



# Hogback NeighborWood Heating Cooperative

Overview, Charette Findings, Action Plan, and Follow-up



This project was made possible by funding from the Northeastern States Research Cooperative.

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*All photographs of the NeighborWood Heating Charette by Jonathan Blake, East Middlebury, VT.*



Logs on the landing in Lincoln, Vermont, ready for fire-wood processing during the 2009 NeighborWood Project.

## PREFACE

I heated with firewood for the first time in the fall of 1973. My brother Ed had purchased an old farmhouse in South Washington, Vermont, and I was a cash-strapped forestry student commuting—hitchhiking actually—to UVM four days per week. Ed's place had a snazzy new Franklin stove complete with screen and brass knobs. There were 55 acres of land—much of it forested—and I was anxious to manage it. Heating with wood seemed logical, frugal, and romantic. I purchased a used McCullough 5-10 in Tunbridge and set to work.

It was September and I needed dry wood. There were dead elms hovering over the chicken house, and they seemed like very logical candidates. So that is where I started my firewood harvesting career. To make a very long story short, there were lots of buried wedges, smoky fires, cold nights, close calls, and mistakes.

Thank goodness that a neighbor stopped by one day to introduce himself. His name was Walter Carlson. Walter and his wife Alma lived up on the hill behind us. I later learned that Walter knew how to do just about everything that was useful exceptionally well. He was the working forest guru of gurus. Walter introduced me to linseed oil, the right tools and processes, and a gazillion other things. He probably saved my life and my brother a small fortune by showing me how to sharpen and operate my 5-10! Walter showed me how to split and dry wood, how to clean a chimney, and which trees could be burned green in a pinch. In short, Walter Carlson taught me more important things than any other person on the face of this green earth.

There is so much to know in order to have a relationship with forests that is restorative, sustainable, efficient, local, and fair (R-SELF)! There are fewer and fewer Walters around, but each of us has at least a little Walter in us to share. Hopefully the *Hogback NeighborWood Heating Cooperative* will one day be our community's Walter: a source of great information and a place to exchange wood stories, share key equipment, and build a healthy community around heating well with wood.

We appreciate all of the information, enthusiasm, and energy that community members shared in the development of this report. This report is the result of that group. It was also made possible by a generous grant through the Northern States Research Cooperative. Thanks to Dr. Cecilia Danks, Principal Investigator of the Community Biomass Project. Special thanks to Sandra Murphy for shepherding all phases of this report and for creating order and information out of a wild yet collaborative process.

*May the forest be with us.*

David Brynn, Founding Forester

Vermont Family Forests

# HOGBACK NEIGHBORWOOD HEATING COOPERATIVE:

## Overview, Charette Findings, Action Plan, and Follow-up

### Introduction

#### A Vision of Sustainability

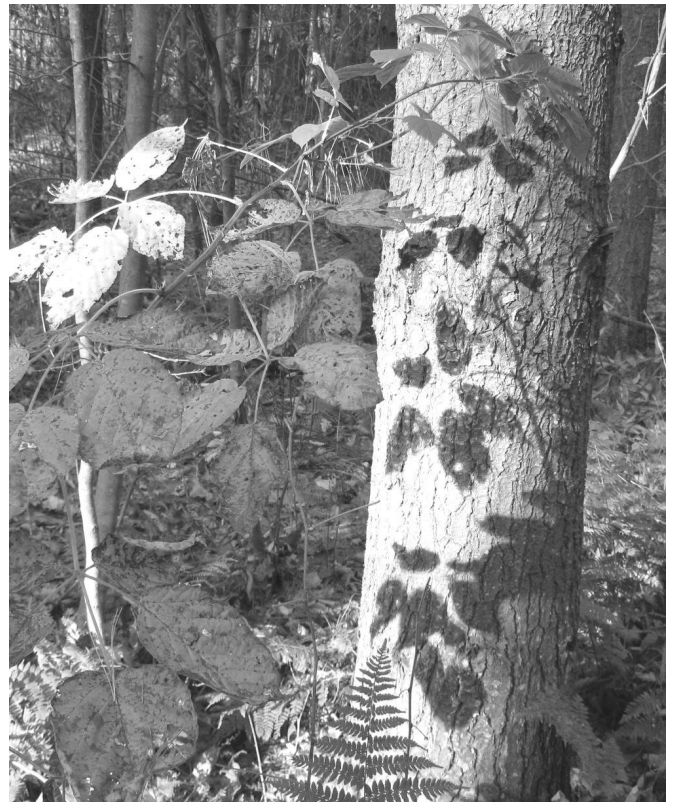
*“There’s a tendency when we get involved in the problems...to go immediately to implementation, and talk first and primarily in that arena. ... But before that we need to be sure that our models are clear, that our information is accurate, and above all we need to be sure that we know where we’re going.*

*“My experience in having, now many times, created a vision and then actually brought it, in some form, into being, is that I never know at the beginning how to get there but, as I articulate the vision, put it out, share it with people, it gets more polished, and the path reveals itself. And it would have never revealed itself if I were not putting out the vision of what I really wanted and finding that other people really want it, too. Holding on to the vision reveals the path and there’s no need to judge the vision by whether the path is apparent.”*

–Donella Meadows, pioneering environmental scientist and author (*Limits of Growth*), from a talk given to the International Society for Ecological Economics, 1994

The **Hogback NeighborWood Heating Cooperative** (HNHC) is a shared vision of community energy sustainability. The setting for this vision is a portion of Addison County, Vermont, known as the five-town region, which encompasses the towns of Bristol, Lincoln, Starksboro, Monkton, and New Haven (Figure 1). Hogback Ridge runs north-south, like a backbone, through the center of this landscape.

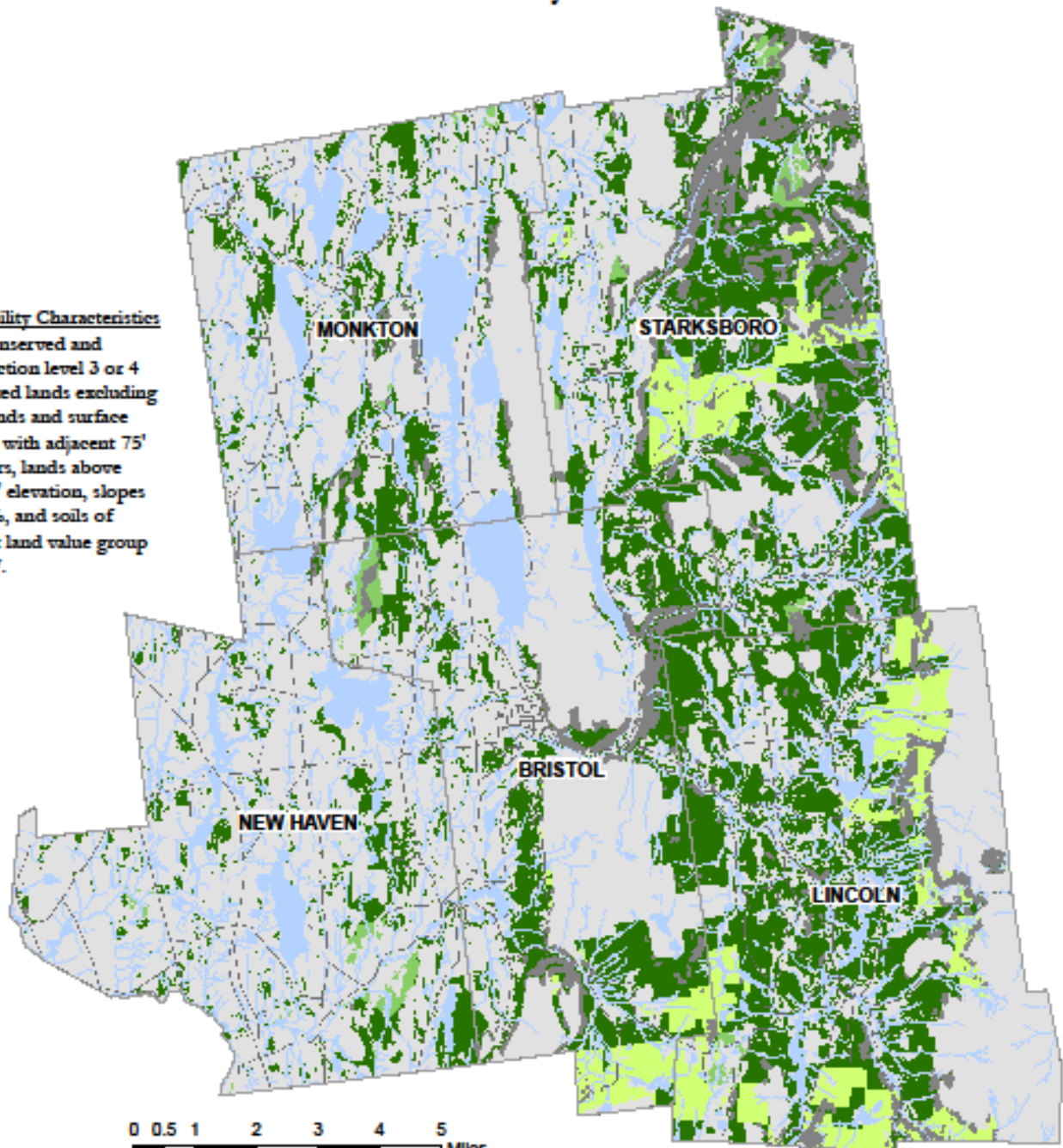
In the words of architect and author William McDonough (*Cradle to Cradle*, 2003), “All sustainability is local.” The best sustainable design solutions draw from and fit with local natural systems. Community members within the five-town region have a long history of conceiving and acting upon visions of local sustainability, exploring and expanding opportunities for locally produced food, energy, education, entertainment, and financing. Vermont Family Forests, a small forestry education non-profit in Bristol, has participated in this process since the organization’s inception in 1995.



**Figure 1**  
**Forestlands Suitable for Sustainable Biomass Harvesting:**  
**Addison County Five Towns**

Suitability Characteristics:

Unconserved and protection level 3 or 4 forested lands excluding wetlands and surface water with adjacent 75' buffers, lands above 2,500' elevation, slopes >60%, and soils of forest land value group 6 or 7.



0 0.5 1 2 3 4 5 Miles

**Suitable Forest Landbase**

- Private unconserved lands
- Private conserved lands
- Public lands
- Potentially suitable, 30-60% slopes

**Unsuitable Areas**

- Water, wetlands, and 75' buffers
- Unsuitable uplands
- Roads



GIS analysis and map  
 by Marc Lapin and Chris Rodgers  
 April 2009

Because the five-town region is extensively forested, wood fuel naturally rises to the forefront of potential sources for local, renewable, sustainable energy. To assess the extent of the sustainable supply of wood biomass for local energy use, ecologist Marc Lapin (Middlebury College) teamed with GIS mapping specialist Christopher Rodgers and VFF founder and forester David Brynn to research and write the *Assessment of the Sustainable Landbase for Forest Biomass Harvest and the Wood Biomass Resource Supply, Addison County Five Towns and Mad River Valley Towns* (2009).

In a nutshell, the report finds that 14,948 cords/year of low-quality timber are available on 37,903 acres of suitable and available land in the five-town area. That's equal to .39 cords of biomass (firewood)/acre per year, or 1.5 cords of firewood per resident/year.

These findings suggest that, while firewood is available as a local source of sustainable energy, its supply is finite. Tapping into that supply without compromising forest health requires careful planning and attentiveness to all stakeholders in the wood energy cycle, from landowners and loggers to sugar maples and fungi.

In 2009, Vermont Family Forests initiated a research and demonstration project to develop, document, and enhance a model for community-supported firewood procurement. Known as NeighborWood, this project involved the harvest of 40.4 MBF of timber and 106 cords of firewood on 25 acres of a 177-acre private, family forest in Lincoln, Vermont. The project tested the feasibility of implementing practices that enhance forest **restoration**, ecological **sustainability**, energy **efficiency**, **localness**, and **fairness** (R-SELF) for all stakeholders in the process.

Specifically, these R-SELF practices included adherence to VFF's Forest Health Conservation Checklist of forest management practices; a competitively priced timber sale in which the logger worked for the landowner; increased stumpage to the landowner; increased pay for the logging operator; the use of a log forwarding trailer to protect forest soil and keep wood clean; on-site processing of fuelwood; fuelwood grading; customer-direct shipping, and a mechanism for obtaining customer feedback.

Analysis of the outcomes from the NeighborWood pilot project yielded important information for future community-based, cooperative wood energy projects. The project attained substantial compliance with ecologically sustainable forestry practices. It successfully ran a competitive timber sale that differentiated between timber and fuelwood values.

However, the NeighborWood pilot project also highlighted significant economic issues. The economic return on firewood to the landowner equaled an annual return of less than \$6 per acre per year. It was also

## R-SELF Principles

### Restorative

In 1949, Aldo Leopold defined land health as "the capacity of the land for self-renewal." Much of the forest's capacity for self-renewal depends on the health of its soil structure, chemistry, nutrients, and organisms. Processes that are restorative go beyond mere forest reclamation for a particular use to improve and enhance the forest's capacity for self-renewal.

### Ecologically Sustainable

Ecologically sustainable forest practices conserve water quality, soil productivity, carbon storage, native biodiversity, and forest vitality.

### Energy Efficient

Energy efficiency needs to be a priority for every stage of the firewood production process—logging, processing, delivery, storage, and burning. Additionally the buildings that utilize firewood must be as energy efficient as possible to minimize the waste of BTUs released during burning.

### Local

In the case of the HNHC, "local" means the five towns of Bristol, Lincoln, Monkton, New Haven, and Starksboro, plus the headwaters of Lewis Creek, Little Otter Creek, the New Haven River, and the Huntington River. A locally sourced project involves local land, local labor, and local capital.

### Fair

Fairness includes both the economic relationships among human participants in the firewood system (compensation to landowners and woods workers, economic accessibility to firewood customers of all incomes), as well as fairness to other-than-human forest community members.

less than 20% of the value received for an equivalent tonnage of fair-to-moderate grade timber. The project’s final report concluded that, “If fuelwood harvesting, processing, and use are to be ecologically sustainable, energy efficient, local, fair to all of the players, and not highly subsidized by timber, then the ‘community-supported’ aspect of NeighborWood will need to be much more highly developed and the price paid for fuelwood will likely need to increase very significantly.”

With these findings in hand, Vermont Family Forests continued to explore the vision of local wood energy sustainability, drawing upon the well-established model of the Community Supported Agriculture (CSA) movement. Just as a CSA offers a local, community-based source of food that exists concurrently with the conventional agricultural system, so a heating cooperative could offer a source of local, community-based wood heat, concurrent with conventional firewood procurement systems.

The conventional model for firewood production hinges on competition among suppliers to provide firewood in exchange for money (“greenbacks”). The HNHC offers a model based on cooperation among all shareholders to produce R-SELF *heating*, which includes but goes beyond firewood into the realm of energy efficiency, alternative wood heating systems, and so on. The HNHC system would accommodate different forms of currency, beyond traditional greenbacks (including barter/exchange of goods and services, with “Hogbacks” as currency), giving economic recognition to R-SELF values.



## NeighborWood Heating Charette

In the autumn of 2012, Vermont Family Forests turned to local community members to help flesh out this vision of the Hogback NeighborWood Heating Cooperative, inviting them to participate in a collaborative gathering, or charette, to identify characteristics of the heating cooperative, as well as tangible actions that will help manifest this vision.

On November 19, 2012, VFF hosted the NeighborWood Heating Charette in Bristol, Vermont, at the Bristol Elementary School. Forty community members took part. Following an introductory session, participants attended and contributed to one of three break-out sessions, exploring key parts of the firewood heating cooperative process: In the Forest (how to identify and sustainably manage the inventory of firewood-producing trees), In Transition (logging, firewood processing, and delivery), and In the Home (energy efficiency in firewood storage and burning, as well as in building construction).

Charette participants generated extensive, creative ideas. A complete compilation of their feedback is included available from Vermont Family Forests upon request. VFF has distilled that feedback into an action plan, which begins on page 10. Vermont Family Forests circulated the action plan to charette participants to solicit their feedback. One early message seems clear—participants felt that the vision and the action plan were creative, exciting, and somewhat daunting, with many moving parts and unknown variables. Given this feedback, it appears that the best course of action is for this cooperative venture to start small, with just a



**Photos (clockwise from top left):** David Brynn introduces the charette; During break-out sessions, participants generated ideas to envision and manifest the heating cooperative; Monkton resident John McNerney (center) makes a point during the introductory session; each participant received a journal in which to record their ideas for the heating cooperative.



few moving parts, and test the feasibility of the process, with the understanding that the cooperative can build upon these preliminary investigations as community interest, engagement, and buy-in allow.

### **HNHC Forum**

Following the NeighborWood Heating Charette, Vermont Family Forests created an on-line forum to facilitate sharing and tracking of ideas related to the HNHC, at [www.familyforests.messageboardchat.com/](http://www.familyforests.messageboardchat.com/). VFF invited 75 people to join the forum—those who had participated in the charette or who have been engaged in the conversation about local wood energy production. To date, participation in the forum has been limited, but momentum for this communication medium may build over time as the idea of the HNHC gains traction.

### **HNHC Pilot Project**

To explore the potential for the HNHC in a limited, manageable way, VFF developed a pilot project for the HNHC—a mini-venture that will express and test the larger vision for the cooperative. The pilot project will involve every part of the cooperative as envisioned in the action plan, field-testing the notion of an economically viable cooperative process that includes cutting trees without compromising forest health, processing those logs into firewood, delivering them to a homeowner via an efficient system that minimizes handling and involves well-designed storage, and conducting an audit of the home and combustion system.

As with the charette, VFF will shepherd the pilot project process. The project will take place at the Waterworks property, a 664-acre, community-owned parcel of land in Bristol. David Brynn, VFF's founding executive director and conservation forester has completed the first step of the process, carefully assessing the firewood that the Waterworks forest is willing to yield. In late May or early June, woodworker Bill Torrey will log and process roughly 100 cords of firewood. VFF will carefully track the production, delivery, storage, and utilization of this firewood during the coming months.

The HNHC Pilot Project directly addresses several specific actions from the HNHC Action Plan, including 2.1.A, 2.1.B, 3.1.A, 3.1.D, 3.1.F, 4.1.A, 4.1.B, and 4.1.D.

### **HNHC Seminar**

In September, 2013, Vermont Family Forests will host a 16-hour seminar, "Producing and Using Firewood Sustainably in the Hogback EcoRegion" to continue community-based conversations and idea-sharing related to the Hogback NeighborWood Heating Cooperative. In the seminar, participants will explore restorative, sustainable, efficient, local, and fair ways to produce and use firewood as a heating source. The seminar will meet six times in several near-Bristol locations over the course of September and October. It will start in the forest, work through the log forwarding, produce the firewood, evaluate home energy efficiency, and examine ways to dry and burn wood well.

Building on the results of the NeighborWood Charette, the seminar will be a hands-on and collaborative experience, drawing on the knowledge of all of the participants while tapping local experts like Matt Sharpe, Roger Wallace, Bill Torrey and others. In the final session, participants will discuss how their findings during this seminar fit into the notion of a community-based wood heat cooperative. A full description of the seminar is available on the VFF website, [www.familyforests.org/public-education/events.shtml](http://www.familyforests.org/public-education/events.shtml).

The HNHC Seminar will directly address several specific actions from the HNHC Action Plan, including 2.1.A, 2.2.A, 2.3, 3.1.A, 3.1.D, 3.1.F, 3.3, 4.1.A, 4.1.B, 4.1.D, and 4.3.A.

# HOGBACK NEIGHBORWOOD HEATING COOPERATIVE ACTION PLAN

**Mission Statement:** The mission of the Hogback NeighborWood Heating Cooperative is to provide reliable access to high quality, durable, and affordable firewood-based heating systems that are restorative, ecologically sustainable, energy-efficient, local, and fair while serving the needs of a diverse, informed, engaged, and evolving membership through cooperative and mutually beneficial relationships over time.

## 1. Cooperative Structure as a Whole

### **Actions:**

- 1.1 Create a comprehensive, creative, flexible, and cooperative (mutually beneficial) firewood heating system from the living trees in the forest to hearth and home.
- 1.2 Identify means of managing the Hogback NeighborWood Heating Cooperative (HNHC), including oversight for ecological and production standards, R-SELF performance monitoring, equipment, coordination of supply and demand, and resolution of disputes and failures.
- 1.3 Identify existing legal framework/documentation to guide the process of forming the cooperative, so we're not reinventing the wheel.
- 1.4 Recognize that the cooperative does not need to limit itself to finding one system/solution that works for everyone, when in fact several solutions may be appropriate.
- 1.5 Be sure the cooperative is inclusive, with membership available and accessible to all who are aligned with the R-SELF Principles.
- 1.6 Offer various levels of involvement or "buy in" for co-op members.
- 1.7 Identify incentives for participation among forests, landowners, loggers, customers, and other potential coop members.
- 1.8 Utilize local labor and resources whenever possible and take good care of all of the players.
- 1.9 Employ full life-cycle analyses when evaluating compliance with R-SELF principles.
- 1.10 **Longer-term action:** *Recognize that "forest products" include forest ecosystem services such as high quality water supplies, non-wood forest products, and wood products.*
- 1.11 **Longer-term action:** *Celebrate cooperative forestry through community-building events.*
- 1.12 **Longer-term action:** *Figure out who's part of "the cooperative system" and invite them to participate.*

## 2. In the Forest

### **Givens:**

- Any actions must contribute to a design that is **Restorative, Sustainable, Efficient, Local, and Fair (R-SELF)** when viewed across the full life cycle.

- The portfolio/forest inventory will be the key to identifying the wood available for cooperative firewood production.
- The cooperative model is an essential part of this firewood-based heating network, resulting in forest management focused more on people and principle and less on profits. Sustainable practices benefit the entire forest community, rather than extracting a profit no matter the environmental costs.
- Assumptions for sustainability:
  - ◊ No loss of forest.
  - ◊ No increase in population.
  - ◊ No increase in per-capita needs.
  - ◊ Current assumptions of sustainable removal and impact on healthy ecosystems are correct.
- We are not trying to divorce fuelwood production from timber harvest, but we are interested in understanding the ecological, economic, and social implications of each.
- Firewood procurement should be part of a holistic, regenerative process.
- System should strive for a balance between supply and demand.
- All firewood production must strive to meet forest management standards set by the cooperative.

## ***2.1 Firewood Portfolio/database***

### **2.1.A Action 1: Develop a portfolio of available trees for firewood.**

- 2.1.A1 Identify a forest firewood data collection and management system that is easy to use and administer, cost-effective, and sufficiently accurate for creating a reliable inventory, and which supports associated accounting.
- 2.1.A2 Involve co-op members of diverse ages in inventory/forest management process to encourage transference of forest knowledge across generations.
- 2.1.A3 Address the challenges of how to manage the portfolio of member forests and available firewood.
- 2.1.A4 Find a way to capture even the smallest contributions to the overall forest firewood inventory (for example, individual trees on a small parcel).
- 2.1.A5 Design co-op to include parcels under 25 acres.
- 2.1.A6 Utilize non-traditional fuel tree species when ecologically appropriate.
- 2.1.A7 Establish “fallow mosaic” for the forested landscape.
- 2.1.A8 Create a supply agreement with landowners that ensures that the customer has assured access to a sustainable supply but allows the landowners flexibility to accommodate unexpected life events and conditions that might compromise forest health (for example, a mild winter that precludes frozen winter conditions for tree harvest).

## **2.1.B Action 2: Identify and adopt forest management standards.**

- 2.1.B1 Utilize forest management standards that can be updated with new information over time.
- 2.1.B2 Set standards for best practices for species management and low-impact harvest (e.g. equipment specs, use of horses, etc.) to protect biodiversity, such as Vermont Family Forests' Forest Health Conservation Checklist.
- 2.1.B3 Develop a simple yet credible monitoring protocol for insuring that forest health standards are upheld in member forests. This protocol will identify the level of compliance of participating forests and seek improved compliance over time.

## **2.1.C Action 3: Create a searchable database of the HNHC's firewood producers.** This will allow customers to connect with nearby landowners/loggers. Web database can include interactive forest maps, so customers can see exactly where the wood is coming from.

- 2.1.C1 **Longer-term action:** *Within the database, list co-op members and the skills they have to offer for barter.*

## **2.2 Marketing Outreach**

### **2.2.A Marketing outreach should address the following topics:**

- 2.2.A1 Benefits of joining the Hogback NeighborWood Heating Cooperative. These include:
  - ◇ Connection with forests.
  - ◇ Community-building that cultivates a shared sense of place and celebrates our woods and wood producers.
  - ◇ High-quality, reliably supplied, R-SELF firewood.
- 2.2.A2 What is R-SELF firewood?
  - ◇ What does a sustainably managed forest look like?
  - ◇ Explain VFF management standards.
- 2.2.A3 How does my purchase of NeighborWood help to ensure a healthy forest for the future?
  - ◇ Why does the co-op's approach matter?
- 2.2.A4 Explain how the HNHC manifests ideas presented in Vermont's *Comprehensive Energy Plan, Volume 2* (Facts, Analysis and Recommendations), page 90, which discusses the value of sustainable forestry management and its implications for carbon storage.
- 2.2.A5 Where is your woodshed? Help people understand and connect with where their firewood comes from (provenance) and how those woods are cared for.
  - ◇ How much fuel is available from this woodshed?
  - ◇ Get people to start thinking in terms of "how many acres does it take to provide heat for me/my family?"

- ◇ **Longer-term action:** Tell the stories of individual forests and landowners within the cooperative.
- ◇ **Longer-term action:** Utilize interactive web-based maps as tools to tell the story and help people connect with local forests and each other.

2.2.A6 **Longer-term action:** Generate a sense of place within the Hogback Eco-region.

## 2.3 Training for Member Woods Workers

**2.3.A Action 1.** Offer Master Logger course or similar baseline skill-building experience for participating firewood harvesters, loggers, and other coop members.

**2.3.B Action 2.** Provide training programs for those collecting data for the firewood portfolio to ensure consistency in inventory standards.



### 3. In Transition: Logging, Firewood Processing, and Delivery

#### *Givens:*

- Any actions must contribute to a design that is **Restorative, Sustainable, Efficient, Local, and Fair (R-SELF)** when viewed across the full life cycle.
- Top quality is essential for building the co-op's reputation and buy-in.
- Best practices should encourage smaller operators and good forestry. Specific management practice lists are helpful, but should not be overly restrictive as long as results meet goals. Accurate assessment of compliance levels with these practices should be feasible.
- Value quality over quantity at all times.
- Hogback NeighborWood Heating Cooperative membership should include landowners, loggers, firewood producers, efficiency and combustion experts, and firewood-based heating customers.
- Avoid exclusivity by ensuring that firewood is available to all customers, not only those able to pay more for the added values of forest health, energy efficiency, local supply, and fairness.
- Seek to optimize the use of local land, labor and capital.
- Proper equipment is essential to achieve efficient production and project success.
- All members, from landowners to end customers, should be encouraged to work as they are able as part of their membership.
- Firewood costs should be determined independently and not 'carried' or subsidized by higher value sawlogs.

#### **3.1 Structure of Firewood Procurement/Processing/Delivery System**

##### **3.1.A Action 1: Identify the equipment needed for firewood production**

- 3.1.A1 Identify the appropriate scale for firewood production. (Market information can inform this process, including how much NeighborWood will be burned in the area, range of per-dwelling demand, potential for increased demand, etc.).
- 3.1.A2 Identify appropriate model for equipment ownership (own, lease, and /or rent). Who owns the equipment—the co-op or individuals?
- 3.1.A3 Identify the equipment needed to start the co-op at a reasonable level and what it will cost (e.g. forwarders, firewood processors, and delivery trucks).
- 3.1.A4 Address issues with cooperatively owned equipment:
  - ◇ Who gets to run the various pieces of the coop's equipment? What are their minimum qualifications?
  - ◇ Safety
  - ◇ Training
  - ◇ Liability/ insurance
  - ◇ Maintenance: doing maintenance, paying for it, what if one of the users breaks the

equipment through negligence?

- 3.1.A5 **Longer-term action:** Lower costs through bulk ordering of supplies (bio-based hydraulic fluid, chain saw oil, saw chains, axe handles, fuel.)
- 3.1.A6 **Longer-term action:** Explore barter options (e.g. trade labor for wood), with value including cash money, equipment hours, logger time, or future volume.
- 3.1.A7 **Longer-term action:** Encourage local community equipment parts salvaging and stocking.
- 3.1.A8 **Longer-term action:** Minimize debt.
- 3.1.A9 **Longer-term action:** Determine full costs and benefits of investments within the R-SELF criteria.

### **3.1.B Action 2: Identify funding sources for equipment**

- 3.1.B1 Crowd-source financing, with return on investment paid in something other than dollars.
- 3.1.B2 Forest futures.

### **3.1.C Action 3: Address the needs of woods workers (loggers, firewood processors).**

- 3.1.C1 How can we structure the cooperative so that it doesn't take business away from aligned loggers and firewood processors? Can the co-op be organized in a way that supports them?
- 3.1.C2 Develop compensation to loggers that allows for a reasonable pace of logging (that which best ensures worker safety, as clarified in Game of Logging).
- 3.1.C3 Create a production model in which a logger does not need to sacrifice financially to take part (one that offers adequate compensation).
- 3.1.C4 Investigate insurance and benefits for member-operators (woods workers).
- 3.1.C5 Identify how the operators will be paid. A per-hour payment for loggers puts incentive in the right place, encouraging attentiveness to forest health.
- 3.1.C6 Develop a price-per-BTU approach as part of the cooperative's price/compensation model.
- 3.1.C7 **Longer-term action:** Encourage more young people to enter welding, diesel mechanics, and logging trades.

### **3.1.D Action 4: Identify the system for firewood production.**

- 3.1.D1 Develop a system of quality control so firewood is consistently clean, dry, delivered on-time, etc.
- 3.1.D2 Develop a scaling and grading system for firewood.
  - ◇ What lengths and species of firewood will be offered and sold?

- ◇ Develop unique names for various firewood grades.
- ◇ Identify levels of need and service among customers and offer various products that align with those needs.
- ◇ Will co-op offer green wood and/or dry wood? One option is to encourage customers to buy dry wood (and educate as to why it's important to burn dry wood), but develop different pricing levels for different levels of dryness.
- ◇ Consider processing wood for gasifier operations (briquette size chunks, rather than stove-length).
- ◇ Promote firewood over pellets (because pellet stoves use electricity, pellets use more energy to create energy than does chunk firewood, etc.).

3.1.D3 Determine location of firewood production operations.

- ◇ Should the co-op create and utilize a center of operations (firewood processing/ aggregation yard), or will processing and delivery be based at individual landings, or some combination of the two?
- ◇ If processing is dispersed at member-landowner forests, is there a single wood-processing rig that moves from job to job?

3.1.D4 **Longer-term action:** *If the coop uses a centralized firewood processing yard , consider including an open-sided, or partially open-sided, roofed building for seasoning wood prior to pick up or delivery. This building could possibly double as community space.*

3.1.D5 **Longer-term action:** *Consider creating a firewood version of apple picking and Christmas tree harvesting—firewood picking. Customers could "pick" a cord or a crate to fill their own vehicle or perhaps even pick a pre-marked standing tree, which would then be felled and split for them.*

**3.1.E Action 5: Identify customer base and services.**

3.1.E1 Identify who the HNHC customers are.

3.1.E2 Develop a customer base looking for a long-term, yearly supply of firewood-based heating; relationship with supplier; high quality; ecological accountability, etc.

3.1.E3 Require customer commitment to the cooperative firewood-based heating supply, to create predictability for production. Perhaps require a 3-year purchase contract.

3.1.E4 Open up the currency to make room for barter.

3.1.E5 Address the top concerns of residential firewood purchasers, including:

- ◇ Consistent, reliable access to firewood
- ◇ Quality of wood
- ◇ Flexible delivery
- ◇ Harvesting quality (sustainability)



### **3.1.F Action 6: Identify delivery mechanism.**

- 3.1.F1 Ensure timely, reliable, energy-efficient delivery of wood.
- 3.1.F2 Utilize orchard crates for storing and delivering firewood. These can be refilled/reused, like a beer growler. Orchard crates don't require stacking, and so save time and energy.
  - ◇ Or, utilize pallets for storage, which require stacking.
  - ◇ Deliver crates or pallets with truck equipped with forklift, and take away empties.
- 3.1.F3 Help customers create storage units for wood (provide design, help build, etc.) that work well with delivery system.
- 3.1.F4 Optimize efficiency in delivery and use (don't put more energy into wood than necessary).
- 3.1.F5 Provide help to older customers in stacking/managing wood on a regular basis (could involve vocational education students for credit).
- 3.1.F6 **Longer-term action:** *Identify and monitor "choke points" in the workflow of co-op operation from forest to end user to improve its structure and deliverables.*

### **3.2 Marketing Outreach**

#### **3.2.A Marketing outreach should address the following topics:**

- 3.2.A1 Why am I paying more than for conventional firewood? Values of the co-op's approach/services.
- 3.2.A2 Firewood grading: Explain the system, how it works, what the grades are and how they're determined.

#### **3.2.B Longer-term action:** *Promote the health and fitness values of heating with wood.*

### **3.3 Training**

#### **3.3.A Workshops and Hogback Community College courses in:**

- ◇ Chainsaw use
- ◇ Logging and transportation techniques
- ◇ Worker's Compensation

#### **3.3.B Longer-term action:** *Create internet forum to post videos of harvesting methods, inventions, how-to videos, general resources for local loggers, etc.*

## 4. In the Home—Energy Efficiency in Wood Burning and Building Design

### **Givens:**

- Any actions must contribute to a design that is **Restorative, Sustainable, Efficient, Local, and Fair (R-SELF)** when viewed across the full life cycle.
- The co-op needs to be concerned as much with optimizing the efficiency of BTUs in service as with how they are harvested and delivered.
- Co-op should serve as “efficient heating supplier,” rather than just “firewood supplier,” bundling efficiency services (audits, connecting customers with resources for improving home energy efficiency, etc.) and firewood supply.
- Cooperative must be accessible for people across the income spectrum.
- Efficiency Vermont-style consultation and assistance (e.g. design assistance, technical know-how, best practices for building contractors) is crucial to developing the local wood-heating market.
- Cooperative should promote and help increase energy efficiency on the purchasing side, so that customers end up burning less wood.
- We have the knowledge to build new buildings to be very efficient, to the point at which a single-home wood-heating unit would be oversized, increasing the benefits of multi-house units or a mass storage element (water, stone).

### **4.1 Structure of System for Optimizing Energy Efficiency in Wood Burning and Building Design**

#### **4.1.A Action 1: Promote *efficiency first* to limit the number of BTUs needed for home heating.**

4.1.A1 Partner with Efficiency Vermont.

4.1.A2 Provide access to information about efficient building design in new and retrofitted construction.

4.1.A3 Identify the many excellent existing resources available (don’t reinvent the wheel). Leverage these existing resources to reach a large number of customers.

4.1.A4 Investigate including access to home energy audit as part of cooperative membership.

4.1.A5 **Longer-term action:** *Explore local, natural, low-embodied-energy materials for super-insulating buildings.*

4.1.A6 **Longer-term action:** *Develop a firewood-based heating version of the “localvore challenge”—an “energy efficiency challenge.”*

#### **4.1.B Action 2: Promote excellent fuel storage so firewood is optimally dry when burned.**

4.1.B1 Develop NeighborWood firewood storage sheds and handling systems and assemble a team for building effective, economical, esthetically pleasing woodsheds and firewood handling systems for co-op members (dry fuel = higher efficiency).

4.1.B2 Develop a wood-drying standard and involve customers in ensuring that this standard is met.

4.1.B3 Focus efforts on convenience to the customer to build demand.

4.1.B4 **Longer-term action:** *Promote or require proper air drying of firewood before burning.*

**4.1.C Action 3: Investigate funding sources to help co-op members pay for energy efficiency measures.**

4.1.C1 Create local revolving loan fund to pay for energy audit and efficiency improvements.

4.1.C2 Identify potential cost reductions so the efficiency process becomes economically feasible.

4.1.C3 Identify existing funding sources for increasing efficiency (for example, PACE financing).

4.1.C4 Investigate opportunities to add value to the NeighborWood firewood (increase cost) and use that added fee to subsidize energy audit costs for co-op members.

4.1.C5 Develop a time bank (service exchange, VFF's *Old Farts Conservation Corps*) for weatherization projects, with Hogbacks as currency.

**4.1.D Action 4: Promote optimal wood burning efficiency.**

4.1.D1 Develop cooperatively owned and operated district heating system that sells BTUs (Denmark and Sweden can serve as models for this).

4.1.D2 Explore group purchase of equipment, including wood stoves, boilers, etc.

4.1.D3 Explore centralized heating plants for neighbors.

4.1.D4 One issue will be the labor aspect of managing cordwood in shared or non-single family buildings. We need to develop business models that compensate tenants or maintenance people to feed shared or central chunk wood systems and replace the higher cost of oil or pellets with lower-cost chunk wood and local labor.

4.1.D5 Investigate ways to "bank" heat once BTUs are released from wood, so it can be utilized as efficiently as possible.

4.1.D6 **Longer-term action:** *Promote or require efficient heat sources, including high-efficiency wood stoves and wood boilers (including masonry heaters and rocket stoves).*

4.1.D7 **Longer-term action:** *Change wood burning practices (efficiency and technology) to allow use of non-traditional fuel tree species.*

## **4.2 Marketing Outreach**

**4.2.A Action 1. Explore the best ways to solicit input/feedback from fuelwood users** (written surveys, online surveys, phone call, etc.), to create an easy and effective data collection/quality feedback system.

### 4.3 Training for Firewood-based Heating Customers

#### 4.3.A Action 1: Offer workshops and information about:

- ◇ Wood stove selection, installation and maintenance
- ◇ Drying and storing firewood correctly
- ◇ Woodshed design and construction
- ◇ Firewood handling methods and equipment
- ◇ Weatherization (retrofitting old buildings with energy-efficient features, as well as energy-efficient materials and techniques for new buildings.)
- ◇ Optimized energy financing within the context of R-SELF values.

**4.3.B Longer-term action:** *Develop a pilot energy-efficiency retrofit with a few homes in the 5-towns area to show the process (energy audit, economical retrofits, funding sources).*

**4.3.C Longer-term action:** *Encourage/develop training in technical schools.*

**4.3.D Longer-term action:** *Work with local schools to add energy efficiency ideas into science curriculum.*



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