1980

Jacksonville, an energy efficient city?

Jacksonville Community Council, Inc.

JACKSONVILLE COMMUNITY COUNCIL, INC.

A Report To The Citizens Of Jacksonville

RODERICK M. NICOL, CHAIRMAN

SUMMER, 1980

"JACKSONVILLE-AN ENERGY EFFICIENT CITY?"

SCOPE OF THE STUDY

In the fall of 1979 the Energy Study Committee received its charge: "Moving Toward an Energy Efficient Jacksonville - how should Jacksonville approach this problem?" This report examines the energy situation to ascertain whether crisis conditions really exist. In the broadest terms, this means a close look at two things: supplies and consumption.

The report is limited to the examination of the availability and consumption of oil in both the nation and Jacksonville in the short term (the next 5 years), and in the long term (the next 20 years), for the fueling of the transportation system and for the generation of electricity to support land use patterns and the built environment.

The report concentrates on Jacksonville's transportation sector, primarily automobile travel and the residential sector, because these sectors are Jacksonville's largest energy consumers.

But supplies, systems, and buildings are only part of the energy story. Individuals in their homes, cars and workplaces are the true consumers. While this report attempts to provide some insight into how people cope with and respond to the energy crisis, it does not examine the sociological consequences caused by the crisis. The report makes recommendations as to how Jacksonville should respond to the crisis and encourages strong conservation measures.

Definition of the Energy Crisis

A crisis is an unstable or crucial time or state of affairs. The energy crisis is the result of decreasing supplies of oil and natural gas controlled by foreign governments at a crucial time when the United States is very dependent on these non-renewable resources. No longer self-sufficient, America has become a major importer of oil, unable to control its price or supply. America's growing population and increasing energy demand must compete for the same finite fuel supplies with the rest of the world.

HIGHLIGHTS

MAJOR PROBLEMS

Shrinking supplies of oil and gasoline, reaching crisis proportions

Jacksonville's vulnerability because of its dependence on foreign oil for electrical generation

Lack of leadership by government and the private sector

A "business as usual" attitude by city government and private business when changes are needed

A deficiency of mass transit services

Energy inefficient buildings and land use patterns

Inadequate conservation by individuals as a result of denial of the energy crisis

RECOMMENDED SOLUTIONS

Consolidate and encourage conservation efforts and provide leadership to the community through an energy commission

Expand efforts to diversify fuels to include seeking renewable sources of energy and promoting energy conservation by the Jacksonville Electric Authority

Reduce single person automobile travel as much as possible

Increase use and services of mass transit and other alternatives

Promote energy efficiency in land use patterns, in new building practices and in retrofitting existing buildings

PREFACE

Despite the complexity and controversy of the energy problem, there is no doubt that the energy crisis is real. Oil and all other non-renewable energy sources will eventually be depleted, and America, as the world's largest energy consumer, is particularly vulnerable so long as it must depend upon others for its supply.

While new technology is being developed, the only reasonable solution to the crisis is conservation. The best form of conservation is a "productive" conservation which addresses elimination of wasteful uses of energy, and reasonable changes in lifestyles.

Jacksonville can successfully cope with the energy crisis if it moves responsibly towards an awareness of its dimensions and if it takes immediate steps to conserve the energy it has. Ultimately failure to do this will be costly, not only to the individual's pocketbook, but also to the community's standard of living.

The time for action is now -- not by the few but by every one of our citizens and our government.

FINDINGS

Findings represent the data base of the committee. They are derived from the published materials listed in the references, facts reported by resource persons or from a consensus of committee understanding as reported by resource persons.

THE ENERGY CRISIS

What seemed to be an excellent decision in 1965 was sorely regretted in 1973. In 1965, Jacksonville decided to become totally dependent on oil for electrical generation. That decision temporarily gave the city one of the lowest electrical rates in the nation. In 1973, the Organization of Petroleum Exporting Countries (OPEC) embargoed oil to the West. Shortages began to occur and prices climbed. They have been climbing ever since and there is no end in sight.

The energy crisis of the 1970s has become the energy plight of the 1980s. Despite crisis conditions, the nation has not taken significant measures to combat the energy problem. The energy crisis is really a crisis of oil and secondarily one of natural gas. U.S. dependency on these non-renewable resources is growing. For example, in 1973 the U.S. was importing about one-third of its oil. By 1979 - six years into the energy crisis - the U.S. was importing between 8 million and 9 million barrels of oil per day - about one-half the U.S. consumption.

The future availability of oil and gas is uncertain. Major discoveries of U.S. oil and gas in the future are doubtful. At the present rate of consumption, equivalent to 40 million barrels of oil per day, the U.S. will deplete the relatively new and huge Alaskan oil field in less than three years.

Forty million barrels of oil is a huge amount. To visualize how much 40 million barrels is, form a line five barrels across and stretch the barrels from the intersection of I-95 and I-10, across the United States to Los Angeles. America is using the equivalent of that much oil every day.

(1 barrel of oil contains 42 gallons)

CAUSES

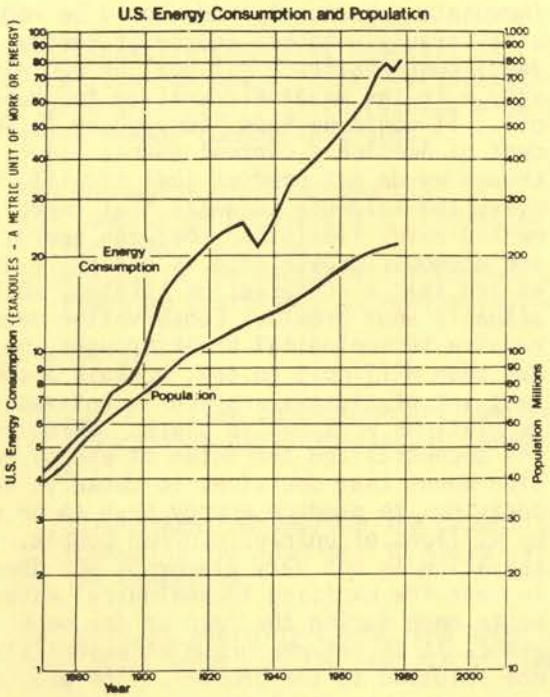
Growth of Energy Consumption

Growth of energy use is soaring. It has outstripped population growth. While the U.S. uses 30 times the energy it used 100 years ago, the population has increased only seven times. In other words, today an American uses four times the energy his great grandparent did. (see chart A)

The nation is doubling its consumption of petroleum every nine years. If this continues, the U.S. will use as much oil during the next nine years as man has used throughout history.

The State of Florida is doubling its consumption of electricity every eight years. If this rate continues, Floridians will consume the same amount of electricity between today and 1988 as they consumed since the discovery of electricity.

Chart A



Data from: Energy Environment Source Book, p.292.

Most people think of growth in a linear way - one plus one equals two, plus one equals three and so on. When consumption increases at a certain fixed percent per year, growth is exponential, not linear.

Exponential growth is extremely sudden and sometimes unexpected. For example, a pond contains one lily which doubles itself each day - 1 lily, 2 lilies, 4, 8, 16, etc. On the 25th day, the lilies cover half the pond. How many more days would it take for the lilies to entirely cover the pond? One more day!

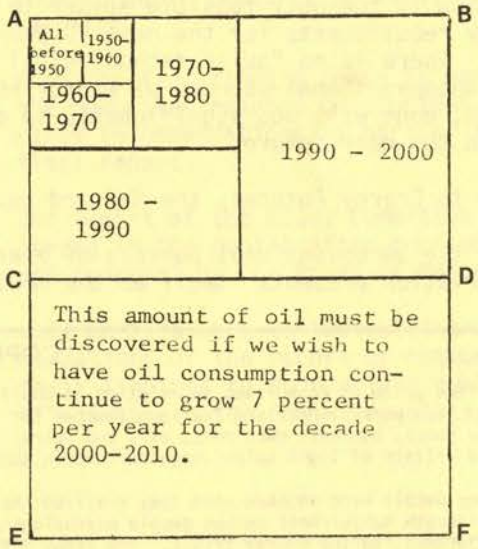
By a simple formula (see Appendix B), one can calculate how long U.S. fossil fuels will last. According to Dr. M. King Hubbert, world authority on the estimation of energy resources and on the prediction of their patterns of discovery and depletion, one-half of the U.S. domestic petroleum has already been consumed. Referring to the lily pond example, the U.S. has "one more day" or one more doubling time until it has consumed all its oil resources.

If oil imports (one-half U.S. petroleum consumed) ceased and if the rate of growth of consumption remained at the 1970 level (7.04 percent), U.S. domestic reserves would last only 14 years. Chart B shows a model which represents growth at 7 percent per year consumption. The oil used during the doubling time is approximately equal to the sum of all previous consumption.

Most people assume that if it took 120 years to consume all the discovered oil, it would take another 120 years to consume that same amount again. This is a misconception. With a constant rate of growth of energy consumption, it will take only one more doubling time to consume the equivalent of all the oil that has been consumed in the past.

Chart B

The rectangle A,B,C,D, represents the total known world oil including all the oil that has been consumed in the past. Rectangle C,D,E,F represents the amount of oil that must be discovered to continue our seven percent growth for one more decade from the year 2000 to 2010.



Depletion of Non-Renewable Resources

It is not possible for American oil wells to produce the necessary 9 million barrels per day to close the gap between what the U.S. produces and what it consumes. In fact, to maintain total U.S. output level of 9 million to 10 million barrels of oil daily requires finding almost 4 billion barrels annually. In only one year of the last 30 years have more than 3 billion barrels of reserves been found.

Florida faces a shortage of energy as early as 1990 when the state projects a 25 percent energy shortage based on a population growth rate of 5.6 percent. In fact, Governor Graham's Energy Legislation specifically states that "If Floridians fail to take sensible steps to reduce energy consumption, within less than two years substantial economic disruptions will occur in the state."

Most agree that oil resources are running out. Authorities such as the National Academy of Sciences, the National Petroleum Council, U.S. Geological Survey and the oil industry differ somewhat in predicting the time of exhaustion of oil, but not very widely. In 30 years the U.S. will probably be past that point of exhaustion. The flow of oil will taper off in a period of years augmented by foreign oil imports. Prices will rise to uncontemplated levels as more and more countries compete for scarce resources. "Three decades from now the use of oil for generating electricity for individual transportation will be rare, incredibly expensive or unheard of." Thinking About the Future.

CONSERVATION—THE ONLY INTERIM SOLUTION

Conservation is the only feasible answer to meet new energy requirements for the next 10 years to 20 years. There is no "quick technological fix." Although unconventional sources of energy should be pursued, none will add significantly to energy sources in the near future.

According to Energy Futures, the Harvard report:

> Among the unconventional sources of energy, conservation presents itself as the most immediate opportunity and should be regarded as a largely untapped source of energy. Indeed, conservation - not coal or nuclear energy - is the major alternative to imported oil.. It could perhaps "supply" up to 40 percent of America's current energy usage, although we do not predict that it will. Moreover, the evidence suggests that there is much greater flexibility between energy use and economic growth than is generally assumed and that a conservation strategy could actually spur growth. Conservation does not require technological breakthroughs, but it has been difficult to tap, because a consistent set of signals - price incentives and regulations - is not in place. Moreover, the decentralized character of energy consumption means that decisions to conserve unlike decisions to produce energy have to be made by millions of poorly informed people. Conservation is not very glamorous nor does it include the exciting technological advancements made during the "man to the moon" program. It is not one group of scientists with one solution to the problem. The problem of energy can be perceived as a lot of specific problems with a lot of particular solutions solved by many alternatives, not THE ANSWER, but improvement.

COPING WITH ENERGY CRISIS

If the price of pork rises in relation to poultry, households shift their meal plans to include more chicken and less pork. There are few such choices for the consumer of energy. Big decisions such as the purchase of new homes, business machinery, cars and retrofitting older structures, and little decisions such as choosing the wattage of light bulbs, require concern about energy efficiency.

Many people were shocked when they realized that cheap energy actually is a thing of the past. Research by Elizabeth Kubler-Ross on how people psychologically cope with the shock or grief in death might parallel adjustment to the energy crisis. The Texas Business Review article "Homeowners and Energy Costs, the Grief Process" relates Kubler-Ross' stages in the grief process: denial, anger, bargaining, depression and acceptance. It then compares these stages to the consumer's acceptance of significant changes caused by the "death of a lifestyle."

Denial Stage

Consumers in the denial stage hang onto the belief that the energy shortage is not genuine. They might argue that supply reductions are a temporary phenomenon associated with the economic and political shenanigans of one group or another. They rationalize that as soon as the forces creating the temporary shortage achieve their objectives, prices and availability will return to normal (by which they mean the conditions prevailing during the 1960s).

Anger Stage

After denial, consumers come to the point of anger. They lash out at politicans, oil companies, utilities, or regulatory commissions. Someone must be blamed for the demise of the energy-oblivious lifestyle, and those responsible must be punished. Anger is an especially ugly phase of the grief process, but a stage through which consumers nonetheless pass.

Bargaining Stage

After anger comes the bargaining stage. Homeowners in the bargaining stage grant the inevitability of changes in their ways of living, but they hope to postpone them. They hope for one more summer of air-conditioning unfettered by high temperature settings or the bother of insulation.

Depression Stage

A sense of loss next overwhelms the individual's ability to formulate a response. Homeowners in this stage may freely admit that they do not know how heating and cooling bills for the coming year fit into their household budgets but are unable to develop plans for holding utility bills in check.

Acceptance Stage

After consumers have completed the experience of the first four stages, they may be able to move to acceptance. Only then can a homeowner deal with, and respond to, the new economics of energy by making appropriate lifestyle adjustments.

Many consumers are still in the denial or anger stage. They have not accepted the changes in lifestyle brought on by the energy crisis. Citizens from all segments of the community must work through the grief process before they can take positive action and make necessary decisions to cope with the crisis.

Utilities in other parts of the country have postponed building additional electrical generating plants by encouraging the use of "conservation as an energy resource." Utilities in California are preparing to implement zero interest weatherization loans to reduce residential gas and electric needs by 25 percent in the next five years. The California effort is not unique. The Tennessee Valley Authority and Portland, Oregon's Pacific Power and Light have implemented verions of it.

Utilities must borrow money to make loans, but compared to financing new plants, results are more reliable and the payback is faster. Consumers pay more too, but not as much as if they were paying for a new kind of plant.

In addition, conservation is a reliable source of energy. It is immune from external shock such as the shutdown of plants or the cutoff of gas or oil. It has no negative environmental effects. It is also cheaper, more accessible and the least disruptive source of energy available. It buys the U.S. time to develop new technologies and helps the U.S. decrease dependence on foreign oil - all positive benefits.

But despite consensus by energy policy analysts that conservation is the only achievable resource in the short term, Americans have not conserved as much as could be expected. According to one analyst the economy has increased its energy efficiency by 10 percent since 1973, but more than 60 percent of the improvement was because of industry's efforts, not individuals.

THE CRISIS IN JACKSONVILLE

PRODUCTION AND CONSUMPTION

Since Jacksonville is almost totally dependent on foreign oil, the crisis dramatically affects the city. Jacksonville's utility bills, which ranked among the lowest in the country, have now risen to among the top eight in the nation.

Jacksonville's electrical energy is supplied by the Jacksonville Electric Authority (JEA). The JEA is one of the largest totally oil dependent utilities in the United States using as much as 10 million barrels of residual oil per year supplied primarily by imported oil.

If all units were on line, Jacksonville's potential supply of electrical generating capacity would be 1572 megawatts from steam generating units and 494 megawatts from the combustion turbines. However, some generating units are out of service for maintenance and others are aging, limiting Jacksonville's capacity. During periods of high demand, combustion turbines which use a more expensive oil must be put on line to generate the city's needed electric power and peak loads.

Demand for electricity varies with temperature conditions. During the period of low usage (mild weather) demand is between 400 and 750 megawatts. The highest usage occurs during the summer when the demand ranges from a low of 750 megawatts to over 1300 megawatts.

Alternatives the JEA is Exploring

President Carter has initiated a program which requires 50% reduction in the use of oil for electrical generation by 1990. The JEA has begun measures to decrease its dependence on oil by diversifying its fuels. Developing alternative fuels while reducing dependence on oil may also provide for decreased costs and increased reliability.

. Purchase of Coal-Fired Power - In February 1980, the JEA completed negotiations with the Southern Companies in Georgia to purchase 50 megawatts of coal-fired power. An additional purchase of 50 megawatts of power is expected this year.

. Conversion to Natural Gas - To achieve a substantial reduction of the 4.8 million barrels of oil required yearly by the Northside generating units, the JEA is pursuing natural gas to fuel one or more steam generating units and combustion turbines. The JEA has a potential supplier but still awaits the needed approval from the federal government and formal arrangements with Florida Gas to transport the fuel. A conversion to gas could begin in the spring of 1981. The change to natural gas is a temporary measure. Since natural gas is also a non-renewable and an increasingly scarce fuel, it is also included under the President's 50 percent reduction program.

. Purchase of Power - The J.E.A. will purchase excess power generated by Regency Square.

. Nuclear Power - Negotiations are underway to purchase 150 megawatts of nuclear power from the Georgia Power Company. The two Vogtle nuclear plants are scheduled for commercial operation in 1984 and 1986. In order to bring the purchased power from Georgia and to increase reliability of service, JEA is making arrangements with participating utilities to construct and operate additional transmission lines by 1983.

. Coal and Oil Mixture Conversion - The JEA has submitted a proposal to the federal government to convert a boiler to use a coal and oil mixture for fuel. The grant is valued at between 15 million and 18 million dollars with a required

contribution from JEA of $13.2 million. If the project is successful, the JEA could save 600,000 barrels of oil each year.

. Coal Conversion - JEA has also requested a grant for $250,000 to study the feasibility of converting an existing oil-fired boiler to coal. This would reduce the boiler's power rating from 500 megawatts to about 350 megawatts. The research would include a study of the economic feasibility of other ideas such as enabling Northside #3 to burn either coal or oil by constructing an additional coal-fired boiler alongside the existing power plant.

. Refuse - JEA will investigate incinerating refuse to provide process steam to be used in such plant operation as preheating fuel for low temperature steam for operating power.

. Hydroelectric - A small amount of hydrogenerated power may be available from the Southeastern Power Administration in Georgia for purchase and use in Jacksonville.

. Coal Power - Design and construction of two 600 megawatt plants is planned to meet Jacksonville's growth and replace oil plants. Since coal is significantly cheaper than oil now, the fuel savings could pay for the cost of construction.

. Coal Power Purchase - Available in 1983, the purchase of coal-fired power from the Seminole Electric Cooperative is being considered by JEA along with purchases of relatively long term power from other utilities.

JEA is seeking to improve its efficiency and reliability through better maintenance of existing plants, application of time of day pricing, rate structures, and integration of load management with current energy conservation efforts.

Most of JEA's power has been generated by nonrenewable sources of oil. Oil will continue to be the JEA's main source for the next three to six years. When the JEA moves to coal by 1990, again it will be primarily dependent on a nonrenewable resource. Although coal will not have the disadvantage of imported oil, all fuel sources except conservation have disadvantages.

TRANSPORTATION

Changing Consumption Patterns

Until World War II, 35 percent of the travelling public used public transportation, walked or bicycled. Cities were more compact than the suburban sprawl of most cities today. But by 1973 the reverse was true. The automobile became the major carrier of people between cities, accounting for 85 percent of the traffic. Railroads and buses together accounted for only three percent with 10 percent going to air travel.

Since the Highway Act of 1956 creating the Highway Trust Fund, the federal government has subsidized rubber wheel travel. Building cars, trucks and planes provided millions of jobs and increased the use of cheap petroleum to help soak up the glut of oil. In fact, one in six jobs in the United States today is related to the auto industry.

The motorized economy, which includes the care, parking, polishing, repairing and insuring of automobiles, uses nearly 25 percent of all the energy burned in the country with half of that amount going for the automobile alone. This energy commitment accounts for more energy than most nations consume for their entire economy.

In fact, the transport sector uses 26 percent of the energy consumed in the United States - half the oil. The American car alone consumes 1/9th of all the oil used in the world every day.

The American cities and suburbs have grown dependent upon the automobile and now cannot exist without it. More than 80 percent of the national population uses the automobile for getting to and from work, and more than half (56 percent) of these cars carry only one occupant. Twenty-six percent of commuters share cars with others and 14 percent use public transportation.

Work is not the only use of the automobile. One-third of all the miles a family puts on its car are for social and recreational activities.

Automobile mileage per gallon is the least efficient for short trips, getting less than two-thirds of the miles per gallon of a warmed-up engine in some studies. Currently more than half the automobile trips are less than five miles in length, and almost 90 percent are less than 15 miles in length.

Until a few years ago gasoline was cheap. However, gasoline is expected to cost up to $2.00 by the end of 1980. Resistance to the higher prices and tight supplies have resulted in a 5.1 percent drop in U.S. gasoline consumption in the United States in 1979.

Driving a full size automobile one mile will cost 24.7¢ on the average this year, twice the cost of driving a mile in 1970, according to Runzheimer and Company, a Wisconsin management consulting firm. Other estimates from car rental agencies have run as high as 37¢ per mile. Ridership on public transportation will grow because of the cost of driving, but Ameri-

cans will still rely on the car for more than 90 percent of their commuting for the near future.

Transportation accounts for the largest amount of energy (38 percent) used by any sector of the Florida economy. In Jacksonville transportation amounts to 34 percent of total energy consumption or about 300 million gallons of non-renewable gasoline per year. In 1973 Jacksonville's per capita consumption was 647 gallons of gasoline per year, 18 percent higher than the statewide per capita consumption.

The city government currently uses 4 million gallons of gasoline a year, and its goal is to reduce that amount by three-quarters of a million gallons. In addition, the city is looking at its automobile fleets with the intent of reducing the 3200 vehicles by 10 percent. As a pilot project the city will convert 100 vehicles to propane gas instead of gasoline. At a cost of $700 per conversion, the city estimates that it will save over 34,000 gallons of gasoline per 100 vehicles by using propane gas.

Because of an 18 percent budget line shortfall, the City of Jacksonville through the Mayor's Energy Office is attempting to reduce fuel consumption by 18 percent across the board. In the last quarter of 1979 city departments reduced their gasoline consumption by eight percent.

Another large consumer of gasoline is the Duval County Public School System. The schools consume 1,748,545 gallons of gasoline transporting children to school for the 180 day school year. About half of that amount is being spent to comply with the desegregation plan. Summer school transportation adds to the total amount of transportation.

Transportation Planning

The Metropolitan Planning Organization (MPO) is the major unit for transportation planning in Jacksonville. The MPO is responsible for federally required transportation planning including development and annual updating of a five-year transportation short range plan and a long range plan to the year 2005. The Jacksonville Transportation Authority (JTA) and the city are represented on the MPO as well as commissioners from St. John's and Clay counties. The MPO makes the political decisions concerning road construction and other transportation matters. Net energy analysis has not been employed in the decision-making process.

Transportation planning in Jacksonville is based on federal travel demand modes which assume that travel conditions will be the same in the future as they have been in the past. Nevertheless the MPO has changed its plans. It has decided to build fewer new roads than it had planned a few years ago.

The public does not share the opinion that travel conditions will be the same. According to a recent Florida State University Poll, there is declining public support for road building.

Energy has been taken into consideration by the MPO in planning for new road construction. The MPO has valued "contribution to energy conservation" at sixteen percent as a criterion for road building and improvement priorities.

Jacksonville's transit network as proposed will cost 425 million dollars in 1979-80 monies or about 650 million dollars allowing for inflation. Sixty-five percent of the funding for the total 2005 Comprehensive Plan will be for the highways, and 35 percent will be for mass transit.

Downtown People Mover

Jacksonville plans a Downtown People Mover costing 107 million dollars. The federal grant will provide 80 percent of the funds, and the state and city 10 percent each. The People Mover is projected to carry 47,000 people each day when it becomes operational in 1985. Since it is automatic, labor costs will be reduced and operational costs of the people mover will be significantly less than the operation of the surface bus system.

High Occupancy Vehicles (HOVs)

One of the key features of the short term transportation plan for Jacksonville is the preferential treatment of High Occupancy Vehicles (HOVs). HOV describes a vehicle holding two or more people. Special HOV lanes would facilitate bridge traffic movement at toll booths for example. Within six months a special HOV lane could be designed to help traffic flow at the Matthews Bridge. Traffic flow improvements at the toll booths would help save gasoline.

Preferential Treatment

Preferential treatment for buses is planned by JTA/DOT along Blanding and Roosevelt Boulevards. Using a priority traffic signalization system, movement of express buses through several intersections would be facilitated.

Peripheral Parking

Other energy efficient transportation plans include the Park N Ride system in the suburbs and

parking for the Downtown People Mover, which is expected to reduce vehicle travel to and from the inner city. These plans address the key to transit planning by dealing with the 20 percent to 30 percent of the people who travel by mass transit during peak hours.

Highways and Bridges

Highways and bridges are inextricably linked to energy consumption since they control vehicle traffic flow and travel distance. Though many of the new highways seek to reduce traffic congestion, they do so by rerouting vehicles to longer more indirect means, increasing energy consumption. The I-295 westerly bypass, for example, is 11 miles longer than I-95. The easterly bypass which includes the Dames Point Bridge is only one mile shorter than the original route.

In addition, new roads and bridges take energy to build. By using net energy analysis one can determine whether new routes save more energy than they cost to build after the expenses of exploration, extraction, production and transportation are subtracted. The "net" is an expression of energy profit.

New roads promote development which affects land use patterns and stimulates demand for more energy in terms of more gasoline consumption and new city services. It is more energy efficient for services to be provided contiguously along routes rather than in a leap frog pattern along routes.

Bikeways

Bicycles have been outselling cars in the U.S. since 1972. What some people have considered a toy or a fad is now becoming an energy saving alternative to the automobile, according to World Watch Institute.

National studies reveal that one-third of the population rides bicycles. In Jacksonville that translates into approximately 200,000 people. Of those riders, 50 percent are children under sixteen. Average adult riders comprise 45 percent (51,000) of the ridership; and the remaining 5 percent of the ridership is made up by experts who generally travel long distances.

Despite flat terrain and mild weather which are conducive to bike travel, Florida's roadways have been designed almost exclusively for motor vehicles. This design problem has made bike travel unsafe or uninviting. Safety of the individual and the bike itself are major issues in bicycling.

The bike plan has not been funded despite its relative low cost. One hundred and eight miles of bicycle paths in 1978 dollars cost 1 million to 1.4 million dollars of a total transportation budget of 425 million dollars. The plan has been used as the bikeway portion of the 2005 Transportation Plan and has been approved by the MPO.

The Jacksonville Area Planning Board recommended 25 miles of bikeways for inclusion in the Capital Outlay Program, but the City Council gave the bike project a low priority and did not fund it. Currently Jacksonville has 10 miles of bike paths.

According to a Jacksonville Area Planning Board staff report, a 10 percent diversion from cars to bikes for short urban trips would produce 30 million barrels of oil in Florida.

Ridesharing

Ridesharing or carpooling has demonstrated its effectiveness in saving gasoline. According to 1975 census data, workers who rideshare saved approximately 3.5 billion gallons of gasoline per year.

The national passenger car average is 1.4 passengers in a 5 passenger car. Ridesharing is an alternative which better utilizes the car.

Jacksonville's Rideshare Program was the product of civic groups and city planners who designed and promoted the program. Under the sponsorship of the Chamber of Commerce three large businesses: Prudential, Mayport Naval Base and the City Hall/Court House Complex, were chosen to test a pilot program before the citywide effort is begun.

Employers who participate in the Rideshare Program are asked to provide some incentive for the program such as company cars, preferred parking and flexible working hours to facilitate coordination of the program.

The Rideshare Program has encountered some obstacles in the past which are being overcome. The lack of credibility of the energy crisis has caused major obstacles to the rideshare program. However, as the price of gasoline increases, more people are participating. Insurance for ridesharing, once a problem, is now available.

Rideshare participants can save up to $300 per year. Other positive outcomes of the rideshare program include reducing environmental pollution and alleviating the need for highway expansion.

The Jacksonville goal of 5 percent participation could save 15 million gallons of gasoline a year from an estimated 300 million gallons Jacksonville used in 1979.

Vanpooling

Following the 1973 national lead of the 3M company, Prudential began a program in Jacksonville and all of its regional offices in 1976.

The individual benefits from vanpooling. He rides in a new, well-maintained vehicle, enjoys door-to-door pick-up service, may relax, work or sleep rather than fight the traffic, is dropped at the door of the building and may save the cost of an additional family car.

The company benefits. Peer pressure in the vanpool helps prevent one day absences. Since the riders pay whether they ride or not, most feel they should use the service. Tardiness is virtually eliminated because if one person is late it makes 14 other riders late. Use of the vans helps improve employee morale since riders feel that the company is giving them something - the opportunity to save money.

The federal government provides incentives to the company by giving a 10 percent tax credit if the company uses the vans for more than 20 percent of company business during the day. A sign on the van can also advertise the name of the company.

The 1979 cumulative figures for 12 vanpools indicated that Prudential saved 90,000 gallons of gasoline last year, based on 10 miles per gallon per van. Carpooling removed an estimated 274 cars from the city's roads. By reducing the number of cars on the road, 87.9 tons of carbon monoxide emissions along with 17 tons of other noxious emissions, including lead, were eliminated.

Mass Transit

As the public changed its transportation preferences to private cars, public transportation systems became subsidized by federal, state and local government with rider fares providing only 50 percent of the total revenue. Fares remained low as bus systems continued to serve their traditional riders, the elderly and the poor. Gas shortages of '74 and '75 brought new users, downtown commuters, to the transit system. Current bus fleets are having problems serving the old routes and the new commuter routes at the same time.

The Jacksonville Transportation Authority (JTA) has nearly reached its passenger capacity with its present equipment. The major mass transit problem lies in the three hour morning peak demand, when about 170 buses are required with the present service schedule. Even at this level, peak hour demand is exceeding seating capacity with existing equipment and funding levels.

City Council has indicated an unwillingness to increase its subsidy of the bus system until the JTA implements a fare increase. At this writing, the JTA has proposed a 15¢ increase in the standard fare, a 15¢ increase for express buses and a $3.00 increase for bus passes. This represents a 17-43 percent increase for the general public. The proposed increase for senior citizens and handicapped is 66 2/3 percent (from 15¢ to 25¢).

According to the chairman of the JTA, Bill Birchfield, one of the greatest potentials for immediate service expansion without additional expense lies in the diversion of some peak hour travel to off peak, with the adoption of flexible work hours by employees. Another possible immediate solution to the peak load service is the reduction of the work week to four days instead of five.

If the JTA doubled its current ridership, it would reduce the number of cars in downtown Jacksonville by only 5 percent. Because of a shortage of buses, the JTA will have extreme difficulty dealing with the increase in ridership without buying new equipment.

Jacksonville operates a 200 bus fleet. The average JTA bus is 10 years old with about 2 years of life left. Refurbishing costing between $15,000 and $60,000 per bus could add another 12 years of life. The JTA is trying to buy 30 used buses at a cost of $365,000 to handle increased ridership through this year. New buses cost up to $115,000 in today's market.

Current buses average 3 to 5 miles per gallon with newer modesl getting even less. While smaller buses appear to be more fuel efficient, their passenger per mile per gallon is less than that of standard buses holding 54 passengers.

The JTA also operates the city parking lots, the Park N Ride lots and peripheral parking for users of the city's shuttle services. Revenues from parking contribute to the mass transit budget.

The JTA maintains two budgets, one for the building and maintaining of highways and bridges and the other for mass transit. Highways are funded essentially from two sources: the proceeds from toll facilities and money acquired from the sale of bonds. For the fiscal year which ended June 30, 1979, bridge tolls alone brought in $14,690,730 from 62 million revenue vehicles. 1979 bridge tolls were allocated to bond principal and interest, toll operations and maintenance. In recent years toll revenues have exceeded these expenses.

The JTA transit budget for 1979, including the Downtown People Mover studies and capital acquisition, was $15,275,478. The amount for bus operations was $10,433,415. The 1980 budget projects $19,683,162 for mass transit with $11,538,033 allocated to bus operations.

Additional funding for mass transit must be made available to provide the services that will be needed in the near future. Possible sources include: surplus bridge toll revenues; increased bridge tolls; and ad valorem, motor fuel, sales and use taxes.

LAND USE AND THE BUILT ENVIRONMENT

The American Dream

The American dream has been to own a home and a piece of land. Americans in increasing numbers moved from the central cities to achieve their dream. Jacksonville was no different.

The 1970 census showed that of the 140 million Americans (68.6 percent of total population) living in metropolitan areas, 54 percent lived outside the central cities. Before the system of roads and cars, only the very wealthy could afford to live in the country and commute each day to the city to work.

Americans fled the noise, congestion, pollution and crime of the industrial areas of the city and sought the beauty and appeal of the "countryside." Despite their drawbacks though, older more compact neighborhoods were more energy efficient than some other land use designs. High density cities allowed populations to live close to work, stores and public transportation.

In suburban areas, where most housing is detached and city services and shopping areas scarce, residents consume three times more energy than do city dwellers. The problems of the energy crisis are accelerating a growing disenchantment with urban sprawl. The crisis signals the end of an era and forces Americans to make central cities better places to live by planning for a more energy efficient tomorrow.

Planning for More Energy Efficient Land Use

The Jacksonville Planning Board has considered three alternative planning concepts for Jacksonville: (1) low density spread, (2) planned unit development, and (3) growth corridors. The Jacksonville Area Planning Board concluded that the growth corridor concept was the least costly and most energy efficient.

According to the growth corridors concept, more intense development should occur along main corridors complemented by mass transit.

In addition to the growth corridors concept, the 2005 Land Use Plan encourages clusters of mixed use areas which could include a combination of residences, small shops and offices. These clusters could help reduce travel.

Energy exists in the unbuilt environment as well as in the built environment. For example, many natural creeks have been used as a means of drainage. However, when abused with excessive amounts of water, a creek will begin to self-destruct and will no longer serve its function. In time the creek will cost the community energy for periodic dredging.

Other examples of energy saving natural features in Jacksonville are the wetlands and swamps. Swamps naturally serve as a free source of storm water treatment alleviating the need for additional water treatment plants. Swamps and marshes should remain in their natural state because they serve a positive function and would contribute to drainage problems and costs if they were used for other purposes.

Because Jacksonville has substantial agricultural interests, it should be noted that today's agriculture is almost totally dependent on petroleum based energy sources. The farmer's ever narrowing portion of the food and fiber dollar has forced him to increase the production efficiency of his operations as no other industry has done. Fifty years ago, over 1/2 the working Americans were on farms. Today fewer than 3 percent are there. As a result, economies have been forced in the agriculture sector. The main areas of further energy use reduction lie in the development of alternate energy sources and in the further development of low energy technology.

Energy Use in Buildings

"If we adopted a high priority national program emphasizing energy efficient buildings, we could by 1990 be saving the equivalent of more than 12.5 million barrels of petroleum per day."
American Institute of Architects

Heating, cooling, lighting and heating water for homes, commercial structures and factories account for 36 percent to 40 percent of the U.S. energy consumption. The residential sector accounts for 20 percent of all energy used. Within U.S. residences most energy is spent for heating (53 percent), hot water (24 percent) and air-conditioning (7 percent). Appliances use 6 percent of the national energy total. Consumers demanding durable and efficient appliances would help reduce energy consumption substantially.

In Jacksonville, the residential sector is the second largest consumer of energy (23 percent) after transportation, with the commercial sector third. The fourth largest sector (14 percent) is the industrial user. In contrast to national figures (26 percent), water heating in Northeast Florida accounts for 30 percent of electricity used in the home followed by air-conditioning (27 percent).

According to Worldwatch Paper, Energy: The Case for Conservation, 30 percent to 50 percent of the operating energy in most existing buildings can be conserved and 50 percent to 80 percent can be saved in new buildings.

Problems in Jacksonville's Housing Efficiency

Most of Jacksonville's housing was built before the 1973 energy crisis. Much of it consists of concrete block with jalousie windows built before air-conditioning was the rule rather than the exception. As time passed, air-conditioning was added to homes that were not air tight, causing high energy consumption. Some homeowners' electric bills have become higher than the mortgage payments.

As Jacksonville replaces its housing (about one percent per year), houses could become more energy efficient. But many new homes are being built in the same energy inefficient ways of the past.

Builders are trying to keep prices down for those who can afford to buy. To the builder this usually means minimal, optional energy efficient techniques or packages. Many homebuyers, too, are interested only in the initial down payment rather than the long term energy savings. They view energy packages in the short run rather than over the life cycle of the house.

Buyers and builders consider energy conservation packages as extras or options which will pay for themselves through the years in fuel bill savings. However, some energy efficient designs can, in fact, reduce the requirements for heating and cooling equipment thereby reducing monthly electric bills, saving money initially as well. Installing double paned windows and reducing window areas will also reduce the need for larger air-conditioning and heating units. The larger investment in the windows will result in an immediate savings in the cost of air-conditioning/heating units as well as a savings in energy over the life of the house.

Building Codes

Jacksonville's building code purports to be a guide for making houses energy efficient. "ASHRAE 90-75," a nationwide code, primarily emphasizes savings on heating rather than savings on cooling. The new Florida Model Code being proposed by the Governor is an ASHRAE type code but primarily geared to air-conditioning.

The State of Florida expects the model code to conserve 12 million to 19 million gallons of oil in the first year. An intelligent, long-range program of code implementation can save 700 million gallons during the next ten years without sacrificing the current standard of living. These numbers represent the savings in residential buildings alone.

For the first time, a family shopping for a home will be able to compare energy consumption features. In turn, builders will be encouraged by public awareness to develop the most efficient residences possible.

Many common misconceptions will be corrected by the code. For example, it can readily be seen by reading the charts in the code that ceiling insulation rated R30 is not much better than R19. A builder can see for himself that greater benefits can be obtained at less cost by moving air-conditioning ducts from the attic into the conditioned space.

Solar energy is encouraged, as is reclaiming heat from air-conditioning for heating water. This advantage must be seen for its true value. Six percent of all energy consumed in Florida goes for domestic hot water, and about 80 percent could be furnished by solar heating. If solar energy were universally used in residences, Florida would save 840 million gallons of oil per year.

New "Old" Designs

People lived in the Florida climate long before air-conditioning. They used passive devices to control the heat. In the early days trees and cloth canopies shaded walkways and cooled the air. Homes had high ceilings with adequate ventilation augmented by fans. Large porches shaded windows from the sun and provided an additional "room" in the summer.

In light of the energy crisis new designs can copy the old. Some of the designs that Florida has had in the past have been very practical. The old schools had a large number of windows, which allowed natural light and increased ventilation. Overhangs also served as an effective tool for shading glass. With no shading, 88 percent of the heat of the sun goes through the window into the building. With an indoor shade or curtain, 35 percent of the heat still enters the room. However, where an overhang prevents the sun from touching the glazed surface, only 5 percent of the heat enters the room.

There are many innovative approaches to designing energy efficient buildings. However, little research has been done on buildings for hot, humid climates like Florida's, where shade and air movement are very important. Principles which work well in the North do not work as well in Florida. Solar heating, for example, can overheat Florida homes even on mild winter days. Rather than using windows for solar heating, it is more important to shade Florida windows with louvres, overhangs or other means.

Site Planning for New Buildings

Almost half of the dwelling units that will exist in 2005 have yet to be built. Planners have a tremendous opportunity and a responsibility to influence energy efficiency in the designing and siting of those structures.

Site planning is very effective in reducing energy needs. In planning buildings on a site, sun, shade, breeze and spaces in buildings should be considered. Each building's placement should be planned to receive maximum benefits from solar orientation. Large areas of windows and walls facing east and west should be avoided. Closets on interior west and east walls can help to provide insulation to the dwelling.

Air movement is an important feature to make a Florida home more liveable. Air movement can be achieved by planning the orientation toward the wind and placing windows to control breezes. Landscaping by planting trees where they can cool the breeze before it enters the house is effective. Better ventilation is possible by staggering homes rather than lining them up next to each other. Operable windows in a clerestory allow rising hot air to return outside. A continuous venting strip along the top of the roof can help keep attics cooler.

Shrubs, trees and other greenery provide natural air-conditioners to help cool buildings. In the spring and the summer the foliage protects the building from the heat's rays and in the winter deciduous trees allow the sun to warm the building. In addition, trees and natural foliage provide fresh air, cooling breezes and attractive scenery.

Site planning provides the potential to improve the quality of life as well as to save energy. Clustering buildings saves energy by shading walls and requiring less infra-structure to provide services and utilities. Clustering also releases land to be used for passive features which cool the air and provide recreational opportunities and green spaces.

Effective Insulation

In Florida some of the most effective insulation is for the outside of the house. Insulation on the outside of concrete block keeps heat from inside of the house in the evening. For instance, for structures covered with a berm of earth there can be 50 percent savings in energy use.

Better insulation enables existing houses to make more efficient use of energy. Some estimates maintain that 30 percent of the residences in the country are completely uninsulated: altogether 66 percent probably need more thermal insulation. Insulation can produce a significant savings. Researchers from the Center for Environmental Studies at Princeton University found that a simple package of interior window insulation, basement and attic insulation and plugging of air leaks produced a 67 percent reduction in annual energy consumption for space heating in northern houses.

Energy Consumption in Office Buildings

Lighting uses a great deal of the energy in present office buildings. Much of this lighting is excessive. The more lighting, the more heat must be competed with by the air-conditioning system. Effective design in combatting heat from lights uses glass on the north side of the building which allows good quality natural light without heat. Skylights and clerestories oriented to the north are also an effective means of lighting an area without heat. An alternative to evenly lighting entire rooms is flexibility in lighting and switching systems.

Operable windows also take advantage of the natural ventilation needed to cool buildings. Even though natural ventilation could be used a significant amount of time in place of mechanical systems, there are many office buildings planned for Jacksonville without operable windows.

Consumers Make A Difference

No matter what the codes require, builders build or architects design, it is the consumer who makes the real difference in energy consumption. Two identical houses can have vastly different fuel bills depending on the habits of the consumers.

CONCLUSIONS

Conclusions express the value judgments of the committee, based on the findings.

Sources and Consumption

1. The world, dependent upon the relatively clean and formerly cheap fuels of oil and natural gas, is beset with an energy crisis. These and other non-renewable energy sources are rapidly being depleted, and their loss will require changes in both sources and uses of energy.

2. Jacksonville is in a particulary vulnerable position because of its almost complete reliance on oil for energy to operate our electric utility, transportation system and built environment. Jacksonville's citizens seem more concerned about the high cost of energy than about the likelihood of impending shortages. Yet the energy crisis is more than a crisis of price. It is also a crisis of supply.

3. Leadership in this energy crisis from within both the public and private sectors of Jacksonville has, to date, been more cosmetic than substantive. Various committees and organizational structures have been created ostensibly to deal with the problem, but no real emphasis or commitment has been given to the task by community leaders. This is particularly true in the areas of leadership-by-example, legislative and administrative actions, energy education, and conservation incentives.

4. The Jacksonville Electric Authority (JEA) is taking some steps to lessen Jacksonville's dependency on oil and to provide for future energy by exploring alternative non-renewable sources. JEA should not select only one non-renewable energy source. Instead, it it is important to use a diverse mix of fuels including those from renewable sources.

5. Jacksonville's citizens lack understanding about the energy crisis and this probably accounts for their apathy towards conservation measures. The less informed they are, the less likely they will be to conserve. For example, some consumers of electricity feel that they are in a "Catch 22" situation --- the more they conserve, the more they must pay if JEA raises its rates to offset a loss in volume. But the contrary is true. Unless consumers conserve, they will be paying even more for the electricity they consume because increased demand will cause increased generation costs (purchase of foreign oil, use of combustion turbines, high operating costs and costs of additional plants and equipment) by JEA which must be passed along to the consumer.

6. A major technological goal is the development of clean, abundant, low-cost energy from renewable resources. In the absence of such technology, our best immediately available resource is, strangely enough, conservation --- using what we have wisely and using less of it.

7. The best kind of conservation is what has been termed "productive conservation." It seeks first to eliminate wasteful and frivolous use of energy and then to concentrate on adjustments in living habits which will cause the least disruption in the consumer's standard of living. It provides an opportunity for Jacksonville to lower its energy bills, improve its transportation, buy time for technology and insure future energy supplies.

Transportation

8. Gasoline will probably be available for the short term, i.e., 1980 to 1985, but it is certain that, despite some sporadic increases in supply, the future will see a decrease in supply and an increase in price. The energy crisis threatens America's long love affair with the automobile, which has been nurtured by the availability of cheap oil, government highway policy, and an effective auto industry marketing program.

9. Even if new transportation technology emerges to permit alternative fuel sources, the public must be motivated to conserve gasoline. Conservation is necessary both to make existing resources last longer and to reduce expenditures which help fuel inflation. Energy saved by conservation and transportation efficiencies could free oil for plastics, medicines, fertilizer, lubricants, chemicals and other products in which it is an indispensable ingredient. The most effective way to immediately reduce gasoline consumption is to reduce private auto use.

10. Positive, aggressive leadership from local government, private enterprise and community groups is needed to bring about gasoline conservation by the Jacksonville consuming public, yet:

    a. The Metropolitan Planning Organization (which is responsible for local bridge and highway planning), the Jacksonville Transportation Authority, and the State Department of Transportation have given

insufficient emphasis to the energy crisis in doing the transportation planning for our community. They appear more concerned about construction of bridges and highways than about reducing the use of motor vehicles, which is essential to lowering gasoline consumption.

b. The Jacksonville Transportation Authority (JTA) appears to be giving little attention to the energy crisis. Its carefully segregated budget favors bridges and highways over mass transit, and its commitment to projects like the Dames Point Bridge and J. Turner Butler Boulevard reinforces the conclusion that JTA sees its primary role as a "builder" and "stimulator of growth" in the community. This role is not balanced by a commitment to mass transit and energy conservation. The city bus system is near capacity and will need to be expanded, but JTA seems more interested in the Downtown People Mover and High Occupancy Vehicle Lanes (HOVs) for which federal money serves as a catalyst and which will provide construction jobs than in mass transit. These projects are not assessed from a net energy viewpoint to insure both their compatibility with a program of energy conservation and their practicability. It is clear that if mass transit is to fill its role as an energy saver, it must be attractive, convenient and economical transportation to its users. This can only be achieved if the decision-makers commit to such a goal and seek ways to increase efficiency of operations and to further subsidize mass transportation.

c. Most actions taken to date by the Jacksonville City Government and the Duval County School Board have been to meet budgetary constraints rather than to further conservation. They are both substantial consumers of gasoline and they need to consider conservation measures which may necessitate changes in their operations, but which will not drastically reduce their services to the public.

d. With few exceptions, the business community and citizen groups have not exerted leadership in promoting conservation. Presumably, business will reduce its own gasoline consumption in order to reduce its operating costs, but it has not done much to provide incentives to its employees to conserve. Carpools, vanpools, city buses, flexitime, staggered working hours, and bicycles all constitute transportation alternatives to the employee's private auto, which could be promoted by business. With respect to bicycles, for example, most businesses do not provide adequate storage space and security for them. Indeed, bicycles are not taken seriously as a transportation mode by the government, as shown by the limited scope of the JUATS Bike Plan and the great disparity between funding for the Bike Plan and other allocations for transportation.

Land Use and the Built Environment

11. Energy conservation in the built environment can be accomplished only through cooperative efforts of consumers, the construction industry and the government.

12. With a few notable exceptions, the local construction industry, including architects, mechanical engineers, builders and lenders, is not designing new buildings, retrofitting old buildings and financing homes and commercial buildings which stress energy efficiency. Too often, the long range cost benefits of incorporating energy efficient features ("life-cycle costing") are ignored in favor of short term first cost savings. Energy efficient buildings can save energy and money.

13. The Jacksonville 2005 Comprehensive Plan (which is designed to describe what our city should be like over the next 25 years) has not been revised to include a so-called energy "element," which would require the testing of various assumptions and conclusions against energy concerns. Further, neither Jacksonville's city government nor the private sector is considering the energy crisis in zoning and land use decisions. Consequently, urban sprawl conditions and natural resources are not adequately protected.

14. Jacksonville's subdivision regulations and building code are not tailored to Jacksonville's climate and do not specifically address the possibilities of passive solar design in site and building planning.

15. Individual consumers make a difference in the energy crisis, provided they have sufficient knowledge of energy conservation measures. Their educated purchase and use of homes and appliances which are energy efficient will save significant amounts of energy. Energy usage between identically constructed houses can vary dramatically because of different consumption patterns by the occupants. If households conserve, money that would otherwise be spent for energy can be spent for local goods and services to the benefit of the community.

RECOMMENDATIONS

Recommendations are the committee's specific suggestions for change, based on the findings and conclusions.

Government

1. In view of the proliferating number of committees studying energy, the Jacksonville City Council, by ordinance, should attempt to consolidate efforts and create the Jacksonville Energy Commission charged with the responsibility of recommending policy to City Council on all matters dealing with energy conservation. Its membership should be chosen by the Mayor and confirmed by the City Council. The commission should be broad-based. JCCI would be willing to suggest a list of possible members for consideration. Membership should be limited to 15 persons, one-third from government, one-third from business and professional organizations, and one-third from civic groups. The commission should be supported by public funds with the option of seeking other funding later, and staffed by a professional director and a secretary hired by the commission. Its functions would include but not be limited to the following:

   (a) to establish a comprehensive public education program dealing with the energy crisis;

   (b) to advocate specific legislative or administrative action by the city government in the interest of energy conservation;

   (c) to act as a clearinghouse for information on energy conservation;

   (d) to recommend energy conservation measures with appropriate incentives to both government and the private sector;

   (e) to monitor and evaluate city planning activities to insure energy efficiency;

   (f) to analyze or cause to be analyzed the net energy requirements of such capital projects and operations of the city government as it deems necessary and to make such analyses public;

   (g) to encourage the private sector to use similar energy analysis in its activities;

   (h) to solicit grants to implement specific programs.

2. The Jacksonville Electric Authority should expand its efforts to diversify its fuels and should be actively seeking renewable sources of energy for its future supply.

   It should promote conservation both to reduce the consumers' costs and to provide a possible alternative to future needs so that generating capacity could be decreased.

   If Jacksonville citizens conserve productively, it may pre-empt the need for new generating plants. Specifically, JEA should:

   (a) provide financing (grants, low or no interest loans, etc.) and other services for customers who wish to install energy saving devices and insulation in their homes, the cost to be repaid through monthly billings;

   (b) adopt residential rate structures which reward low consumption, and penalize high consumption of electricity;

   (c) adopt co-generation measures which use so-called "wasted energy."

3. The Metropolitan Planning Organization, Florida Department of Transportation, Jacksonville Transit Authority, Jacksonville Port Authority and the Jacksonville Planning Body of the City of Jacksonville should re-examine all major transportation projects such as road and bridge construction and expansion, mass transit projects and parking garages in light of the energy crisis. An energy analysis which takes into account net energy should be required for each major project. Recommendations from the analysis should be disseminated to the public by the agencies.

4. The J.T.A. should assign mass transit a higher priority than new bridge and highway construction. An assured revenue source for mass transit is urgently needed and should come from one or more of the following sources: bridge tolls, sales, gas or other taxes or general revenue funds.

5. The City of Jacksonville and the Jacksonville Transportation Authority should review traffic circulation and promote energy efficiency by revising operating practices.

A) Traffic light synchronization plans should be expanded and implemented.

B) JTA attorneys should seek to amend bond contracts so that tolls can be collected in some lanes without stopping traffic - perhaps using annual tags.

C) High Occupancy Vehicle Lane Plans which would speed traffic through tolls should be implemented.

6. The City of Jacksonville, including its Streets and Highways Department, the Jacksonville Transit Authority, the Department of Transportation and the City Council, should fund and construct well-maintained bikeways on or adjacent to new roads and major road reconstruction projects, giving a high priority to such alternate transportation routes. The city should appoint a bikeway staff person to coordinate with respective city and state departments in planning and funding bikeways with a citizens' advisory group representing the general public and experienced cyclists. In addition, the City, schools and private business centers should provide auxiliary services for bikers such as secured bike parking areas or enclosed locker facilities. A network of safe bike paths should be constructed as energy efficient transportation alternatives, especially to schools and for short trips.

7. The Mayor should re-examine his plan to cut gasoline usage. Rather than an across-the-board cut of 18 percent, each department should set goals for conservation unrelated to budget constraints and contingent on individual departmental needs. As city vehicles are replaced, new energy efficient vehicles should be purchased.

8. The Duval County School Board should revise its policies for transporting children to school. The School Board should insist on sidewalks and bike paths so that children can safely walk or ride bicycles rather than being driven. Bus routes should be re-examined so that children who live in close proximity to the school can walk or ride bikes. Schools should examine the use of J.T.A. buses during non-peak hours. Students should be discouraged from driving to school by school policy and/or paid parking requirements. The School Board and the NAACP should review the court-ordered desegregation plan to decrease the length of busing trips in light of the energy crisis.

9. The J.T.A. and the City of Jacksonville should charge commercial rates for downtown parking. Increased parking rates provide incentives for using mass transit, carpools and vanpools.

10. The Jacksonville Planning Body should revisit the 2005 Plan and confirm whether the growth corridors concept is the most energy efficient plan for further growth and development. In addition, the 2005 Comprehensive Plan should contain an energy element which would require the testing of various assumptions and conclusions against energy concerns. The energy element and land use element should:

A) discourage sprawling patterns of land use which waste energy and overtax city services.

B) assure that new developments and major rezoning conform to the plan.

C) include a conservation zone which would reduce the intensity of use of marshlands and swamps so that natural systems could retain their functions of low energy water treatment. In this way the natural systems would prevent the need for building additional energy intensive water treatment plants.

11. The Jacksonville City Council should adopt the Florida Energy Efficient Code, modified if need be to the particular problems of Jacksonville's climate:

A) The code should assign ratings of energy efficiency to new residences so that consumers can make informed decisions based on comparisons in shopping for new houses.

B) The Mayor should require that public buildings set an example of energy efficiency. Any public buildings now on the drawing board should be re-examined for energy conscious designs such as operable windows and passive solar design.

12. The City Council should pass a tree ordinance to provide shading of paved areas, sidewalks and buildings to cool outside air and reduce the need for air-conditioning. The ordinance should prevent unnecessary removal of trees and should also promote the planting of shade trees along thoroughfares, parking lots and should encourage additional planting on private property.

Private

13. Leadership in government, education, industry, professional organizations and civic groups must help the Jacksonville populace adapt to altering lifestyles by providing education, incentives and examples. Architects, developers, engineers, builders and lenders must be encouraged to consider energy and maintenance costs as well as first time costs in designing new structures and retrofitting older ones.

14. With the leadership of the Chamber of Commerce, private and public employers should provide incentives to employees to encourage the use of carpools, vanpools and mass transit. Incentives should include preferred parking, and employer transit fare payments. In addition, some businesses could implement flexi-time and 4 day work weeks where applicable to help save energy and encourage conservation.

Consumer

15. The individual can help save energy in many ways. The following list contains only some of the numerous suggestions that can work:

    . Use public transportation, a motorcycle, a moped or a bicycle or walk to work.

    . Share a ride. Join a carpool or a vanpool. Eliminate unnecessary trips.

    . Observe the 55 mph speed limit on the highway. Most automobiles get about 20 percent more miles per gallon on the highway at 55 mph than they do at 70 mph. Drive at a steady pace. Avoid stop and go traffic.

    . Have your car tuned as recommended by the manufacturer. Regular tune-ups can save you as much as 10 percent on gasoline costs.

    . Check tire pressure regularly. Ten percent under inflation in your tires will reduce gas consumption about 5 percent, 40 percent under inflation will cost you nearly 60 percent in peak mileage.

    . Consider steel belted radials when you buy new tires. They give several percent better mileage and last longer.

    . Remove unnecessary weight from the car. The lighter the car, the less gas it uses.

    . Purchase only the optional equipment and accessories you really need. Items like automatic transmission and power steering require considerable energy, all derived from gasoline.

If designing a new home or apartment building some of the following suggestions have saved money and fuel:

    . When designing a new house, design for the climate and take advantage of sun and shade.

    . Install windows you can open, so that you can use natural ventilation in moderate weather.

    . Use double-pane glass throughout the house. Windows with heat-reflecting or heat-absorbing glass in south and west windows provide additional energy savings.

    . Insulate walls and roof to the highest specifications recommended in the area.

    . Install water heater as close as possible to major use. When buying a new water heater, select one with thick insulation on the shell. Consider solar water heating.

    . Select light-colored roofing in air-conditioned buildings.

    . When buying a house, ask for a description of the insulation and data on the efficiency of space heating, air-conditioning, and water heating plants, or have an independent engineer advise you about the efficiency of the equipment provided. Consider the need for additional insulation or replacement of equipment.

REFERENCES

Avera, William E. "Homeowners and Energy Costs." Texas Business Review, January - February 1980, pp. 40-44.

Bartlett, Albert Allen. "Forgotten Fundamentals of the Energy Crisis." American Journal of Physics, September 1978, pp. 876-889.

Fowler, John M. Energy Environment Source Book. 2 vols. Washington: National Science Teachers Association, 1975.

Governor's Energy Office. Governor Graham's Legislative Program: Energy. Tallahassee, Florida [1980].

Hayes, Dennis. Energy: A Case for Conservation World Watch Institute, 1976.

Jacksonville Area Planning Board. Jacksonville Urban Area Transportation Study Annual Report 1978-1979.

Lees, James R. "Energy Alternatives Reconsidered." NECEP Journal, March 1979, pp. 25-27.

Northeast Florida Regional Planning Council. Regional Energy Plan. Jacksonville, Florida, June, 1979.

Portland, Oregon. Ordinance #148251. Adopting an Energy Conservation Policy for Portland. 15 August 1979.

Region IV Energy Action Committee. Energy and Northeast Florida. Northeast Florida Regional Planning Council.

Salisbury, David F. "Bicycle Becomes Big Wheel Once Again." Christian Science Monitor 1 April 1980.

Sease, Gary. "JTA Now Needs More Buses." Jacksonville Journal. 23 January 1980.

"Shaping the Next Three Decades." Thinking About the Future. August 1979.

Stobaugh, Robert and Yergin, Daniel. Energy Future. New York: Random House, 1979.

Turlington, Ralph D. "Energy and Education in Florida." Address presented at the Florida Energy Awareness and Conservation Conference, Orlando, Florida, 21 April 1980.

Udall, Stewart; Conconi, Charles; and Osterhout, David. The Energy Balloon. New York: McGraw Hill, 1974.

APPENDIX

GLOSSARY

COGENERATION ... The combined production of electricity and heat, primarily in two forms:

1) Steam or hot water from a power station is delivered by pipes to homes and offices to provide heat and hot water.

2) Production of electricity and steam at industrial sites where the firm produces not just steam but also electricity as a byproduct of generating the steam. Half as much fuel is used to produce electricity in steam, using cogeneration, as would be needed to produce the two separately.

EXPONENTIAL GROWTH FORMULA ... An easy way of calculating the doubling time is simply to divide 70 by the annual percentage increase. Thus a growth rate of 14 percent per year results in a doubling time of five years.

$$\frac{70}{\text{percent}} = \text{doubling time} \qquad \frac{70}{14} = 5 \text{ yrs.}$$

LIFE CYCLE COSTS ... The initial purchase price plus the operating costs over an anticipated life expectancy.

NET ENERGY ... All the useful energy left from an energy source after the energy costs of exploration, extraction, production and transportation are subtracted. This "net" is an expression of energy profit in a particular energy process. The distinction is similar to gross income versus net profits. Net energy is the net profit.

NON-RENEWABLE RESOURCES ... Oil, gasoline, coal and fossil fuel derivatives are non-renewable. Renewable resources include solar energy of all types.

RETROFIT ... Retrofit is a space age term describing the upgrading of a complex system for the insertion of improved components. In buildings it generally means changes in equipment and structures to improve thermal and lighting efficiency.

SOLAR ENERGY ... A blanket term that covers a diverse set of renewable energy technologies, from microwave satellites to wood, America's original fuel. There are so many facets of solar that the Department of Energy organized the categories into the following:

1) Thermal (heating and cooling) applications
   Heating and cooling of buildings - including hot water heating
   Agricultural and industrial process heating

2) Fuels from biomass
   Plant matter, including wood and waste

3) Solar electric
   Solar thermal electric-such as the "power tower"
   Photovoltaics-solar cells
   Wind-windmills
   Ocean thermal electric
   Hydropower-hydroelectric dams

COMMITTEE MEMBERSHIP AND WORK

The committee met weekly from November, 1979 to June, 1980. Each week it heard from knowledgeable resource persons and received additional written materials researched by JCCI staff.

Members of the Committee

Rod Nicol, Chairman

Jack Brooks	....	Management Team
Betty Carley	....	Management Team
Ken Eilermann	....	Management Team
George Fisher	....	Management Team
Jim Myers	....	Management Team
Espie Patrinely	....	Management Team

Sybil Ansbacher	Sharon Laird
Betty Bedell	George Maida
Mary-Lou Boyer	L. Clifford Mayfield
Diana Furr	Bobbie-Sue Miller
Judith Gefter	Charlotte Minter
Elwood Geiger	Peggy Nielsen
George Harmon	Gloria Rinaman
Marvin Hill	Frank Satchel
Helen Hoekenga	Sylvia Simmons
Lillian Johann	John Sulik

JCCI Staff: Carol S. Miner, Associate Director

Ida M. Cobb, Executive Secretary

RESOURCE PERSONS TO THE COMMITTEE

Alexander, Steve
Aide to State Representative
John Lewis

Bartlett, Albert A.
Department of Physics and
Astrophysics
University of Colorado

Birchfield, William O.
Chairman, Jacksonville
Transportation Authority

Boutwell, Marvin
Chief, Zoning & Building Codes Division
Department of Housing & Urban Development
City of Jacksonville

Boyer, David
Boyer & Boyer, Architects

Cannon, John
Division Head, Jacksonville Area Planning
Board

Connell, Daniel W., Jr.
Vice-President, Atlantic National Bank

Doueck, Bruce
Energy Conservation Coordinator
Jacksonville Electric Authority

Frankel, Arnie
Jacksonville Area Chamber of Commerce

Hammond, Jim
Evans & Hammond, Architects

Healy, Edward
Chairman, Department of Natural Sciences
University of North Florida

Hearne, Theresa
Director, Mayor's Energy Office

Hester, Lex
Director, Governor's Energy Office

Hill, Barbara
Assistant Transportation Planner
Jacksonville Area Planning Board

Jordan, Dan
Associate Manager, Building Services,
Prudential Insurance Company

Kennedy, William
Governor's Energy Office

Koutnik, Ward
Head, Transportation Division
Jacksonville Area Planning Board

Lyles, Royce
Executive Director
Jacksonville Electric Authority

Malcolmson, Michael
Public Affairs Director
Texaco, Inc.

McCue, Pat
Director, Intergovernmental Affairs
Florida Department of Transportation

O'Leary, Ken
Board of Directors
Northeast Florida Home Builders Association

Prugh, Peter
Assistant Professor of Architecture
School of Architecture
University of Florida

Underwood, Herb
Executive Director
Downtown Development Authority

Wood, Terry
City Councilman
City of Jacksonville

Zeman, Bobbie
Staff, Regional Energy Action Committee
Northeast Florida Regional Planning Council

ABOUT THE JACKSONVILLE COMMUNITY COUNCIL

The Jacksonville Community Council, Inc. is a non-profit broad based citizen organization chartered in 1975. JCCI represents a merger of three former community groups:

The Community Planning Council
The Commission on Goals and Priorities for Human Services
Delegates to the Jacksonville Community Planning Conference at Amelia Island

Its goals are:

. To build citizen competence and awareness in effectively participating in community affairs.

. To strengthen and improve the capability of community institutions to serve citizens of the community.

. To forecast emerging trends and opportunities that will impact on the quality of community life.

. To act as a catalyst for bringing together decision-makers.

JCCI is funded by:

The United Way of Jacksonville
The City of Jacksonville
Gifts from private corporations
Grants for specific research and evaluation projects

JCCI functions primarily through the volunteer citizen study committee process:

A Program Committee from the JCCI membership recommends issues of community interest.

The JCCI Board of Managers approves the issues of study for the year.

Study committee chairpersons and management teams are selected

Study committee participants are recruited from JCCI membership and the community.

The Study Committee obtains a data base by means of regular meetings with responsible, knowledgeable resource persons, and staff research.

When the fact finding phase is completed, the committee reaches conclusions and makes recommendations as part of the final report.

The report of the Study Committee is released to the public after consideration and approval by the Board of Managers.

JCCI members work to implement the recommendations of the report by communicating their findings to appropriate public officials and the community-at-large.

JCCI BOARD OF MANAGERS

Robert D. Davis ..... President
George W. Corrick ..... President-Elect
Joan Carver ..... Secretary
Robert T. Shircliff .... Treasurer

Eleanor Ashby
Jacquelyn Bates
John Bryan
Betty Carley
Yank D. Coble, Jr.
J. J. Daniel
Albert Ernest
Howard Greenstein
David Hicks
Kenneth Johnson
Daniel L. Lauray
Flo Nell Ozell
James Rinaman
Robert Schellenberg
Suzanne Schnabel
Eddie Mae Steward

JCCI STAFF

Marian Chambers
Executive Director

Carol S. Miner
Associate Director

John L. Hamilton
Associate Director

Ida M. Cobb
Executive Secretary

C. Annette Brinson
Secretary

Sheryl Thomas
Clerk-Typist

Edythe Abdullah
James H. Abernathy, Jr.
W. T. Adam
Robert H. Adams
Gary Adler
Jo Alexander
John W. Alexander
Frank Allcorn, III
Robert Alligood
Harry Anderson
Sybil Ansbacher
Eleanor Ashby
Joe Bailey
Ann Baker
Barbara Bald
Ronald J. Bannister
W. Ray Barbee
Martha Barrett
Judy Batchelder
Jacquelyn Bates
C. Ronald Belton
Luann Bennett
Stephen Berry
W. O. Birchfield
Richard Bizot
Margaret Black
Murray Black
Susan H. Black
Arthur H. Bolte
Forrest F. Boone
James Borland
Bruce Bower
Wayne Bowers
Frederick W. Bowman
Chyrlene M. Boyd
Mary-Louise Boyer
Tyrie W. Boyer, Jr.
D. C. Brandvold
Lew Brantley
Alexander Brest
Janis K. Brill
Jack E. Brooks
Clanzel T. Brown
Marian Tally Brown
John C. Bryan
J. Shepard Bryan, Jr.
Cecilia Bryant
Ezekiel Bryant
J. D. Buchanan, Jr.
Julie Buckingham
John Bunker
Sherman Burgess
James W. Burke
J. W. Burnette
Bernice Butler
Johnnie Lee Byrd
Samuel Byrts
William H. Caldwell
Hugh Carithers, Jr.
Betty Carley
Joe Carlucci
Tom Carpenter
Dale Carson
William Carter
Joan Carver
R. Daniel Castle
James P. Citrano
Yank Coble
Corine W. Cole
Cecil W. Cone
Daniel Cook
William Cook
Genie Cooke
George Corrick
O. B. Cosby
Richard L. Covey
Nancie Crabb
Eartha B. Crawford
Gerald Crews
L. E. Crittenden
William J. Crossen
Joseph Cullen
Earl T. Cullins
Robert J. Dahl
Gerald Dake
Howard L. Dale
J. J. Daniel
James E. Davis
Kevin L. Davis
Ormond L. Davis
Robert D. Davis
Vera Davis
D. Clinton Dawkins
Edward W. Dawkins
Walter Dickinson
Louis DiGiusto, III
Joseph J. Dodge
Honey Donziger
Dottie Dorion
Walter Dorman
Paul C. Doyle
Ruby R. DuBose
Lawrence J. DuBow
Betsy Dunlap
Connie Edgar
Ken Eilermann
Albert Ernest
Jimmie S. Fant
Drema Farmer
James S. Farr
Vivian D. Farrell
Richard G. Fenn
Emmett Ferguson
Ronnie Ferguson
George R. Fisher
Susan Fisher
Beaulah M. Flournoy
Robert Flowers
Joe Forshee
Tillie Fowler
Ginger Frailey
George A. Frank
Moses Freeman, Jr.
Robert O. Freeman
Frank Friedman, Jr.
Diana S. Furr
John Gaillard
Marvin Ganson
Sallie Garlington
Judith Gefter
Elwood E. Geiger
Carolyn Gentry
Margaret Gibbs
Harold Gibson
Sue Giddings
James Gilmore
James A. Gloster
Jake Godbold
Herbert Gold
Lois Graessle
Alice Grant
Marvin L. Grant
Roy G. Green
Arnett Greene
Howard Greenstein
Anne Grimes
Mary Loftin Grimes
Richard G. Groff
B. A. Grubbs
Alice R. Hadwin
Mattox Hair
Bonnie Hamm
Pat Hannan
George Harmon
David Harrell
William Harrell
Thomas A. Harris
Rosanne Hartwell
Preston Haskell
Tom Healy
Charles G. Helms
James Henry
David Hicks
Marvin Hill, Jr.
Helen Hoekenga
Wendell P. Holmes
Betty Holzendorf
J. Earl Huntley
Rodney L. Hurst
Kitty Inman
Alberta Jackson
David B. Jackson
Hattie R. Jackson
Jesse A. Jackson
William Jackson
Marilyn Jacobs
Judy Jacobson
Barbara Jaffe
Diane Jefferson
Lillian Johann
Andrew E. Johnson
Kenneth L. Johnson
William L. Johnson
Silas E. Jones
Morton Kesler
Charles E. King
Ira Koger
Margaret Koscielny
Daniel Kossoff
Julie H. Kuntz
Sharon R. Laird
Daniel Lauray
William G. Lee, Jr.
Melinda J. Leighty
Jessie M. Lester
Madelyn Levin
Earl Lewis
George Longworth
Jean Ludlow
Royce Lyles
Wilford C. Lyon, Jr.
George Norman Maida
Tim Mann
Arthur B. Manning
Richard C. Martin
William S. Mathias, Jr.
Judith Ann Mattison
Meltonia May
L. Clifford Mayfield, Jr.
Donald McClure
Jane McCullagh
Martha McGee
James T. McGibony
Anne G. McIntosh
Garry Merritt
William Merwin
Joseph F. Mikulas
Bobbie-Sue Miller
Gene Miller
Douglas J. Milne
John P. Minahan
Don Miner
Charlotte Minter
Edmond J. Moran, Jr.
Max K. Morris
E. Ronal Mudd
James R. Myers
Louis C. Myers
Rod M. Nicol
Jack Nooney
Maria O'Hearn
Michael S. O'Leary
Prime F. Osborn
Flo Nell Ozell
Linda U. Padgett
Steve Pajcic
Ted Pappas
Gene Parks
Espie Patrinely
Jesse L. Patterson
Pam Paul
Trinita L. Petersen
Mary Alice Phelan
Ann Radwan
Harry Reagan
Jarold W. Regier
Bobby G. Reid
Mac Reigger
Franklin Reinstine
Del Revels
Robert L. Richard
Gloria Rinaman
James Rinaman
Beth Rio
Lynwood Roberts
Andrew Robinson
Rhoda Rosenberg
Anne Ross
R. Ed Rowan
Herbert Sang
Frank Satchel
Robert Schellenberg
Harry Schnabel
Suzanne Schnabel
Fred Schultz
Isabelle Sears
William Segraves
Isabella Sharpe
Sandra L. Sheppard
Robert T. Shircliff
Mary Lou Short
George Shuman
Charles Simmons, III
Frances Simmons
Sylvia Simmons
Kenneth M. Smith
Nancy Snyder
Leonard Spearman
Mary Spuhler
John Stafford, Jr.
William Stainback
Johnnie M. Stallings
Robert A. Stern
Eddie Mae Steward
John J. Sulik
I. M. Sulzbacher
William Sulzbacher
David Swain
Marcus Tamplin
Hans G. Tanzler, Jr.
C. Chadwick Taylor
Julia Taylor
Mari Terbrueggen
Earle C. Traynham
Israel Tribble
Arnold Tritt
Darlene Tye
B. J. Walker
Larry Weas
Thomas E. Weaver
John Welch, Jr.
Al Wells
Jim Wells
Dick Weston-Jones
Coby R. White
Susan Whitesides
Margaret Abel Wiegand
Walter Williams, Jr.
Courtenay Wilson
Hugh Wilson
Stephen R. Wise
Betty Wood
Wayne Wood
Julie Woodruff
Rene' Woodward
Claude Yates
R. P. T. Young

NOTES

JACKSONVILLE COMMUNITY COUNCIL, INC.
1045 Riverside Avenue, Suite 180
Jacksonville, Florida 32204

A JCCI report: Jacksonville—An Energy Efficient City?

United Way