

ENERGY

A. Introduction

The Vermont Municipal and Regional Planning and Development Act (24 VSA Chapter 117) stipulates that the Regional Plan shall have the purpose of guiding development in such a fashion that it shall:

- Reduce wastes of energy which result from either excessive congestion or excessive scattering of population;¹
- Promote efficient and economic utilization of energy;²
- Promote the conservation of the supply of energy;³
- Promote the reasonable use of energy resources.⁴

To accomplish this purpose, the Regional Plan must contain an energy element, which may include an analysis of energy resources, needs, scarcities, costs and problems within the Region across all energy sectors, including electric, thermal, and transportation, a statement of policy on the conservation of energy and the development of renewable energy resources, and a statement of policy on patterns and densities of land use and control devices likely to result in conservation of energy.

With the passage of Act 174 in 2016, the concept of “enhanced energy planning” was formally included in statute. Regional Plans that meet standards set by the Department of Public Service (DPS) for enhanced energy planning can seek a “Determination of Energy Compliance.” This determination ensures that the Regional Plan will be given substantial deference in all proceedings of the Public

Service Board under §248. Additionally, with this determination, regional planning commissions can grant determinations of energy compliance to communities who meet the standards set by DPS. TRORC has developed a standalone Energy Implementation Plan (EIP) in order to meet the standards set by DPS. The EIP has been adopted by reference as part of this Plan.

The policies and programs in this chapter (and in the EIP) are intended to direct future development and to indicate how energy development and generation shall occur in this Region. It is also intended to ensure that the TRO Region maintains a safe, efficient energy system which encourages energy conservation and the generation of renewable resources in a manner that does not negatively impact the rural nature of our communities.



Bradford Falls | Source: TRORC Staff

B. Background

Concern about the sustainability of our nation's dependence on foreign oil has grown greatly since the oil crisis of the mid-1970s. In the mid-2000s the price of oil based fuels experienced a dramatic rise, which highlighted the tenuous position that oil dependency has put the nation in. Unpredictable fluctuations in the cost of fossil fuels can make budgeting for everyday activities such as home heating and travel by car become increasingly burdensome for our communities. While TRORC recognizes that energy supply and demand are directly influenced by economic forces at the state, federal, and international levels, the manner in which our Region plans for future growth, how it consumes energy, and where it chooses to get energy from, will have an important impact on global energy resources.

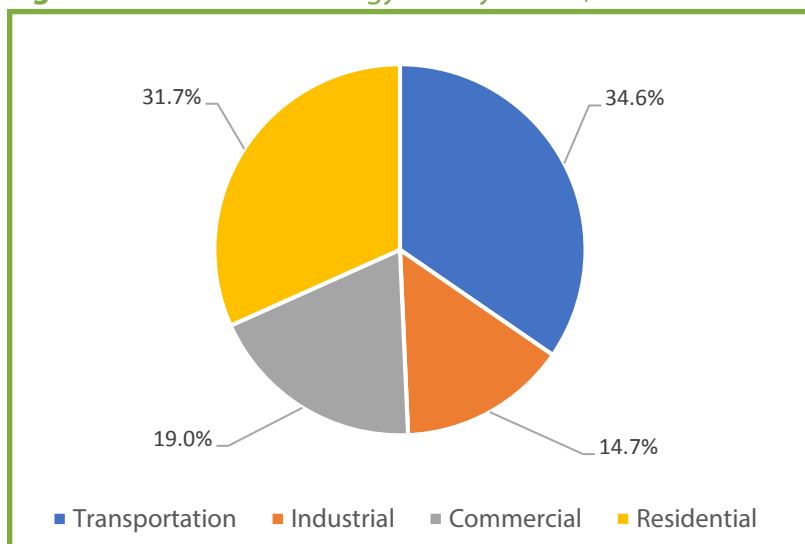
Theories such as the Hubbert Peak Theory (a.k.a. Peak Oil), suggest that at

some point—perhaps sooner than later—the worldwide consumption of oil will outpace the existing supply. Although new technologies may enable energy providers to extract oil from locations that were previously impossible to reach, there is most likely a finite amount of oil available. Many of these more extreme methods of energy extraction have the potential to create negative impacts on our environment. Given the predictions of Peak Oil, the TRO Region, like the rest of the world, should prepare for a very different future, one that focuses on sustainability. Declining oil production and increasingly worrisome signs of climate change underscore the need for good planning and active discussion about energy alternatives. It is in consideration of this, that TRORC supports the principles of energy conservation, environmental stewardship, and energy independence.

C. Statewide and Regional Energy Needs

Since 1970, total end-use energy consumption statewide has increased at an average rate of around half a percent per year. Over the same period, Vermont's population has grown at an average rate of around 0.8% per year. This means that Vermont consumes about as much site energy per capita today as it did in 1970. In more recent years, since around 2000, Vermont's overall demand for energy has moderated somewhat, even as the population and economy continued to grow (albeit more slowly than in the decades before 2000). Total energy end use is now 5% lower than it was 15

Figure 12-1: Vermont Energy Use by Sector, 2014



Source: U.S. Energy Information Administration

years ago, and per-capita site energy consumption now appears to be on a slight downward trend, having decreased by around a half a percent per year on average since 2000. This shift is mainly attributable to declining consumption of gasoline, electricity, and distillates, the three largest components of Vermont's total primary energy consumption.

In terms of per capita energy consumption for residential and transportation purposes, the North East is about the same as the rest of the U.S. In Vermont, almost 80% of residential energy is dedicated to space heating and domestic hot water, while nearly 35% of the state's total energy usage goes toward transportation.

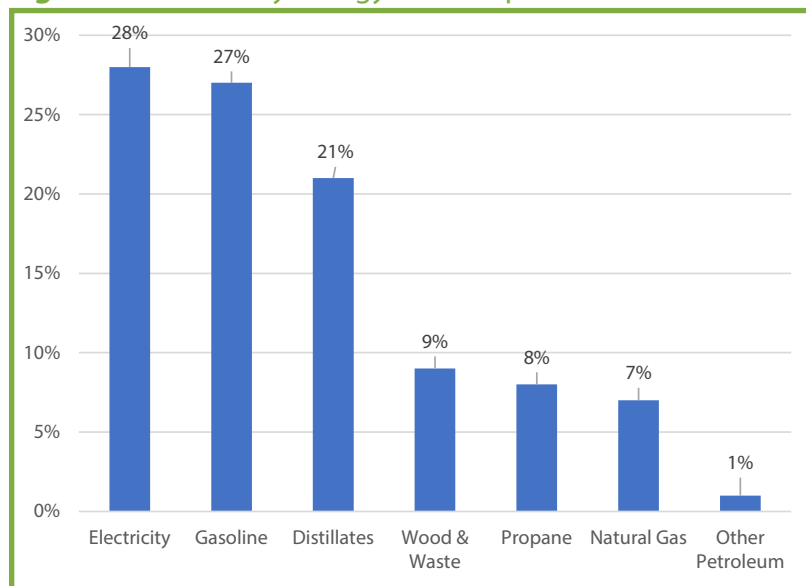
Of the energy dedicated to transportation, over 50% is used to fuel private cars for residents (as opposed to being used for public transit, road maintenance, or another public purpose). This reinforces the need for clear policy that guides land use in such a fashion that it does not continue to encourage auto-centric development.

D. Current Energy Sources

Fossil Fuels

The TRO Region, like Vermont, depends primarily on fossil fuels for energy production and transportation. As shown in the Figure 12-1, fossil fuels (most of which is used in transportation) account for more than 50% of all energy consumed in Vermont. Nearly 50% of the oil consumed in the U.S. is imported. Our economic system is so closely tied to the availability of fossil fuels that even modest

Figure 12-2: Primary Energy Consumption



Source: VT Department of Public Service

price increases can lead to inflation, a slowdown in economic growth, and monetary instability. These instabilities have a much broader impact than just our economic system. Fluctuation in the price of fossil fuels can impact our communities at the municipal and residential level as well. Increasing fuel costs make it more expensive for communities to provide services and maintain facilities. Rising costs can make it challenging for residents to heat their homes. The price and availability of food is also impacted by changes in fuel costs.

But these consequences of intensive fossil fuel use are only part of the story. The combustion of fossil fuels has been determined to be the largest contributor of atmospheric "greenhouse gases" (primarily carbon dioxide). There is consensus in the scientific community that continued accumulation of greenhouse

gases within the earth's atmosphere has lead to a warming of the atmosphere, or "greenhouse effect." Such warming causes severe coastal flooding and unpredictable climate shifts, threatening the viability of the earth's most significant urban and agricultural centers. Vermont has experienced an increase in the number of severe weather events* over the past twenty years, most notably Tropical Storm Irene in 2011. If, indeed, climate instability and climate change are linked as many feel is the case, it is essential that we decrease our reliance on fossil fuels in an attempt to reverse or at least halt future damage to our atmosphere.

Vermont can successfully claim that a substantial amount of the power used statewide comes from renewable sources when compared to other states.



White River Junction Solar Farm | Source: ©Advanced Energy

Renewable Energy

Vermont can successfully claim that a substantial amount of the power used statewide comes from renewable sources when compared to other states. Although the majority of Vermont's renewable energy is generated through Hydro-Quebec, some hydroelectric power is generated in Vermont. Additional sources of renewable energy include several utility owned commercial-scale wind, landfill methane projects, and utility-scale solar facilities. For more information on renewable energy in the TRO Region and the siting of renewable energy generation facilities, see the TRORC EIP.

E. Electrical Generation

While Vermont is fortunate to have two large electricity generators that utilize fuels that are considered less harmful in terms of greenhouse gas emissions, TRORC believes that we must continue to strive toward energy independence as a primary element of this energy plan. To do so, we must consider a wide range of potential benefits and impacts on our Region and utilize this analysis to create a plan for the future.

F. Permitting Considerations

Energy generation in Vermont is subject to a number of different permitting requirements, most of which are limited to state level permitting. On the municipal level, state statute protects residential renewable energy generation systems from regulations that will prohibit their development.

**Based on disaster declarations for the State of Vermont as reported by the Federal Emergency Management Administration.*

Section 248 for Non-Renewable Generation Facilities, Transmission and Distribution Systems

Distributed power generation facilities, such as hydropower dams, fossil fuel plants as well as wind power or solar systems owned by utilities, are subject to review and approval by the Vermont Public Service Board (30 VSA §248). Under this law, prior to the construction of a generation facility, the Board must issue a Certificate of Public Good. A Section 248 review addresses environmental, economic, and social impacts associated with a particular project, similar to Act 250. In making its determination, the Board must give substantial deference to the recommendations of municipal and regional planning commissions and their respective plans if they have received a determination of energy compliance. Accordingly, it is appropriate that this Plan address these land uses and provide guidance to town officials, regulators, and utilities.

TRORC's criteria for renewable energy generation facilities are specifically addressed in the Regional EIP (adopted by reference as part of this plan). For non-renewable energy generation facilities, as well as transmission or distribution facilities, the following policies shall apply:

- 1. Preferred Locations:** New non-renewable generation, transmission, and distribution systems shall be sited in locations that reinforce the Region's traditional patterns of growth, of compact downtown and village centers surrounded by a rural

countryside, including farm and forest land.

- 2. Prohibited Locations:** Because of their distinctive natural, historic or scenic value, energy facility development shall be excluded from the following areas:

- Floodways shown on FEMA Flood Insurance Rate Maps (except as required for hydro facilities);
- Fluvial erosion hazard areas shown on Fluvial Erosion Hazard Area maps (except as required for hydro facilities);
- Wetlands as indicated on Vermont State Wetlands Inventory maps or identified through site analysis;
- Rare, threatened or endangered species habitat or communities.

- 3. Significant Areas:** All new generation, transmission, and distribution facilities shall be sited and designed to avoid or, if no other reasonable alternative exists, to otherwise minimize and mitigate adverse impacts to the following:

- Historic districts, landmarks, sites and structures listed, or eligible for listing, on state or national registers.
- Public parks and recreation areas, including state and municipal parks, forests and trail networks.
- State or federally designated scenic byways, and municipally designated scenic roads and viewsheds.

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- Special flood hazard areas identified by National Flood Insurance Program maps (except as required for hydro facilities)
- Public and private drinking water supplies, including mapped source protection areas.
- Primary agricultural soils mapped by the U.S. Natural Resources Conservation Service.
- Necessary wildlife habitat identified by the state or through analysis, including core habitat areas, migration and travel corridors.

4. Natural Resource Protection:

New generation and transmission facilities must be sited to avoid the fragmentation of, and undue adverse impacts to the town’s working landscape, including large tracts of undeveloped forestland and core forest habitat areas, open farm land, and primary agricultural soils mapped by the US Natural Resource Conservation Service.

- 5. Protection of Wildlife:** Designers must gather information about natural and wildlife habitats that exist in the project area and take measures to avoid any undue adverse impact on the resource. Consideration shall be given to the effects of the project on: natural communities, wildlife residing in the area and their migratory routes; the impacts of human activities at or near habitat areas; and any loss of vegetative cover or food sources for critical habitats.

6. Site Selection:

Site selection should not be limited to generation facilities alone; other elements of the facility need to be considered as well. These include access roads, site clearing, onsite power lines, substations, lighting, and off-site power lines. Development of these elements shall be done in such a way as to minimize any negative impacts. Unnecessary site clearing and highly visible roadways can have greater visual impacts than the energy generation facility itself. In planning for facilities, designers should take steps to mitigate their impact on natural, scenic and historic resources and improve the harmony with their surroundings.

Local Permitting

The Vermont Municipal and Regional Planning and Development Act (24 VSA Chapter 117) does not allow communities to impose land use regulation that prohibits or has the effect of prohibiting the installation of solar collectors or other renewable energy devices. It also prohibits communities from regulating the height of renewable energy systems such as windtowers provided that they are small in scale. However, statute does enable Vermont’s municipalities to adopt regulatory bylaws to implementing the energy provisions contained in their town plan. Zoning bylaws and subdivision regulations are the most commonly used bylaws. Each affords the opportunity to promote energy efficient development at the local level.

Zoning bylaws control the type and density of development. It is imperative that communities recognize the connection between land use, transportation and energy and seek to create zoning ordinances and subdivision regulations that encourage energy efficiency and conservation. Encouraging high density and diverse uses in and around existing built-up areas will lead to more compact settlement patterns, thereby minimizing travel requirements. At the same time, zoning bylaws must be flexible enough to recognize and allow for the emergence of technological advancements which encourage decreased use of fossil fuels, such as increased use of solar and wind power.

Local zoning bylaws may also permit the creation of planned unit developments (PUDs). PUDs are a grouping of mixed use or residential structures, pre-planned and developed on a single parcel of land. The setback frontage and density requirements of the zoning district may be varied, to allow creative and energy efficient design (i.e. east-west orientation of roads to encourage southern exposure of structures, solar access protection, use of land forms or vegetation for wind breaks, and attached structures), and to encourage the construction of energy efficient buildings.

Subdivision regulations are one of the most effective tools for encouraging energy efficiency and conservation. Subdivision regulations, like PUDs, involve town review (through the Planning Commission, Zoning Board of Adjustment or Development Review Board) in the design process. Because subdivision regulations

govern the creation of new building lots, as well as the provision of access and other facilities and services to those lots, a community can impose requirements that a developer site their building to maximize solar gain. Likewise, subdivision can require that landscaping be utilized to reduce thermal loss.

G. Energy Efficiency and Conservation

Energy efficiency and conservation are the highest priorities of the TRO Region. In general, these elements are the most cost effective method of reducing energy use. It is always less expensive to reduce consumption than to produce energy. But, there are barriers that prevent home owners and businesses from making energy efficiency investments and participating in existing programs. High upfront costs, split incentives, poor understanding of benefits, a lack of information about efficiency and poorly timed home improvements all present challenges to improving energy efficiency.

Energy efficiency and conservation are the highest priorities of the TRO Region.

Improving existing structures and building new structures with a vision toward increased energy efficiency is a critical way to promote energy conservation and lessen or postpone the need for costly sources of additional energy. Enhanced energy efficiency in buildings and structures can lessen the amount of income that our Region spends on energy costs, decrease per capita consumption of non-renewable sources of energy, and decrease the

emission of both acid rain precursors and greenhouse gases. Reducing the consumption of costly, imported forms of energy and increasing the use of renewable emission-free energy can reduce reliance on global markets, stimulating local economies.

Much of the Region's building stock is old, and many of these buildings are considered historic and are either listed on or eligible for listing on the State and National Registers of Historic Places. In Orange and Windsor Counties, 47% of homes were built before 1970.

In Orange and Windsor Counties, 47% of homes were built before 1970 and are in need of energy efficiency measures.

There are a wide range of programs designed to reduce costs for home energy efficiency improvements, many of which are organized by Efficiency Vermont. Efficiency Vermont is Vermont's statewide energy efficiency utility, which is funded by an energy efficiency charge on a consumer's electric bill; it is managed by the Vermont Energy Investment Corporation (VEIC), an independent non-profit energy services organization that is under contract to the Vermont Public Service Board. Efficiency Vermont helps Vermonters reduce energy costs by making their homes and businesses energy-efficient. It provides technical assistance and financial incentives to help Vermonters identify and pay for cost-effective approaches to energy-efficient building design, construction, renovation, equipment, lighting and appliances. TRORC supports statewide, regional

and local efforts to provide educational outreach to communities to better educate homeowners as to what resources are available to them for energy efficiency improvements.

New residential development in the State of Vermont is required to comply with Vermont Residential Building Energy Standards (RBES). Commercial development is subject to similar (but more effectively enforced) code regulations. Some examples of the types of development the RBES applies to include:

- Detached one- and two-family dwellings.
- Multi-family and other residential buildings three stories or fewer in height.
- Additions, alterations, renovations and repairs.
- Factory-built modular homes (not including mobile homes)

In order to comply with the RBES, a home, as built, must meet all of the Basic Requirements and the Performance Requirements for one of several possible compliance methods. If the home meets the technical requirement of the RBES, a Vermont Residential Building Energy Standards Certificate must be completed, filed with the Town Clerk of the community and posted in the home. If a home required by law to meet the Residential Building Energy Standard does not comply, a homeowner may seek damages in court. It includes heating and cooling systems as well. Unfortunately, the program lacks a mechanism that enforces the proper filing of the required certificate. Without having a way to penalize contractors who do not

file these reports, there is no way to ensure compliance with the RBES. Communities who wish to take a role in guaranteeing compliance with this program can do so by requiring proof of filing as part of a certificate of occupancy through their zoning ordinance.

H. Municipal Energy Efficiency and Conservation

Municipalities expend a substantial amount of their yearly budgets on energy related costs, primarily for heating and transportation. When the price of fuel rises, costs rise, which forces the community to either raise taxes or cut services. In the event that fuel costs were to double in the future, municipalities could be dramatically impacted. Efficiency and conservation at the municipal level can have a broad impact and will benefit the community as a whole. Some of the opportunities for energy efficiency and conservation at the municipal level include:

- Tracking energy expenses by building.
- Conducting energy audits on municipal buildings.
- Creating municipal policies that reduce energy use (such as an energy efficient purchasing policy.)

State statute enables communities to form an Energy Committee, which is a volunteer board that focuses on energy issues. An Energy Committee can assist the Planning Commission with developing good energy policy. It can also be responsible for auditing and tracking energy expenses in order to recommend energy efficiency improvements for municipal buildings.

Capital Budget and Program

Given the potential expense of energy efficiency improvements, it is essential to wisely budget town funding to cover these costs. State statute enables communities to create a Capital Budget and Program for the purposes of planning and investing in long-range capital planning. Although most communities have some form of capital account where they save money, many do not have a true Capital Budget and Program. A capital budget outlines the capital projects that are to be undertaken in the coming fiscal years over a five-year period. It includes estimated costs and a proposed method of financing those costs. Also outlined in the Program is an indication of priority of need and the order in which these investments will be made. Any Capital Budget and Program must be consistent with the Town Plan and shall include an analysis of what effect capital investments might have on the operating costs of the community.

When planning for routine major facilities investments, such as roof replacements, foundation repairs, etc., it is important to also consider making energy efficiency improvements at the same time. The cost to replace or renovate a community facility will only be slightly higher if energy efficiency improvements are done at the same time, rather than on their own.

Municipal Incentives

Communities can also consider offering incentives to residents that encourage energy efficient improvements. Vermont enacted legislation in May 2009 (Act 45) that authorizes local governments to create

Clean Energy Assessment districts. Once created, municipalities can offer financing to property owners for renewable energy and energy-efficiency projects. Eligible projects include the installation of solar water and space heating, photovoltaic panels (PV), and biomass heating, small wind, and micro-hydroelectric systems. Property-Assessed Clean Energy (PACE) financing effectively allows property

owners to borrow money to pay for energy improvements. The amount borrowed is typically repaid via a special assessment on the property over a period of up to 20 years; if the property owner wishes to sell the parcel before fully repaying the obligation, then the obligation is transferred to the new property owner at the time of sale.

Goals, Policies and Recommendations: **Energy**

Goals

1. Energy efficient homes and buildings are constructed to lessen or postpone the need for costly sources of additional energy.
2. More public transportation facilities and opportunities exist to increase ridership in areas already serviced by public transportation.
3. Educational efforts increase awareness and use of energy conservation practices.
4. Patterns of land use and development use energy most efficiently.
5. Renewable energy generation is sustainable and protects our natural and rural landscape.

Policies

1. Prior to the construction of additional or upgraded transmission or distribution lines or related facilities, utilities must demonstrate that such public investments are justified to improve efficiency and is not inconsistent with the goal to increase energy conservation for the consumer. In the consideration of the public benefit resulting from such investments, full consideration of the associated external costs must be reflected in any decision. Prior to the acceptance or acknowledgment of any new energy source or facility development affecting the region, full community and technical review is required to enable objective analysis of the positive and negative economic, social, aesthetic, and environmental impacts associated with the project.
2. Unless specifically prohibited within a land use area, New non-renewable generation facilities, and transmission and distribution systems, must be sited to avoid the fragmentation of, and undue adverse impacts to the town's working landscape, including large tracts of undeveloped forestland and core forest habitat areas, open farm land, and primary agricultural soils mapped by the US Natural Resource Conservation Service.
3. Properly planned and constructed expansions and efficiency improvements to existing hydropower generators and transmission facilities are required where such investments clearly benefit the residents of the region and are in accord with goals and policies of this Plan.
4. Where development and construction of electric power generation facilities (renewable and non-renewable) are proposed for public use, design plans must consider placement of such facilities in locations where environmental impact is minimal or reasonable measures have been employed to mitigate adverse impacts.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Energy**

Policies (continued)

5. The Regional Plan requires transportation practices that promote energy efficiency. This includes the following initiatives:
 - a. Invest in bicycling and walking facilities within settlement and commercial growth centers, and invest in bicycle and walking facilities that connect settlement and commercial growth centers.
 - b. Continue investment in public transportation and rideshare programs to reduce the region's dependency on single-occupancy vehicle trips.
 - c. Construct more park-and-ride commuter parking lots at Interstate interchanges and within our settlement and commercial growth centers.
 - d. Support transportation facility design enhancements that better accommodate multi-modalism on the Region's existing roads and bridges.
 - e. Require large-scale private land use development to invest in transportation infrastructure and services that promote multi-modalism or provide the necessary right-of-way to allow public investment in those facilities.
6. Capital investments of public utilities and services are encouraged within built-up centers to support the high intensities of use.
7. Where it is demonstrated that the costs of providing energy services and facilities clearly is outweighed by a public benefit to the areas or region and the land use settlement patterns resulting from the development or subdivisions are in conformance with this Plan and relevant local plans, such services and facilities should be permitted.
8. No new dams or major improvements to existing dams are supported without full consideration of its social, economic, and environmental impacts, the appropriate local plan, and this Regional Plan. Future hydroelectric power development must occur within these guidelines:
 - a. Run-of-the river projects are preferred over projects which require impoundments with low or minimum flows;
 - b. Recreation and fisheries are top priorities for river uses and should not be significantly diminished by hydropower development. Provisions should be made for fish passage and canoe portages. Also, recreational opportunities at hydropower facilities should be explored and developed where appropriate; and
 - c. Water quality and minimum flows must be maintained.
9. New developments that are proposed under Act 250 must include measures to reduce energy consumption through site and building design, materials selection and the use of energy-efficient lighting, heating, venting and air conditioning systems.
10. TRORC supports the development and use of renewable energy resources – including but not limited to wind, solar, biomass, micro hydro and cogeneration – at a scale that is sustainable, that enhances energy system capacity and security, that promotes cleaner, more affordable energy technologies, that increases the energy options available locally, and that avoids undue adverse impacts of energy development on the local community and environment.

Goals, policies and recommendations continued on next page

Goals, Policies and Recommendations: **Energy**

Recommendations

1. Actively support partnerships, strategies, and state and federal legislation that will ensure the affordable, reliable and sustainable production and delivery of electrical power to the region, in conformance with regional and municipal goals and objectives.
2. TRORC will participate in long-range utility planning and development to ensure that local energy, resource conservation and development objectives are identified and considered in future utility development.
3. Participate in the Public Service Board's review of new and expanded generation and transmission facilities to ensure that local energy, resource conservation and development objectives are identified and considered in future utility development.
4. Work in cooperation with state and local agencies, emergency service providers, regional suppliers and municipalities to develop local emergency contingency plans that ensure access to critical energy supplies and measures to reduce nonessential energy consumption in the event of an abrupt energy shortage.

Energy Endnotes

1. 24 V.S.A. § 4347(2)
2. 24 V.S.A. § 4347(3)
3. 24 V.S.A. § 4347(4)
4. 24 V.S.A. § 4347(5)