instrumental in the negotiations, said while more work is needed, "This historic agreement lays a solid foundation for work to protect our environment."[20] President Clinton called the accord "a huge step" [21] for addressing the pending threat of global warming and climate change. He also suggested the United States must take the

---

[17] Stevens, William K., "Kyoto Accord Only a Start in Fight Against Warming," The San Diego Union-Tribune, December 12,1997, pg. A-26.

[18] Ibid.

[19] Ibid.

[20] "Reaction: Gore Praises Kyoto Pact," Detroit News, December 11, 1997, pg. A18.

[21] "International Treaty Reached Today To Reduce Global Warming," The Associated Press Political Service, Decemer 11, 1997.

lead on emission reduction. "Whether the problem has been the acid rain, deadly pesticides, polluted rivers or the ozone hole, the ingenuity of the American people has always proved to carry the day – and we'll do it again."[22] To help meet these emission reductions, on January 31, 1997, the Clinton administration introduced a proposal for $2.7 billion in climate change research spending and $3.6 billion in tax break incentives towards purchases of clean cars and energy efficient technology.[23] "The new proposals avert the worst dangers of climate change while keeping our economy growing strong."[24] As evidenced by these proposals, the basis to Clinton's global warming policies is a belief that "energy efficiency and development of new energy-saving technologies will allow for reductions…and still not threaten the economy. Energy efficiency is taking on new urgency." [25] While the treaty must still be passed, the commitment of the Clinton administration indicates a longer-term commitment to reducing emissions.

Given that coal's primary component is carbon, reducing coal use is the most effective way to meet CO_2 emission levels required of the Kyoto agreement. This is particularly relevant to the U.S., where 60% of all electric power comes form coal-fired plants.[26] As indicated above, each kWh produced at these conventional power plants is responsible for specific quantities of CO_2 emitted into the atmosphere. By simply cutting demand,

---

[22] Peterson, Jonathan, "Clinton Offers Breaks to Fight Global Warming," Los Angeles Times, 02/01/1998, pg. A-1.

[23]Ibid.

[24] Ibid.

[25] Hebert, H. Josef, "Close-up, Pact Renews Focus on Energy Efficiency," The Seattle Times, December 11, 1997, pg. A2.

[26] "Emissions Cuts to Up Adoption of Technologies in U.S.," New Technology Week, No. 30, Vol. 11: July 28, 1997, p.1.

which in turn limits production from these dirty plants, the U.S. can achieve substantial reductions in CO_2 emissions.

In the short term, eliminating coal-fired electricity is unrealistic. Opponents of an international climate treaty argue that reducing CO_2 emissions at power plants will curb U.S. economic growth by jeopardizing the electricity supply.[27] A study by Resource Data International "concluded that no single alternative resource or even a combination of all other alternatives can replace coal to generate electricity and sustain current levels of U.S. economic growth to meet even the most modest climate treaty proposal that would stabilize CO_2 emissions at 1990 levels."[28] Furthermore, meeting the energy needs of new building construction will only increase overall carbon emissions.

It is not only possible but also essential to reduce the additional demand of those buildings through efficiency and clean power. Because each kWh of electricity saved means reduced carbon emissions, adopting progressive energy-use policies is important if we are going to meet 1990 emission levels. According to John Gibbons, former science adviser to President Clinton and director of the Office of Science & Technology Policy, "coping with climate change and forthcoming carbon reduction quotas will force the United States to make major changes in the way it uses energy and will require adoption

---

[27] "Climate Change Treaty Would Curb U.S. Economic Growth, Jeopardize Electricity Supply," PR Newswire, August 20, 1997, p.1.

[28] Ibid.

of a range of new technologies.[29] But such policies do not necessarily mean high prices and economic hardship for building owners.

Economic Benefits of Energy Conservation

Technological innovation allows for reductions in energy use for relatively small investments. Efficiency reduces energy consumption, which results in lower utility bills, lower costs of environmental compliance and conservation of local budgets. Furthermore, "energy efficiency can create savings that provide additional savings that provide additional revenue for other pressing community needs."[30] Newark, New Jersey recently converted 16,000 street lamps to high-pressure sodium lamps. The reduced energy bill is saving the city $1.3 million every year."[31] These savings will then generate funds available for investment in other necessary programs and services.

Such savings can be applied to the private sector as well. In 1992, total spending for energy in commercial and industrial buildings amounted to $71.8 billion. The majority, $57.6 billion, was devoted to site electricity (energy consumed at the buildings without factoring in conversion losses)[32].[33] From a business standpoint, this energy use

[29] "Emissions Cuts to Up Adoption of Technologies in U.S.," New Technology Week, No. 30, Vol. 11: July 28, 1997, p.1.

[30] Goldberger, Dan J. and Phillip Jessup, "Profiting from Energy Efficiency!," International Council for Local Environmental Initiatives, (U.S.A., 1994): p.4.

[31] Fact Sheet: The Economic Power of Energy Efficiency, ICLEI (Berkeley, CA, 1997) from internet site www.iclei.org/sb1.htm.

[32] The amount of electricity actually consumed on site without factoring in conversion losses.

constitutes a major cost burden. To be competitive in today's global market, business must cut unnecessary expenses and costly overhead. Investing in energy efficiency means reduced costs without sacrificing the quality of operations. Energy not used is money saved in annual operating costs. In the long run, these saving cover the cost of initial investments, particularly if tightening regulation in the future forces businesses to upgrade older and dirtier systems.

Two of the of the world's most successful corporations recently implemented a new lighting strategy that reaped substantial economic benefits. "Honda of America Manufacturing Inc. and General Motors found a way to shave factory costs without asking workers to do a single thing differently: They changed light bulbs."[34] The introduction of energy efficient bulbs reduced overall energy use. The change has eliminated thousands of kilowatts of annual energy consumption levels while providing the same quality of lighting. With no "discernible difference in lighting levels" Honda was able to conserve 3,200,000 kilowatt hours of power "that knocked an estimated $200,000 to $250,000 off its annual electric bill."[35] According to a spokesperson for the company these savings outweighed the costs of the new technology and installation. [36]

The Big Picture

---

[33] US Department of Energy, Energy Information Administration, Commercial Buildings Energy Consumption and Expenditures 1992: pg. VI.

[34] Chappell, Lindsay, "Bright Ideas Lower Costs at GM, Honda Factories," Automotive News V. 71 (February 1997): pg. 68.

[35] Ibid.

[36] Ibid.

"Over 30% of the total energy use and 60% of the electricity use in the United States is in buildings."[37] According to the Energy Information Agency[38], "in 1992, the 4.8 million commercial buildings in the United States consumed 5.5 quadrillion Btu of electricity, natural gas, fuel oil and district heat."[39] Including the conversion loses for the electricity portion, this number more than doubles, to almost 10.8 quadrillion Btu's. The power generation to support the needs of the commercial sector constantly pours gaseous emissions into the atmosphere. "Including the utility-generated emissions, commercial buildings account for 15% of U.S. greenhouse gas emissions."[40] The Energy Star Program and Green Lights at the Environmental Protection Agency promote technologies to reduce energy consumption and its associated costs. According to Energy Star, the commercial sector can save, "an amazing 40 percent – or $28 billion- … through the widespread use of energy-efficient technologies, providing significant dollars to be reinvested into the economy."[41] At the same time this would mean an approximate 6% reduction in greenhouse gases. Although this may be optimistic it illustrates the

---

[37] Ibid.

[38] The Energy Information Agency at the Department of Energy collects surveys of end use every three years. The EIA calculates end use for a number of criteria including service categories (Education, Healthcare Mercantile etc.), building sizes by square feet and end use (Electricity, Natural Gas etc.). These numbers do not distinguish between individual inefficiency and efficiency but do provide an aggregate average of use in existing buildings.

[39] US Department of Energy, Energy Information Administration, Commercial Buildings Energy Consumption and Expenditures 1992: pg. VI.

[40] US Environmental Protection Agency, Energy Star Buildings Manuel (July 1995): pg. 2.

[41] Eisele, Julie, "The Climate is Right for Change," Buildings EPA Supplement (March 1995): pg. 8.

enormous potential of commercial and industrial buildings to reduce both costs and emissions.

Energy use at one building results directly in natural resource use and air emissions that cause environmental problems. If one agrees that acid rain, tropospheric ozone and global climate change are bad, energy use threatens not only the balance of the earth's ecosystems but also the long-term quality of life for the human population. But, rather than being a burden of additional costs and bureaucratic red-tape, as environmental regulation is often perceived, reducing energy consumption also results in considerable costs savings.

CHAPTER TWO

The Case Study:

Providence Place and Energy Consumption

To achieve overall goals for reduction, the first step is at the individual project level. Providence Place, a publicly-subsidized mall under construction in Providence, RI, illustrates the opportunities to reduce the environmental impact of commercial buildings. Given the sheer size and scope of this particular building, there will likely be numerous adverse effects and added stress on the environment. By reducing overall energy use at Providence Place as well as other commercial buildings, we can achieve long-term economic and environmental benefits to society.

Brief History

Nearly 20 years ago, city parcels 10 and 13 in Providence's Capital Center district were zoned for a "high density project."[42] This created the possibility for a major development such as a large shopping center.[43] The idea for a mall in Providence surfaced in the late 1980's. By 1987 a partnership of regional developers began making plans for the

[42] Environmental Assessment/Major Investment Study - Providence Place HOV Garage and Interstate 95 Access Ramp Improvements, Vannesse Hangen Brustlin, Inc., (November 1994): pg. 81.

[43] Tooher, Nora Lockwood, "Mall Construction gets go-ahead from Capital Center Commission," The Providence Journal-Bulletin, May 30, 1997, pg. A1.

creation of a downtown mall. It wasn't until 1990 when Daniel Lugosch and the Pyramid Group formed the Providence Place Group (PPG) that the reality of a downtown mall in Providence took shape.[44]

Based on the projected economic benefits, political support for a mall in Providence was always strong. Proponents argue that a mall is the answer to a much-needed revitalization of an evaporating urban center and the downtown retail structure. "Similar to most American cities, Providence has lost most of the traditional retailing which formed the backbone of its commercial core."[45] Providence Place seeks to alleviate the mass exodus of retail spending out of the City and State. Present estimates show that Rhode Islanders spend close to $300 million a year on retail items in neighboring states.[46] "The availability of new and unique retail shopping opportunities for Rhode Islanders is expected to result in the recapture of a substantial amount of retail purchases now being made by Rhode Islanders outside the state."[47] In addition, "Providence Place will create significant job opportunities during construction and retail jobs thereafter and will help to alleviate this chronic unemployment and underemployment."[48] Developers promise that the mall project will be responsible for 3,000 temporary construction jobs and upon its completion 2,800 permanent jobs. Included with these jobs is a substantial increase in

---

[44] Brusset, David, "Designing Providence Place VII," The Providence Journal-Bulletin, May 29, 1997, pg. 7B.

[45] Environmental Assessment/Major Investment Study - Providence Place HOV Garage and Interstate 95 Access Ramp Improvements, pg. 81.

[46] Rhode Island State Law - "Providence Place Project" 42-63.5 State Affairs and Government, pg. 46.

[47] Ibid.

[48] Ibid, pg. 45.

City and State taxes from employed residents. Estimates of the potential increases in annual taxes range from $500,000 to $1.5 million.

Harder to estimate is the possible increase in investment across the city. Proponents believe every dollar invested in the mall will create opportunity for additional development of apartments, offices, retail and other business. In turn these would create more jobs, private investment and taxes for the city and state. Rhode Island law states, "A private investment, construction project and unique retail shopping center of the size and quality proposed for the Project will have enormous spin off economic benefits and will multiply each dollar of private investment many times over, resulting in the establishment of new businesses, new jobs and increased sales tax, income and real estate taxes to both the State and the City."[49] In short, the mall will generate tremendous economic benefits to the City and its residents. This already seems to be true. There have already been proposals for three upscale hotels and a 250-unit apartment complex within blocks of the mall.

Recently, public financing in return for the benefits of the development to the City has been a key element to downtown projects of this nature. Claiming the project was too large for private investors to assume the full burden, the Providence Place Group (PPG) requested such assistance. Daniel Lugosch, Managing Partner of the Providence Place Group said, "we have no financial flexibility left, which makes it very difficult. The city has been our staunchest supporter and I'd like to find a way to help them out. But it's

[49] Ibid, pg. 46.

going to require creativity on another front other than my pocket book."[50] Originally, proposals for public support were in the form of a $47.25 million dollar city bond to be repaid from annual property tax over the course of thirty years. A matching $47.25 million in federal highway money was allocated by the State Department of Transportation. Public officials supported this proposal, but 64% of voters were adamantly opposed use of public funds in this manner.[51] Under this heavy public scrutiny, this finance plan was eventually dropped. However, a different finance idea in the form of tax exemptions and rebates, as opposed to up-front financing, surfaced in 1994 and was subsequently approved in 1995.

On November 8, 1995, the State of Rhode Island approved a new finance agreement including the donation of state land and other economic considerations.[52] As stated in Rhode Island law: "a public investment to help defray those extraordinary expenses is required in order to induce the substantial private investment and the myriad public benefits described above."[53] Amid great fanfare, the City of Providence approved the new tax agreement on October 22, 1996.[54] Although the public had balked at public financing, lawmakers and city representatives ended up agreeing to grant upwards of $220 million in long-term tax rebates and exemptions over thirty years (See Chapter

[50] Donovan, William and Katherine Gregg, "Sales tax reduction brought into the mall debate," The Providence Journal-Bulletin, November 4, 1995, pg. 1A.

[51] MacKay, Scott, "Voters wary of public spending for mall," The Providence Journal-Bulletin, February 11, 1994, pg. 1A.

[52] Donovan, William and Katherine Gregg, "Mall tax relief measure clears general assembly," The Providence Journal-Bulletin, November 9, 1995, pg. A1.

[53] Rhode Island State Law - "Providence Place Project" 42-63.5 State Affairs and Government pg. 45.

[54] Smith, Gregory, "Mall tax agreement," The Providence Journal-Bulletin, October 23, 1996, pg. 1C.

Three). Former Providence mayor and original mall supporter Joseph R. Paolino summarized four years of political negotiations between City and State officials: "Providence Place may have been controversial, but the Providence Place mall is good for the State of Rhode Island."[55]

Fleet Bank, one of the nation's largest banks, originally agreed to short-term backing for the project. In addition to the financial support, the loan symbolized local business (Fleet has deep local roots) support for the mall. By 1997, the PPG (now the Commonwealth Development Group) received new long-term financing from the Nomura Asset Capital Corp., financier of the world's largest mall, in Canada, and subsidiary of a major Japanese bank. "After five years, Nomura will pay off Fleet and become the mall's long term lender."[56] With short-term financing, new long-term backing, and a public agreement in hand, the project progressed at a more rapid pace. Groundbreaking for required archeological digs was officially March 24, 1997.[57] All that remained was design approval from the Capital Center Commission, as stipulated by the finance agreement (See Chapter Three). On July 8, 1997, the Commonwealth Development Group (CDG) received final approval from the Capital Center Commission.[58] Upon securing proper building permits, CDG began driving the first piles into the ground.

---

[55] Ibid.

[56] Arditi, Lynn, "Fleet, mall sign loan agreement," The Providence Journal-Bulletin, March 18, 1997, pg. 1E.

[57] Arditi, Lynn, "Providence mall breaks ground," The Providence Journal-Bulletin, March 25, 1997, pg. 1A.

[58] Tooher, Nora Lockwood, "Mall Construction gets go-ahead from Capital Center Commission," The Providence Journal-Bulletin, May 30, 1997, pg. A1.

After many years posturing for political and financial support, Providence Place was no longer a concept but a reality in the making.

Providence Place

Occupying 13.2 acres, The Providence Place Mall will be a major retail and entertainment center for the entire region. A unique design, it spans both a river and a railroad. The 9-floor building includes a 5,000-space parking garage of approximately 2,125,000 square feet. The area of the actual mall, less the parking will be approximately 2,000,000 square feet with 1,250,000 square feet devoted to retail space and roughly 800,000 square feet of common space.[59] Three anchor stores - Lord and Taylor, Filene's Basement and Nordstrom – are complemented by 150 high-end retail spaces. At the center of the building, the "winter garden", a predominately glass space, overlooks the Woonasquatucket River and Providence's "Water Place Park". In addition to a food court, the winter garden contains as many as 7 restaurants. Finally, one hundred and twenty feet high, on the top floor is a twenty-screen cinema including an I-Max theater.[60]

Energy and Providence Place

Providence Place will no doubt be a major end-user of energy. By doing rough estimates for electricity use alone, one can see the need for efficient energy use at the mall.

[59] Telephone Conversation with Ken Fries – Commonwealth Development Group, April 20, 1998.
[60] Submitted Proposal for Development to Capital Center Commission, Providence Place Group (Commonwealth Development Group), October 21, 1994.

According to the Energy Information Agency at the Department of Energy the average "Electric Energy Intensity" for a mall over 500,000 square feet, including attached parking garages, is 9.7 kWh/sq. ft per..[61][62] Providence Place in total (4,125,000 sq. ft including the garage space) will therefore consume approximately 41,000 Megawatt-Hours annually in electricity. Less the parking space (less energy intensive but almost half the square footage),[63] the electricity consumption for the mall space alone is approximately 26,500 Megawatt-Hours or 12.5 kWh/sq. ft. This end use means both costly operating expenses and environmental pollution.

Current industrial and commercial costs for electricity in Providence are $.10 per kWh, but large end-users usually receive substantial discounts. Brown University, for example pays approximately $.07 per kWh depending on peak and off peak use.[64] Dave Delnero of Narragansett Electric says the mall would likely receive this reduced rate. "If [the mall] were to go on line today people at the mall would get a price of about $.07 or maybe $.06 per kWh."[65] Using $.06 per kWh, this comes to a total annual cost of approximately $1,600,000 or $.80 per square foot per year. In addition, by using Table 1.1 (p.11), one can calculate the possible pollution from generating this electricity for the

[61] US Department of Energy, Energy Information Administration, Commercial Buildings Energy Consumption and Expenditures 1992: pg. VI

[62] This assumes electric driven cooling equipment.

[63] According to EIA the average electric energy intensity of parking garage is 6.9 kWh/sq. ft multiply this by 2,125,000 sq. ft =14,500,000 kWh per year.

[64] Conversation with Kurt Teichert – Brown University February 21, 1997.

[65] Conversation with Dave Delnero - Narragansett Electric, July 16, 1997.

mall. For example, based on the average level of emissions per kWh in the U.S., annual carbon dioxide emissions would be approximately 40,000,000 lbs.

Amory Lovins of the Rocky Mountain Institute in Energy Efficient Buildings: Institutional Barriers and Opportunities estimates that buildings can exceed baseline building codes to reduce energy use by as much as 50%. Through theoretical modeling and estimates from pilot programs, the EPA Energy Star program predicts a more conservative 30-40%.[66] The West Valley High School, in Hemet, California, incorporated a design that exceeded Title 24, California's building code -- the strictest code in the United States -- by 30% to achieve annual cost savings of $161,800 with an 8.3 year payback.[67] In the case of the mall, a 30% reduction would result in estimated savings of $480,000 in annual operating expenses and a reduction of 12,000,000 pounds of annual CO_2 emissions, while an optimistic 40% reduction would mean estimated savings of approximately $640,000 in annual operating expenses and 16,000,000 pounds of annual CO_2 emissions.

In comparison to overall annual emissions for commercial buildings (15% of the total US greenhouse gas emissions), this may appear to be relatively insignificant savings. But it is important to remember the context of such savings. We must make decisions one building at a time. The potential of the aggregate savings of many energy efficient buildings is tremendous. . Consider the possibilities if one major project in every state

[66] Conversation with Tom Hicks - EPA Energy Star Buildings, July 16, 1997.

[67] Randazzo, Mike "News Briefs - Efficient Envelope Helps School Save $161,800/Yr," Energy User News, October 1997, from internet site, www.energyusernews.com.

capital in the United States was able to reduce expenses and carbon emissions by this 30%. The result would be 600 million pounds of avoided annual carbon emissions. If the U.S. intends to meet 1990 levels, as outlined at Kyoto, this is certainly one step in the right direction.

Energy Efficiency and Clean Power

To be successful, Providence Place should operate under a similar efficiency philosophy as the Honda and GM examples given in Chapter One. Energy conservation and efficiency measures translate into lower operating costs for CDG. Because efficiency lowers costs for individual tenants as well, CDG may also charge slightly higher rents. Higher incomes generated from tenants and lower operating costs means greater profits for the CDG. At the same time, reduced consumption at Providence Place results in long-term benefits to the environment. By implementing efficient technology and using clean power, the mall can successfully limit emissions from power generation to meet its energy needs. In the context of Providence Place, the following offers a few simple examples of issues to address when examining the overall impact of energy use at buildings like the mall. Although many of the calculations in this section are crude they illustrate the potential for cost and emissions savings through use of advanced technology and efficient equipment and design.

Part One - Energy Efficiency

It is important to realize the inherent connection between the various issues. "Remember that worker productivity, lighting quality, energy efficiency, security, safety, maintenance and economics are all interrelated."[68] Amory Lovins suggested in the early 1990s there is a need for a more integrated approach between architectural design and mechanical systems to achieve greater net savings.[69] "As a [theoretical] example, reducing lighting energy use by half plus a four-fold cut in ventilation rates…will reduce total building energy use by 25%. These two measures create a further 17% reduction in chiller energy for a total reduction in building energy use of 42%."[70] Through the cascade effect, the benefits of reducing cooling needs created by these components carries greater over-all reductions. Careful design and operations result in less lighting and ventilation and less heat generated from those components. That means additional energy savings for cooling. This is essential to Providence Place. Typically energy use at malls is "driven by its internal loads like lighting, plug loads and heat from people"[71] that require constant cooling. The cascade effect allows for overall energy savings without necessarily increasing costs. "The integrated approach will always result in lower operating costs; in many cases, it will lower capital costs too."[72]

---

[68] Barnett and Browning, pg. 68.

[69] Todesco, Giuliano "Super Efficient Buildings: how low can you go," ASHRAE Journal (December 1996): pg. 3.

[70] Ibid, pg. 4.

[71] Ibid.

[72] Barnett and Browning, pg. 14.

For example, through use of higher efficiency controls, equipment and an integrated design the Portland Water Pollution Control Laboratory reduced consumption by 36% at an incremental cost of $100,000 with an expected payback time of 3.5 years.[73] Even more relevant to the retail setting of the mall is the Wal-Mart Environmental Demolition Store in City of Industry, California. It achieved energy use reduction of 1.3 million kWh per year with a three year payback through an efficient building envelope and mechanical systems that required half the amount energy of a space of equal dimension built to title 24.[74] I already demonstrated the potential savings at the mall of exceeding Title 24 by 30% and 40% let alone 50%.

One of the largest opportunities for energy savings in the building envelope is through windows and skylight selection. "Twice as much energy is lost through U.S. windows each year as flows through the Trans-Alaska pipeline."[75] Windows allow for greater access to daylight, reducing the need for additional artificial lighting. More importantly, savings are achieved through the rejection of solar heat (measured by "shading coefficient") and the reduction of heat transfer (measured by the "u-value") of a window.[76] Today's technology allows for builders to choose from a variety of windows that result in long term savings. "The biggest breakthrough in green building products

---

[73] Kessel, Nelson L., "News Briefs – Efficient Laboratory Uses 36 Percent Less Energy," Energy User News, May 1996, from internet site, www.energyusernews.com.

[74] Randazzo, Mike "News Briefs – Environmental Demo Store Doubles Title 24 Efficiency," Energy User News, May 1996, from internet site, www.energyusernews.com.

[75] Zeiher, Laura C, The Ecology of Architecture (New York: Whitney Library of Design, 1996), pg. 109.

[76] Ibid.

over the past decade is the invention of better windows."[77] Usually referred to as "super windows", new and accessible windows combining double or triple pains with argon or krypton glass offer lower shading coefficients and U-values. The savings can be substantial.

Most of the glazing at Providence Place is devoted to common areas. Although this increases use of daylight, it does not reduce demand in the lighting intensive retail spaces (See Chapter Three). Nevertheless, window selection plays a vital role in maintaining a consistent interior climate. Malls usually require constant cooling to offset the tremendous heat created by lighting needs and people in the mall so heat loss is likely not an issue. Heat gain from all the glazing, on the other hand, increases cooling needs. In turn, this consumes more energy then necessary.

Joel Stinson, Vice President Operations, Nordstrom, believes that retail malls devote approximately 30% of their energy use to air climate control.[78] For the mall this amounts to approximately 7,950,000 kWh in annual consumption, $480,000 in annual operating costs and 12,000,000 pounds of annual CO_2 emissions. The New York Transit Authority completed a window upgrade at its 20^{7th} St. Maintenance Facility that will reduce heating and cooling demand by 15%.[79] Total cost savings were $99,000 per year.[80] If the mall

[77] Barnett and Browning, pg. 46.

[78] Telephone Conversation with Joel Stinson - Vice President Operations, Nordstrom, Oct 15, 1996.

[79] Nelson, Kessel L., "News Briefs – Transit Co. Replaces Aging Windows, Earning 99,000 Annual Savings," Energy User News, May 1996, from internet site, www.energyusernews.com.

[80] Ibid.

were to reduce its heating and cooling demand through efficient windows by five percent -- less optimistic than the New York Transit authority 15% --, the savings would amount to close to $72,000 in annual operating expense and 1,800,000 pounds of annual carbon emissions. By investing in more efficient windows, the mall can decrease energy cooling demand and lower overall energy needs.

Similar to windows, roofs diminish the needs for cooling at a mall in a simple and cost efficient manner. Again, it comes down to selecting the proper roof with efficient insulation to reduce the amount of heat transfer successfully. The greater the ability of the roofing material to keep outdoor heat out and retain a consistent indoor air climate reduces cooling demand. For example, simple color choice has a large effect on the ability of a roof to reduce energy needs. Intuitively, black absorbs more heat while white will reflect it. Given the size of the mall's roof - approximately 13 acres - simple color choice may have a large impact on reducing the amount of heat gain, thereby reduce cooling needs.

A study by the Florida Solar Energy Center of efficient roof choice and air conditioning energy use in occupied homes illustrates the potential for energy savings. "Measured AC electrical savings in the buildings during similar pre- and post-retrofit periods averaged 19%, ranging from a low of 2% to a high of 43%."[81] Although this data is specific to residential homes, applying the conservative 2% savings, the study's lowest recorded

[81] Parker, Danny S., Stephen F. Barkaszi, Jr., Subrato Chandra and David J. Beal, "Measured Cooling Energy Savings From Reflective Roofing Systems in Florida: Field And Laboratory Research Results," FSEC-PF-293, Florida Solar Energy Center, December 1995, from the internet www.fsec.ucf.edu.

savings, to overall cooling demand at the mall demonstrates the potential for savings at with even the simplest roof choices. The result is approximately $10,000 in annual cost savings and 240,000 pounds of reduced annual carbon emissions. At the same time, according to an MIT computer simulation study, lighter tiles that reduce the reflected fraction of incident solar heat by 35% [thereby reducing cooling demand by more than 2%] cost approximately $25 per 1000-square-foot[82] or in the case of Providence Place approximately $22,000[83] or a two year payback.

Roofing choice at the mall also affects energy use at other buildings due to the phenomenon known as the "the heat island effect". Sun-absorbing black roofs play a role in raising the mean temperature in an urban setting. "Urban heat islands are not inevitable, but the product of dark roofs, black pavement and loss of vegetation."[84] At the same time the chillers working to cool the mall will dump their waste heat in the immediate vicinity of the mall – reinforcing this effect. Fortunately, lighter roofs, preferably painted white with titanium oxide pigment, can make a large contribution to reducing this effect. Remembering the cascading effect, lighter roofs will result in direct savings in costs and energy to the mall and also result in indirect savings to the community as a whole. In designing Providence Place, roof color was an issue more in terms of aesthetics. Wanting to be unassuming for views from surrounding hotels, CDG chose to keep the roof black. When it came to the decision energy cost and consumption

[82] Rosenfeld, Arthur H and Joseph J. Romm, Hashem Akbari and Alan C. Lloyd, "Painting the Town White and Green," MIT's Technology Review (Feb/Mar 1997): pg. 53.

[83] 13 acres or 566,280 total square feet at $25 per square foot.

[84] Rosenfeld, Arthur H and Joseph J. Romm, Hashem Akbari and Alan C. Lloyd, "Painting the Town White and Green," MIT's Technology Review (Feb/Mar 1997): pg. 53.

were never considerations for the mall. This immediately eliminated an easy option for energy conservation.

Electric lighting further exemplifies the potential for direct and indirect energy savings at a mall. "Lighting alone accounts for up to 25% of all electricity sold in the U.S.!"[85] Lighting is not only a necessity in malls, it is a priority. There is an incredible amount of artificial lighting devoted to common areas, storefronts, merchandise spots and signage at Providence Place [table 4.2]. According to the EIA average annual energy intensity for lighting in retail spaces of this size is 3.8-kWh/sq. ft. per total square footage.[86] That translates into approximately 15,675 Megawatt-Hours of use for the mall space only and does not include additional lights for the parking facility. In addition, to its energy demand, intensive lighting generates an enormous amount of heat. As indicated, this increases the loads for cooling adding to overall energy use.

New lighting options present a cost-effective way to save more than half of the energy used in commercial buildings in the U.S.[87] New fixtures, lamps and ballast offer all the quality of old lighting technology at more efficient levels.[88] This includes substituting compact fluorescent lamps for incandescent lighting and choosing efficient, newer technology. "Tubular fluorescent lights are used for ambient light in many commercial

---

[85] Eisele, pg. 8.

[86] US Department of Energy, Energy Information Administration, Lighting in Commercial Buildings, March 1992: pg. 44.

[87] Zeiher, pg. 112.

[88] US Environmental Protection Agency, Energy Star Buildings Manuel (July 1995): pg. 3.

buildings. However, note that…old-style T-12s use significantly more energy then the newer T-8."[89] Efficient lighting will insure quality but less energy intensive lighting. For example, by converting to efficient T-8 lighting, Yeshiva University in New York City saved 7.7 million kWh or $1 million in annual cost savings with a payback period of just under two years.[90] Although it is uncertain what the mall will use, implementing efficient lighting in the first place will reduce consumption dramatically.

Typically each store is left to its own design and technology decisions. In addition, Rick Duggan, Project Manager of the PPG says the individual stores of the mall will be sub-metered to reflect individual use.[91] But this does not eliminate the opportunity for the mall developer to implement efficient technology in the approximately 800,000 square feet of common area[92]. According to the EIA, "Lighting in Commercial Buildings," the mall could reduce consumption by 32%[93] by simply implementing the highest efficient fluorescent and incandescent lamps. Applied to the common areas of the mall, this would reduce overall consumption by 921,000kWh per year[94], achieve annual cost savings of $55,260 and reduce emissions by 1,381,500 pounds of carbon.

---

[89] Barnett and Browning, pg. 70.

[90] Nelson, Kessel L., "News Briefs – T-8 Conversion Cuts University' Annual Elec. Use by 7.7 million kWh," Energy User News, June 1997, from internet site, www.energyusernews.com.

[91] Telephone Conversation with Rick Duggan - Project Manager Providence Place Group (Commonwealth Development Group), Oct 1996.

[92] From Submitted Proposal for Development to Capital Center Commission - revisions, Providence Place Group (Commonwealth Development Group), May 1997.

[93] US Department of Energy, Energy Information Administration, Lighting in Commercial Buildings, March 1992: pg. 47.

[94] Total area of common space, 800,000 square feet multiplied by energy intensity 3.6 kWh per sq. ft per year determines total usage of 2,880,000 kWh per year. Multiplied by 32% determines usage savings.

"For the building to achieve its full promise, it must be operated and maintained in accordance with its design."[95] Operations management can successfully diminish overall energy use with little effort or cost to developers. It simply means regulating the operation of equipment based on the needs of buildings. The largest savings can be achieved if occupants turn off the lights and turn down the air conditioning when occupancy is low or the building is closed. The main part of the mall will stay open later than individual stores. However, tenants will want to maintain some retail lights at those hours to market name brand and merchandise to wandering movie and restaurant customers. Lighting in those areas is an opportunity to reduce overall consumption. Rather than have full lighting for each window, the mall could successfully reduce overall use if it were to adopt a comprehensive rule limiting each store to a small level of lighting during off-hours. Another possibility is for the CDG to proscribe additional limitations in the lease agreements that require each unit to adhere to a specific energy per square foot maximum use or pay additional rent. Such a proviso would further limit consumption at the individual and aggregate levels.

The Westinghouse Savannah River Co. used to operate lighting in its 100,000 square foot building 24 hrs a day, 365 days a year. After completing an occupancy sensor lighting installation, Westinghouse expects to save 543,742 kWh per year, or 5 kWh per square foot per year, for annual cost savings of $27,000 with a one-year payback.[96] A crude

---

[95] Barnett and Browning, pg. 89.

[96] Nelson, Kessel L., "News Briefs – Sensors Conserve Over 500,000 kWh; Provide One-Year Payback,"

calculation illustrates the potential savings for the mall through regulating levels of lighting and cooling in off-hours. If, through occupancy sensors, Providence Place saved 100,000 kWh per 100,000 sq. ft, or 1 kWh per sq. ft per year -- dramatically less then the Westinghouse example above – total annual savings would be 1,250,000 kWh per year, or roughly $75,000 in annual operating savings and 1,875,000 in reduced carbon emissions.

In the same manner as implementing lighting fixtures, under the current process management has no incentives (Chapter Three) to implement such lighting controls. The problem is developing incentives for developers to do so (Chapter Five). In the least, regulating lighting in the 800,000 square feet of common area to save 1kWh/sq. ft per year (less than the savings achieved in the Westinghouse example) might save as much as 800,000 kWh per year with cost saving of approximately $48,000 and carbon emissions reductions of 1,200,000 pounds.

Part II - Power Supply

Limiting pollution from energy use may be as simple as looking at the cleanest and most efficient conventional options of power supply. Coal, the dirtiest fuel, and oil produce carbon dioxide, sulfur dioxide, nitrogen oxides and particulate matter. Natural gas emits approximately half (per unit of energy produced) as much carbon dioxide (CO_2) as coal,

---

Energy User News, October 1997, from internet site, www.energyusernews.com.

25% less than oil and virtually no particulate matter or sulfur dioxide.[97] In addition, gas-fired turbines can achieve much greater efficiency levels. In turn, this translates into less consumption and lower fuel costs. Finally, transmission over distances can result in additional conversion losses of up to 10%. Because of the close proximity of the combined-cycle Manchester Street Plant to Providence Place, there is access to gas-fired electricity with less transmission losses and greater efficiency.[98]

One realistic, clean and efficient alternative for large developments is co-generation. In most industrialized countries, the largest waste of energy occurs at power plants when fossil fuels are burned to produce electricity. Traditional coal, oil or natural gas fired plants convert only about one-third of the initial energy contained within the fuel into useful electricity. The remainder of the energy is discarded as waste heat without serving any useful purpose. Co-generation is a process to create electricity and reuse the waste heat for industrial processes, building heat and cooling.

Cooling is particularly relevant for the mall. Simply defined, the waste heat in the form of steam is passed through absorption chillers that create cold water by using a refrigerant to absorb heat from the steam. The water is then passed through coils that remove heat from the building. By doing so this technology converts large volumes of waste steam produced by the co-generation turbine into building air conditioning.[99]

---

[97] Fact Sheet: Natural Gas, ICLEI (Berkeley, CA) from internet site www.iclei.org/sb1.htm.

[98] This assumes that Providence Place chooses to buy power from Manchester Street that is not guaranteed under deregulation of the utility industry (Chapter X).

[99] "Chiller Overview," from internet site www.chillers.com.

The best co-generation system for the mall would be gas-fired turbine similar to a jet engine. In addition to the cleaner properties of gas, gas turbines are more efficient than any other type of fossil fuel fired power plants. With waste heat recovery, turbines can achieve efficiencies of approximately 80%.[100] This increase in efficiency and the ability to support two operating systems, electricity generation and air climate control, translates into lower fuel costs and fewer emissions of pollutants than generating electricity and heat separately.

Co-generation combines less environmental damage with the potential for cost savings and revenues to developers. Owners of the co-generation unit can resell any excess electricity for a profit. At the same time, the mall and any number of other users get clean power and reusable steam for heating and cooling from the co-generation plant. There is also one additional benefit of co-generation to the public. The mall will be a peak user. Given the need for cooling, its own peak demand will fall squarely on top of the summer high. But, unlike other end-users, the mall can not cut back on demand, especially during operating hours. Therefore co-generation eliminates the stress of electricity use on the already extended utilities in Providence and New England (See Chapter Four).

Co-generation is a particularly relevant issue for Providence Place. On December 5, 1995, the Providence Energy Corporation and The Independent Energy Corporation

[100] Ibid.

submitted a proposal to the PPG to build and operate a co-generation plant at the mall. According to the utility, the plant would provide 80-100% of the mall's electric needs and 100% of the hot water, heating and cooling needs.[101] [102] In return for providing the facility and the guarantee of a large end user, CDG would receive a substantial discount and a small percentage of ownership.[103] Also, The Providence Energy Corporation would assume the costs of construction and operation. This means savings in capital investments, maintenance costs and administration costs related to energy costs. Finally, as a partner, the CDG would profit from the selling of excess electricity and waste heat to tenants and neighboring buildings.

Under the terms of the proposal, the Commonwealth Development was not responsible for the initial capital investment to build the co-generation plant. Therefore the mall would receive electricity at the reduced rate and without having to commit to additional capital. Assuming the proposed co-generation plant provided electricity to everyone at the mall for $.03 per kWh or the costs achieved at Stony Brook, the mall on the whole would save close to 50% or almost $800,000 in annual electricity costs. A more likely scenario however would have the mall management charged a separate rate from

[101] "Providence Place Group and the Energy Concept", submitted for proposal by the Providence Energy Corporation and Independent Energy Corporation to Providence Place Group, December 5, 1997.

[102] Due to the competitive nature of a deregulated market the Providence Energy Corporation would not release any estimations, but presumably as incentive for the PPG, the cost for the mall would be lower than the current rates of approximately $.06/kWh. Bob Monteith (Telephone Conversation March 1997) controller for a co-gen plant at Suny- Stoney Brook, says that the Stoney Brook plant is producing electricity under $.03/kWh.

[103] "Providence Place Group and the Energy Concept", submitted for proposal by the Providence Energy Corporation and Independent Energy Corporation to Providence Place Group, December 5, 1997.

individual tenants thereby reducing the cost savings. Even so, the CDG would still save $24,000 on electricity costs for the common spaces alone.

Individual stores in the mall will be cooled by individual, electrically driven roof-top cooling units. As indicated before, that cooling would amount to $480,000 in annual operating costs and. Co-generation eliminates that consumption. Similar to electricity supply, the co-generation plant would supply steam for the mall's cooling as opposed to electricity. While the mall would still have to buy that steam, the costs would be offset by that $480,000 saving. At the same time co-generation eliminates the associated 12,000,000 pounds of carbon emissions without creating any additional by-products, except perhaps environmentally benign steam. In addition, the proposal guarantees use of the cleaner natural gas rather than coal or oil.

The Co-generation proposal offered a reasonable economic and environmental alternative to Providence Place. But, for reasons unknown, CDG decided against the co-generation plant at some time during the design process. Exactly when and why is unclear. According to my research, while the energy office was evaluating a proposal to build a co-generation plant at the neighboring Masonic Temple, most people were not even aware of the proposal for co-generation inside the mall in the first place. Kurt Stenberg, Supervising Mechanical Engineer for the State Building Commission and Tim Howe, State Conservation Officer, were unaware of such a proposal as of July 24, 1997, after the construction process had already begun. Co-generation was another chance for the mall

to reduce its impact through clean power in not only a cost effective but also revenue generating method.

Chapter One indicated that greater overall cost and pollution savings may be achieved by correctly analyzing and limiting the consumption patterns of individual buildings. In addition to limiting the environmental effects of energy use, simple methods for conservation and efficiency can result in long-term savings for developers. Energy conservation provides a realistic opportunity to minimize the environmental impact of large retail buildings without alienating developers. Providence Place represents a good example of the opportunity to limit the impact of energy use at commercial buildings. Outlined above are just a few examples of the different ways Providence Place could reduce that impact. But, there are many other cost-effective options for energy efficiency and power supply to reduce the overall effects of energy use at a building such as Providence Place. Given this, why does the commercial sector fail to implement the necessary energy reducing and cost saving technology and practices?

CHAPTER THREE

Problems and Opportunity:

Public Finance Agreements

"Who are the biggest investors in the Providence Place mall? If you guessed the lead developer, you're right. But there is another big investor and that's you: the taxpayer."[104]

The Providence Journal-Bulletin, November 9, 1995

Providence Place typifies how design decisions are made for malls and evidences why developers may fail to implement more efficient technology and management practices. Furthermore, Providence Place helps to identify opportunities to ensure that developers are actually reviewing the variety of energy use issues and incorporating realistic conservation measures. It was clear from the start of this investigation that the decision-making process for Providence Place, as it related to energy conservation and efficiency, did not provide an effective guarantee for protection of the public's interests.

The Problems

The problems begin with the number of interested parties involved in a shopping center. This includes the developer as well as the larger stores which exert a strong influence

[104] Donovan, William and Katherine Gregg, "Mall tax relief measure clears general assembly," The Providence Journal-Bulletin, November 9, 1995, pg. A1.

over design and operations. Large shopping centers like Providence Place are dependent on the stability and attractiveness of these "anchor" stores. The stronger the anchor stores, in terms of merchandise quality and consumer recognition, the greater the ability of a mall as a whole to attract other tenants and customers. (Providence Place received an enormous boost in its bid for development when Filene's, Lord & Taylor and Nordstrom agreed to participate. Mentioned in the city tax agreement is the importance of the anchor stores not only to the mall but also to the City.[105]) For this reason, mall property management will grant a number of concessions including below-market or free rent to attract anchor stores.[106] Simultaneously, anchor stores may demand autonomy over design and operation decisions that greatly affect overall energy use. This combination - the anchor's desire for autonomy, and management's desire to satisfy the needs of the anchors - results in largely separate entities with independent decision agendas. In turn this creates a conflict between a cohesive design for the whole building and the individual anchor stores.

This was certainly true for Providence Place. Originally, this mall was an integrated design led by the CDG Architects and their energy consultant group from New York, Consentini Associates. According to Mike Maybaun, project leader with Consentini, the mall management set basic design criteria for the total energy consumption of the mall. This included an estimate of the power an anchor would need to fulfill its energy needs. "The anchor designers would then have to meet those criteria or use supplemental

---

[105] Resolution of the City Council - No. 565, Providence, Rhode Island, Approved October 22, 1996.

[106] Conversation with Jos Nicholas - Owner, Comina - retail store chain, May 5, 1997.

power."[107] (In this instance supplemental power simply refers to more power than originally allotted by the mall's design estimates, as opposed to more power that the mall will provide. The mall will not provide power.) However responsibilities changed after anchor stores registered dissatisfaction with the CDG's designs. Michael Creighton, Store Designer for Nordstrom, in a subsequent conversation, said that "although originally not the case, Nordstrom is in control of all issues related to its space at Providence Place."[108] In addition, he suggested the May Company - parent company to Filene's and Lord Taylor - chose to bring in its own team.[109] But what did this mean in terms of energy use? Energy use is closely related to design and operations on a whole. It is greatly affected by the loss of an integrated approach between different applications (i.e. uses such as lighting or HVAC) and separates areas of the building. The fragmented decision process at Providence Place eliminated or at least severely handicapped the possibilities for a comprehensive strategy for energy conservation and efficiency. Instead, it created many parties acting independently on a separate set of priorities based on a wide range of retail philosophies and incentives. It is these different priorities that further limit a sound review of opportunity for conservation, efficiency and alternative resources.

The direct relationship between retail sales and indoor aesthetics controls the design process for anchor stores. It has been shown that consistent and comfortable air

---

[107] Conversation with Mike Maybaun - Consentini Associates, April 21, 1997.

[108] Conversation with Michael Creighton - Project Manager Nordstrom, May 21, 1997.

[109] Ibid.

temperature and quality of lighting results in higher the sales.[110] This creates additional disincentives to energy conservation. For example, Creighton suggested Nordstrom never uses natural lighting on its sales floors, although it might decrease artificial lighting needs, because it is not conducive to retail sales. While this may reduce heat gain, usually this does not offset additional energy use for both the artificial lighting and increased cooling needed to offset heat generated from those lights.

Economic constraints also limit the incentives. Most developments of this size, including Providence Place, are on a "fast track" to completion. The goal of mall management is to complete the building in the fastest and cheapest manner possible. Incentives for responsible design disappear under the pressure to keep capital investment low. After spending to meet these aesthetic needs, contractors must meet budgets that restrict them from buying more expensive energy-efficient technology. Even though efficiency would pay back over time, cost controls for initial investments are tight. This is particularly true for Providence Place where Gilbane Building Company, the original contractor since 1989, recently resigned as contractor over a reported dispute with the CDG about the developer trying to cut corners to the possible detriment of the building's construction.[111]

The overall methodology to energy-related design also contributes to the failure implement efficient technologies. According to James Henson, electrical engineer and lighting designer, malls usually require 100% constant cooling, 24-hours a day, year-

[110] Conversation with Jos Nicholas - Owner, Comina - retail store chain, May 5, 1997.

[111] Arditi, Lynn, "New Mall Manager to Start Monday," The Providence Journal-Bulletin, November 22,1997, pg. 1A.

round to offset heat from inefficient lighting. Retail anchors, given aesthetic desires, aggressive timetables for completion and the fear of unreliability, tend to stay with the systems that have proven satisfactory to their needs in the past. Joel Stinson (Nordstroms) says big retailers use proven technology from the store designed most recently to insure the desired aesthetics. Nordstrom, typical of other anchors, uses designs and technology from the last completed building, adjusted for climate and special needs. The attitude tends to be: "go with what works", and only tinker with the designs with proven technology. This is true for the overall development as well. "We have done this before. We did the Mall of America, so we know what will work to achieve the best customer satisfaction for Providence Place," confirmed Mike Maybaun. As Henson suggests, often these malls implement inefficient systems even though more efficient and better quality technology exists at incremental costs.[112] Many simple changes pay back in as little as two to five years. Normally, commercial outfits rarely implement technology beyond two-year paybacks but this does not mean they cannot. Although longer pay-back time for some technology may result in savings spread out over time, the overall savings in energy use can be dramatic. If this is the case why wouldn't a mall implement the more efficient technology? Stinson summarizes the typical retail approach to design, "First and foremost is aesthetics, then cost and almost an afterthought is efficiency."[113]

Dan Goldberger, Director, Green Buildings for the International Council for Local Environmental Initiatives (ICLEI), offers an alternative explanation. He believes the

---

[112] Telephone Conversation with James Henson - Electrical Engineer and Lighting Designer, April 15, 1996.

[113] Telephone Conversation with Joel Stinson - Vice President Operations, Nordstrom, Oct 15, 1996.

private sector fails to implement efficient technology because "[developers] are ignorant and uneducated."[114] He says that developers would likely use new, efficient technologies if they simply were aware of their existence and the economic benefits they provide.

A number of different factors affect the decision process for energy. The sheer number of stakeholders makes it impossible to implement an integrated, comprehensive approach to energy use. Priorities are geared towards keeping initial investment low, managing costs and completing the project as quickly as possible. But in the end, the lack of incentives for greater efficiency is what causes the unnecessary use of energy. Without immediate economic benefits or a vested interest in efficiency, the fundamental values and perhaps, ignorance of individual decision-makers affect the ultimate decision to spend the time, effort and investment in adopting efficient technology and methods.

To illustrate this point, I sought to pin-point areas where Providence Place could approach energy use with new techniques for conservation and efficiency. By simply identifying areas where the mall was failing to conserve energy, I believed I could offer recommendations for more efficient methods. I thought, for example, that if in fact the most important feature for anchor stores was aesthetics, I could identify more effective and also more efficient lighting technology for these stores.

---

[114] Conversation with Dan Goldberger, Director Green Buildings - International Council for Local Environmental Initiatives, June 26, 1997.

But quickly these goals changed. It was difficult, if not impossible, to get the necessary information to perform this type of analysis. Since the mall is located on state land, responsibility for the energy review of the mall (excluding electrical review) falls under the State Building Commission and electrical review under the Building Inspector for Providence. As of April 21, 1997 with the designs virtually completed, Ramsey Loga, Director of Building Inspection for the City of Providence, had only reviewed the preliminary exterior design plans open to the public and had seen no specific electrical estimates. According to Kurt Stenberg, Supervising Mechanical Engineer for the State Building Commission, nothing was reviewed as of July 24, 1997. Because it is a private development, public rights of access to information on the Providence Place design process do not exist. The only way to get information on energy use for Providence Place is through the developers and project managers involved in the project. However, they have no incentives to share such information. When I approached them for information, the developers and anchor designers were open about the process but quite reluctant to give design details. At one point during a discussion concerning use at anchor stores and the mall, Rick Duggan responded, "they're probably not going to talk to you about it, they're pretty closed mouth about their business and I'm certainly not going to hand it out to you."[115] I realized the decision process itself was worthy of analysis. Perhaps in researching how to change the decision process to incorporate the public, I might find some insights into ways of reducing the overall energy use.

[115] Conversation with Rick Duggan - Project Manager Providence Place Group (Commonwealth Development Group), April 16, 1997.

Opening up the process is vital to at least generate concern for efficiency. By doing so it may be possible to "educate" developers and influence their decisions to consider more efficient practices. The EPA Green Lights program experience suggests, "often…facility managers know about the benefits. But participation may not be a priority on the part of the check signers and decision makers."[116] Forcing developers to participate in an open process that may results in public scrutiny, costly red-tape and the loss of precious time creates incentive for developers to properly review the issues. At the same time, given enough time and education, the long-term benefits of energy efficiency will likely be understood by management. Assuming the City has an interest in affecting the behavior of a mall [Chapter Four], the public finance agreement presents the possibility to raise the issue early in the overall process.

The Opportunity - Finance Agreements

The public finance agreements guaranteed CDG a number of exemptions and rebates. First, "the legislation exempts the developers from paying an estimated $7 million in sales taxes on construction materials." In addition, the agreement allows the mall representatives to retain, "two-thirds of every sales tax dollar generated by the mall, up to $3.68 million annually over the first five years - $18.4 total, and $3.56 million annually the next 15 years - $53.4 total; and it clears the way for the mall to be built on donated state-owned land."[117] But, the largest concession comes from the City in the form of

[116] Eisele, pg. 9.

[117] Donovan, William and Katherine Gregg, "Mall tax relief measure clears general assembly," The Providence Journal-Bulletin, November 9, 1995, pg. A1.

property tax rebates. "For the first twenty years…PPG shall pay 100% of each Tax Payment directly to the lender or lenders…for the last ten years…ninety percent of each of the Tax Payment directly to the lender." This means a property tax rebate over thirty years totaling $141 million.[118] The total of all rebates and exemptions is approximately $220 million. Finally, the State agreed to pay approximately $2 million for some associated "improvements" vital to integrating the mall smoothly with the adjoining downtown area.

The tax issue is an important one to examine. One of the strongest supporting arguments for the mall was the potential increase in property and sales taxes. Given an already small tax base in Rhode Island and Providence, this is important income to fund public investment in infrastructure and economic revitalization. Ironically, that is no longer an available benefit. Public officials bargained these important benefits away in an effort to solidify the development of Providence Place. By allowing the developers to retain the sales and property tax, the agreement effectively eliminates tax benefits from the Providence Place for thirty years. Supporters of the mall say, "the taxpayers are not on the line for the debt. Except for the ramps and some site improvements, they're not putting up any cash to build the mall."[119] However, one can argue that even though there is no up-front capital investment, the City still loses the taxes that a different development may have raised. "The city's [loss] is that it is forgoing taxes on property it

---

[118] Resolution of the City Council - No. 565, Providence, Rhode Island, Approved October 22, 1996.

[119] Arditi, Lynn, "Taxpayers, developers, banks are all key to Providence Place," The Providence Journal-Bulletin, March 23, 1997, pg. 23A.

could have used for another development later on that would be fully taxed."[120] Admittedly, the likelihood of the land being used for a development of the same size and scope to generate the same tax income is low. However, in the heart of downtown, that land is still attractive to different developments that may not require tax breaks and incentives. In addition, the City and State must accept the burden of any negative impact the mall may have, including driving existing non-mall based retail stores out of business, creating gridlock and traffic problems and possible environmental damages. Chapter Two already highlighted the employment benefits and the influx of investment due to the mall. But these are speculative and based on the ability of Providence Place to succeed. There are no guarantees.

This is not to say there were no concessions granted in return for the public financing. According to Patricia McLaughlin, city solicitor and lead negotiator for Providence, the goals of the negotiations were, "to force a cooperative spirit with Downcity."[121] Most of the concessions granted to the City in return for financial assistance stemmed from a desire to secure CDG's contribution to the revitalization of the whole city. Unfortunately, budgets for these concessions were not clearly outlined. More importantly, the agreement failed to provide mechanisms (specific funds, the authority or department and personnel to execute the programs) for implementation of the various programs. The majority of concessions were modified by language that allows the mall developers leeway on the successful execution of these programs. The only specific

[120] Ibid.

[121] Smith, Gregory, "Council Prays, Cianci promises mall will thrive," The Providence Journal-Bulletin, October 30, 1996, pg. 1C.

language says that these stipulations shall be effectively put in place under "personal obligation of CDG."[122] Unfortunately, there is little to guarantee that the city will not be responsible financially or logistically for the burden of implementing these programs.

Immediately after the agreement was signed, CDG donated $100,000 to the Smith Hill Center, a local community center in a lower-income neighborhood of Smith Hill, to support programs in the neighborhood nearest the mall's location. CDG must also contribute $2.5 million to the construction of a "first class movie theater," in the heart of downtown. Similarly, for the first five years, developers of the mall shall contribute half the cost of a downtown advertising campaign as well as provide three information stations to promote the rest of downtown Providence. The budgets are to be approved by the CDG with no guarantees for a base amount or guidelines for implementation. Currently, no estimates of their cost have been made public. Finally CDG, in conjunction with the City, the State and the Rhode Island Public Transit Authority, must set up a shuttle bus service to downtown when the mall opens. The costs will be shared by the State and developer "to provide this service for as many hours of the shopping mall's operation as economically feasible." There is no clear definition of feasibility or base requirements for operating hours and procedures.[123]

The agreement stipulates hiring corporations in the State of Rhode Island for construction contracts. "As a goal, Providence Place Group must attempt to devote at least 10% of the

---

[122] Resolution of the City Council - No. 565, Providence, Rhode Island, Approved October 22, 1996.

[123] Ibid.

construction costs to businesses owned by women and ethnic minorities. "It shall be a further goal" that the mall hire at least 10% of its workforce from similar minority groups. Finally, the state and city, in cooperation with the Providence Place Group, will develop retail sales and management training and CDG "will use its best efforts to publicize the training and will encourage its tenants to 'consider hiring graduates.'"[124] On this point, CDG believes the burden falls on the State to develop the program.[125] However, according to Barbara Teto, the State's Department of Employment and Training has yet to even begin to outline such a program.[126]

Perhaps the only clear concession is a requirement to donate some funds directly to the city. When and if the mall achieves average sales of $400 per sq./ft, Providence Place Group will contribute a payment or "reinvestment into the city" totaling $8.8 million. Even assuming that the CDG acts in good faith and fulfills the agreement as stipulated, the total concessions as outlined do not justify the enormous public financial support. Including all the considerations outlined above, the total estimated commitment from the CDG in return for the City's $220 million investment.[127] is approximately $19.4

---

[124] Ibid.

[125] Telephone Conversation with Rick Duggan - Project Manager Providence Place Group (Commonwealth Development Group), Oct 1996.

[126] Telephone Conversation with Barbara Teto - Department of Employment and Training, July 30, 1997.

[127] Arditi, Lynn, "Taxpayers, developers, banks are all key to Providence Place," The Providence Journal-Bulletin, March 23, 1997, pg. 23A.

million.[128] It therefore seems reasonable for the public to require some additional benefits.

Certainly the public deserves more tangible concessions to help offset some of the negative impacts of the mall. "Because the mall project requires more than $100 million of public funds, the public deserves more…"[129] Providence did in fact have significant input on one issue. That issue provides a good example of the public's ability to influence this type of publicly-funded development.

The Design Review Committee

Maintaining the historical design and preserving a unified skyline is important to Providence and the State of Rhode Island. The State legislature provided for a mechanism to insure this. Any development in the "Capital District" is subject to the exterior design review by a public/private board, the Capital Center Commission. Armed with "Design and Development Regulations," the Capital Center Commission has the ability to enforce specific zoning and design regulations. Providence Place was subject to such a review. The success of the Capital Center Commission Design Review Committee's examination of Providence Place is an example of the public's ability to

[128] I determined this by adding the values of commitments from the PPG that were not matched by state funding. If I included those concessions I would have to add in the matching estimates form the state to the total estimate of public funding. The matching funds cancel each other out. In addition this does not include the potential economic benefits of the mall articulated in chapter one. This estimation therefore only included the monetary commitments of the PPG - 100,000 for Smith Hill, 2.5 million for the downtown theater, and 8.8 million in "reinvestment". Then I added $5 million for good measure.

[129] "Design is destiny," The Providence Journal-Bulletin, 24 July 1994, pg. 8C.

shape private development even in the face of overwhelming political pressure. Although focused on exterior design only, this review process merits analysis as a primary example of the opportunity to stipulate a similar review process specific to energy concerns in future agreements.

The Capital Center District encompasses 77 acres of land surrounding Rhode Island's historic State Capital. There is a strong feeling that "there is a statewide need for coordinated attention to and supervision of development of such areas for the purpose for preserving for the education, enjoyment and welfare of the general public important historical and aesthetic features…."[130]

Out of the concern for maintaining the urban integrity of the Capital District and the City of Providence, the State legislature established The Capital Center Commission in 1981 (updated in 1993) to oversee development within this district. A "seventeen member board representative of the public/private partnership working in downtown Providence," to establish and enforce design criteria for both private and public projects within this district. [131] "The commission must review and approve all public and private sector development plans and improvements" and grant a 'Certificate of Approval' before any construction may take place."[132] The law for the Providence Place finance agreement confirmed this review process. Specifically, the agreement states that public

[130] State of Rhode Island - General Assembly, "An Act Relating to Special Development Districts," January Session, 1981.

[131] "The Capital Center Commission" from internet site www.state.ri.us/quasisd/qsd03.htm

[132] Rhode Island State Law - "An Act Relating to Special Development Districts," January Session, 1981.

infrastructure improvements in the district must be "subject to all design and construction reviews…without limitation, the design approval of Providence Place."[133]

According to Deborah Melino-Wender, Director of the Capital Center Commission, the Commission has authority to approve requests for variances from the written Design and Development Regulations of the Capital Center Project. Given the size and needs of the mall project, there were a number of requests. Theoretically, the committee could deny the variance and therefore the building permits. But, beyond its ability to enforce the code, the Capital Center Commission Design Review committee played a more significant role in shaping the overall design of the Providence Place Mall.

"When the Mall was first proposed in the late 1980's, it was a modernist abomination."[134] Architect Frederick St. Florian, hired in 1994, redesigned the mall with the assistance of "an extraordinary series of public designs workshops."[135] The Capital Center Commission, representing the public, entered the process with a series of meetings with the specific purpose of reviewing the designs for phase one approval - preliminary designs. This review created a design more reflective of the public concerns as demanded by the Capital Center Commission. However, this was only the beginning of a larger process. The real design review followed the certification of the public finance agreement.

---

[133] Rhode Island State Law - "Providence Place Project" 42-63.5 State Affairs and Government, 1996, pg. 53.

[134] "Design is destiny," The Providence Journal-Bulletin, 24 July 1994, pg. 8C.

In April of 1997, with the development of Providence Place on the "fast track", the CDG submitted designs to the Capital Center Commission for approval. Without this approval, CDG could not get construction permits. "This spring, in a second series of workshops…negotiated in sharply focused sessions that, in spite of confusion, brought the mall a long way in the right direction."[136] On April 8, 1997, the Capital Center Commission created a special committee, the Design Review Committee (DRC). The seven-member DRC, comprised of an architect consultant, local architects, landscape-architects, and other prominent Providence business leaders, was charged with examining the exterior design of the Providence Place Project and eventually making recommendations for approval to the whole Capital Center Commission. The Committee requested design changes based largely on its educated opinions and preferences. The meetings were open to the public and allowed for the contribution of opinion from all local designers, builders, educators and concerned citizens. Through the process, the DRC altered the appearance and design of the building significantly. Whether these changes were for the public good is a matter of personal opinion. However, the fact remains that the CDG changed the design to reflect the wishes of the Capital Center Design Review Committee.

The DRC effected change at Providence Place because it had the authority to recommend approval to the Capital Center Commission and thereby the ability to delay the development. Granted, the political support for the mall would likely have pushed the

---

[135] Ibid.

[136] Ibid.

project through the commission. But, the power to petition and demand review was enough to insure cooperation from the developers. While complete stoppage was unlikely, costly delays were a believable threat. "Developers must realize that a work stoppage could cost them more than it would cost to just do the quality work from the start."[137] It is essential that the possible sanctions of a committee fit the situation. A threat too large – like completely blocking the project - would not have been politically feasible. But, fearful of the ramifications and costs of further delays in the already lengthy process, the CDG was willing to compromise with the Committee. In addition, Ms. Melino-Wender suggested there was a level of reciprocity amongst the developers and the Committee. When the Committee granted certain variances, it was understood that the mall developers would review other issues of concern.

The greatest DRC asset was that it required the public -- local professionals and officials -- to conduct the design review. These meetings succeeded in creating a higher profile for the mall development, because it incorporated the power of public opinion into the process. Extensive and widespread coverage of the meetings appeared in The Providence Journal-Bulletin, leading to greater public scrutiny. Wilfred Gates, Chair of Design Review Committee and prominent member of the East Providence Chamber of Commerce, observed that the developer had little interest in alienating the public and future shoppers. By bringing the long-term perspective of the DRC into the public light, the committee was able to exert the force of public pressure on the CDG and force it to

[137] Brusset, David, "Designing Providence Place VII," The Providence Journal-Bulletin, 29 May 1997, pg. 7B.

redesign various issues in question. The risk to the CDG was creating a poor public image and alienating the would-be customers of the mall.

Examples of the Committee's successes include changes in aesthetic details from material choices to overall design features. The redesign of one of the most popular anchor stores, Nordstrom, illustrates the nature and ability of the Committee to affect change. Through design review - changing brick choice, requesting different designs and softening the roof color - CDG redesigned the building to achieve a more holistic look. In addition, the level of cooperation that manifested between the Committee and developers was exemplified when Nordstrom declined to build a more pronounced and accessible entrance on the northeast corner of Providence Place. Regulation did not require the mall to build such an entrance. But in order to satisfy the committee, CDG acquiesced to the requests of the Committee to promote the NE corner as a focal point of activity and highlight another corner's entrance. Furthermore, the CDG agreed to highlight a separate entrance instead. These types of concessions were not required by the regulation but were granted in an effort to satisfy the DRC. The effectiveness of the DRC was this ability to leverage their legal authority over desired variances against voluntary change by the developer to adhere to committee requests. The design review process evolved into a cooperative effort between the CDG and the DRC. In addressing perceived weaknesses and asking the architects "to return to the drawing board," the committee successfully drew attention to various parts of the design. In this way the new building in many areas conformed to the overall aesthetic desires of the DRC.

Chairman Gates further emphasized the success of the committee on its timing. Being involved early in the process allowed CDG to consider DRC recommendations without altering the schedule or budget dramatically. Had the process become a logistical burden or even a technical annoyance, the cooperation of the developer would have likely dissipated rapidly. The design example shows that when the public has a recognized interest, it can take steps to protect it. In the case of the Providence Place Mall, design review was a consideration vital to the development of a building in the Capital Center District. This process exemplifies the opportunity to include more progressive thinking in promoting energy conservation and efficiency in the design and construction of a mall. Of course, the steps to include design review were taken in advance of Providence Place when the legislation was passed. Ultimately, such legislation would have to pass for energy to be an issue. The issue is generating concern amongst the public to help promulgate that legislation.

CHAPTER FOUR

The Incentive:

Why Should Providence Care?

"Because pollution control and environmental protection are costly, it is in society's best interest to be economical in its decisions about environmental protection and improvement."[138] – A. Myrick Freeman, Science Advisory Board U.S. EPA

It is important for Rhode Island and Providence's future that the mall reflect the kind of development acceptable in the State and City. The Capital Center Commission had the ability to affect the exterior design and to ensure the mall would be in harmony with the surrounding Capital Center District. But, the focus was only on the aesthetics of the building and its appearance as a part of the City. Energy use was not a concern. Energy issues never entered the discussion prior to or after the approval of the public finance agreement. According to Wilfred Gates, many of the committee members are well informed of the benefits of energy efficiency and conservation. But, it was outside the purview of the committee. Energy was simply not a responsibility for the Capital Center Design Review and, more importantly, was not a priority for Providence. Without the

[138] Freeman, A. Myrick, "Economics, Incentives, and Environmental Regulation," Environmental Policy ion the 1990's, Edited by Norman J. Vig and Michael E. Kraft, CQ Press; 1997, p.194.

pressing threat of an energy crisis, "energy is not on the front burner like it was in the seventies. It's a low burner issue."[139]

Energy is a "low burner issue" for Providence in general. Currently, state projects are subject to review by the State Conservation Officer and the State Building Commission. But, at present, the City does not have an office dedicated to responsible and effective use of energy. To influence developments like the mall, the public must first establish policies for energy conservation and efficiency. However, if the priorities of Providence today are any indication, it appears most local policies are indifferent to energy issues. The question is, why should a city, specifically Providence, care about energy use in the first place?

A City's Responsibility

Chapter One illustrated the international effort to limit overall global emissions. Government delegates must continue to pursue "sustainable development" strategies [i.e. strategies that both protect the environment and foster economic development] as they did five years ago at the Rio Summit and in December 1997 in Kyoto. However, this time the international community must make a more serious effort to reach target goals. Because the U.S. leads all nations in both CO_2 emissions per capita and total CO_2 emissions, it is important that the largest polluter assume the lead on attaining target emission goals.

[139] Conversation with Wilfred Gates - Chair, Capital Center Design Review Committee, July 8, 1997.

The burden of meeting the demands of the Kyoto Protocol will fall on individual States to regulate their emission levels. The guidelines of Kyoto call on the United States to cut emissions 7% below 1990 levels. Regardless whether the treaty is ratified it is clear that that the global concern for carbon emissions will not disappear. Treaty or no treaty the United States federal government has to get serious about reducing emissions. To do so, the Country will be forced to adopt a nationwide plan for emission reductions. Each State will have to meet a specified regional emissions. Such a program will resemble the EPA's proposed programs to reduce regional ground level ozone and particulate matter announced in the summer of 1997.[140] The proposed regulation enforces tighter standards by region. Theoretically this would apply to reducing carbon emissions as well. For this reason most States are already taking greenhouse gas inventories to determine current levels and room for reductions. Ultimately the states will put the burden on cities to reduce emissions to meet the State targets.[141]

To meet Kyoto and other emission standards, the place to reduce U.S. energy consumption is at the heart of its use, the city. "American cities and towns account for over 80 percent of national energy use."[142] But it will take a coordinated effort amongst all cities to reach national and international goals for reductions in carbon emissions and

---

[140] Edwards, Ranadall, "Court Filing on Air Pollution Looks Gloomy for Ohio," The Columbus Dispatch, February 26, 1998, pg. 3C.

[141] Allen, Scott, "Clinton Backs Tougher Air Standards," The Boston Globe, June 26, 1997, pg. A1.

[142] The Energy Yardstick: Using Places to Create More Sustainable Communities, produced by Oregon Department of Energy, Washington State Energy Office and California Energy Commission for the Center for Excellence for Sustainable Development – U.S. Department of Energy, (August 1996): pg. 1.

other pollutants. According to Dr. Noel J. Brown, Director North American Region, United Nation's Environment Program, "although it was national governments that signed the Climate Change Convention at the Rio Earth Summit…they did not set targets to reduce CO_2 emissions. Now, it is the cities of the world that are actually setting specific targets. The real global leadership for the reducing of carbon emissions and energy conversation is coming from municipal leaders."[143]

For example, in 1990 the city of Toronto, Canada made a commitment to reduce carbon emissions 20% below 1988 levels by the year 2005.[144] To do so, the city developed a municipal office dedicated to energy conservation and efficiency. According to Dan Goldberger, Toronto adopted an aggressive program requiring all new development to meet uniform energy efficiency standards.[145] In addition, the city established the "Better Buildings Partnership" to work with the private sector to develop programs for energy efficiency. Although original goals were based on carbon reductions, Goldberger believes the result has been a combination of both environmental and economic benefits to Toronto.[146] The "Better Buildings Partnership " is expected to lead to a full-scale city-wide program having an estimated economic impact of approximately $3 billion dollars

[143] Promotional material, "The Challenges and the Opportunity: Global Warming and Economic Development," Better Buildings Partnership, Toronto, Canada.

[144] Ibid.

[145] Conversation with Dan Goldberger, Director Green Buildings - International Council for Local Environmental Initiatives, June 26, 1997.

[146] Ibid.

in addition to reducing CO_2 emissions by 1.8 million tons per year."[147] And this is not the only example of a city initiative to reduce global emissions through energy efficiency.

The International Council for Local Environmental Initiatives (ICLEI) is an international association of local governments dedicated to the prevention and solution of local, regional and global environmental problems.[148] By setting target goals and developing a local action plan for energy efficiency, the ICLEI's City Climate Protection Campaign works with 130 local municipalities worldwide to reduce overall greenhouse gas emissions.[149] In conjunction with the Cities for Climate Change Protection more than 50 progressive cities across the U.S. and Canada are already taking actions to implement energy efficiency programs for the environmental benefits.

Cities have a responsibility to make decisions that are in the best interest of its residents. Like the cities involved in the ICLEI programs, Providence has an obligation to protect the environment for the future of the public. If the city government has the power to protect its people from health risks and quality of life issues associated with a dirty environment, it is morally obligated to use that power. As the representative of the public interest for a safe and clean environment, the city government has the moral responsibility of working toward a sustainable future. In reducing negative impacts to the environment, Providence can successfully insure a cleaner environment for its citizens and contribute to a State, Federal and global effort for climate control. Like the cities in

[147] Ibid.

[148] Pamphlet, "Cities for Climate Protection," ICLEI, Toronto Canada.

the ICLEI, this should include a commitment for the responsible use of energy. Such a strategy will aid in the reduction of environmental degradation outlined in chapter one.

Local Incentives

While I outlined the environmental and cost benefits of reducing individual consumption, there are additional long-term social and economic incentives for widespread programs for reducing energy consumption. Although science cannot make exact predictions about the effects of global warming, the consensus is that the greenhouse effect will have a number of related impacts on urban quality. These in turn will be costly for individual states and local municipalities. But most officials apparently are concerned with spending money on programs with more immediate returns like low-income housing, police, education, transit, municipal waste issues and economic development. Many fail to realize the substantial long- and short-term economic benefits of energy efficiency in buildings. Like pollution the incentives benefit both the City and the State. As Providence prospers economically, in turn so does the Rhode Island. With this in mind, I will look at this argument from the City's perspective.

The cost of pollution should be incentive enough for a city to adopt a comprehensive plan. Because the burden of meeting emissions' standards falls local municipalities, it is in the best interest of the private sector to build efficiently from the start. When required to get back to 1990 levels, those states and particularly those cities that have required

[149] Pamphlet, "Cities for Climate Protection," ICLEI, Toronto Canada.

energy efficient buildings since 1990 will be in much better shape to avoid additional costs of retrofitting. Those that fail to do so will have to retrofit recent construction to achieve these reductions. Although retrofits payback over time, this is additional costs that should be avoided. Using foresight, it is therefore economically beneficial to be efficient from the start.

Costs of Pollution

Increased temperatures and air pollution continue to result in increased health problems. "An increase in temperature of just two degrees C would cause 340 additional deaths per year in New York City alone."[150] The formation of ground-level ozone - the primary ingredient of urban smog - will continue to grow. This contributes to respiratory disease, allergies and cardiovascular disease that result in higher healthcare costs to society on a whole. The 1988 heat wave in North America is an indication of the potential health problems facing Providence in the future. Across the U.S. "during the heat wave, ozone levels were 25% higher than national ozone standards."[151] Increases in health issues mean increase in spending for health insurance and health care. For the millions of uninsured in this country the burden of costly medical bills falls on limited municipal budgets.

[150] "What will global warming mean to us in the city," Cities for Climate Protection, from internet site www.iclei.org/sb1.htm.

[151] Ibid.

Rising sea levels from global warming pose an additional incentive. Average sea level has already risen approximately 15 centimeters around the world in the past century threatening coastlines with erosion and flooding. A state with as much coastline as Rhode Island likely cannot afford the decrease in tourism as beaches shrink in the future. As most glaciers around the world continue to melt, the sea level is expected to continue rising. The result is the infiltration of salt water into aquifers and further up rivers. "A 30 centimeter sea level rise would cause salt water flow further upstream in rivers that empty in the sea. Coastal cities that obtain fresh water from nearby rivers might be forced to construct new water supply infrastructure further inland - at staggering cost."[152] Rising sea levels will cause problems for municipal infrastructure such as water and sewage backup, hazardous waste leaks, water pipeline leaks, and erosion and corrosion of roadbeds and other facilities. These latter issues may not pose immediate threats to Providence but they are still issues to remember.

Benefits of Efficiency

In a global market system it is essential for cities to be efficient to attract new business. Efficient operations lower costs of doing business. Lower costs mean greater profits for individual businesses. This frees up capital for reinvestment and economic growth. If Providence insures energy efficiency in the private sector, in the long term, this will attract more business resulting in extended benefits. In the short-term, this might require initial investment from the private sector for efficient infrastructure. But, as illustrated,

[152] Ibid.

this technology usually pays back over time. In return, the city and private sector gain the value of creating an attractive business climate geared towards lower operating costs and therefore increased margins. "By intentionally conserving all forms of energy and promoting reliance on renewable resources in planning and design choices, cities can simultaneously improve their economies, environments and quality of life."[153] In the future a more conscious public will choose to live in a city with a cleaner standard of living. More residents mean a growing tax base as well as a larger market for business interests.

Energy efficiency also generates additional economic benefits through the multiplier effect.[154] Savings mean more disposable income for individuals and working capital for businesses to spend. "Reduced energy costs to commercial and industrial users allows for reinvestment of these savings into economic growth and job development." For example, if a company spending $10,000 on its energy bills is able to save 20% as a result of efficiency measures, after a payback period on the initial investment, that frees up $2,000 to spend elsewhere in the economy. Typical estimates show that every dollar spent on energy conservation generates $.57 more economic activity than every dollar spent on electricity.[155] Investments in efficiency create growth in emerging goods and services in businesses that promote energy products. These dollars spent locally (as

---

[153] Ibid.

[154] Additional economic activity across the local economy generated by combinations of spending and investment in one area is called the multiplier effect. Also, every saved dollar then invested elsewhere, generates larger benefits several times over.

[155] "What will global warming mean to us in the city," Cities for Climate Protection, from internet site www.iclei.org/sb1.htm.

.

opposed to using the same money to buy energy from energy corporations outside of the city) mean an increase in jobs to the local communities.

The city of San Jose, California, a member of ICLEI, exemplifies the benefits of efficiency measures to overall employment. The San Jose Environmental Services Department estimates that over an 11-year period a city-wide effort for efficiency "will increase net employment…generate $33 million in incremental wages and salaries and increase local spending by $20.8 million."[156] This is predominantly due to the emergence of new efficient technology vendors increasing their workforce to meet rising demand for new products and services. These positive benefits also extend beyond the local level. The American Council for Energy Efficiency Economy found a $46 billion investment in efficiency per year (as opposed to comparable investment in supply options to meet rising energy demand) from 1992 to 2010 would create 1.1 million new jobs, a 0.5 percent rise in personal income and a 0.1 percent increase in GDP."[157] By cutting consumption the benefits are avoided cost for new supply to meet rising energy demand and economic opportunity for emerging industry.

This raises an additional issue: "Under a regulatory regime that has characterized the electric industry since its inception, utilities have enjoyed a government-sanctioned regional monopolies and consumers have been forced to accept whatever services (or

---

[156] Ibid.

[157] Goldberger and Jessup, pg. 4.

lack thereof) and prices that public utility commissioners have dictated."[158] But in July 1997 Rhode Island began deregulation of its markets. This allows customers to choose power providers based on a number of issues including price, service and even environmental quality. "The aim is to promote greater efficiency and lower consumer prices than are attainable in constrained regulatory environments that inhibit market process." On the surface this is good for the environment. Greater efficiency reduces consumption of resources and higher prices may eventually curb total consumption.

However, this latter argument for reduced consumption is a bit idealistic. Deregulation also eliminates the government's firm hand in controlling the behavior of electricity providers. Realistically consumers large and small will seek out the lowest priced provider. And, dirty and inefficient coal fired plants that can quickly increase capacity without any construction costs or time still produce some of the cheapest electricity. An additional and perhaps more immediate concern inherent in deregulation is the possible increase in reliability problems. In the past, when demand was too large for the existing power plants to fulfill, utilities were obligated to build new plants. As a regulated monopoly the burden for producing more supply at the same price was with the utility. Under deregulation this may disappear completely.

Traditional economics indicates that as demand increases, prices will rise. This adds to the cost of doing business and increases the strain on individual budgets. The result will be one of two evils for a city trying to protect its citizens and businesses from burgeoning

[158] "Electric Competition," Economic Education Bulletin, Vol. XXXVII, No.6: (June 1997) published by American Institute for Economic Research, p.1.

costs. An increase in use of retired plants and dangerous nuclear plants at the cost of greater pollution and public safety concerns. Or perhaps, increased prices for small (compared to the industrial and commercial sectors) residential users and increasingly unreliable supplies. Deregulation of the utility industry will allow Providence users to buy power from coal-fired plants in the Midwest. But this again can result in increased air pollution for Providence as prevailing winds carries emissions from the Midwest east. As investment in cleaner and technologically advanced supply continues, the trend will change. Accessibility to competitively priced gas fired electricity may eventually eliminate the dependence on coal fired plants. But, until the infrastructure and sources are established, the short term will mean greater use of the coal plants. Unfortunately there remains a lot to be seen as deregulation continues to progress.

Local Energy Use Policy and The Private Sector

The State Energy Office handles all energy conservation policy for state and municipal buildings in Rhode Island. By executive order the state has a number of programs directed at energy efficiency in public and municipal buildings. According to Tim Howe, State Energy Office, over the last five years, through standards that exceed building code, Rhode Island saved 3.6 megawatt-hours.[159] State law mandates that state buildings go through a review process for energy use.

---

[159] Conversation with Tim Howe - Rhode Island State Energy Office, July 23, 1997.

> "All new, renovated, and newly leased public buildings shall be designed in compliance with such standards and guidelines…Architects and engineers hired by the state will be required to comply with these standards and will also be required to meet with the statewide energy officer and state building code commissioner, or their designees, commencing with the design phase to review the standards and guidelines and to determine how to incorporate them into the project design. A written authorization must be obtained from the statewide energy conservation officer for a building permit by the building code commissioner.[160]

Building codes set the parameters by law but are lenient and fail to require efficient energy use. "Building codes have great merit, but…the levels they require should regarded as *floors,* not *ceilings.*"[161] As energy expert and avid environmentalist Randolph Croxton said at the E Source Members' Forum about meeting energy code as the goal, "if it were built any worse, it would be illegal."[162] Rhode Island baseline building code, ASHRAE 90.1 Standards, although similar to many states, fails to meet today's technology standards for efficiency. Howe and Stenberg both concede these codes reflect the technology of 1989 and are grossly outdated.[163] They are currently trying to update

---

[160] Rhode Island State Energy Code, as cited in a confidential memo from Tim Howe, Conservation Officer, Rhode Island State Energy Office.

[161] Barnett and Browning pg. 45.

[162] From a Speech by Randall Croxton at E Source Members Forum, October 6, 1993.

[163] Conversation with Kurt Stenberg and Tim Howe - Rhode Island State Energy Office, July 24, 1997.

building codes. But until then, projects like the mall are required to meet only these baseline standards.

The largest benefits will still be realized through the private sector. Commercial and industrial buildings present an opportunity to reduce enormous energy waste and pollution. Unfortunately, neither the State Energy Office nor Providence has any legal authority over decisions for energy use in the private sector. As Howe said, "if [the mall] were a State Building, which it's not, we may have been able to do something."[164] The legal weight of the public sector is in the building code. Kurt Stenberg at the State Building Commission will be reviewing the mall's energy use for the State of Rhode Island. It is possible to make "strong" suggestions to the CDG where he identifies opportunities for greater efficiency.[165] Even so, at this point the designs are finished and it is likely too late. As long as the mall is meeting building code the state has little legal power to affect energy use at Providence Place.

The assumption is that the private sector takes care of energy issues to receive the economic benefits of reduced consumption (Chapter Two reviewed why this fails at the mall). Demand side management (DSM) programs at the local utility offer technical assistance and rebates for using better technology. The state relied on these programs to introduce the benefits of new technology to developers. But even this failed to guarantee high efficiency in new buildings. The concerns over capital investment and budgets

[164] Conversation with Tim Howe - Rhode Island State Energy Office, July 23, 1997.

[165] Ibid.

outweigh the rebate incentives for DSM. "Bottom line - these people [developers and builders] got limited budgets they have to meet. The technology even with the rebates, costs too much up front. Even if over time they'll save more."[166] In a deregulated future, the DSM programs may disappear. The utilities originally supported DSM to avoid having to build new expensive power plants. If existing plants were incapable of meeting demand, the utility was obligated to find the electricity elsewhere or build a new plant. As Dave Delnero, Narragansett Electric said, "we're not doing this just because we are good guys. If we help people be more efficient in the long run it will cost a lot less than having to build a new plant."[167] But, as already mentioned, in a newly deregulated market the burden to provide power to all users will no longer fall on utilities. Limiting demand will no longer be in the best interest of the utility. Increased demand means higher rates and greater profits.

An Example

Given the economic dependency and environmental degradation of energy use, it is in the best interest of the public to encourage conservation, efficiency and clean energy. "For those municipalities that choose to pursue energy efficiency in their building stock the benefits are enormous and include cost savings, environmental protection, and local job creation."[168] This happens at all levels. The private sector makes the initial investment in return for lowering operating costs and long-term payback on invested capital. The

[166] Conversation with Dave Delnero- Narragansett Electric, July 16, 1997.

[167] Ibid.

public receives the enumerated benefits of lower energy consumption highlighted above including lower demand and therefore lower prices, more reliability and the short and long-term benefits to society of less pollution.

Philadelphia is a good example of a mainstream city adopting progressive policies for energy use. Concerned about the rising costs of government, Philadelphia's Mayor Rendell focused on operating costs. The Rendell Administration created the "Municipal Energy Office" in 1993 to research and implement cost-effective measures to reduce energy use.[169] Originally these programs were implemented for the economic benefits to Philadelphia. But inherent in these objectives is energy conservation. Michele Knapic of the Municipal Energy Office in Philadelphia says the city's goals are to achieve both savings in energy usage and reductions in emissions.

The Philadelphia Municipal Energy Office in cooperation with the EPA's Green Light and Energy Star Programs and the DOE's Rebuild America, launched pilot programs for efficiency on Earth Day, April 22, 1997. As an outcome of these programs, municipal buildings are being retrofitted with new systems and equipment to reduce overall use. Also, all new public buildings exceed building code to reflect the latest conservation and efficient technology and design. The city undertook a proactive effort to affect energy use in private buildings as well. This is mainly through voluntary partnerships for retrofit and new construction. But eventually, the successes of these pilot projects will be

---

[168] Goldberger and Jessup, p.6.

[169] Conversation with Michele Knapic - Municipal energy Office in Philadelphia, July 29, 1997.

adopted into a more stringent local building code. In the case of development similar to Providence Place the municipal energy office is prepared to cooperate with private developers to implement efficiency measures. The new policy also includes an aggressive campaign to promote efficient energy businesses in the Philadelphia area. Such business will stimulate needed publicity for responsible energy as well as economic growth.

Although this is a relatively young program and the full benefits of Philadelphia's efforts are yet to be seen, Knapic believes early measures are already yielding a dramatic reduction in overall energy use.[170] As the programs mature, Knapic believes partnerships in the private sector will only continue to create business opportunities coupled with usage savings and reduced emissions for the City of Philadelphia. While Providence and Philadelphia clearly are different, this is still an example of a municipal government taking steps to reduce overall energy use. In a similar fashion, Providence could achieve proportionate savings and pollution reductions.

Cities must adopt more progressive strategies to influence responsible energy use. There are clear economic and environmental incentives for Providence as there are for Philadelphia to establish a citywide program to address energy issues in all public and private buildings. Following the state's example, all municipal buildings should continue to be retrofitted for energy efficiency. The benefits of these measures illustrate the potential for savings to the private sector. The public should enter into partnerships to

[170] Ibid.

insure the private sector begins to address energy issues in existing buildings. More importantly the city must devise steps to insure that private buildings take energy use into consideration from the start. One objection may be that private decisions are usually superior to public ones, particularly when it comes to efficiency. But if builders and developers are in fact uneducated or indifferent, there should be at least a process to insure that the private sector reviews measures for conservation and efficiency. In addition, the private sector may fail to anticipate government pressure to meet emissions targets of the Kyoto Protocol. The result would be additional costs to both the public and private sector to reduce emissions to the required levels.

It is foolish to assume that reducing the gaseous emissions in Providence or even the aggregate in a small State like Rhode Island will have a large impact on global climate change. Reducing local energy use will not greatly reduce the possibilities of rising global sea levels. In the same manner, it is not a given that local ozone and acid rain will diminish with less local energy. But Rhode Island and specifically, Providence's ability to control its own emissions will contribute to aggregate goals across the country. Currently, the Rhode Island State Energy Office is in fact implementing plans for alternative vehicles and energy efficiency for the public sector. But in order to achieve 1990 target emissions it will take more than changing the behavior of the public sector. Mainstream officials outside of DEM and State Planning must turn their attention to ability of the private sector to reduce energy-related pollution. Addressing energy use and the potential for savings at new commercial buildings will alleviate some of the

burden on meeting new ozone standards and Rhode Island's share of federal programs to reduce carbon emissions.

CONCLUSION
Recommendations

"Obviously cities grow incrementally. But the make-up of this project (Providence Place) has greater implications as a "model" for the growth of this city."

Derek Bradford – Capital Center Commission Design Review Committee Member

The contribution of public funding should create an opportunity for public involvement. In return for the public's commitment to financing, it is not unreasonable to ask for a role in shaping behavior at the facility. This is especially true for issues of social consequences, like energy consumption and environmental pollution. States and cities across the country will build new, and renovate old infrastructure to meet the consumer and business demands of the growing economy. The Providence Place Mall is an example of this type of growth. Both Rhode Island and the City of Providence financed the private development on the speculation of powerful long-term economic benefits. However, the inevitable result of any new construction like the mall is some negative impact on the environment. Certainly the State, City and the public have a right to economic prosperity (assuming the mall meets its expectations). But, this does not mean the State and City should not limit -- within economic reason, so as not to scare developers off completely -- the environmental damage of a publicly financed private development. At the same time it is possible to achieve substantial economic benefits.

My suggestion is based on ideas that surfaced through my thesis process. In researching

Providence Place, it was apparent to me that there may be an opportunity to alter decisions at the mall to reflect more environmental responsibility. This is particularly true for energy use.

Environmental Review Commission

The current design process at a mall permits poor decisions based on complacency and haste without thoroughly reviewing environmentally sound alternatives. While it is hard to affect private development without changing legislation, there is a real possibility in the case of publicly-funded projects such as Providence Place. The government can stipulate in financial support agreements that private developer participate in an environmental review process by a public/private independent commission. Unlike existing building code requirements and environmental assessment regulation, the purpose of this commission would be to insure that developers are at least considering alternatives for cost-effective and environmentally less detrimental technology, procedures and designs. As Derek Bradford commented, it is important that Providence Place act as the model for future growth in this City. As indicated in Chapter Four both the State and City have an incentive to require a review. Implementing such a review takes a proactive role towards continued economic development with less damage to the environment. A major component of such a process (in addition to reviewing other resource use – like water and solid waste generation) is the implementation of a committee responsible for reviewing energy use at new buildings.

The Energy Review Concept

Embodied in the process is a level of cooperation between the commission and the developer to research, review and apply these alternatives for the benefit of the public but not necessarily at the long-term expense of the developer. Establishing a committee to insure energy efficiency is a reasonable stipulation because it is both environmentally sound and economically beneficial over the long-term. Rather than being a burden of additional costs and bureaucratic red-tape, as environmental regulation is often perceived, reducing energy consumption can result in considerable cost-savings that offset any increases in initial capital investment. At the same time, it is in the best interest of the State and City to insure energy efficiency at local buildings. As articulated in Chapter Four there are a number of incentives to be proactive including possible future requirements to meet Federal and State and carbon emission reductions. Taking every opportunity to reduce energy-related pollution now increases individual City as well as the State's ability to meet local targets for greenhouse gas emissions and avoids future private and public costs of abatement and reductions.

It is hard to judge what the parameters for this process should be. There is no precedent for an energy review. Rhode Island is uniquely small in both geography and population and therefore more manageable. In this case, given the mutual interests of the State and City (both benefit from efficiency and both provided some concessions), the process should include both representatives of the State, City and members of the local community. The committee should be implemented on a cooperative basis allowing the

committee to take greater advantage of the existing State Energy Office and City Planning Departments to protect the interests of both Rhode Island and Providence.

Authority

The environmental commission and specifically the energy review committee must have legal support. The DRC had as much power as it did because the law stipulated that all development in the capital district had to meet approval from the Capital Center Commission. Lacking legislative authority, there would be no incentive for developers to participate in the process and even less incentive to implement committee recommendations.

This Legislation needs to set reasonable but flexible goals for energy consumption. At the same time, the legislation must outline sanctions for developers who fail to meet committee recommendations. For example, the committee might withhold required building permits if developers fail to meet committee targets. While this may resemble an adjusted, more stringent building code, there are two main differences. The first, is the fact this legislation only applies to publicly-funded projects. The second, is the objectivity of the committee to enforce changes and target ranges.

The committee must be realistic and offer goals that are not so stringent as to alienate developers. To diminish the threat to developers, it should simply offer consumption ranges for the building and stipulate the use of “best available technology”. The premise

behind this proposal is not to burden developers unnecessarily with more regulation but rather to bring developers to the table to explore potential opportunities to reduce consumption. Therefore, if developers offer reasonable explanations - based on cost analysis, space and timing concerns or design considerations - for not meeting consumption targets the committee should grant a variance. For example, if the developer illustrates that certain available technology does not payback over 20 years, the committee allows a variance. One might argue this is simply granting the developer a way around the committee. However, the real power of the energy review committee would be granting these variances. For a variance, developers would not only have to illustrate why they chose particular applications but also why they didn't chose other applications. In doing so, alternative options may be discovered. For example, the proposed co-generation plant at Providence Place may not have been looked over had the committee had the opportunity to discuss it with developer.

The Rhode Island Hazardous Waste Management Facilities Act section 23-19.7-6 establishing assessment committees, "for purposes of siting and negotiating impact agreements" on behalf of local communities[171], provides a legislative example for the energy review committee. The law grants a committee, comprised of representatives of the public figures and Local Government, the authority to review proposed hazardous waste facility sites in the "best interest of the community."[172] Rather than cite specific criteria, the act allows the committee to negotiate agreements with developers, "to protect

[171] Rhode Island State Law – "Health and Safety: Hazardous Waste Management Facilities: Local Assessment Committees – Constitution, power and duties" 23-19.7-6, 1997.

[172] Ibid.

the public health, the public safety, and the environment of the community as well as the fiscal welfare of the community…"[173] While the energy committee would require some basic criteria such as best technology, this concept simply allows the review committee to stimulate discussion with developers on the available efficient and clean alternatives without holding either to hard and fast regulations.

A Public Process

The committee concept also draws the public's attention to the decision process for energy use. This allows the public not only to question and scrutinize developer decisions, but to express disapproval as well. Under public scrutiny, developers are more likely to adhere to reasonable suggestions to strengthen their public image and fortify public support for the project. This is particularly true if the public also is being squeezed to reduce their own carbon emissions – perhaps by a fuel tax. The committee takes advantage of this desire for a good image. Failing to adopt the more efficient options increases costs to tenants and decreases the potential return to the city. This only alienates perspective tenants and customers. Instead, the mall will likely want to convey a commitment to making the best decisions on behalf of those tenants and customers. By raising salient issues publicly, the committee can force developers to alter behavior or face considerable public scrutiny. They may even consider increasing costs where reasonable to implement more expensive equipment rather than suffer poor public opinion.

---

[173] Ibid.

Budget

The review process requires an annual budget to establish the necessary staff, infrastructure and procedure for all potential reviews. Again, the Capital Center Commission is the analogy. The Capital Center Commission has a full time commissioner, Deborah Melino-Wender, and an office to draft new regulation, rulings and to process the substantial amount of information and paper work related to the proceedings and responsibilities of the Commission. Similarly, an energy review committee requires such support. However, there is one way to alleviate some of the stress on creating a separate budget for an environmental review commission by breaking up some of the responsibility to existing government agencies. If the authority of the energy committee fell under the already staffed and funded State Energy Office, the fiscal requirements of the energy review process for publicly funded buildings may be greatly reduced. Additional budget and staff may still be essential but at least it would be easier to incorporate the program under an already established agency rather than attempting to create an entirely new one.

The Committee's Composition

The composition of the committee for energy review poses a unique problem to this proposal. This is one issue that cannot be compared to the Capital Center Commission. In that case the motivating circumstances behind the commission were the aesthetics of

the capital district. Having a judgement concerning visual dynamics of the building does not necessarily require any previous experience. Of course it helps to have some background in architecture or planning but essentially it still boils down to personal opinion. The DRC was therefore made up of architects, consultants and planners but also bankers, educators and local citizens. Tackling energy issues is a substantially different issue. While it will be important to include the perspectives, for example bankers and business members will be essential to committee analysis of costs and payback periods, it is also necessary that the energy review committee have some members with technical expertise.

To know and understand the intricacies of energy efficiency and conservation including the basics of supply and demand, technology innovations, HVAC, lighting and other systems interaction and the efficiency of alternative energy resources requires some technical expertise. Therefore it is important to find appropriate people with enough background to insure the issue receives an educated review. A few members of the committee should have this expertise, for example: mechanical or electrical engineers, energy mangers or consultants, utility representatives, efficiency and conservation equipment vendors, government regulators, contractors and developers. These types of people bring pertinent points of view to the table that in conjunction with other perspectives, bankers, educators and consumer advocates allow for a comprehensive review.

To guarantee that the majority of interests are represented the committee should include

the following. At least two members of the State Energy Office including the State Conservation Officer, one member from the City or Town's planning department, one representative from the City or town's executive office, one representative from the City or town's council and at least five community members including, "one of whom should be knowledgeable in environmental matters by reason of training or experience."[174]

In conjunction with the composition, the committee must develop a proper process through which it can reach a consensus among committee members. Unanimity is unrealistic because it will be difficult to get different personalities with different perspectives to agree on issues that have many technical and practical alternative solutions. A majority ruling is more realistic. Again remember, the true power of the committee will be in encouraging developers to create their own solutions. If the committee is successful, like the Capital Center Commission, as members continually raise issues in the public the developer will take it upon his/her self to find the appropriate measure to satisfy all concerns with an economically reasonable and efficient solution.

Timing

It is the design stages that most of the savings and alternative opportunities, for example, co-generation and efficient building envelopes, need to be explored. It is therefore essential that the review occur early in the development process. As soon as a developer

[174] Rhode Island State Law – "Health and Safety: Hazardous Waste Management Facilities: Local Assessment Committees – Constitution, power and duties" 23-19.7-6, 1997.

is granted financial assistance, the review process should begin. Since it will be a stipulation of the agreement, there should be no hesitation on the part of the developer or the public to begin addressing energy use. Early initiation of review allows for more bargaining room when the developer balks at certain requests. Given the fast-track nature and the political support behind these projects, the more time to raise the issues the more opportunity to actually change the design.

Compliance

The Department of Energy Buildings Standards and Guidelines Program's "Com check - EZ Compliance Guides." is a relatively easy tool to determine compliance of different components or the whole building. The computer program currently verifies compliance to a percentage below or above ASHRAE 90.1 or other specifically designated standards. By requiring a building to exceed 90.1 code by a certain percentage, com-check is a good way to confirm the overall building is meeting recommended efficiency goals. At the same time the threat of compliance tool like Com check will keep developers honest in their attempt meet recommendations.

Barriers to Energy Review

Although the idea of a committee is sensible there are currently a number of barriers to implementing a process. The first is the promulgation of the necessary legislation. Illustrating to the General Assembly and the Governor and other representatives of the

public the virtues of energy efficiency and conservation is an up hill battle. When the immediate threat of an energy crisis and associated economic burdens loomed in the seventies, it was possible to get people's attention. The threat of the scientifically questionable and long-term environmental doom of global climate change - based on the perception that carbon emission regulations carry immediate financial costs to consumers with no immediate returns - is another story.

Politically, the officials will not want to pass any legislation that is viewed as anti-economic growth. For the most part the threat of scaring off projected economic benefits outweighs the legislature's desire for environmental protection (elected officials fear losing votes in a weak economy). The legislation must emphasize the cooperative nature of the program and highlight the co-existing goal of economic benefit. It must be viewed as a necessary and good process to protect the developers and public interests. To reiterate a point made earlier, the private sector may hesitate to participate and opt to develop elsewhere if the sanctions for non-compliance are too stringent or if they are too uncertain. Developers will require certainty to guarantee closure to the process. Given political support for these developments, the pressure from politicians can reverse public opinion and result in backlash against the committee itself, right or wrong.

The scope of the committee's review affects the whole process. Within the legislation, what issues and what the target goals are, pose problems as well. The size, location and building use will dramatically affect opportunity to reduce consumption. The committee's guidelines must be generic enough to allow for adjustment to the different

project. How one designs these guidelines an issue that requires further research.

Tied to the legislation is of course the budget for the committee's operations. Where is the money coming from? Shrinking budgets and backlash against environmental programs contribute additional hurdles to the legislation. Politicians and the public will question allocation to an energy committee rather than to more immediate programs such as welfare. Or another argument: no new allocation of funds period. Instead cut local budgets and spending. Even if there is a surplus as the Federal Government achieved in 1997, many still argue to save the surplus for future use and reduce taxes. Meanwhile strong industry forces - construction unions, builders associations, equipment manufacturers and utilities – will increase political resistance to legislation that may be perceived as cumbersome and even paranoid.

A comprehensive review process can also be very time consuming. Because of the voluntary nature of the committee, it will be hard to convince qualified people to take the time out of busy work schedules to participate in the review. One answer to this problem might be to designate members and pay them for their time. But, in large part, this would turn the committee into a regulatory body employed by the state rather than a public/privet cooperative.

Even with legislation enabling an energy review process and a budget there are still issues that need to be addressed. An energy review process should have a clear mission statement and an easily definable range of goals for addressing energy use at commercial

buildings. What those targets are, is an another problem all together. It will require research and analysis to determine reasonable and achievable targets that will not at the same time dissuade development. The objective of the process is to reduce the unnecessary energy use without undue economic and logistical burdens. Articulating that rationale and the total benefits of energy conservation and efficiency will help persuade the private sector to participate and in a committee process. At the same time this solidifies public support and helps generate political support for the review process.

Alternatives to a Review Committee

The surest way to increase efficiency and alter behavior at commercial sites is to change building code. While this is one of the current efforts of the State Energy Office, it is unlikely to occur any time soon. Adopting more stringent requirements for publicly-funded projects only will face similar political pressure. In addition, this again will contribute to alienating developers.

One thought is to develop a regulatory task force to review these proposed code revisions. For all intents and purposes it would resemble the review committee except for designated participants and the authority to withhold building permits. Again, a task force eliminates the cooperative quality of a committee and essentially creates additional government bureaucracy the private sector abhors.

One final option would be to stipulate that all construction with in the state be certified by

an independent energy consultant group or even an association like ASHRAE. Take the responsibility completely away from the government and leave it up to an already fully staffed and educated evaluator. The problem here is who pays for it. Requiring the developer to pay adds additional economic burden that will face real opposition. At the same time there is no guarantee that the idea is worthy of State or City investment. Additionally, the objectivity of a review of this nature comes into question. Many of these private sector groups and associations are affiliated with the equipment vendors and building industry. While this may facilitate working with developers to find reasonable solutions, it may also cloud the independent body's ability to enforce stricter applications and standards.

These recommendations, barriers and alternatives are all ideas that surfaced during my research. In many case while theses ideas offer some solutions to addressing energy issues at a project such as Providence Place, they require additional research and more thorough analysis. Regardless there is an opportunity, whatever the right solution is, to affect the behavior of these projects to reflect more responsible behavior.

Bibliography

Books

Barnett, Diana Lopez with William Browning, A Primer on Sustainable Building (Rocky Mountain Institute, 1995).

The Energy Yardstick: Using Places to Create More Sustainable Communities, produced by Oregon Department of Energy, Washington State Energy Office and California Energy Commission for the Center for Excellence for Sustainable Development – U.S. Department of Energy, (August 1996).

Environmental Assessment/Major Investment Study - Providence Place HOV Garage and Interstate 95 Access Ramp Improvements, Vannesse Hangen Brustlin, Inc., (November 1994).

Freeman, A. Myrick, "Economics, Incentives, and Environmental Regulation," Environmental Policy in the 1990's, Edited by Norman J. Vig and Michael E. Kraft, CQ Press; (1997).

Goldberger, Dan J. and Phillip Jessup, "Profiting from Energy Efficiency!," International Council for Local Environmental Initiatives, (1994).

Vig, Norman J. and Michael E. Kraft, Environmental Policy in the 1990s, (Congressional Quarterly Press, YEAR).

Zeiher, Laura C, The Ecology of Architecture (New York: Whitney Library of Design, 1996).

Articles

Anderson, William P., Pavlos S. Kanarogalou and Eric J. Miller, "Urban Form, Energy and the Environment: A Review of Issues, Evidence and Policy," Urban Studies, Vol. 33, No. 7-35 (1996).

Arditi, Lynn, "Fleet, mall sign loan agreement," The Providence Journal, March 18, 1997.

Arditi, Lynn, "Taxpayers, developers, banks are all key to Providence Place," The Providence Journal, March 23, 1997.

Arditi, Lynn, "Providence mall breaks ground," The Providence Journal, March 25, 1997.

Arditi, Lynn, “New Mall Manager to Start Monday,” The Providence Journal, November 22,1997.

Brusset, David, “Designing Providence Place VII,” The Providence Journal, May 29, 1997.

“The Challenges and the Opportunity: Global Warming and Economic Development,” Better Buildings Partnership, Toronto, Canada (1996).

Chappell, Lindsay, “Bright Ideas Lower Costs at GM, Honda Factories,” Automotive News V. 71 (February 1997).

“Climate Change Treaty Would Curb U.S. Economic Growth, Jeopardize Electricity Supply,” PR Newswire, August 20, 1997.

“Design is destiny,” The Providence Journal, 24 July 1994.

Donovan, William and Katherine Gregg, “Mall tax relief measure clears general assembly,” The Providence Journal, November 9, 1995.

Donovan, William and Katherine Gregg, “Sales tax reduction brought into the mall debate,” The Providence Journal, November 4, 1995.

Eisele, Julie, “The Climate is Right for Change,” Buildings EPA Supplement (March 1995).

“Electric Competition,” Economic Education Bulletin, Vol. XXXVII, No.6: (June 1997) published by American Institute for Economic Research.

“Emissions Cuts to Up Adoption of Technologies in U.S.,” New Technology Week, No. 30, Vol. 11: July 28, 1997.

“Reaction: Gore Praises Kyoto Pact,” Detroit News, December 11, 1997, p. A18.

Hebert, H. Josef, “Close-up, Pact Renews Focus on Energy Efficiency,” The Seattle Times, December 11, 1997.

Hentz, Patty, “Planning Helped Rescue Downtown Portland,” The Salt Lake Tribune, January 1, 1995.

“International Treaty Reached Today To Reduce Global Warming,” The Associated Press Political Service, December 11, 1997.

Kakissopoulos, Constantinos A., “Energy - guest editor’s foreword”, Ekistics 344 (Sept/Oct 1990).

MacKay, Scott, "Voters wary of public spending for mall," The Providence Journal, February 11, 1994.

Nasser, Haya El, "Entertainment Centers a Big Draw," USA Today, December 27, 1996.

Nelson, Kessel L., "News Briefs – Efficient Laboratory Uses 36 Percent Less Energy," Energy User News, May 1996, from internet site, www.energyusernews.com.

Nelson, Kessel L., "News Briefs – Transit Co. Replaces Aging Windows, Earning 99,000 Annual Savings," Energy User News, May 1996, from internet site, www.energyusernews.com.

Parker, Danny S., Stephen F. Barkaszi, Jr., Subrato Chandra and David J. Beal, "Measured Cooling Energy Savings From Reflective Roofing Systems in Florida: Field And Laboratory Research Results," FSEC-PF-293-95 Florida Solar Energy Center from the internet www.fsec.ucf.edu

Peterson, Jonathan, "Clinton Offers Breaks to Fight Global Warming," Los Angeles Times, 02/01/1998.

Pressler, Margret Webb, "Task Force Calls for New Downtown," The Washington Post, December 12, 1996.

Randazzo, Mike "News Briefs - Efficient Envelope Helps School Save $161,800/Yr," Energy User News, October 1997, from internet site, www.energyusernews.com.

Randazzo, Mike "News Briefs – Environmental Demo Store Doubles Title 24 Efficiency," Energy User News, May 1996, from internet site, www.energyusernews.com.

Reese, Shelly, "Indianapolis Pins Hopes on New Mall, Will Center Revitalize Downtown?" Cincinnati Inquirer, July 23, 1995.

Rich, Frank, "Not Necessarily Nirvanas," The Commercial Appeal, December 8, 1996.

Rosenfeld, Arthur H and Joseph J. Romm, Hashem Akbari and Alan C. Lloyd, "Painting the Town White and Green," MIT's Technology Review (Feb/Mar 1997).

Sheldrick, B. and A. Scott, "Energy and environment: deriving a research agenda," Environment and Planning A, V.21 (1989).

Smith, Gregory, "Mall tax agreement," The Providence Journal, October 23, 1996.

Smith, Gregory, "Council Prays, Cianci promises mall will thrive," The Providence Journal, October 30, 1996.

Stevens, William K., "Kyoto Accord Only a Start in Fight Against Warming," The San Diego Union-Tribune, December 12,1997.

Todesco, Giuliano "Super Efficient Buildings: how low can you go," ASHRAE Journal (December 1996).

Tooher, Nora Lockwood, "Mall Construction gets go-ahead from Capital Center Commission," The Providence Journal, May 30, 1997.

Unpublished Work

"Chiller Overview," from intenet site www.chillers.com.

Fact Sheet: The Economic Power of Energy Efficiency, ICLEI (Berkeley, CA, 1997) from internet site www.iclei.org/sb1.htm.

Fact Sheet: Natural Gas, ICLEI (Berkeley, CA) from internet site www.iclei.org .

"Providence Place Group and the Energy Concept", submitted for proposal by the Providence Energy Corporation and Independent Energy Corporation to Providence Place Group, December 5, 1997.

Submitted Proposal for Development to Capital Center Commission, Providence Place Group (Commonwealth Development Group), October 21, 1994.

Submitted Proposal for Development to Capital Center Commission - revisions, Providence Place Group (Commonwealth Development Group), May 1997.

"What will global warming mean to us in the city," Cities for Climate Protection, from internet site www.iclei.org.

"Cities for Climate Protection," ICLEI, Toronto Canada, from internet site www.iclei.org.

Government Documents

Resolution of the City Council - No. 565, Providence, Rhode Island, Approved October 22, 1996.

Rhode Island State Law - "Providence Place Project" 42-63.5 State Affairs and Government, 1996.

Rhode Island State Law – "Health and Safety: Hazardous Waste Management Facilities: Local Assessment Committees – Constitution, power and duties" 23-19.7-6, 1997.

State of Rhode Island - General Assembly, “An Act Relating to Special Development Districts,” January Session, 1981.

US Department of Energy, Energy Information Administration (EIA), Commercial Buildings Energy Consumption and Expenditures, 1992.

US Department of Energy, Energy Information Administration, Lighting in Commercial Buildings, 1992.

US Environmental Protection Agency, Energy Star Buildings Manuel (1995).

US Environmental Protection Agency, Green Lights Program, (1992).

Personal Interviews

Kurt Teichert – Brown University February 21, 1997.

Rick Duggan - Project Manager Providence Place Group (Commonwealth Development Group), April 16, 1997

Jos Nicholas- Owner, Comina - retail store chain, May 5, 1997.

Michael Creighton - Project Manager Nordstrom, May 21, 1997.

Wilfred Gates - Chair, Capital Center Design Review Committee, July 8, 1997.

Dave Delnero - Narragansett Electric, July 16, 1997.

Tim Howe - Rhode Island State Energy Office, July 23, 1997.

Kurt Stenberg and Tim Howe - Rhode Island State Energy Office, July 24, 1997.

Telephone Interviews

Joel Stinson - Vice President Operations, Nordstrom, Oct 15, 1996.

Rick Duggan - Project Manager Commonwealth Development Group, Oct 15, 1996.

Ken Fries – Commonwealth Development Group, April 20, 1998.

James Henson - Electrical Engineer and Lighting Designer, April 15, 1996.

Mike Maybaun - Consentini Associates, April 21, 1997.

Dan Goldberger, Director Green Buildings - International Council for Local Environmental Initiatives, June 26, 1997

Tom Hicks - EPA Energy Star Buildings, July 16, 1997.

Michele Knapic - Municipal energy Office in Philadelphia, July 29, 1997.

Barbara Teto - Department of Employment and Training, July 30, 1997.