



MIT-USGS Science Impact Collaborative

Transitioning from the Energy Present to the Energy Future

Collaborative Community Planning *Cape and Islands Energy System* *Stakeholder-Assisted Modeling*

A Joint Project by the Cape and Islands Renewable Energy Collaborative (CIREC) and the MIT-USGS Science Impact Collaborative (MUSIC)

April 2005



About the Systems Model and the Online Survey

Participants in the Cape & Islands Renewable Energy Collaborative (CIREC) are initiating coordinated community planning activities geared toward managing and accelerating the local and regional transition to a sustainable energy future.

Community planning activities will engage local and regional stakeholder groups in characterizing the present energy situation, envisioning the energy future, and working together to promote adoption of cleaner and green supply and use options throughout Cape Cod, Martha's Vineyard, and Nantucket.

To jumpstart the process, CIREC participants have partnered with representatives from the Massachusetts Institute of Technology-U.S. Geological Survey Science Impact Collaborative (MUSIC) to create an on-line survey. The survey is designed to encourage the public and other stakeholders to weigh in on and prioritize energy-related issues.

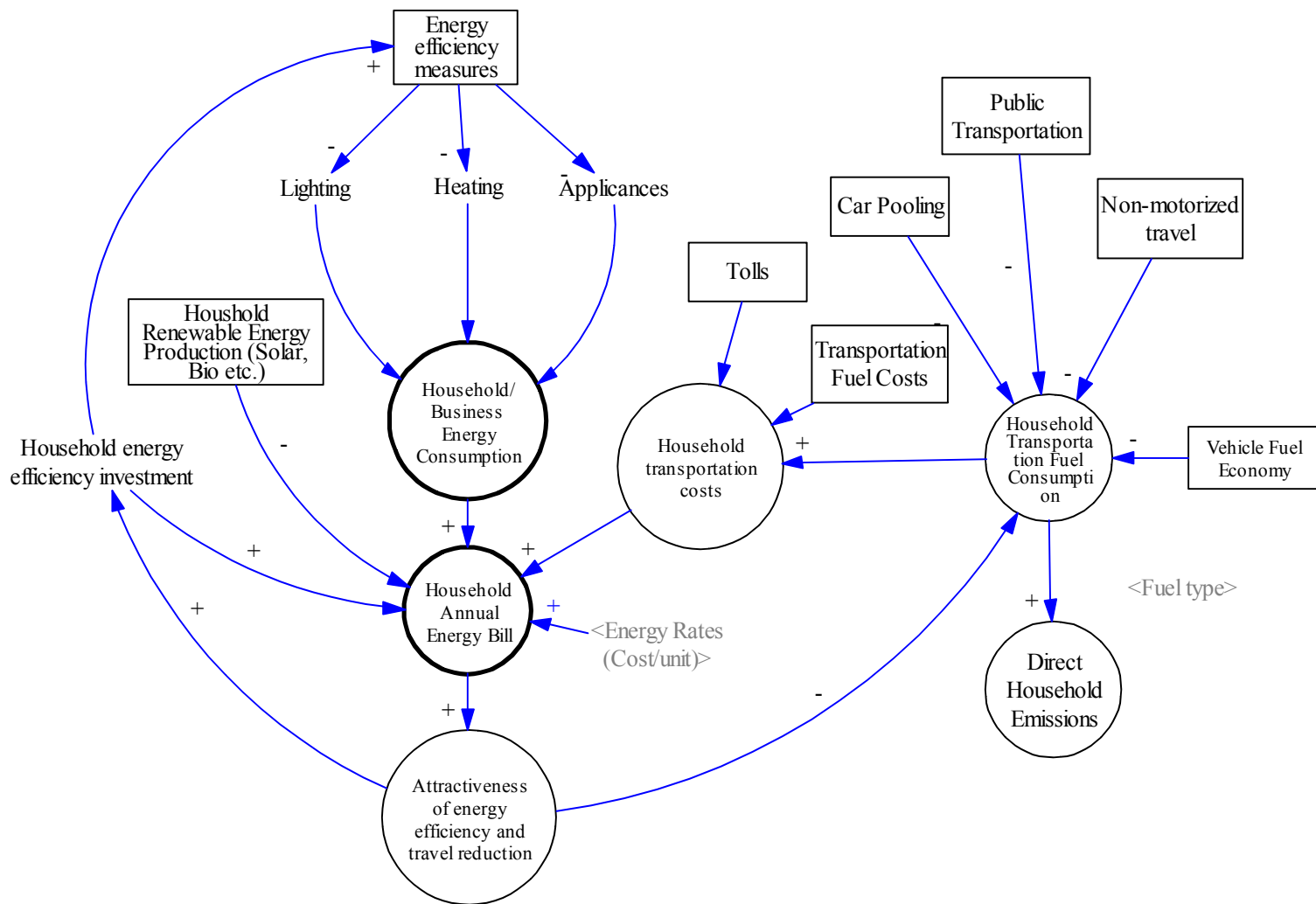
The CIREC-MUSIC team has also invited local and regional officials and representatives from environmental and business organizations, state and federal agencies, energy companies, and other key stakeholder groups to attend a mid-April meeting hosted by Waquoit Bay National Estuarine Research Reserve (WBNERR). Stakeholder opinions expressed through the survey and at the meeting will guide the development of both a model of the Cape & Islands energy economy and fact sheets characterizing the "true costs" of the current energy situation.

The model, created with support from MUSIC, illustrates how electricity and fuels are supplied to, purchased by, and used by Cape & Islands consumers, and it will identify alternative energy options consistent with the local resource base. It will also show the interconnections among energy systems and diverse economic, environmental, and social issues.

This documents presents the initial Cape and Islands Energy systems model and the results of the online survey. The model will be refined and provided with more detail during the collaborative community sessions.

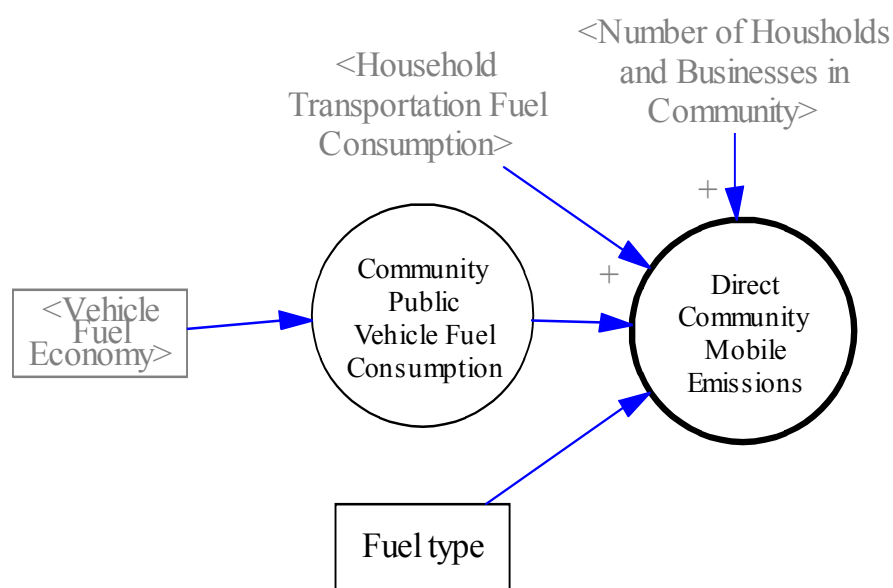
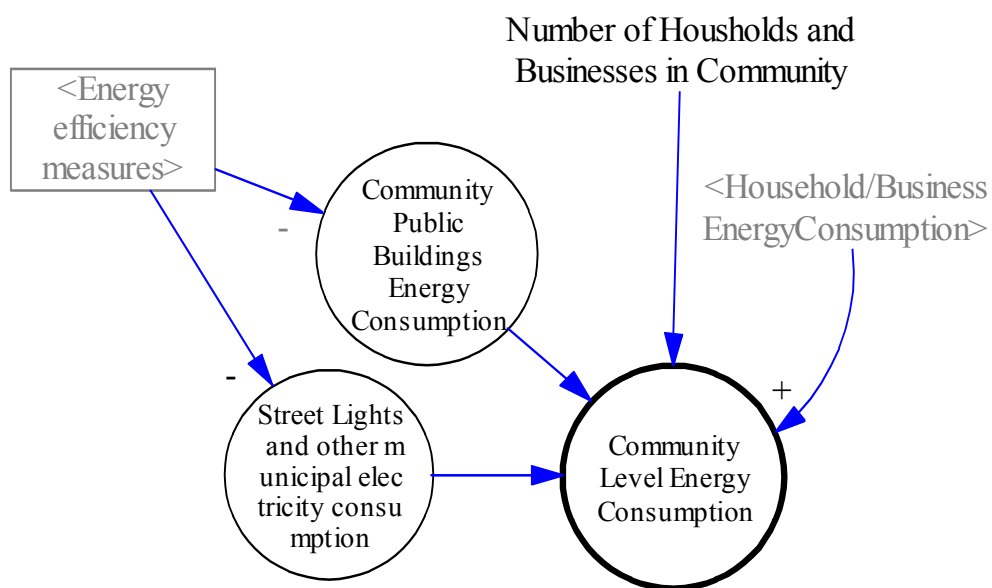


Household/Business Energy Consumption



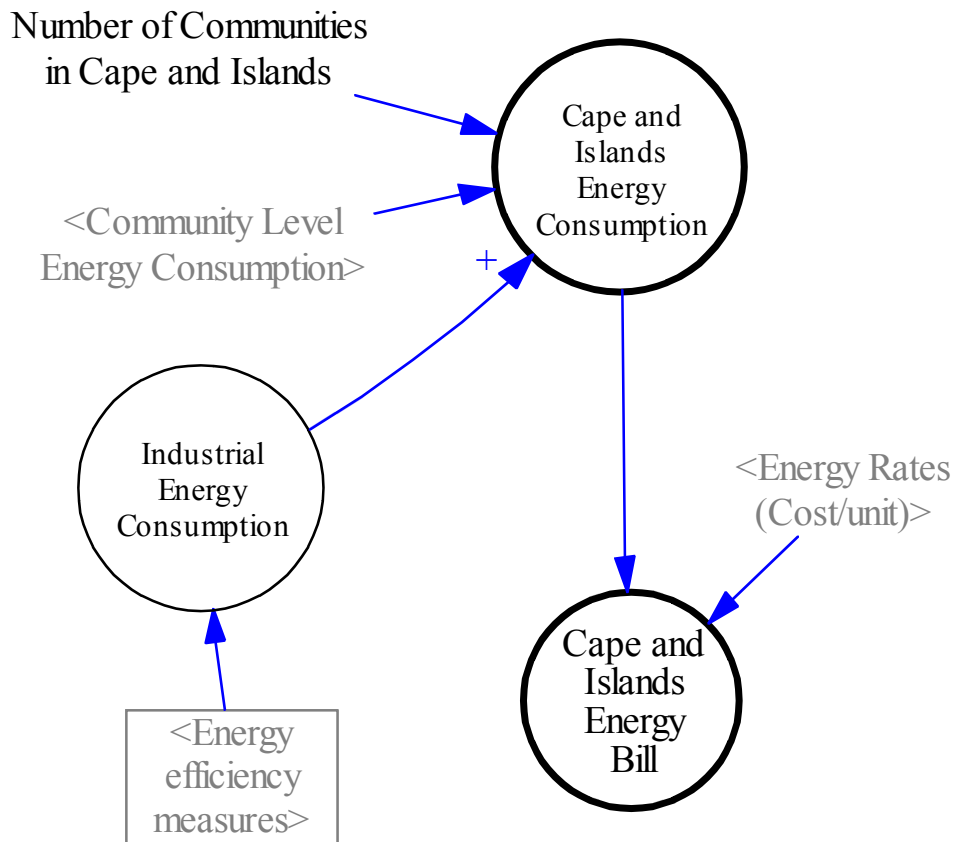


Community Energy Consumption



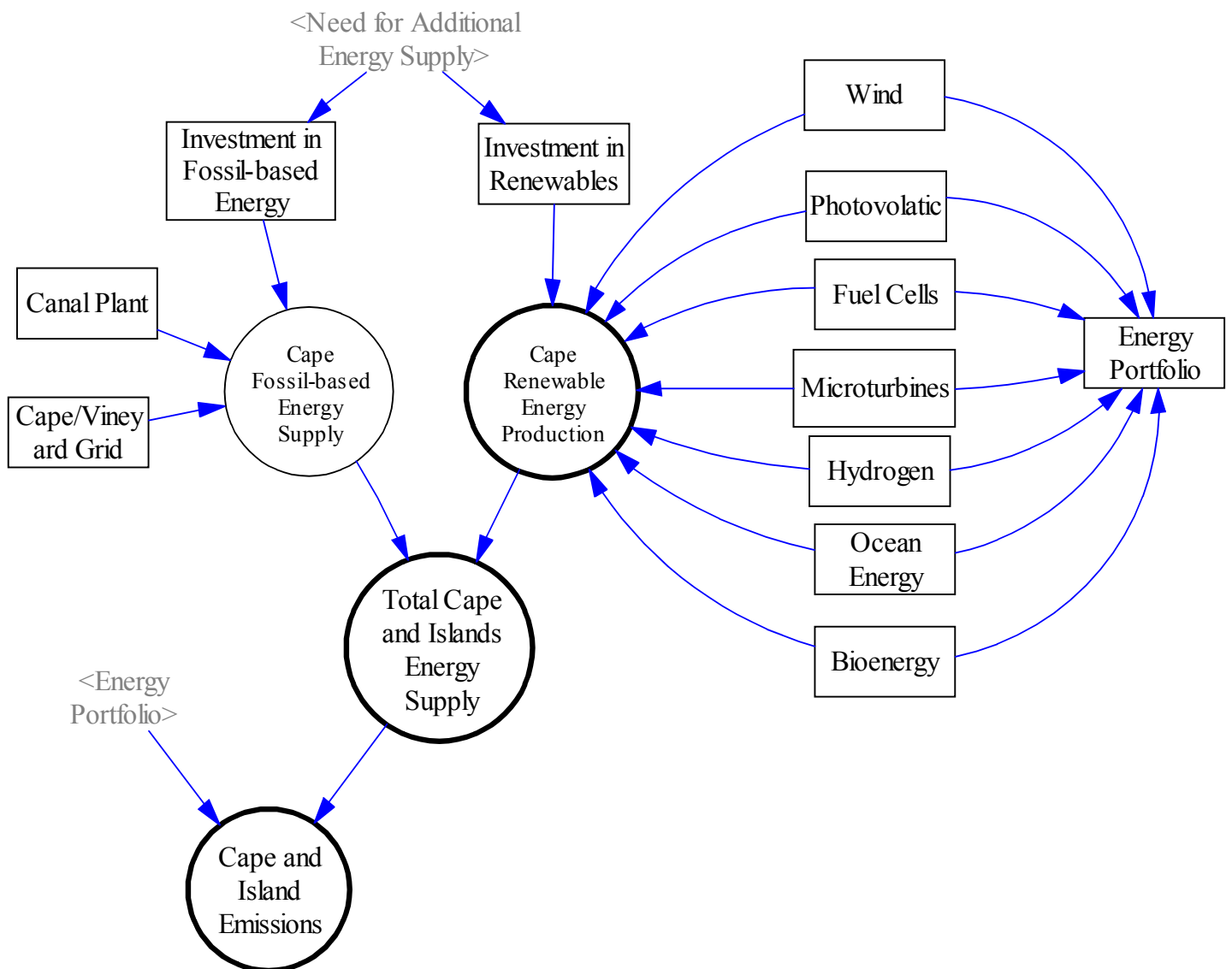


Cape and Islands Energy Consumption



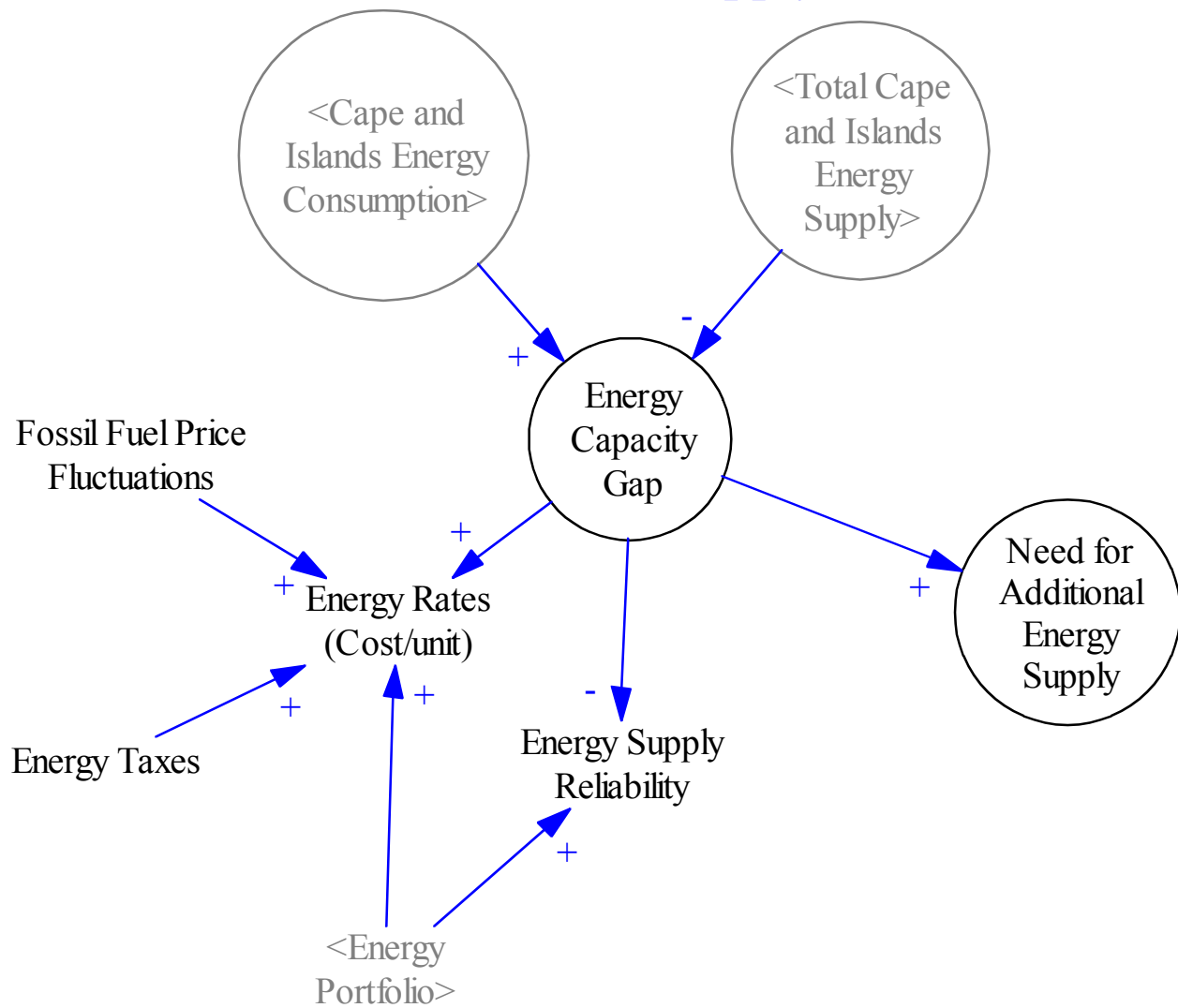


Cape and Islands Energy Supply



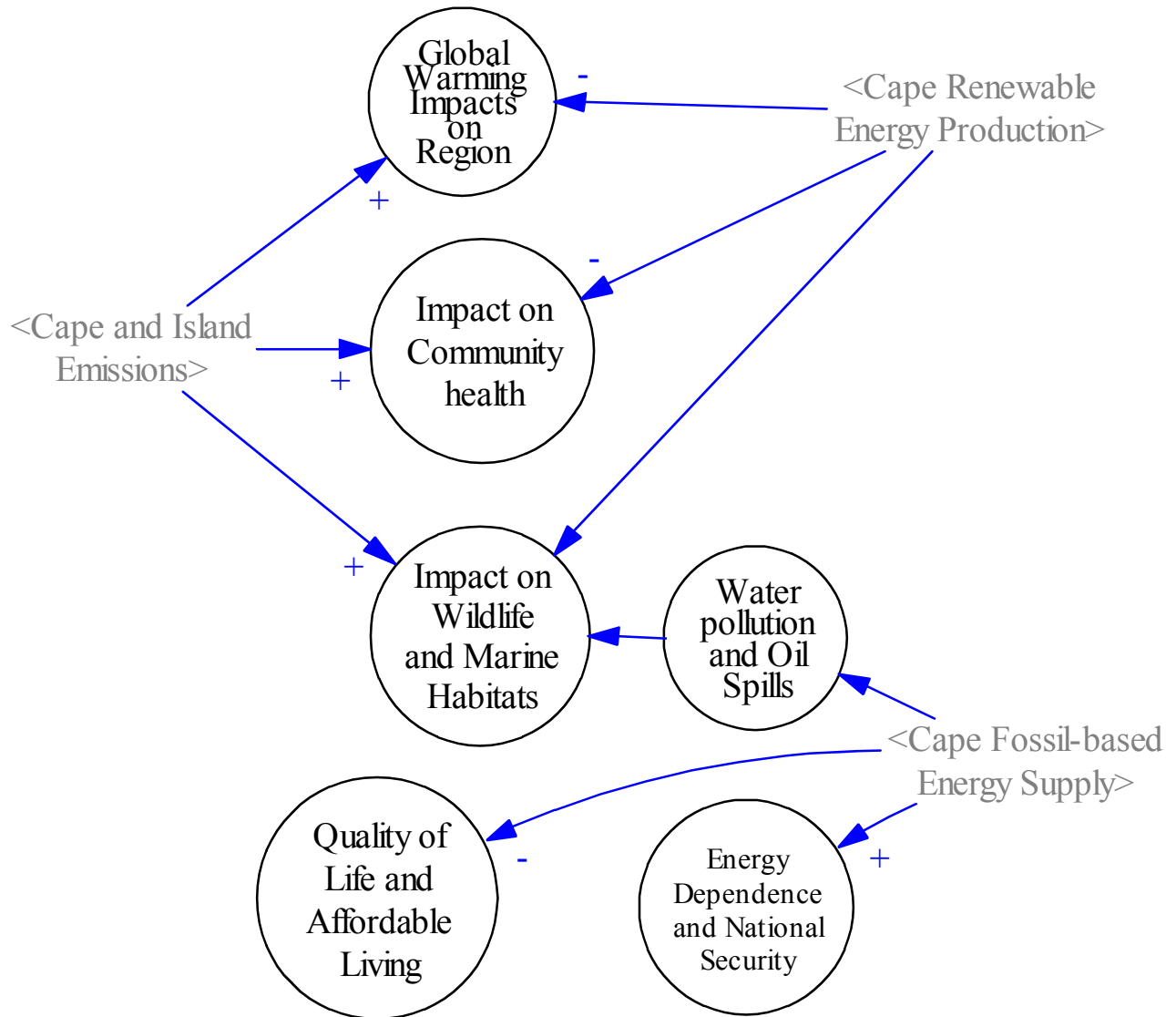


Cape and Islands Energy Demand/Supply





Social and Environmental Impact





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Collaborative Community Planning *Stakeholder Survey Results*



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Present Energy System

Economic, Environmental, And Social Impacts Of The Present Cape & Islands Energy System

At the Household (business) level

- Clearly we need to move toward a cleaner, greener system of power production. Wildlife habitats are degraded and human health is degraded as well. But any alternative source needs to be a responsible source. Some "green" sources such as nuclear power would not be an improvement.
- Complacency among consumers
- Economic: high cost of energy - one of the most expensive regions in the nation, particularly expensive for consumers is home heating.
- Education on cost-effective energy efficiency and renewable energy technologies.
- Expense, health and environment
- Family incomes eroded by increased cost of energy
- High cost of energy for all uses (2)
- High costs of heating and transportation, domination by corporate (off-Cape) interests, health threats, insurance hikes, depression
- Health impacts are big at the household level, with many people in our area affected by our poor air quality. This is an economic, env. and social impact
- Increased cost of living and health issues; degradation of water and air resources-natural
- Increasing cost of home fuel oil, electricity, gasoline
- Need to Build underground utilities to avert power failure and damage
- Rising cost of energy, potential scarcity, health risks
- Rising cost of fossil fuels
- The need for a Cape wide program for land based wind. Not each town going at it independently as is now the case. I want to stress one program, Cape wide. There is no governmental agency at the state, county or local level moving in a Cape wide, one program, direction. This includes MTC.



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- The system is in its last stage prior to being replaced by some form of clean energy. But cleaning up the Cape is not enough; the rest of the country has to join in.
- Unstable prices, rising costs, health problems, family members killed in wars for oil and empire building.



Economic, Environmental, And Social Impacts Of The Present Cape & Islands Energy System

At the Community level

- Air quality impact from fossil fuel emissions, particularly from Canal plant, i.e., adverse health.
- Community wind initiatives and municipal solid waste treatment plants adding methane production.
- Damage to tourism through more oil spills on our beaches
- Economic impact on business of rising costs
- Economic impacts of our reliance on imported energy sources is a huge drain on our economy.
- Global warming sea level rise bleeding of environmental life blood for area
- High cost of energy for municipal uses, and the impact of high cost fuel on the economically needy population
- High energy costs are putting pressure on community budgets; air quality, water quality, risks of climate change
- If there was a Cape wide program in operation now would the initial costs be more or less for equipment?? If there was a Cape wide program in operation would the output of clean electrons be more or less?? The answers to these questions are obvious.
- Increasing costs of gasoline adversely impacting tourism; ecosystem degradation; unhealthy air quality
- No comprehensive energy policy, local politicians are not pushing for good energy policy or to integrate renewable energy at a level that can make a difference now.
- Over-reliance on natural gas; future oil spills;
- Pollution of air, groundwater, Nantucket Sound, rising energy and health care costs affecting town and school budgets.
- Poor air quality (and the attendant health risks); harm to individual animals by components of fossil fuel plants (e.g., eiders stuck in holding tanks); occasional devastating oil spills
- Reduce electrical use by substituting fluorescents where ever possible and replacing old appliances with high efficiency models.
- The environmental impacts are mostly seen in terms of water quality issues, ie, oil spills, mercury contamination, and nitrogen loading from atmospheric deposition. Socially, I think our reliance on automobiles to get around on our narrow roads is on of the biggest issues at this level.
- Weird weather, economic stagnation, absurdities regarding public transportation, hindrance on job creation, morale issues



Economic, Environmental, And Social Impacts Of The Present Cape & Islands Energy System

At the Regional (and/or National) Level

- We need more active programs encouraging conservation and dramatically more efficient and cleaner vehicles--which are the source of considerable air pollution.
- Degradation of human and wildlife habitat (pollution); effects on public health; global warming; alteration of animals' population dynamics; increased oil & natural gas drilling; safety risks associated with LNG platforms
- As one piece in the house of cards, our weakness will contribute to bringing the house down. we have a chance to be leaders and a model, and we have a responsibility to take the risk. we were the place where the mayflower compact was written; a tradition was begun here of self-determination and that precedent compels us to take risks.
- Large Wind Projects, such as Cape wind.
- David W. Cash, Executive Office of Environmental Affairs has just started at the State level. It is very hard for me to think at the Federal level, when the state is just taking first steps.
- Another 9-11 terrorism attack due to our financing them through foreign oil purchases
- CO2 emissions from power plants & vehicles: impact on global climate change. Nitrification of open water bodies. Dependence on foreign sources of expensive fuel: balance of payments, funding of radical governments and terrorists.
- CO2 Emissions, foreign oil dependence leading to economic vulnerability
- Effects of climate change
- Pollution of our planet, climate change, endless war for oil, crisis in health care costs, huge federal budget deficits, continued corruption of most politicians by energy monopolies.
- Higher costs for goods and services; increased air pollution--unhealthy air quality; energy vulnerability/insecurity; more military conflicts over oil (and possibly natural gas) supplies
- No energy policy. Huge need for focus, development of sustainable, renewable energy technologies
- Biggest threats hear are related to global warming and all of the related problems that come with significant and rapid changes to our climate.
- Regional: Business competitiveness, air quality, water quality, public health, risks of climate change. National: security issues, spending priorities (guns vs. butter problem), climate change



Long Term Consequences of No Intervention in the Current System

- Air pollution, health problems, high cost of energy, war over limited resources
- Climate change that will impact our natural systems, including food production, which will cause civil war over dwindling resources
- Continuing poor air quality and adverse health impacts. Even though new emission regulations on power plants begin, the purchase of SO₂ and NO_x allowances under "cap & trade" will leave us in the hot zone since allowances are less costly than cleaner fuel for the same production. Oppressive family expenditures for energy in all forms, a quality of life issue, or even remaining on the Cape.
- Fuel costs will rise and air quality will not improve. But, I must add, that much of our air quality problems arise from plants in the mid-west and from the ever increasing number of cars on the Cape and their associated emissions. Pollution is less of a problem to us in the winter when the number of cars is dramatically lower.
- We will have at least one more major oil spill within the next 25 years. Our air quality will continue to get much worse, with bad air alerts happening more frequently in the summer and smog and haze having more of an impact. I think that within 25 years, probably much sooner than that, we will experience an economic collapse because fossil based energy (except coal) will become much more expensive than it is now, affecting all sectors of the economy and threatening the stability of our current lifestyles and societal structures. People will not be able to afford to vacation here, businesses will not be able to pay high energy costs, and we will have major power shortages during times of peak demands on the hottest days in the summer and the coldest days in the winter. The effects of climate change will become more dramatic over this time, but I think those will be less noticeable than the major changes that will come with economic collapse.
- It must change! If it doesn't the Cape & Islands will become a land of second and third class citizens. There is too much brain power to do otherwise.
- Loss of land area, economic impact for businesses, continued health risks; unsustainable costs for fixed income retirees on Cape Cod.
- Oil on our beaches, loss of tourism dollars. Impoverishment, pollution
- Our natural resources will be severely degraded and the natural appeal of the Cape will vanish. Climate change will take a large toll on our environment.
- Sea level rise, storm severity/frequency, ecosystem change, and aquifer infiltration - will the Cape & Islands still be a desirable place to live and visit?
- Skyrocketing energy costs; increased beach erosion from sea-level rise; more severe storms leading to homeowners inability to get insurance; degradation of ocean ecosystem. Too expensive to live and work in the region
- Water levels may rise a couple of feet and storms will increase in size and intensity
- World War Three in the Middle East, irreversible pollution of planet, accidents and terrorist attacks at nuclear power facilities, rising sea levels and more extreme storms - but I am an optimist!



Promise of Available Renewable Energy Options and Existing Obstacles Bioenergy

Potential:

- Very Promising (9)
- Promising (11)
- Not promising (4)

Obstacles:

- Need to deal with emission issues from trash to energy. Cost is also an obstacle for many of these
- Not well enough informed on this. I feel doubtful, and the waste stream may subside in several years. Used frying oil, etc. is somewhat helpful for transportation, but really not the answer.
- Digester gas from wastewater treatment facilitates
- Land fills are not big enough on Cape to make feasible,
- We don't have the technology in place now
- Consumer laziness
- Cost and Reliability
- Limited fuel, i.e., wood chips (Indeck), limited LFG sites, CO2 emissions, can't meet RPS as is. Biofuels somewhat promising but take energy to produce and still have CO2 emissions
- Limited Scope
- These are probably only temporary and will be replaced by more effective systems.
- Cost efficient technology development
- Education, current cost of implementation & use
- Burning anything causes pollution.
- Political Manipulation
- Emissions; supply: certainly there in the short-term, but not sure about its sustainability if adopted on a grand scale
- Local production facilitates farm policy
- Need to have municipal, county and other decision makers thinking about energy in a comprehensive fashion
- Not enough resources available, but promising for some smaller scale distributed applications. Obstacles include educating facility managers about these options and having knowledgeable business people who can make economically feasible proposals to them.
- Cost; mindset that many of these things are "wastes" to be managed rather than resources to be harnessed



Promise of Available Renewable Energy Options and Existing Obstacles

Fuel Cells, Microturbines, and Other Cogeneration Technologies

Potential:

- Very Promising (8)
- Promising (10)
- Not Promising (3)
- Don't Know (1)
- Infeasible (1)
- Not useful (1)

Obstacles:

- I am less familiar with these, but question is the gain if they rely on fossil fuels for energy generation. And I don't know what "microturbines" are.
- I don't know. I hear different ideas about this. I'm not well enough informed.
- Try to always find ways to use "waste heat" to maximize total thermal efficiency.
- Fuel cells need hydrogen which is not readily available
- It is a long way off here and nationally
- Consumer laziness
- Fuel cells using hydrocarbon reformers still emit as much CO₂ as conventional generators.
- Continued production of air pollutants
- Limited Scope
- Only temporary
- Cost efficient technology development
- Cost of implementation, current dependency on natural gas
- Stop using fossil fuel
- Infrastructure implementation
- Lots of different technologies lumped together. Fuel cell technology seems a lot farther off than originally thought; natural gas supplies/cost problematic if used for fuel -- if not would probably have to rely on offshore wind or nuclear for electrolysis
- Cost of producing fuel cells and hydrogen
- I don't see these being very useful unless they are run on biomass
- Cost; limited applicability for current technology; even then, there is a need for education on the value of cogeneration



Promise of Available Renewable Energy Options and Existing Obstacles Hydrogen Energy

Potential :

- Very Promising (5)
- Promising (9)
- Not promising (5)
- Not beneficial/useful (2)
- Infeasible (2)

Obstacles:

- Same concerns with wind energy plants--need appropriate siting
- Difficult to store and distribute
- When produced from renewable energy sources for use as an energy carrier for fuel cells.
- Presently a net loss of energy
- We don't have the technology in place now
- When it's mandatory
- Cost
- Hydrogen for fuel and fuel cells need manufactured hydrogen. No net gain if from hydrocarbons. Only if from pollution free wind, wave, solar, or geothermal sources
- Hydrogen gas stations to make it available
- Limited Scope
- In the future when wind power is put to use 20 miles+ from the shore hydrogen can be produced via electrolysis and stored in compact "pancake" tanks for use in fuel cell vehicles in the future.
- Cost efficient technology development
- Costs of maintenance, no real short term ROI
- Technology still in development
- Negative net energy cost - waste of time/money
- Hydrogen production extremely energy intensive; no infrastructure
- Where would the hydrogen come from?
- Cost of producing hydrogen fuel
- Very inefficient use of the electricity
- Better choice would be plug in hybrid electric vehicles. The production and storage is just too inefficient right now.
- This is long-term solution but technology not available, fuel supply infrastructure not available, vested interests represent obstacles



Promise of Available Renewable Energy Options and Existing Obstacles

Ocean Energy: Tidal current, wave, and ocean current technologies

Potential :

- Very Promising (7)
- Promising (12)
- Not Promising (4)

Obstacles:

- Need a design that will not result in injury to marine wildlife
- Technological Challenges
- Needs a not sure category. I am interested in projects in Scandinavia
- Should consider tidal turbines
- Don't know much about them
- Long way off
- As technology improves it will be more promising
- Unreliable, ecological questions
- A future dream, only demo stage now, should be encouraged with federal funds, a long way to go to viable economics, 10 to 20 years?
- Is the technology available?
- Limited Scope
- If the corrosive effects of sea water can be managed, yes.
- Cost efficient technology development
- Costs of implementation, NIMBY
- Technology still in development (2)
- Political manipulation, costs oil to create ocean products
- Technology largely unproven; siting/permitting will be major issue; policy framework doesn't exist
- Environmental concerns; regulatory framework lacking
- The NIMBY factor, but great resource locally
- We have some resources here, particularly wave energy off the eastern coast. Obstacles are ocean management/zoning issues and high capital costs of equipment



Promise of Available Renewable Energy Options and Existing Obstacles

Solar Energy

Potential:

- Very Promising (15)
- Promising (7)
- Not promising (2)

Obstacles:

- Consumer laziness
- Cost efficient technology development
- Cost, bad climate for New England
- Costs
- Costs of implementation and maintenance, no real short term ROI
- Education on the benefits of solar thermal needed to accelerate application now; also, there is a need for incentives like those for solar PV; for solar PV, cost is barrier; mechanism needed to offset high capital costs.
- Efficiency/cost
- In the very near future I see much more Solar power generating electricity in homes and factories and feeding back into the grid when surplus is available.
- Interconnections with Nstar problematic
- Limited Scope
- Lots of potential here for including in new construction and retrofits. Obstacles are lack of incentives for solar thermal, a bad image from the past to be overcome, and relatively few trained installers.
- May need price support/tax breaks for consumers
- Need an order of magnitude breakthrough on economics for utility scale generation. Time frame??
- Need more \$ for support-cost is still high to get every building to have solar, but we are making progress.
- Needs to increase marketing, and lobby for better tax credits.
- None - we know how to do this, we just need to make the technology available and understood by potential users
- Political Manipulation
- PV is still expensive and there is no focus or incentives on solar thermal, which is much more cost, effective. Very slow and long payback
- Solar thermal should be increased to decrease NG and electricity use.
- Too soon to say. Did not have good luck w/ solar hot water. Maybe battery farms at the equator could ship batteries north & sold, giving equatorial economies an industry, and northern latitudes winter warmth
- We should have solar pv on EVERY roof!!!



Promise of Available Renewable Energy Options and Existing Obstacles Wind Energy

Potential:

- Very Promising (21)
- Promising (1)
- Not promising (2)

Obstacles:

- They must be sited in locations that minimize potential risk to birds and bats and minimize impacts to fragile species and habitats
- Wildlife impacts; technological challenges of far-offshore locations
- Cape Cod will lead in this.
- Cost-effective today
- Most cost-effective thing we can do today
- But there is a huge need for a central driving force.
- Clean, safe, proven track record
- A mature technology proven world wide. Obstacle: the view!
- No real obstacles
- Minor benefit, wind inconsistency, high maintenance cost offshore
- Obviously the Gold standard
- NIMBY (5)
- The people must have local control of energy developments.
- Political Manipulation
- Siting; lack of consistent regulatory framework both on land and in the ocean
- There are obstacles everywhere!
- Lack of good economic models for financing local projects, lack of technology for going far offshore.
- Uncertainty on tax incentives, siting/permitting barriers



Visions for Cape and Islands Energy System

- Most homes equipped with solar cells to generate power. More fuel efficient, cleaner cars. Better public transportation system that makes it easier NOT to use cars.
- Affordable, locally produced, renewable energy options for every retail & business consumer
- Community leaders in distributed wind, waste treatment to methane, and waste heat to hydrogen for stationary and transportation applications.
- Initially to meet all load growth with renewables and efficiency. Then to gradually increase that percentage until we are reducing the use of fossil fuels.
- 25% renewable energy would be a great goal by 2010.
- Nantucket Windfarm, community wind, solar PV on most homes and business.
- Hydrogen production from excess electrical generation for fuel cells
- Fossil fuel-free and Energy Independent Cape & Islands (3)
- Nuclear power to satisfy all our energy needs.
- Wind power, both off shore and on shore producing power for domestic and manufacturing consumption during the day and hydrogen production during the down time (late night) hydrogen production for fuel cells for homes and factories.
- To meet the 20 to 25% renewable energy sources that have been achieved in European countries. We have the opportunity to be a leader in off shore wind energy, we must convince the public and our politicians. Everyone driving a hybrid car.
- 65% fossil free co-generation/35% blended biofuels by 2020
- The Cape and Islands Municipal Utility to harness renewable energy that is of, by, for, how, and where the people decide. Goal of total energy self-reliance using clean technologies by 2020.
- Combination of Wind/Ocean/Solar, in order of magnitude. Household solar grid contributions.
- Abundant, cheap, 100% clean energy. That's the ideal (you didn't say it had to be practical). If you're seeking practicality I would offer: a combination of large scale offshore renewable energy sources; widely adopted distributed generation scenarios including individual households and community-scale initiatives, and a decreasing dependence on natural gas and other fossils. Nuclear completely phased out.
- Growing more of our own food, eliminate gas-guzzling vehicles from our roads to reduce pollution and congestion, public transportation in CNG busses!
- Hybrid or biodiesel fueled vehicle mandate, renewable energy sources only sun, wind, biomass
- Net exporter of green electrons. Distributed generation on homes, businesses, and municipalities can probably account for 25-50 percent of our energy demands, and large offshore wind and wave projects can provide electrons for export.
- Leader in U.S. renewables industry
- Sustainable energy economy; net sink of greenhouse emissions



Information, Incentives And Policies Needed For Energy Efficiency Measure Adoption

- Tax breaks, financial assistance to households with incomes below the Cape median. Progressively higher taxes on cars that are not fuel efficient (e.g., getting less than 30 mpg)
- Rebates/ incentives currently available for some consumers of energy-efficient products for the home are promising. Landlords should be required to pay a portion of heating and electric costs, so that there would be an economic incentive for them to ensure rental properties are adequately insulated and feature energy efficient appliances and light fixtures. We also absolutely need to improve the environmental effects of transportation sources by greatly improving public transit options on Cape Cod, requiring greater efficiency from vehicles (particularly trucks and SUVs) on a federal level, and encouraging manufacturers to increase the availability of hybrid cars. We also need to increase what people pay at the pump and on their utilities to more accurately reflect the costs of their consumption.
- Residential models, municipal models, "tupperware" parties, publicized lotteries for installation of free technology to residences
- Develop new financing techniques for municipal renewable energy projects to lower the integrated life-time costs for renewable energy technologies. Use risk-adjusted discounting in energy decision making.
- Federal and State tax write offs up to 60% of the cost of materials and installation. The \$20 billion in annual tax subsidies to Fossil fuels and nukes should be completely switched to efficiency, mass transportation and renewables. We should never forget that the financially viable passenger rail industry was put out of business by government subsidies of the national highway system. Therefore the Federal government would be justified in heavily subsidizing passenger rails now at the expense and via a gasoline/fuel tax.
- The Cape Light Compact(CLC)in 2004 did a great job on Energy Efficiency (EE)programs. However, the CLC had \$8 mil to spend in 2004. In 2005 they only have \$5 mil. The wait for an EE audit is now beyond 2 months. The CLC could exceed 2004 results but the \$\$\$'s simply are not there. The CLC is now exploring getting into the wholesale part of the business.
- "People Power" - use your (and other enviro-orgs) power at the ballot box in election, and immediately begin benign informational picketing at the organizations and media which obstruct progress towards energy independence.
- More tax credit (than now) for solar PV. Instead of auto excise tax based on vehicle value, have a carbon tax or credit based on vehicle milage: heavy tax on low milage graduated to deep credits for over 35 to 50 MPG. Tax credit for use of biofuels to level (or reduce) cost comparable to conventional oil/gasoline.
- In general, people tend to act in their own self-interest. That is, they tend to do for themselves first, and for the general good after that. So they will tend to invest time and money in something (e.g., increased energy-efficiency) if it makes economic sense for them individually. And if it helps their community, then that is a bonus.



Information, Incentives And Policies Needed For Energy Efficiency Measure Adoption (Continued)

- Yes, there are the rare people who, out of an extraordinary sense of obligation, do more for society (e.g., pay more income tax than they owe), but these are the exception. Any long-range plan needs to look beyond the "early adopters" who already "get it", to the "fence-sitters" who need a solid, economic reason to change their existing behavior. Otherwise, (figuratively speaking) you may start out fine but then won't be able to shift into second gear.
- Uncover the barriers that prevent sustainable energy use, and design specific programs to change the identified unsustainable energy use behaviors to sustainable behaviors, ie Doug McKenzie-Mohr
- Cost incentives for efficiency measures.
- Stop supporting fossil fuels with federal money and start passing that money to homes and factories utilizing non-fossil fuel energy sources.
- Creating an awareness of the dangers of doing nothing.
- Require fuel efficiency standards.
- The reassignment of state and federal tax dollars is the only answer I can come up with.
- Tax credits of 50% or more for both residential and commercial installations of renewable energy systems and energy efficiency improvements. Door-to-door outreach is needed to let homeowners and businesspeople know what their options are.
- Tax incentives, government subsidies, community planning and special-interest nonprofit group-cooperative sharing
- Clear and honest information on economic returns and environmental benefits. Policies that would allow homeowners to purchase their renewable hardware over time ("Pay-As-You-Save", for example - maybe offered by electricity providers).
- Tax incentives for insulation, hi efficiency windows and appliances, discount coupons, etc. Send out info in tax bills, thru schools, buses/employers "it's about all of us working together"
- Set fossil fuel prices to biomass standard like biodiesel which is renewable on btu/CO2 comparative basis (biodiesel-CO2 considered null as CO2 produced equals CO2 absorbed by plants, btus lower than petro diesel but higher than gasoline or natural gas---electricity to cost of wind from Hull turbine a municipally owned (not for profit) renewable system
- The CLC should do a targeted campaign to building owners who have electric heat first and get them to fuel switch.
- A tariff and credit system should be adopted for automobile purchases based on efficiency. People who buy efficient vehicles should get credits which are paid for by people who buy inefficient vehicles. Local efficiency programs could develop guaranteed savings contracts to pay for initial costs, people pay back the low interest loan by paying what they should save in utility bills.
- Higher price (reflecting true cost) for fossil-based options (3)



Information, Incentives And Policies Needed For Increased Clean Energy Adoption

- Tax incentives to individuals to install solar or other energy generating devices (2)
- Higher/progressive taxes on vehicles that pollute. Broad-based and well-marketed public education on advantages of energy conservation and availability of financial assistance.
- I think consumers should pay the true costs of the energy they use, which, as you point out, includes environmental and public health costs. (This is also true for food, especially that which requires excessive transport.)
- Mainly, instruct children in schools. Not only with books, but with active models. It's a long haul.
- Include external costs in evaluating municipal energy options. Have municipalities become energy producers and not just energy consumers.
- Use municipal lands to support energy production. Provide local tax relief for residential and commercial renewable energy systems. Make codes support renewable energy development-- wind and solar friendly.
- Externalities, which have been quantified, should be added to any new generation source's cost benefit analysis. Autos should pay a sales/luxury tax based on their output of emission/passenger mile.
- The Cape, the state and the nation must move much faster toward renewables. Wind is #1 and sun in in 2nd place. The others tag along.
- However, we can't just dump oil. Let us not forget China is the 2nd largest user of oil, behind the USA. China is huge yet a big portion of their nation is without electricity. Incentives? The answer is Federal and State serious tax incentives for big and medium sized business.
- More media information and more disclosure information on utility bills about the "externality" cost of the current fuel or energy. More tax credits for high mileage hybrids and biofuels as noted above. Need consistent federal (not on-again, off-again) production tax credits for renewable energy production. Need federal mandated RPS of 20% by 2020, increasing to 50% at the rate of 1% a year thereafter. (state RPS may be higher than federal if desired by state). Need higher REC values for PV and hydrogen generation from non-polluting (carbon) sources (note, PA has a value of \$300 for solar PV RECs).
- Again Nuclear power, once we can get over the 'fear' of this method, all the above problems will be solved.
- Encourage capital investment in off shore wind power.
- Making green energy cost more competitive with traditional sources.



Information, Incentives And Policies Needed For Increased Clean Energy Adoption (continued)

- The current farm subsidies; production tax credit and blending credits combined with the current rise in the cost of a barrel of oil, if used as intended, can bring down the retail price of blended biofuels in 05-07. The problem is that current producers and distributors are using these incentives to increase their very slim gross margins and shorten the ROI. If folks knew that they could get biodiesel at \$1.45 and ethanol at \$1.25, I think there would be a huge acceptance for the use of biofuels.
- The other issue slowing the acceptance of biofuels is the engine manufacturers not extending the warranty for the use of biofuels in their products. Business can't afford to take the risk of voiding the warranty of equipment just to use biofuels.
- Quick and dirty resolution would be to have our state government just mandate the use of biofuel-blends across the board, such as CA mandating the ethanol blend. Get the lobby machine tuned up!!
- The renewable energy charges should be LESS than fossil fuel sources, as the overall costs are less. Charging more for renewable energy gives people the false impression that it costs more, but the wind energy from the Town of Hull costs 3.4 cents per kilowatt - less than half of what the Cape rate is! Once again, better outreach and marketing would increase the installation of home- and business-based renewable energy systems. Town ordinances need to be addressed.
- Tax fuel acquired from war. Calculate the cost of not-implementing cape-wind and make that a "wind-free view tax" for the residents/communities that prevent capewind initiatives
- US should participate in international efforts to mitigate climate change by setting and meeting targets for GHG emissions through the widespread adoption of energy efficiency and renewable energy technologies. Level the playing fields for renewables/fossils/nukes one-way or the other (i.e. up or down -- just make it level).
- Make the polluters pay more!
- Create level playing field by reducing direct/indirect subsidies for fossil fuels and internalizing externalities



Energy Consumption Reduction/ Clean Energy Adoption Strategies

Household (Business) Level

- Get my teenagers to turn out lights and turn off devices when not in use
- Get support for installing more fuel efficient heating
- Incentives for landlords to provide energy-efficient rental properties
- Decision to utilize of local services (rather than driving elsewhere for a service)
- Find ways to get subsidized or free improvements. Offer my home as a neighborhood model.
- Get more dogs for winter nights.
- Purchase a hybrid vehicle.
- Extra window insulation
- Efficiency, efficiency, efficiency, insulation, insulation insulation
- Passive solar, bike friendly environments
- Energy Efficiency programs, but see above in re reduced funding
- Small wind turbines for a cluster of homes. but NStar has too much veto power
- Join CIRC, CPN and others. Give them money
- Decrease cost, increase reliability of renewable fuels
- Purchase of hybrid vehicle. (Already use compact fluorescent bulbs!)
- Tax incentive for biofuel use. More modern efficient oil or gas furnace.
- Installing energy efficient appliances lights and heating systems, "tightening" up the home to prevent heat leakage
- Hybrid cars (2)
- Improve insulation and reduce drafts with careful caulking
- Replace incandescent lamps with fluorescent lamps
- Subscribing to the offer by the Cape light Compact to use green energy
- Biking to work
- Use of Solar Energy
- Co-generation
- Conservation - we have done the Cape Light Compact's energy audit, and lowered out monthly costs by \$30.
- Drive high-mileage vehicles.
- Solar cells on houses, contributing to grids in case of excess
- Implement conservative usage tactics: turn off lights, cook together, no TV, shutdown idle computers
- Adopt energy efficient measures that consume less electricity
- Reduced Auto Travel (2)
- Installation of solar panels
- Get the CLC green option on the market and promote it (2)
- Increase the MTC rebate levels for solar and wind so more homeowners can take



Energy Consumption Reduction/ Clean Energy Adoption Strategies

Community Level

- Adopt energy efficiency measures in all public buildings
- Again Energy Efficiency programs, but there is a great lack of funding.
- Build wind turbines and biomass digesters
- Cape Light Compact Green Credits
- Car pooling
- Community based solar cells, with grid contributions, paying individuals based on contribution ratios for excess
- Conversion of schools and other buildings to renewable energy (2)
- Credits for hybrid or biodiesel cars and town-vehicle adoption of hybrid vehicles (4)
- Encourage Public transportation (2)
- Get the towns to set good models by requiring green building and strict energy codes
- Greater availability of locally made/ grown/ crafted consumer goods
- Greatly increase conservation programs and small renewable energy systems through door-to-door outreach.
- Have towns buy clean electricity and purchase clean fuels.
- Make stores carry hi efficiency lights ONLY (2)
- Mandate energy efficient future municipal and residential buildings (2)
- More efficiency in municipal buildings, more efficient an fewer vehicles, pv on every roof top, passive solar, super insulated designs for new buildings
- More extensive use of bikes
- Municipal wind turbines (2)
- Off shore wind power (2)
- Planned parenthood to reduce population
- Programs to make natural gardening an elite and highly desirable mode. ie.: less chain saws, power mowers, etc.. Maybe work on the social-taboo angle.
- Reduce municipal vehicles (car pools)
- Require the use of energy efficient lighting of streets and public buildings
- Start a fund like Aspen did that collects the fines for excessive energy consumption
- Start installing wind power for municipal buildings. This will ultimately convince the general population that wind power is not an eyesore but a very attractive power source.
- Support local efforts to install solar or other cleaner means of energy generation to help get the town further "off the grid"
- Support the establishment of municipal utilities that can develop low-cost, 100% clean, renewable energy for the towns, schools, households, and businesses.
- Tax incentives for renewable energy



Energy Consumption Reduction/ Clean Energy Adoption Strategies Cape and the Islands Level

- Mount a public education campaign. Put leaflets on all of the SUVs and miniVans (especially in summer) with info on what that vehicle does to contribute to pollution on the Cape.
- Improved public transit (9)
- Corresponding tolls for vehicles
- Get George Bush out of office.
- Offshore and community wind power development with "reasonable bylaws." (5)
- Massive insulation, air tightening programs for residential buildings.
- More extensive bike trails
- A cape wide centralized program. MTC and/or the CLC have not produced such
- Push on sun, but investigate tide and wave energy
- "People Power" - use your (and other enviro-orgs) power at the ballot box
- Informational picketing at the organizations and media obstructing progress towards energy independence.
- Removing historical review of PV installations and eliminating visual restrictions on wind turbines.
- Produce local energy via "clean and green" methods - tidal, biomass, wind, etc.
- Pass legislation to prohibit diesel smoke from polluting the atmosphere.
- Organize the Cape and Islands Municipal Utility to develop renewable energy throughout the region.
- Car pooling
- Cape Wind, community solar
- Develop indigenous renewable energy resources
- Municipal wind and solar for all public buildings
- Emissions calculations and reduction strategies - larger excise taxes for polluting vehicles
- Hybrid biodiesel electric autos and trucks
- Cape light compact net metering 60 kw home or business renewable electricity
- Set policy that requires the use of renewable energy
- Get all towns and NGOs on board to promote the policy and get buy-in
- Ban regular light bulbs from stores
- More informed decision-making by regional officials
- Climate policy
- Consensus vision of energy future, setting framework for future action



Actions to Achieve Vision

- Lobby for more support for public transport. Put up a sign by the bridges to remind people of the contribution of cars to pollution.
- Encourage the construction of small-scale, public-owned renewable energy projects through community outreach and the allocation of funds
- Start investigating municipal wind and methane production
- Support legislation in the state house and fight for programs that will subsidize comprehensive efficiency of residential buildings.
- Streamline and encourage offshore wind permitting (as in England and Europe) as well as community wind. Change charter of Cape Light Compact (if needed) to allow direct purchase of wind and PV power.
- Start at home - energy-star lights, use green- energy when given a choice, insulation, hybrid cars, sustainable building methods and materials. Also - don't be shy about it - talk about it with neighbors and friends, encourage them, be a role model, talk to public officials, work to make energy efficiency an "expected" behavior
- Build Nuclear power plants. Wind power can't supply CONTINUOUS energy, therefore it cannot stand alone as a solution.
- Push for the Wind Farm now and then proceed to larger off wind energy further off shore (2)
- State mandate of the use of blended biofuels!!!!
- All Cape & Island municipalities following federal epact regulations and using 100% biofuels in daily operation of power & backup power generation
- Acceptance by MA DOER for 100% biofuel powered reciprocating engines and turbines as a renewable energy source available for Renewable Energy Credits
- Federal, State, and regional subsidies for implementation of co generation Start reaching out and demanding that policy be set at the regional level
- Expansion of Cape Light Compact and MTC resources to include the subsidies & implementation of 4K-250K co generation power plants
- Regional utility w/renewables
- Public transportation system and incentives, corporate carpools, vanpools etc.
- Call on the Cape Light Compact and our elected officials to provide leadership to move us into the energy future through locally-controlled municipal utilities.
- Generate support and increase awareness. Make it a political issue and get Romney out. Lobby hard. Get involved with progressive organizations which will be active in support. Make Cape Cod a carpool community.
- Educate general public about options and implications of choices made; demand political leadership -- the future of the nation's energy infrastructure is being determined as we speak.
- Adopt a Cape Wide vision that translates into action plans for every sector
- Comprehensive coordinated planning from a Beyond Cape Wind perspective!



Goals Of Coordinated Community Energy Planning Process

- Make sure that you involve all stakeholders: not just those in "clean energy" groups and town managers (2).
- Address consumption/ production issues together
- Maybe major goals are daunting. Brave little steps will get us there, too. In one word, actually, I would say that purest creativity, not leaning on old solutions, is the way.
- Increased community and private ownership of renewable energy systems.
- Education and public support for efficiency programs, mass transportation, bike trails, passive solar and wind.
- Start with an ad hoc committee with 2 members each from the CLC, EDC and the Assembly of Delegates (Economic Affairs Committee), CIREC and one county commissioner (Lance Lambros). Give them \$25,000 +/- for an expert (Scott Ridley) and 60 days to produce a county wide Plan.
- Reasonable turbine and PV bylaws to encourage their use. Mandate energy efficient new buildings. Set town goal or establish a town RPS at least comparable to state RPS. (note some US cities do this now, and I believe one MA town did as well). Goal of B20 biofuel for all town Diesel vehicles and oil heating plants (cost issues).
- Promoting public acceptance and the social expectation that each of us will reduce our fossil-fuel energy consumption in whatever ways we can.
- More municipal wind power so that the general population will accept a string of wind turbines along the center and or either side of the Midcape cape; private or public ownership makes little difference-- just get on with it.
- Utilizing on and off shore wind as well as other renewable energy sources
- Education of every elected official representing the Cape & Islands. 2020 date to be only 35% dependant on fossil fuel for the region
- Involving people in every town to become a "green energy activist", and if the people lead, the leaders will have to follow.
- Community awareness of progressive issues and conservation techniques. Increasing collaboration between citizens. Create alliances with progressive political organizations to galvanize support and activism on the issue.
- Communicate so as to create as much synergy as possible; avoid redundancy; avoid unintended "cumulative consequences".
- Conservation is the key
- Regional renewable energy commitment from the top down by all commissions.
- Reduced pollution and increased energy efficiency without economic impacts
- Setting good policy and getting cooperation from many organizations and politicians
- Replace fractious atmosphere with collaborative one; promote comprehensive thinking; gain consensus where possible and identify priorities for future work
- Education about what the problems are and the potential solutions to them, consensus on what should be done, and a plan (with commitments) to move forward



Additional Comments

- All of the so called Renewable Energy Groups and non-profits need to get together and focus on education and political change in the region. Hire a "consultant" to deliver the message to the State House. If as much energy and resources that are currently associated with the acceptance and non-acceptance of the Wind Farm were harnessed to create a long term solution for this community, it would be done in less than 5 years
- Do not place the wind farm on Horse Shoe Shoal. Let's not forget industrial development during the last two centuries, what it did to our rivers, streams, and bays. We haven't recovered from that yet. This would be a catastrophic mistake building in tidal glacial till. Build it on land...such as Nomans Island, lease the land. On land construction and maintenance would greatly lower the over all costs.
- Don't assume that just because an energy source is "green" (e.g., wind power, hydrogen cells, tidal energy) that it is without environmental costs. These costs must also be considered (e.g., impacts on wildlife habitat or fragile species) and reasonable and independent risk assessments should be done.
- I must say I am very disappointed with MTC for going at it Town by Town rather than the Cape as a whole. That is simply not good management. There is also some disappointment with the CLC, however, they simply don't have the horses with a staff of only eight.
- Increase public ownership of hybrid vehicles for police and other applications. Begin community wind and methane production. Use community produced methane for building and vehicle (CNG) applications
- Make some noise!
- Questions too macro - why not use form to determine what people are doing now?
- The support and roll of the Cape Light Compact needs to be expanded, more visible and well funded.
- This needs an enhancement of the spirit, which generally only arises because of crises.
- Why do the majority of the polls always seem to come up with similar lame excuses for not backing the wind farm. Are the nimbys putting cash in their campaigns? Otherwise intelligent persons surprise me with their responses.
- Wind and solar PV development are paramount. Use excess power to generate hydrogen by electrolysis (instead of sending excess off Cape on the grid).



Survey Participants (As of April 11, 2005)

Name	Affiliation
Almy, Jessica	The Human Society of the U.S.
Amsler, Megan	Cape & Islands Self-Reliance Corp.
Benson, Albert H.	U.S. DOE Northeast Region
Brooks, Walter	Cape Cod Today
Chris Powicki	Water Energy & Ecology Information Services
Conlon, Michael	MASSPIRG
Coulson, Mark	N/A
Fenlon, Fred J.	Assembly of Delegates, Chair Econ. Affairs Committee
Giles, Allan	N/A
Kleekamp, Charles	Clean Power Now, Cape Clean Air
Mangiafico, Jean	League of Women Voters Cape Cod Area
Mullin, Richard F	N/A
Patrick, Matt	State Rep. 3rd Barnstable District
Richard Lawrence	Cape & Islands Self-Reliance
Stead, Cynthia	Resident, Town of Dennis
Twombly, Martha	Cape Cod Commission
Watson, Greg	MTC
Watt, Tana	Cape Cod Commission
Weber, Paul	LWV- Wellfleet, MA
White, Peter A.	Cape Cod Green Rainbow Party
Wright, Tyger	The Wright Company
Young, Sharon	The Human Society of the U.S.

Average Monthly Energy Costs for Participants

