RONCEVERTE
THE FRIENDLY RIVER CITY

Ronceverte Eco-Community Plan

Water Energy *Community*

RONCEVERTE MAIN STREET – RONCEVERTE DEVELOPMENT CORPORATION – CITY OF RONCEVERTE – RONCEVERTE GREEN TEAM

July 2013

Downstream Strategies

Ronceverte Eco-Community Plan

Water – Energy – *Community*

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ABOUT THIS PLAN

The Ronceverte Development Corporation's Main Street program strives to meet the challenge of economic redevelopment of downtown Ronceverte, by maintaining its historical and cultural landmarks while improving the well-being of all residents with an emphasis on environmental revitalization.

To accomplish these goals, Main Street's Economic Restructuring Committee was granted a West Virginia Main Street Innovation Award in 2012 to develop a plan for an eco-district in Ronceverte. The Economic Restructuring Committee chose Downstream Strategies of Alderson, known for their skills in environmental economics, survey design and execution, and planning services. The results are an innovative eco-community plan for the friendly river city. This plan presents a multi-phased approach to creating a business district that emphasizes green infrastructure, energy efficiency, and renewable energy and provides a green development concept for the town.

ACKNOWLEDGEMENTS

The Main Street Ronceverte Program would like to extend a sincere thank you to the following people as we celebrate this first step toward a promising green future for Ronceverte: Main Street West Virginia of the West Virginia Development Office; Downstream Strategies; Alterra Renewable Energy; Sally Baker, Tony Benedetto, and Sharon Schaefer of Main Street Ronceverte; Doug Hylton and Reba Mohler of the City of Ronceverte; Kevin Hill of Vista AmeriCorps; and the Ronceverte Mayor Gail White.

ABOUT DOWNSTREAM STRATEGIES

Downstream Strategies (DS) has more than 14 years of experience building capacity for sustainability through projects in our three main program areas—Water, Energy and Land—via our unique toolkit, which includes Geographic Information Systems and Stakeholder Involvement and Participation. We combine sound interdisciplinary skills with a core belief in the importance of protecting the environment and linking economic development with natural resource stewardship. DS provides science, research, and tools to organizations, businesses, and agencies and has considerable background in environmental science and policy. We have completed many projects related to sustainable and community-oriented planning: green infrastructure planning, solar energy feasibility and development, watershed planning, and community energy planning. These publications can be found on our website, www.downstreamstrategies.com/projects.html.

LETTER FROM THE RONCEVERTE GREEN TEAM

The Ronceverte Green Team's positive message is that we should all do our part to provide for an environmentally sustainable future. We are not experts and we might not even be the best role models in our own lifestyles, but we are people that care and want to do something for Ronceverte and our planet. The idea of creating a more sustainable community not only supports a healthier future for families and ourselves, but also helps to drive the town's economic redevelopment. Our goal is to be greener at work and at home, and to bring like-minded people together to share information and skills, so that we can improve our community. Although we volunteer for the team part time, our belief in an environmentally sustainable future is full time.

☐ Some of the team's highlights include:

- Creating an eco-community plan for our community
- Creating a community garden on the site of the condemned city pool
- Building a solar powered car charging station that helps reduce the city's electric bill
- Organizing an energy (sustainability) fair to highlight green concepts

☐ Future plans:

- Conducting energy audits and building surveys, comparing good and best practices building-by-building, and then working with the owners to make improvements
- Creating a website resource to provide reference information and advice
- Working with the City of Ronceverte to implement curbside recycling

More of us are becoming aware of the need for an environmentally sustainable future, but if you are not a politician or big business leader, what difference can you really make? Small steps are key to getting started, and awareness is a great first step. Take a look at our surroundings, and small positive choices can go a long way. The "feel-good factor" from taking positive action, and the community spirit that can be fostered when making contact with like-minded people, are other steps. Everyone has a part to play, and with more folks making healthier decisions and leading more sustainable lifestyles, the future is bright. Making the right decisions and 'going green' do not have to be difficult or create intolerable sacrifices. A sustainable lifestyle can be fun and save money too. For example, growing your own food is not only an environmentally sound decision, there's also nothing quite like the pride and taste that home-grown food can provide, while again saving you money.

The Ronceverte Green Team is a small group of individuals, but a team that represents a change in attitude in a much wider population. We are at the beginning of moving towards sustainability, and together we really can make a change for the better.

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INTRODUCTION

ABOUT RONCEVERTE

Ronceverte, West Virginia, "Gateway to the Greenbrier Valley," extends along the banks of the majestic Greenbrier River. Ronceverte's growth started with a gristmill in 1780 and then "boomed" when the lumber mill was in operation and the Saint Lawrence Boom and Manufacturing Company began operations in 1883 (1). Ronceverte is an ideal small Appalachian community, rich in natural beauty and resources. The assets of Ronceverte are numerous, but like most small towns in West Virginia, it struggles with declining populations and empty storefronts. However, a new revitalization effort is underway by city government, Main Street, the Ronceverte Development Corporation, and community leaders. This effort has led to many community features, such as recreational facilities on the 22-acre Island Park, which features a children's playground, a four-lane quarter-mile track, basketball courts, horseshoe pits, picnic shelters, ball fields, walking trails, and a skateboard park. An amphitheater hosts the *Riders of the Flood* outdoor drama each September, as well as the annual River Festival in June (1). To enhance and capitalize on these efforts, Ronceverte is engaged in an eco-community planning initiative that will once again highlight this area and create one of the greenest small towns in rural Appalachia.

RONCEVERTE ECO-COMMUNITY PLANNING INITIATIVE

In 2012, the Main Street Ronceverte Economic Restructuring Committee ("Main Street") was granted an Economic Restructuring Innovation Award for the creation of an eco-community plan for the city of Ronceverte. Through this grant, Main Street hired Downstream Strategies (DS). This initiative uses a stakeholder-driven approach to eco-community planning and provides the groundwork for Ronceverte's redevelopment into a sustainable and green mixed-use community. This plan includes several already-funded projects designed to enhance quality of life, while reducing the community's impact on the environment. The plan organizes projects into three categories: water, energy, and community. These components represent ideals of sustainability and are presented in the first phase of the planning process. The water component relates to the community's use and conservation of water resources, the energy component considers the development of renewable energy projects and an investment in energy efficiency, and the community component is a cross-cutting category that considers the impact of projects on community cohesion.

To realize this vision, a planning process was undertaken in which stakeholders identify, plan, and implement projects that are aligned with the vision of an eco-community. The eco-community plan will enable Ronceverte to cultivate a sustainable and community-focused future by providing a blueprint for attracting residents and businesses, promoting green development and tourism, and creating a model for other rural communities across Appalachia.

FIGURE 1: STUDY AREA FRAMEWORK

The study area was determined and sketched during several meetings with town stakeholders. Through this phased approach, the stakeholders selected sites based on knowledge, ownership, willingness to participate, and need. While Ronceverte encompasses a larger area and has more businesses and potential participants, this effort was seen as a first phase and a way to engage more stakeholders in future phases. The future phases would include the larger area of Ronceverte and incorporate more residential areas.

ECO-COMMUNITY PLANNING AREA

Overview

The city of Ronceverte is a community located along the banks of the Greenbrier River, with a historic foundation in the boom and bust of industry and a vision toward a sustainable and green future. Like many communities in rural Appalachia, Ronceverte has a declining population and struggles with poverty and lack of resources, but it has amazing potential for becoming a model of rural transition. Located close to Lewisburg, West Virginia, "The Coolest Small Town in America," Ronceverte is poised to capitalize on the popularity and growth in Lewisburg and the region by offering a picturesque, riverside eco-community, one of the first in West Virginia. Implementing this eco-community plan will improve the quality of life for residents, attract new business and families, create jobs, revitalize the downtown area, and provide significant cost savings to town government, residents, and businesses. According to the 2005 Ronceverte Master Plan (1), potential trade growth of 8-9% was forecasted for the region between 2005 and 2010, with significant expansion in the construction, professional, health care, entertainment, and service sectors. Ronceverte's eco-community efforts can help the city attract a share of that regional growth. Highlighting the notion of eco-communities stimulating economic development, a recent study from Georgia Tech examined four case studies across the United States (2). In these communities, redevelopment combined with eco-planning resulted in investment from businesses and increased foot traffic to local shops.

DEVELOPING THE PLAN

Initially, Main Street (MS) and the Ronceverte Development Corporation (RDC) pursued the idea of creating an eco-district plan, using a popular planning technique developed by the Portland Sustainability Institute (POSI).[1] The eco-district planning process typically takes place in large cities or urban areas, and then works with a smaller sub-community to develop eco-districts. These districts are developed at a smaller scale to accelerate the process towards sustainability and project development.

For this initiative, stakeholders felt this was too much and instead chose the self-coined term "eco-community." The eco-community planning processs used a phased approach. Phase 1 focuses on the core areas of the town, while Phase 2 will integrate the residential area. The eco-community plan consists of several key concepts and goals, outlined by the stakeholder group during the planning process:

- ☐ Create economic benefits from sustainability investments:
  - help residents and businesses save money,
  - create significant competitive and livability advantages,
  - provide long-term value for existing business communities, and
  - create job opportunities for citizens.
- ☐ Increase social and environmental benefits:
  - bring neighborhood stakeholders, property developers, utilities, and municipalities together and
  - achieve outcomes including improved environmental performance, improved community participation, new patterns of behavior, economic development for local businesses, quality of life improvements, and job creation.

[1] Learn more about eco-districtrs by visiting the POSI website: www.pdxinstitute.org.

Process and Framework

Through a series of stakeholder meetings, a process and outline was created to develop the eco-community plan:

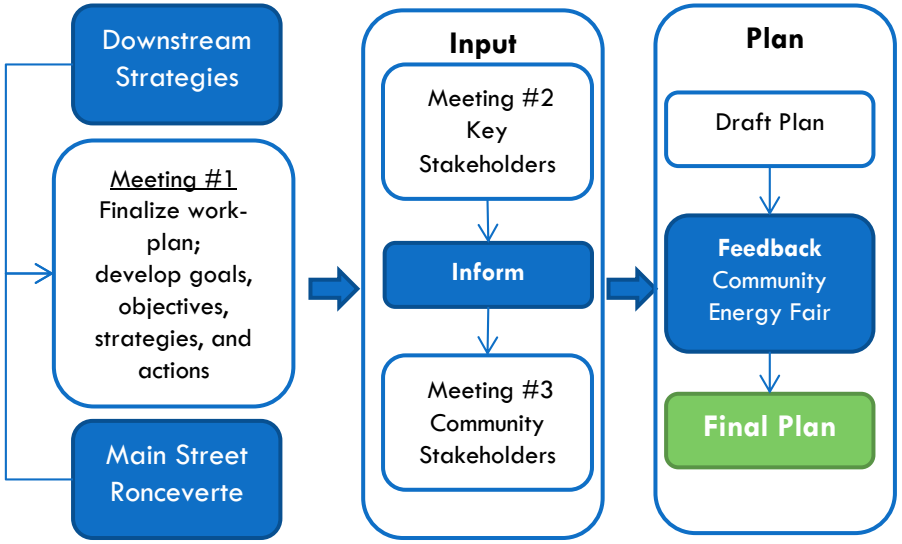
- developing of a list of sustainable projects, including funding sources, timelines, and concepts;
- providing energy assessments to local businesses and town government entities;
- convening a larger group of stakeholders to gain input for planning and the implementation processes;
- forming the Ronceverte Green Team;
- performing a preliminary renewable energy assessment of the town; and
- developing of a phased timeline for project implementation.

The streamlined planning process included a series of meetings and background research conducted by DS. Figure 2 illustrates the project approach by defining key steps in the planning process. At the initial meeting—meeting #1—DS and MS outlined the goals and roles of stakeholders. Key town government officials and local business owners were involved in meeting #2. A third community meeting—meeting #3—was held to gather broader input. A draft of this plan was submitted to the stakeholders for review, and it was presented at Ronceverte's Community Energy Fair. The fair provided an opportunity for stakeholders not yet involved in the process to provide input and guidance.

The framework is based on the three eco-community components: water, energy, and community. These components were chosen based on the priorities set by stakeholders and are used throughout the plan.

Water	Water conservation and stormwater management
Energy	Energy efficiency and renewable energy development
Community	Enhancing the quality of life for Ronceverte residents

FIGURE 2: PLANNING APPROACH



ECO-COMMUNITY PLAN

STAKEHOLDER PRIORITIES

The eco-community planning process produced several initial outcomes. First, the Ronceverte Green Team was formed as a sub-committee of Main Street, functioning as the lead for developing and implementing the goals set forth in this plan. Second, the Green Team worked with DS to form the objectives and goals of the planning process, which are listed in the previous chapter. Third, a second meeting with key stakeholders was convened and

a list of project ideas was developed through a facilitated discussion. Each stakeholder listed project ideas, no matter how bold, that could be part of the eco-community plan. The results are summarized in Table 1, organized by key stakeholders and eco-community components. These ideas where examined in more detail by DS, then prioritized based on feasibility, community interest, current efforts, and cost. These project ideas are summarized in Appendix A. A planning matrix (in the following sections) outlines each project, including a timeline, potential costs, stakeholders, and resources. Several projects were initiated as part of this planning process and are highlighted in the following chapter.

TABLE 1: STAKEHOLDER PROJECT IDEAS

Project idea	Key stakeholders	Component
Recycling bins	City/residents	
Glass recycling	City/residents/ private company	
Community garden	City/residents	
Weatherization	City/residents/ businesses	
Light-bulb exchange	City/residents	
Rain barrels	City/residents	
Energy assessments and audits	City/businesses	
Education	City/residents/school	
Green existing city plans	City/ Green Team	
SPARK station	City/residents	
Green housing demonstration	City/Green Team	
District energy	City/utility	
Hydropower	City/utility/ energy developer	
Solar energy	City/utility/ residents/developer	
Green infrastructure	City/residents	
Greening the upgraded wastewater plant	City/utility/contractor	

PROJECTS AND IMPLEMENTATION

The foundation of eco-community planning is developing and implementing projects that achieve greater sustainability and enhance livability. The purpose of this plan is to create projects that consider more factors than traditional planning and development. The vision is to apply sustainable principals to all aspects of future development and community projects:

- **Reduce energy consumption from city government, businesses, and residents; invest in renewable energy projects; and create a city energy plan.** Ronceverte's vision of becoming energy independent and increasing efficiency will save money, reduce carbon emissions, and provide a stream of future revenue for a variety of stakeholders in the community.
- **Reduce potable water consumption and improve stormwater management.** Drinking water is purchased from the City of Lewisburg at a high cost; developing programs to reduce water consumption will save the city and its residents money. Building green infrastructure[2] projects to reduce pollution to the Greenbrier River from runoff will also beautify the town.
- **Create projects that enhance community involvement and participation.** Projects will include a community garden, public beautification projects, improving mobility and walkability, and implementing programs to educate and assist residents and business with various sustainable initiatives.
- **Reuse existing infrastructure and buildings for redevelopment and infilling with new development.** Various tax incentives and grant programs will be used to preserve and upgrade existing structures and buildings.

Project ideas and concepts developed during the planning process were gathered and expanded upon in this report. Appendix A captures each idea and details its feasibility, potential financial resources, and potential cost. In addition to developing concepts, several projects were initiated as part of the eco-community planning process. Funding was secured for a community garden at the old municipal swimming pool site, three energy assessments were completed for local businesses, and a grant proposal was submitted for a solar-powered electric vehicle recharging kiosk (SPARK), solar energy assessment, and solar array. These projects are highlighted in the following sections.

[2] USEPA's green infrastructure website: www.water.epa.gov/infrastructure/greeninfrastructure

SPARC STATION AND SOLAR ENERGY DEVELOPMENT

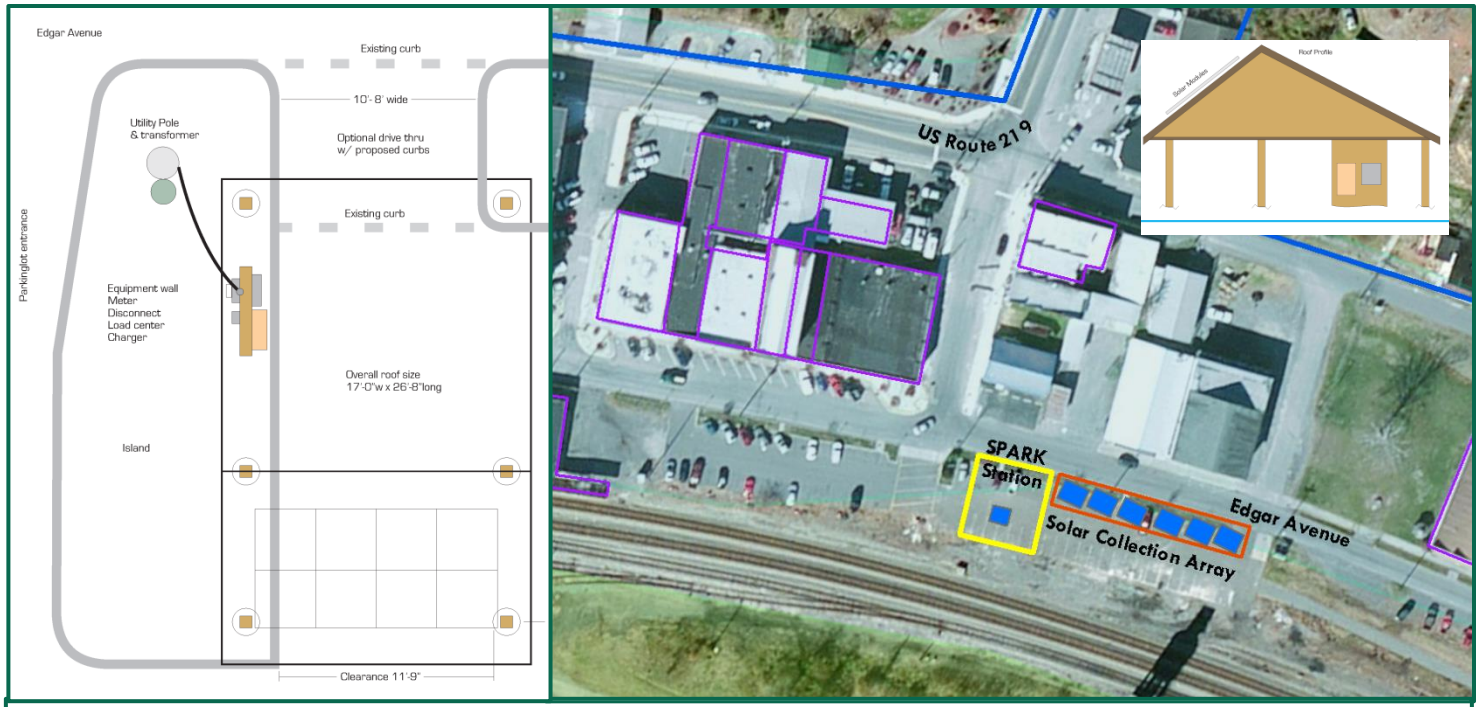
Alterra Energy, from Renick, West Virginia, performed two solar energy assessments as part of the planning process: a SPARC (Solar Powered Electrical Vehicle Charging Station) station and an ancillary solar collection array.

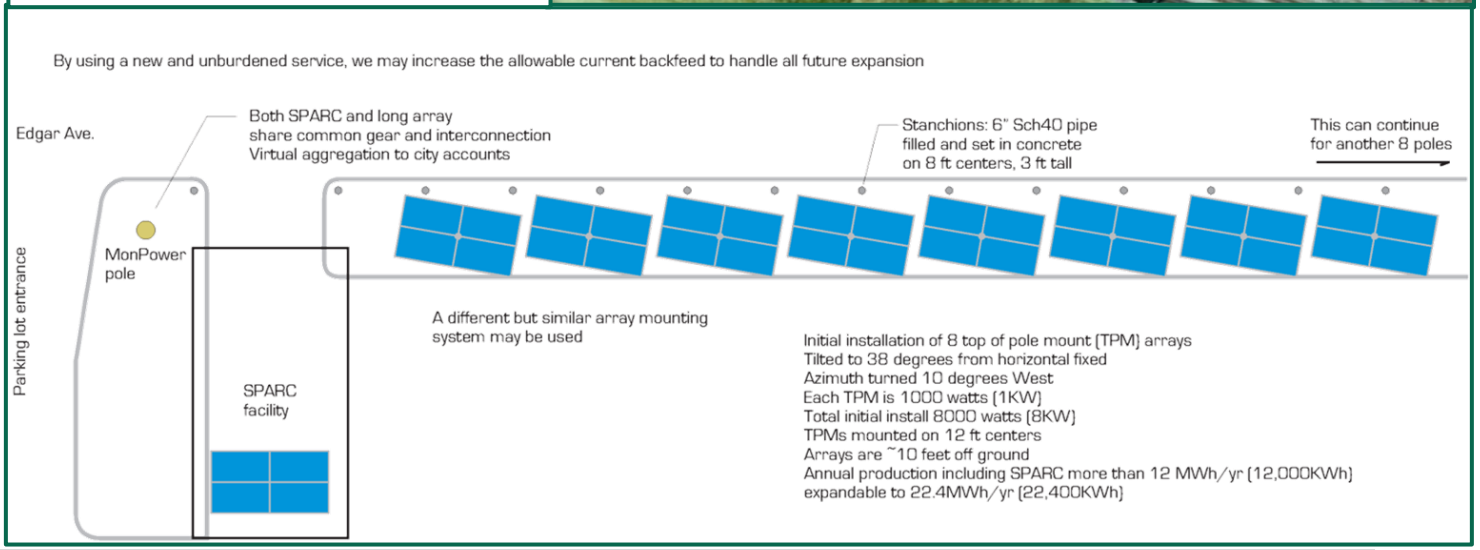
<u>SPARK Station:</u>

- Car charging station
- Cost: $10,500

<u>Solar Array:</u>

- Solar energy production for town
- Cost $48,000
- 8-kW System





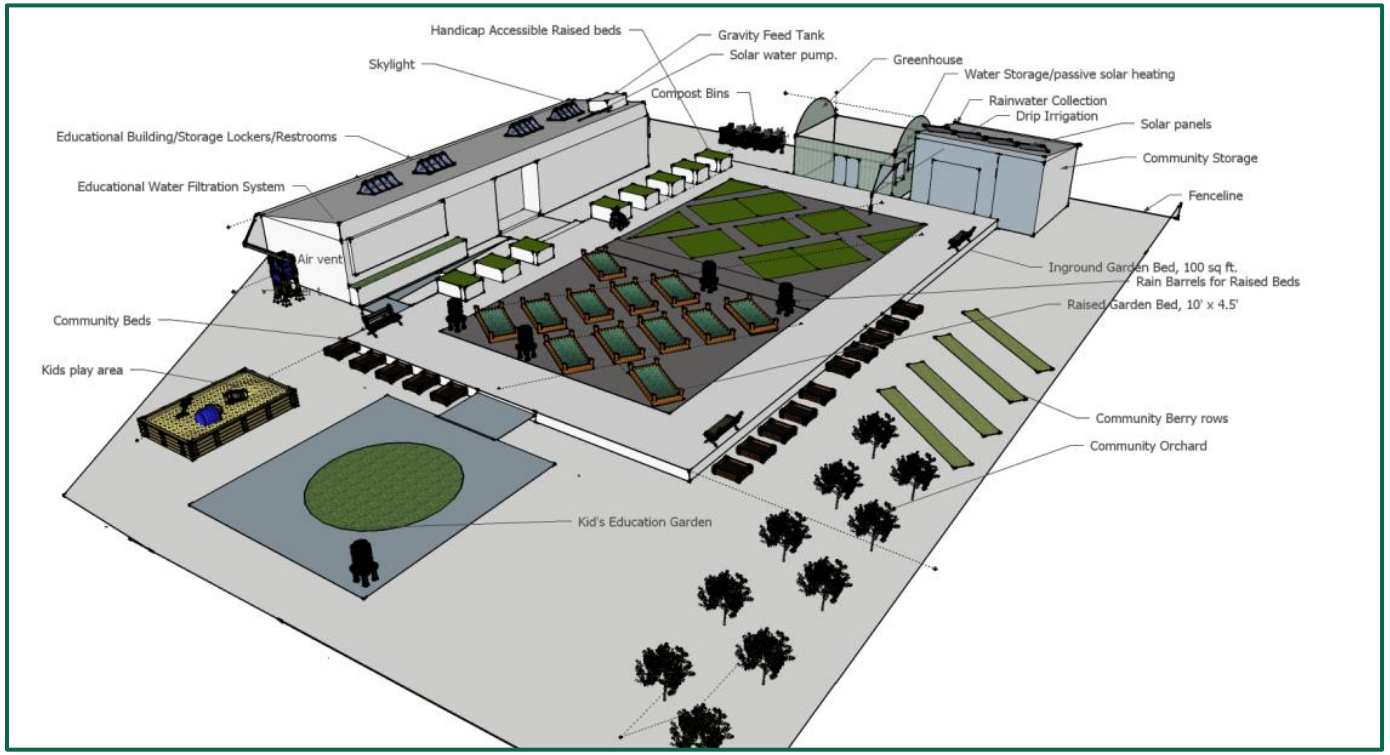
RONCEVERTE COMMUNITY GARDEN

The Ronceverte Community Garden project is funded by a West Virginia Department of Agriculture Specialty Crop Grant along with a Growing Healthy Communities Grant. This project is converting the damaged Ronceverte pool into a self-sufficient community garden.

Whether because of building density or hilly terrain, many residents in Ronceverte lack access to land that is suitable for growing food. Establishing a community garden in Ronceverte will provide residents access to suitable land and result in increased production of fruits and vegetables.

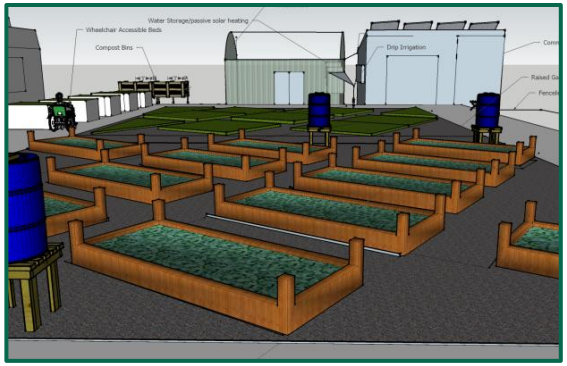
The community garden will feature the following assets:

- Water catchment systems
- Solar pumps
- Passive solar design in buildings
- Educational garden area
- Educational water filtration area
- Fencing
- Handicap-accessible beds
- Raised and in-ground beds
- Community orchard and berry patch
- Composting facilities



Before

After



ENERGY ASSESSMENTS

Energy assessments (EAs) were performed for three Ronceverte businesses as a part of the eco-community plan. The EAs are funded by the U.S. Department of Agriculture via a partnership between the West Virginia University Industrial Assessment Center and Industries of the Future. The primary objective is to identify and evaluate opportunities for energy conservation. Data were gathered during site visits. Recommendations were identified, energy savings were estimated, and conceptual implementation costs were provided. Table 3 summarizes the EA results. Several resources may be available to help pay for retrofits and reduce energy costs, as listed below.

TABLE 2: ENERGY ASSESSMENT SUMMARY

Company	Recommendation	Cost	Savings	Payback period (years)
Edgarton Café & Bakery	1. Retrofit existing lighting	$121	$228	0.5
	2. Install programmable thermostat on heating unit	$145	$991	``
	3. Insulate the ceiling with blown-in spray foam insulation	$2,992	$2,101	1.4
	Summary	**$3,258**	**$3,320**	**1.0**
Greenbrier Cut Flowers	1. Retrofit existing lighting	$85	$159	0.5
	2. Install programmable thermostat on heating unit	$145	$194	0.7
	Summary	**$230**	**$353**	**0.7**
Martin & Jones Hardware	1. Retrofit existing lighting	$2,274	$1,021	2.2
	2. Install programmable thermostat on heating unit	$725	$2,542	0.1
	Summary	**$2,999**	**$3,563**	**0.8**

Resources

- United States Department of Agriculture (USDA), Rural Energy for America Program (REAP) : Lisa Sharp at (304) 284-4871 or Lisa.Sharp@wv.usda.gov
- Natural Capital Investment Fund (NCIF), Small Business Energy Loan Program: Marten Jenkins at (304) 876-2815 or mjenkins@conservationfund.org
- Appalachian Power Company (APCo) Energy Saving Programs for West Virginia Business Customers: (888) 446-7719 or www.appalachianpower.com/save/programs/
- Federal Energy-Efficient Commercial Buildings Tax Deduction: www.dsireusa.org/incentives/ and click on “See Federal Incentives.”

REVIEW OF TOWN COMPREHENSIVE PLAN

Building		Eco-revitalization concepts	Components	Resources
1	**Shanklins Theater**	Green roof, energy-efficient lighting, and windows.		Interior storm windows for historic buildings: www.stormwindows.com
2	**Old City Hall**	Green roof, solar hot water, energy efficient lighting, and windows.		Solar hot water heater resource: www.energy.gov/energysaver/articles/solar-water-heaters
3	**City Hall**	Solar panels, rain barrels, and aerators on faucets.		Space ideal for possible community solar project, cost for 12-15 panels: $150,000-$180,000. Aerators cost $3-$6 each.
6	**First National Bank**	Solar panels, rain barrels, low-flow faucets and toilets, energy-efficient hand-dryers, and lighting.		Low-energy hand dryers: www.exceldryer.com/products_xlerator
8	**Hanshaw Insurance**	Green roof, solar hot water, water catchment, vertical garden, and green space on south side.		Vertical garden/living wall resource: www.independent.co.uk/environment/green-diy-tutorials-plant-a-living-wall-1911047
9	**Rudy Corner**	Green roof, energy-efficient restaurant appliances, low-flow faucets and toilets.		Green roof resource: www.epa.gov/heatisland/mitigation/greenroofs
16	**Laundry building**	Solar panels, water catchment, green space, permeable pavement, energy-efficient appliances, lighting and windows.		Permeable pavement fact sheet: www.mastergardener.umd.edu/local/howard/files/baywise%20files/PermeablePavingHowardCountyMasterGardeners10_5_11%20Final.pdf
26	**First National Bank**	Solar/green roof, green landscaping, low flow faucets and toilets.		Green landscaping resource: www.epa.gov/reg3esd1/garden/ Low-Flow Toilets: www.tinyurl.com/d8tsosl
29	**CSX Depot**	Water catchment, green landscaping, energy efficient lighting and windows.		Water catchment resource: www.builditsolar.com/Projects/Water/Water

GREEN INFRASTRUCTURE AND WATER CONSERVATION

Rain gardens, also known as bioretention cells, are a decorative means of increasing infiltration. They often use engineered soils and carefully chosen plants to infiltrate up to 30% more rainfall than typical turf lawns. This location could catch runoff from the parking lot and walking trails.

Tree Trenches are planters that manage stormwater by providing storage, infiltration, and evapotranspiration of runoff. Excess runoff is directed into an overflow pipe connected to the existing sewer pipe.

Bioswales filter contaminants from stormwater runoff and allow for biological uptake of pollutants. They utilize plants and engineered soils that are specially chosen to increase infiltration and filter pollutants from the runoff.

Pervious pavement technologies include interlocking pavers and plastic grid paving. Both can be planted with grass or filled with gravel to promote infiltration.

Rain barrels are storage systems connected to downspouts to harvest runoff from roofs. Collecting and reusing this runoff can result in substantial savings for property owners and stormwater management departments alike. Nearly 80% of domestic water use is for landscaping or indoor non-potable use, including flushing toilets and washing clothes.

RENEWABLE ENERGY ASSESSMENT

A general assessment of the solar energy resources available to the town was completed and is presented in Table 3 on the following page. The roof size was calculated for each building to estimate the size of solar system that could be installed. This was used to estimate costs. The solar system sizes in Table 3 are based on maximizing solar production on each roof. The next step in pursuing a project would be to scale back each system, if necessary, to match each building's electricity demand.

Generally, solar systems could be installed at nearly every location in town. The estimated gross cost (not including tax credits) is $6,000 to $7,000 per kilowatt. The main federal tax credit (commercial/residential) is the Investment Tax Credit (20% of project costs). USDA provides grants and low-interest loans for renewable energy installations that cover up to 25% of the project costs. Solar hot water heaters are also ideal for any location that has hot water needs. During the summer months, solar hot water heaters can provide up to 100% of a home's water heating needs and typically provide 50-80% of water heating demand over the course of a year. In addition to solar energy, micro-hydropower, biomass, geothermal, and waste heat resources also exist in the city of Ronceverte.

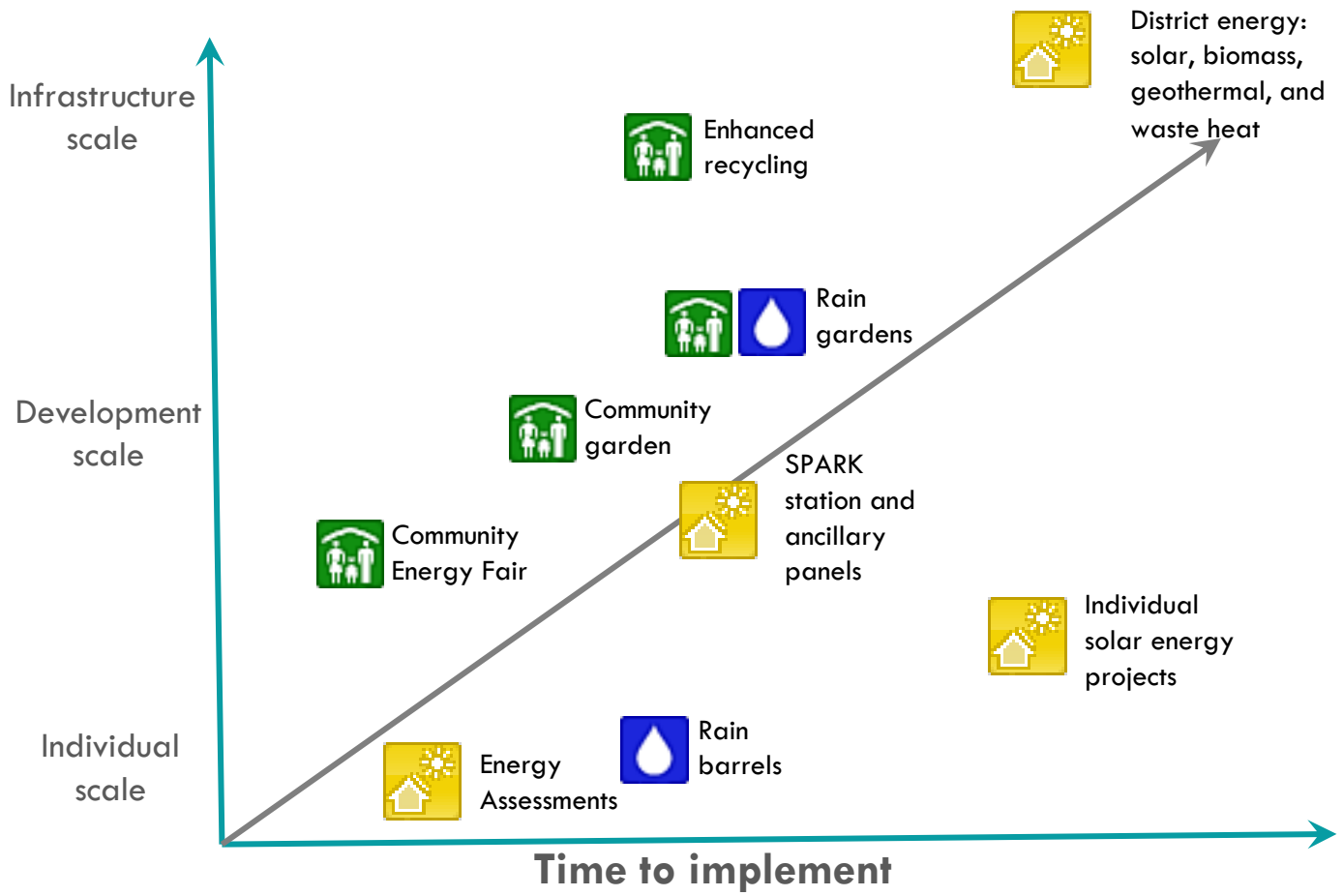
TABLE 3: RENEWABLE ENERGY IDEAS

	Building	Energy development concepts	Resources
1	**Armory**	Solar panels, solar hot water	10,970 square feet. Can install maximum of 110 kilowatts of solar PV, with an estimated maximum cost (without tax credits) of $600,000-$700,000. If the Armory has average-to-high hot water heating needs, solar hot water is a good option and has a low payback period. Solar PV is eligible for federal tax credits and USDA renewable energy grants.
2	**Community Garden Solar**	Solar panels, solar hot water	1,338 square feet. Solar PV is ideal for this space. Can install a maximum of 13 kilowatts of solar PV if whole space is used. Would need an electric meter to hook in the system. Possible ideal space for a community solar project. Cost (without tax credits): $80,000-$100,000. May not be eligible for tax credits or USDA grants if space is owned by Town. Can lease space to businesses for solar PV development.
3	**City Hall**	Solar panels and solar hot water	2,593 square feet. Can install a maximum of approximately 25 kilowatts of solar PV (12-15 solar panels) if whole space is used. Cost (without tax credits): $150,000-$180,000. May not be eligible for tax credits or USDA grants if space is owned by Town. Can lease space to businesses for solar PV development. Would need an electric meter to hook the system into. Possible ideal space for a community solar project. Solar hot water is also a viable option, especially if the City Hall hot water needs are average to high.
4	**Gateway**	Solar panels, geothermal heat pumps, solar hot water	11,261 square feet. Can install a maximum of 112 kilowatts of solar PV. Cost (without tax credits): $600,000-$750,000. Likely eligible for tax credits and/or USDA grants. Solar hot water and geothermal heat pumps are also potentially viable options.
5	**Greenbrier Tech**	Solar panels, geothermal heat pumps, solar hot water	14,023 square feet. Can install a maximum of 140 kilowatts of solar PV. Cost (without tax credits): $800,000-$1 million. Likely eligible for tax credits and/or USDA grants. Solar hot water and geothermal heat pumps are also potentially viable options.
6	**Architectural Wood**	Solar panels, geothermal heat pumps, solar hot water, biomass generator, combined heat and power	32,342 square feet. Can install a maximum of 320 kilowatts of solar PV. Cost (without credits): $1.9-$2.2 million. Likely eligible for tax credits and/or USDA grants/loans. Architectural Wood would be able to benefit from net metering the excess electricity. Solar hot water and geothermal heat pumps are also potentially viable options. Biomass generators (electricity) using waste wood and combined heat and power systems would be ideal.
7	**B.A. Milligan Flooring**	Solar panels, geothermal heat pumps, solar hot water, biomass generators	62,080 square feet. Can install a maximum of 620 kilowatts of solar PV on the roof alone (assuming the square footage value represents roof space). Additional ground space may also be used. Cost (without tax credits): $3.7-$4.3 million. Likely eligible for tax credits and/or USDA grants/loans. B.A. would be able to benefit from net metering the excess electricity. Solar hot water and geothermal heat pumps are also potentially viable uses, as well as diverting water from the Greenbrier River for low-power hydro. Main additional energy opportunities, however, are biomass generators (electricity) using waste wood and combined heat and power systems. Biomass generators cost $2,000-$3,000 per kilowatt. Such generators can be combined with waste heat recapture that can be used to generate additional electricity (with a steam turbine), or for manufacturing purposes (e.g., to drywood). Onsite wood waste can be used.
8	**Recycling Center**	Solar panels	13,487 square feet. Can install a maximum of 135 kilowatts of solar PV. Cost (without tax credits): $800,000-$1 million. May not be eligible for tax credits or USDA grants if space is owned by Town. Can lease space to businesses for solar PV development. Possible ideal space for a community solar project.
9	**Southern States**	Solar panels, geothermal heat pumps, solar hot water	10,294 square feet. Can install a maximum of approximately 100 kilowatts of solar PV if whole space is used. Cost (without tax credits): $600,000-$750,000. Likely eligible for tax credits and/or USDA grants/loans. Southern States would be able to benefit from net metering the excess electricity. Solar hot water and geothermal heat pumps are also potentially viable uses, depending on the energy needs of Southern States.
10	**SPARK Extension**	Solar panels, electric car charging station	Refer to page 7.
11	**SPARK**	Solar panels, small wind, small hydro	2,116 square feet. Can install a maximum of approximately 21 kilowatts of solar PV. Cost (without tax credits): $120,000-$150,000. May not be eligible for tax credits or USDA grants if space is owned by Town. Can lease space to businesses for solar PV development. Possible ideal space for a community solar project. No other energy possibilities identified if this is a solar-focused project. Can possibly be combined with small wind turbine or low-power hydro.
12	**Wastewater Treatment Plant**	Solar panels, geothermal heat pumps, methane collection	2,068 square feet. Can install a maximum of 21 kilowatts of solar PV on roof and more on ground if space available. Cost (without tax credits): $120,000-$150,000. Not likely eligible for tax credits and/or USDA grants/loans if plants are owned/operated by Town. Geothermal heat pumps and combined heat and power are also potentially viable options, depending on the energy needs and processes of the WWTP. The ideal energy development option is solar, although the feasibility of capturing and combusting methane to generate electricity using a turbine generator should be investigated.

SUMMARY

The Ronceverte eco-community planning process identified projects and initiatives necessary to achieve a sustainable vision for the town. Implementing these projects has begun with the community garden, energy assessments, and the SPARK car-charging station. These projects are formed around the idea of linking community, energy, and water; this linkage is central to creating a sustainable and prosperous Ronceverte. These projects are further organized into three different scales: infrastructure, development, and individual. Figure 3 illustrates the relationship among these projects within the planning framework and the role of each project in the cumulative effort towards sustainability. Project implementation can be a contagious process, where new projects are developed from existing efforts; therefore, each project is important, no matter what scale. This planning process evolved from a brainstorming and visioning process. This document is an effort to capture that vision, report those ideas, and plan for the future. The eco-community connects businesses, government, and residents through social and physical infrastructure to develop a more sustainable future and improve environmental performance. In addition, this effort will encourage new ideas of sustainability and continue to attract new residents and business and provide a high quality of life for the Ronceverte community.

FIGURE 3: PLANNING EFFORTS



FIVE-YEAR PLANNING MATRIX

Implementing the action items described below will move Ronceverte toward achieving its eco-community goals. These action items also include projects, initiatives, and programs identified as being consistent with realizing the City's overall vision. The Green Team will help the City implement all aspects of the eco-community plan and, where appropriate, assume a leadership role.

Action items	2013	2014	2015	2016	2017	Description	Component
Develop eco-community framework							
Create formal Green Team roles and form an advisory group to town government.	✓					The eco-community must create a shared vision and structure to ensure that it has the capacity and resources to implement eco-community projects. This phase includes the creation of an entity with the explicit charge to manage town sustainability, implement projects, and define the next steps of the eco-community.	
Define a formal shared eco-community vision with the community; implement this vision through the Green Team. Develop objectives and goals.		✓					
Implement Phase 2 of the eco-community planning process to include all areas of Ronceverte—most importantly the neighborhoods.		✓					
Draft a formal resolution for City approval that outlines the eco-community plan vision and goals for the community. This resolution should state goals for city government such as decreasing energy consumption by 10% through efficiency measures and generating 5% of electricity from renewable energy sources by 2020.	✓						
Integrate sustainable principals into all facets of city government, including planning and infrastructure improvement.	✓						
Implement projects							
Complete Community Garden as planned.			✓			Successful project implementation requires coordination between stakeholders, private developers, and government. These projects include existing projects and goals to perform more detailed assessments of project ideas listed in this plan.	
Perform solar assessment of Community Garden.		✓					
Organize rain barrel program and install rain barrels at specified location around town. Create incentives for residential installation.			✓				
Perform green infrastructure assessment and develop shovel-ready detailed project plans. Work with local watershed organization to assist.			✓				
Procure funding for SPARK car charging station and ancillary solar array.		✓					
Perform at least 10 energy assessments for residents and businesses.	✓						
Partner projects							
Contact B.A. Milligan's and discuss teaming opportunities for biomass energy and water reuse from the old water treatment plant.			✓			An eco-community initiative must reach out to existing businesses and explore project ideas that would integrate their uses into the common vision.	
Work with the wastewater treatment plant designer to determine the potential for methane capture and reuse and to encourage sustainable building practices.		✓					
Integrate the eco-community principals into the revision of the City Master Plan.	✓						
Create a Green Team Business Advisory Group to assist businesses located or interested in locating in Ronceverte learn about the various eco-community		✓					

programs.

Note: Action items for the final two years will be identified once the Green Team forms.

APPENDIX A: PROJECT IDEAS AND RESOURCES

Project description		Components	Resources	Partners
Rain barrels	Park shelters and commercial buildings. Use to water plants throughout the city		Rain barrel resource: http://www.epa.gov/reg3esd1/garden/rainbarrel.html	Ronceverte Community Development, Downstream Strategies, USDA Specialty Crop Grant, West Virginia Development Office
Community garden	Space for residents to grow their own fruits and vegetables, along with being an educational model for sustainable and healthy living.		Community garden start-up guide: http://communitygarden.org/docs/startup_guide.pdf	Recycling Center, Greenworks Recycling
Expanded recycling	Add curbside pickup and glass recycling.		Greenworks Recycling, Lewisburg, West Virginia: http://www.greenworksrecycling.biz/#!	Local Businesses, city buildings
Solar photovoltaic	Solar projects can be installed at nearly every location in town. The estimated gross cost (not including tax credits) is $6,000 to $7,000 per kilowatt. A single kilowatt will offset approximately 1,300 kilowatt-hours a year (10% of the average household annual electricity demand). The main federal tax credit (commercial/residential) is the Investment Tax Credit (20% of project costs). USDA provides grants and low-interest loans for renewable energy installations that cover up to 25% of the project costs.		West Virginia solar resources: http://www.wvcommerce.org/energy/renewable_energy/solar.aspx	Residential homes, city buildings, local businesses
Solar hot water	Solar hot water heaters are ideal for any location that has hot water needs. During the summer months, they can provide up to 100% of a home's water heating needs, and typically provide 50-80% of water heating demand over the course of a year. A typical residential solar hot water system has a capacity of 60-80 gallons for a household of three or four people. Such a system can cost $2,000 to $4,000. These are typically the most cost-effective renewable energy systems, with payback periods of 3-8 years.		Solar hot water heater resource: http://energy.gov/energysaver/articles/solar-water-heaters	West Virginia Division of Energy
Wind	Small-Scale Wind Turbines. Initial estimate is that the ridge can hold 100 kilowatts of wind, maximum. This would cost between $150,000-$250,000, and generate 175,000 kilowatt-hours (approx. equal to annual demand of 12-15 homes).		Small wind consumer's guide: http://www.windpoweringamerica.gov/pdfs/small_wind/small_wind_va.pdf	

Geothermal	Only direct use geothermal heat pump systems are likely to work for Ronceverte. Geothermal heat pumps are feasible anywhere in West Virginia. They cost $5,000 to $6,000 per ton of heating and cooling capacity for residential units (equivalent to $1,400 to $1,700 per thermal kilowatt, or kWt), and $6,000 to $10,000 per ton for commercial applications ($1,700 to $2,900 per kWt)		Geothermal heat pump resource: http://energy.gov/energysaver/articles/geothermal-heat-pumps	List of funding and tax credits for geothermal heat pumps http://www.fhp-mfg.com/?p=tax_credits
Micro-hydro	There are several springs in Ronceverte with fairly consistent flow. The springs will have to be assessed for their suitability for low-power hydro. Low-power hydro systems are 1 MW or smaller and operate in waters with heads less than 30 feet. The low-power category is divided into three sub-categories depending on the technology most appropriate for the hydraulic head of the stream. For instance, conventional hydro turbines operate best in streams with a head of 8 to 30 feet, while unconventional systems designed for lower flow volumes are best suited for heads less than 8 feet. Each of these systems normally has a power capacity between 100 kW and 1 MW. The third category, micro-hydro, is associated with technologies with capacities of less than 100 kW. The systems would ideally be located adjacent to the consuming building or a distribution line to a consuming/net-metered building. Cost varies depending on size, but generally falls in the range of $1,000 to $3,000 per kilowatt. A kilowatt of low power hydro can generate 4,000-5,000 kilowatt-hours per year. It would be useful to map the springs and adjacent distribution lines.		Micro-hydropower systems buyers guide: http://canmetenergy.nrcan.gc.ca/sites/canmetenergy.nrcan.gc.ca/files/files/pubs/buyersguidehydroeng.pdf West Virginia net metering info: http://www.cleanenergyauthority.com/solar-rebates-and-incentives/west-virginia/west-virginia-net-metering	

Biomass energy	A variety of technologies can convert forest biomass into energy for residential, commercial, and industrial uses. Biomass generators are ideal for locations that generate wood waste or can buy it cheap. These systems range from capacities of less than 1 MW to greater than 100 MW and can generate electricity, space heat, or process heat. To generate electricity, the most common method is direct combustion: burning the biomass directly in a boiler. Other methods such as gasification (heating biomass at high temperatures in the presence of oxygen) or pyrolysis (heating biomass at high temperatures in the absence of oxygen) can be used as well. These technologies create a second fuel that is then burned in a boiler. In either process, the combustion heat is used to create steam, which turns turbines to generate electricity.		Biomass resource: http://www.wbdg.org/resources/biomasselectric.php	Biomass funding sources: http://www.ehow.com/list_6814496_usda-biomass-grants.html
Combined heat and power	Combined heat and power (CHP) is the concurrent production of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy, which is most often natural gas, coal, biomass, biogas, or oil. Instead of purchasing electricity from a local utility and then burning fuel in a furnace or boiler to produce thermal energy, consumers use CHP to provide the same amount of energy in one energy-efficient step. Installation capacities can range from a few kW to several hundred MW and are typically scaled according to the thermal consumption and waste output of the user. CHP for Ronceverte businesses would most likely involve capturing the heat generated by industrial processes and using it for heating or cooling in the same or nearby buildings, or generating low-cost, clean electricity that can either be consumed onsite or sold back to the grid. Either approach can save between 50-70% of fuel costs and emissions associated with producing and consuming electricity and heat separately.		Combined heat and power resource: http://www.epa.gov/chp/ United States Clean Heat & Power Association updates on funding: http://www.uschpa.org/i4a/pages/index.cfm?pageid=1	
Energy efficiency	Many steps can be taken to increase the energy efficiency of buildings (lighting, equipment, insulation, windows).		Energy Efficient West Virginia: http://www.eewv.org/	

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