ENERGY & CLIMATE COMMITTEE

RETREAT AGENDA

Thursday, January 24, 2019, 4:00 PM
Railroad Square Senior Housing Conference Room
49 Community Way, Keene, NH 03431

Members:
Dr. Ann Shedd, Chair
Peter Hansel, Vice Chair
Terry Clark, Councilor
Chris Brehme
Jess Baum
Jake Pipp
Ken Dooley
Larry Dachowski, Alternate
Aperr Naadzenga, Alternate

Staff:
Rhett Lamb, ACM/Planning Director
Mari Brunner, Planning Technician

1. Call To Order and Roll Call
2. Introductions
3. Sustainable Energy Plan
    a. Values statement
    b. Plan outline
    c. ECC role & next steps
4. Other Business
5. Next Meeting: Wednesday, February 6, 2019

CITY OF KEENE SUSTAINABLE ENERGY PLAN

Draft Outline / Table of Contents

CITY OF KEENE SUSTAINABLE ENERGY PLAN

Overview of Work Scope

1. Literature Review ("pre-planning")
    a. Conduct an internet search & reach out to other municipalities to determine what other communities are doing around sustainable energy planning.
    b. Research energy-related goals/targets adopted by other communities
    c. Review City of Keene planning documents (CMP, Climate Action & Adaptation Plans, Bicycle Pedestrian Master Plan, etc.)
2. Community & Stakeholder Engagement (throughout process)
    a. Convene a steering committee (could be full ECC, subcommittee of ECC, or new group)
    b. Identify stakeholder groups to engage (i.e. landlords, businesses, transportation providers, renters, homeowners, etc.)
    c. Identify outreach methods (i.e. online survey, community forums, focus groups, passive displays, tabling at events, speaker series, etc.)
    d. Develop timeline/work plan for implementing community and stakeholder engagement activities
3. Data Collection
    a. Identify data needs for each sector (heating sources, electricity use, water use, renewable energy system installations, etc.)
    b. Work with City and other community partners to collect data (KSC/Antioch/SAU 29/others?)
4. Vision & Goals
    a. Propose vision/goals based on community input, baseline data, and research
    b. Gather public feedback on proposed vision & goals
    c. Refine vision & goals based on public feedback
5. Action Plan (i.e. "roadmap" to get from baseline to vision/goals)
    a. Within each sector, identify short, medium, and long term actions to help achieve the plan vision/goals. Use input from stakeholder groups and feedback from community engagement. For each action, include a timeframe, who is responsible for implementation, etc.
6. Write & Adopt the plan
    a. Prepare a first draft of the plan for review by steering committee & City staff
    b. Revise plan based on feedback & share revised draft, repeat as necessary
    c. Present final draft to City Council for referral to committee
    d. Present final draft to City Council Committee for recommendation to City Council
    e. Present final draft to City Council for adoption

CITY OF KEENE SUSTAINABLE ENERGY PLAN - DRAFT TIMELINE

	TASKS	Assigned to:
1	**LITERATURE REVIEW**	
1.1	Conduct research on efforts of other communities on sustainable energy planning	
1.2	Research energy related goals/targets adopted by other communities, especially NH communities, and compare	
1.3	Review City's planning documents to identify energy related goals/action items that should be incorporated into this planning effort	
1.4	*Deliverable : Matrix of energy targets/goals from other communities; Outline of Keene's existing energy related action items/goals*	
2	**DATA COLLECTION***	
2.1	Work with City departments to identify data needs and collect municipal energy use/trends	
2.2	Identify data needs for the Residential Sector and collect data on Residential Sector energy use/trends	
2.3	Identify data needs for the Commercial/Industrial Sector and collect data on Commercial/Industrial Sector energy use/trends	
2.4	Identify data needs & collect data on Institutional energy use/trends (Keene school district, KSC, CMC, County buildings, etc.)	
2.5	Identify data needs for the Transportation Sector and collect data on Transportation Sector energy use/trends	
2.6	Analyze collected data for each sector identified above and ID trends pertinent to project using charts, graphs, tables, etc.	
2.7	*Deliverables : Excel sheets with collected data & sources; tables, charts, and graphs; summary documents to share with stakeholders*	
3	**PLAN DEVELOPMENT**	
3.1	Write draft introduction section (Planning Context, Planning Process, Vision and Goals) & share internally for review	
3.2	Write draft "current energy context" section (Overview & sub-sections for each sector) using data collected & share internally for review	
3.3	Write Energy Action Plan section using input from focus groups, steering committee, & community forums & share internally for review	
3.4	Share draft plan with steering committee & City departments for review & incorporate feedback	
3.5	Develop Executive Summary, appendices (Glossary, related plans, supporting data, etc.), and citations	
3.6	Share final draft plan with City manager and/or other City leadership for review & incorporate feedback	
3.7	*Deliverables: Final plan with executive summary, introduction section, current energy context, action plan, and appendices*	
4	**COMMUNITY & STAKEHOLDER ENGAGEMENT**	
4.1	Meet monthly with ECC to discuss plan progress, receive input and guidance, and establish Committee roles with respect to plan development	
4.2	Conduct focus groups with targeted stakeholders to inform the development of plan objectives and strategies	
4.3	Create project webpage on City of Keene website to provide project updates, post link to survey, share meeting/forum dates, etc.	
4.4	Hold three community workshops to present draft objectives/strategies for each sector and receive feedback/input	
4.5	Hold one final community forum to present on final draft plan prior to adoption by City Council	
4.6	Present before City Council on draft plan prior to adoption & start process of adoption (refer to committee, then adopt at City Council)	
4.7	Distribute information on adopted plan to community groups / stakeholders / media, etc.	
4.8	Develop ECC strategy for promoting adopted plan & following up on progress with implementation of plan	
4.9	Ongoing Marketing and Promotion of Outreach (e.g. press releases, update project page on City website, event flyers, social media postings)	
4.10	*Deliverables : 4 focus groups; 3 community workshops; One community forum; One Council Presentation; ECC promotional strategy*	

Achieving 100% Renewable Energy in Hanover

FIRST STEPS

MARCH 2018

At its 2017 town meeting, Hanover citizens showed up in record numbers--nearly double the average turnout--and voted overwhelmingly to commit to using 100% renewable energy for its electricity by 2030 and heating and transportation by 2050. Subsequently, Sustainable Hanover--a town committee established in 2009--expanded its Energy Subcommittee to lead, support, and engage the community in efforts to achieve these goals.

As a first step forward, the Energy Subcommittee created the following statements to guide its efforts.

- ☐ We envision Hanover as a resilient and healthy community powered by affordable and clean renewable energy.
- ☐ The production and distribution of electricity, heating and cooling of buildings, and modes of transportation are efficient and pollution-free.
- ☐ Thoughtful development leads to walkable neighborhoods, flexible and adaptable buildings and lifestyles less dependent upon the automobile.
- ☐ Clean energy related business opportunities and living-wage jobs help our families and community thrive.
- ☐ How we achieve this vision is as important as the vision itself. We value relationships and are committed to an accessible, inclusive, and equitable process for both getting to and maintaining our vision.
- ☐ We welcome, in fact depend upon, ideas, leadership, and participation from entities throughout the town.
- ☐ Hanover inspires and assists other communities to make similar transitions in order to stabilize the climate.

Frequently Asked Questions

Remind me, what were the goals committed to in the vote? Our mandate was passed at Hanover town meeting on May 9, 2017: "To see if the Town will vote to join the "Ready for 100 Action" campaign, thereby committing to a goal of 100% reliance on renewable sources of electricity by 2030 and renewable sources of fuel for heating and transportation by 2050. Joining the "Ready for 100 Action" campaign implies that the Town of Hanover will lead the community in initiatives designed to help local institutions, businesses and residents transition to 100% renewable sources of electricity and fuel oil. The Town has begun by investing in energy efficiency and renewable electricity generation for Town facilities and will follow by transitioning to vehicles and heating systems fueled by renewable sources."

Who is required to meet the goals of 100% renewable electricity by 2030 and transportation and heating/cooling by 2050? No one is required to meet these goals. However, the Energy Subcommittee is committed to working towards these goals with all entities within Hanover's geographic boundaries--our municipality*, schools, businesses, organizations, residences, and Dartmouth College.

What energy sources qualify as "renewable"? We are using the U.S. Environmental Protection Agency's definition of renewable energy. For our purposes, renewable energy refers to a set of energy resources that restore themselves over short periods of time and do not diminish, such as solar, wind, geothermal, low impact hydro and some forms of biomass. (https://epa.gov/greenpower/green-power-partnership-eligible-resources).

How will we measure success? The Energy Subcommittee is developing a set of indicators for measuring our success by sector and welcomes input from others.

Does the renewable energy need to be generated locally here in Hanover? No. We anticipate achieving these goals through a portfolio of renewable energy sources, with generation here in Hanover being an important component. Generation of energy elsewhere, such as offshore wind on the New Hampshire seacoast, and certified renewable energy credits (RECs) will be part of the mix.

How does land use planning fit into these goals? The Energy Subcommittee wishes to preserve our beautiful community and use resources, including our land, judiciously. We encourage others to do the same as we work toward these goals together.

Is resiliency--that is the ability of our energy systems to bounce back from storms and other disruptions--part of achieving our goal? The Energy Subcommittee and Town are using resilience as one criteria for evaluating and selecting potential energy projects. We support other entities doing so as well.

How much will this cost? The Energy Subcommittee and Town are using fiscal prudence and affordability as criteria for evaluating and selecting potential energy projects. Cost estimates will be influenced by a large number of players, outside forces, and rapidly changing technology. Collectively, these forces have dramatically reduced the cost of clean energy over the last decade. Energy transformation is a prudent investment, not only to protect our environment and economy from climate disruption, but also for health reasons. According to one engineering estimate, a transition to clean energy in NH would yield an average annual savings of more than $6,000 per person in energy, health, and climate costs. The transition would also create new clean energy jobs for our community and our economy.

Is Hanover trying to be a model community? As of November 28, 2017, fifty municipalities throughout the country have adopted these goals. Hanover is the first town in New Hampshire to do so and the first in the country to do so by popular vote. Several other municipalities within New Hampshire and Vermont are now working to make similar commitments at their 2018 town meetings. We look forward to sharing our experiences with and learning from other municipalities both nationally and regionally. We anticipate commonalities as well as differences in our respective journeys and expect to both inspire and be inspired by others.

Examples of Existing or Potential Projects for Various Sectors of Hanover

The following table provides examples of existing and/or potential projects going on in various sectors of Hanover for achieving our goal through three key strategies: reduce our energy consumption from all sources, lessen our dependence on fossil fuels, and expand our use of renewable energy.

	Electricity	Heating/Cooling	Transportation
Municipality*	Develop programs to improve access to electricity generated from renewable sources for Hanover residents and businesses.	Leading by example, weatherize municipal buildings to the highest possible efficiency, reducing their cost and energy footprint for heating and cooling.	Transition town fleet to electric vehicles (EVs). Ensure that charging stations are distributed throughout the town for employees, residents, and visitors.
Schools	Install LED lighting, motion-sensing switches, and Energy Star equipment in all buildings.	Add air or ground sourced heat pumps, and use the school as a working example for parents and the wider Hanover community	Replace current bus fleet with electric vehicles. Promote car pooling, biking and walking. Encourage students to learn about next-generation transportation systems.
Residents	Participate in community solar projects that lower the threshold for switching to solar power.	Shift from fossil fuels to air or ground sourced heat pumps to cool and heat homes.	Reduce car dependence with bike paths and bike sharing programs (electric and standard).
Businesses & Organizations	Replace machinery and lighting with the most energy-efficient models and use rooftops for solar panels.	Conduct ongoing energy reviews to find ways of increasing efficiency and fuel savings.	Reduce unnecessary travel; move to virtual meetings. When travel is necessary, encourage ridesharing and/or public transportation. Invest in EVs for employee use.
Dartmouth College	Maximize solar potential by developing rooftop and ground mounted solar arrays on college property.	Replace fossil fuels with renewable resources, likely responsibly harvested biomass.	Work with town and residents to implement a regional transportation system for employees and students, using state-of-the-art electric buses and other transit.

* The governing body of Hanover

For more information, visit our website at hanovernh.org/sustainable-hanover-committee.

If you have questions or ideas to share, please contact a member of the Energy Subcommittee:

Yolanda Baumgartner, Co-Chair - yfoursh@gmail.com
Marjorie Rogalski, Co-Chair - marjorie890@gmail.com

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TOWN of HANOVER
HANOVER, NEW HAMPSHIRE 03755

Sustainable Hanover

From:	April Salas
To:	Mari Brunner
Cc:	Ann Shedd; "judith.colla@gmail.com"; "Yolanda Y. Baumgartner"
Subject:	RE: Hanover 100% Renewable goal - values statement
Date:	Monday, January 14, 2019 12:15:18 PM

Mari,

Apologies for the delay! I returned from vacation on the 7th to a mountain of emails! That's what I get for relaxing.

It's wonderful to hear from you and was so great to meet you at the event. Below is our values statement in bulleted format, and I also included a few of our 'accomplishments' which convey some of the steps that we took before we even made it to town meeting vote on R100. Regarding the values statement, we spent a few meetings and back/forth edits to arrive at the below. Our Sustainable Hanover Committee – Energy Subcommittee led the effort. I've cc'd Yolanda Baumgartner and Judi Colla, our co-chairs. They can also weigh in on our process and correct any dates I may have gotten wrong.

I've also included our values/criteria discovery work that we undertook before kicking off our work with 3Degrees, after our R100 vote. It's proven useful as we now transition from baselining our community wide energy usage to actually looking at developing a strawman strategy/plan to help set clean energy targets for residential, municipal, commercial and institutional. We'll be starting that this winter/spring.

https://www.hanovernh.org/sites/hanovernh/files/uploads/2018_vision_statement_03122018_0.pdf

As a first step forward, Sustainable Hanover Energy Subcommittee (SHES) created the following statements to guide its efforts.

- *We envision Hanover as a resilient and healthy community powered by affordable and clean renewable energy.*
- *The production and distribution of electricity, heating and cooling of buildings, and modes of transportation are efficient and pollution-free.*
- *Thoughtful development leads to walkable neighborhoods, flexible and adaptable buildings and lifestyles less dependent upon the automobile.*
- *Clean energy related business opportunities and living-wage jobs help our families and community thrive.*
- *How we achieve this vision is as important as the vision itself. We value relationships and are committed to an accessible, inclusive, and equitable process for both getting to and maintaining our vision.*
- *We welcome, in fact depend upon, ideas, leadership, and participation from entities throughout the town.*
- *Hanover inspires and assists other communities to make similar transitions in order to stabilize the climate.*

Selected Accomplishments

- *EPA Green Power Community, 2014*

- *Green Power Purchasing Program for residents, 2016/17*
- *Completed residential solarize, weatherize programs in 2016-17*
- *Town Adopted Article in Support of Ready for 100 in May, 2017*
- *Established Sustainable Hanover Energy Subcommittee (SHES)*
- *Established Task Forces - Vision and Planning, Outreach to Businesses, Outreach to Dartmouth, Outreach to Large Users, Outreach to Residents, Outreach to Schools*
- *Organized Meeting to Communicate Progress to Town (Mar, 2018)*
- *Town Approved Modifications to Zoning Ordinance Allowing Solar (May, 2018)*
- *3 Degrees Reported to SHES re: Possible Steps Forward (May, 2018)*
- *Tuck Students Reported to SHES re: Community Solar Options on Town Land (May, 2018)*

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***3Degrees-Hanover Discovery Criteria**:*

- *Source renewables from green-e certified projects*
- *Source renewables in a cost effective manner*
- *Consider the co-benefits of renewable energy with environmental and social benefits*
    - *"Additionality" is important – invest in new projects rather than only buying into existing ones*
    - *"Subtractionality" – consider reducing carbon/GHG by purchasing into/developing green projects in high carbon locations, if cant develop locally*
    - *Keep in mind the bigger picture and supply chain – impact of NG pipeline/fracked gas*
    - *"Walk the talk" –*
        - *use the town /municipality to demonstrate on the ground commitment to renewable energy and source local and visible projects;*
        - *serve as visible leader, e.g. affordable net-zero housing*
    - *"Replicability" – consider how Hanover can prove that renewables aren't just for 'wealthy' communities; how can we try things and share our knowledge in the community/within NH*
    - *Education/Awareness: encourage STEM in schools, leverage or build community toolkits*
- *Develop local and regional projects*
    - *Define local as within Hanover town boundary or neighboring towns*
    - *Define Region as within ISO-NE territory*
    - *Source nationally when local and regional are not an option*

Let me know if it's easier for us to speak by phone? It's a lot of information and I'm happy to walk you through it.

Best,

April

April Salas
Sustainability Director

distribution of this message and any attachments is strictly prohibited. Thank you for your assistance.

Disclaimer

Community Vision

The Six Vision Focus Areas

The vision statement is supported by a set of goals, published as part of the community vision document in 2008. In order to retain and build upon the community input that helped create the vision, the six vision focus areas, also used as community goals, form the foundation for the comprehensive master plan. Sustaining and actively applying these focus areas are key to implementing and achieving the community vision. The six vision focus areas are:

1. A Quality Built Environment
2. A Unique Natural Environment
3. A Vibrant Economy
4. A Strong Citizenship & Proactive Leadership
5. A Creative Learning Culture
6. A Healthy Community

A Quality Built Environment

The built environment addresses the physical and structural parts of our city, including what our city looks like, where we live, how we get around, and how we live. For our future, achieving a quality built environment means:

Providing Quality Housing ❖ Sustaining a Vibrant Downtown ❖ Maintaining Neighborhoods ❖ Preserving and Celebrating Architectural History ❖ Balancing Growth and the Provision of Infrastructure ❖ A Complete Transportation System ❖ Fostering Renewable Energy and Efficient Use of Resources

A Unique Natural Environment

The natural environment addresses the natural areas (green spaces, plants and animals, hillsides and waterways) within and around our city, as well as the man-made areas (green infrastructure, parks, agriculture, and gardens). For our future, achieving a unique natural environment means:

Achieving Community Sustainability ❖ Creating Green Infrastructure

Community Vision

JOEL ST. JOHN

A Vibrant Economy

A vibrant economy addresses the issues of opportunity, prosperity, livability, and availability of meaningful work for citizens. For our future, achieving a vibrant economy means:

Providing for a Balanced Local Economy ❖ Employment Opportunities

A Strong Citizenship and Proactive Leadership

Strong citizenship and proactive leadership focuses on the way our city is led and how community members are engaged in civic opportunities. For our future, achieving a strong citizenship and proactive leadership means:

Transparent and Responsive Leadership ❖ Collaborative Community Planning ❖ Engaged Citizenry

A Creative, Learning Culture

A creative, learning culture considers individual and community health and well-being, education, and interpersonal relationships. For our future, achieving a creative, learning culture means:

Thriving Arts and Culture ❖ Educational Opportunities for All ❖ Diversity

A Healthy Community

A healthy and safe community considers community and individual health and well-being, provides access to healthcare opportunities, and provides resources to lead safe, healthy lives. For our future, achieving a creative, learning culture means:

Healthy Living ❖ Public Safety ❖ Social Services

The Plan

Defining a Sustainable Community: Balancing Environment, Society and Economy

The word "sustainability" is being used more frequently, but it does not have a universal definition and it has been described in numerous ways. The most commonly referred to definition is the one from the Brundtland Commission from 1983, which states that sustainability is "Meeting the needs of the present without compromising the ability of future generations to meet their own needs." In 2003, Keene defined sustainability in its 2003 Community Goals, which states, "If Keene and surrounding town are to continue to be a desirable, affordable place in which to live and work, it is essential that there be a proper balance among the factors that make up our quality of life – why people enjoy living here. These factors can be summarized as: Environmental quality, Economic vitality, and social Equity, and are referred to as the three "E's" of a healthy and sustainable community. The goals that are set forth herein are intended to preserve all the best of our region and to embrace participatory democracy, which will enhance its vitality and stability for the future." Essentially, what the community said in 2003 and reiterated throughout this master planning process is that there are no trade-offs between these areas (e.g., economic growth or environmental health, development or resource protection); sustainability optimizes all three.

Community Sustainability

A truly sustainable community is one that takes a long-range view, balancing and integrating economic, environmental, social, and physical considerations within its local decision-making. Achieving a sustainable community requires dedication throughout the city – municipal departments, citizens, businesses and organizations – to meet the needs of the present without compromising the ability of future generations to meet their own needs. It means coordinating efforts to use resources efficiently, reduce waste, and prevent pollution and environmental impacts. It means taking into account our shared objectives to achieve our community's vision for a healthy community, continued high quality of life, and a vibrant economy.

Over the last decade, Keene has worked to address sustainability through measures to lower greenhouse gas emissions and increase community resiliency to the expected impacts of a changing climate. By addressing climate change through collaborative planning and action, the community can foster long-term environmental, social, and economic vitality within Keene and the Monadnock Region.

A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.
Aldo Leopold (1886-1948)

DEFINING CLEAN ENERGY

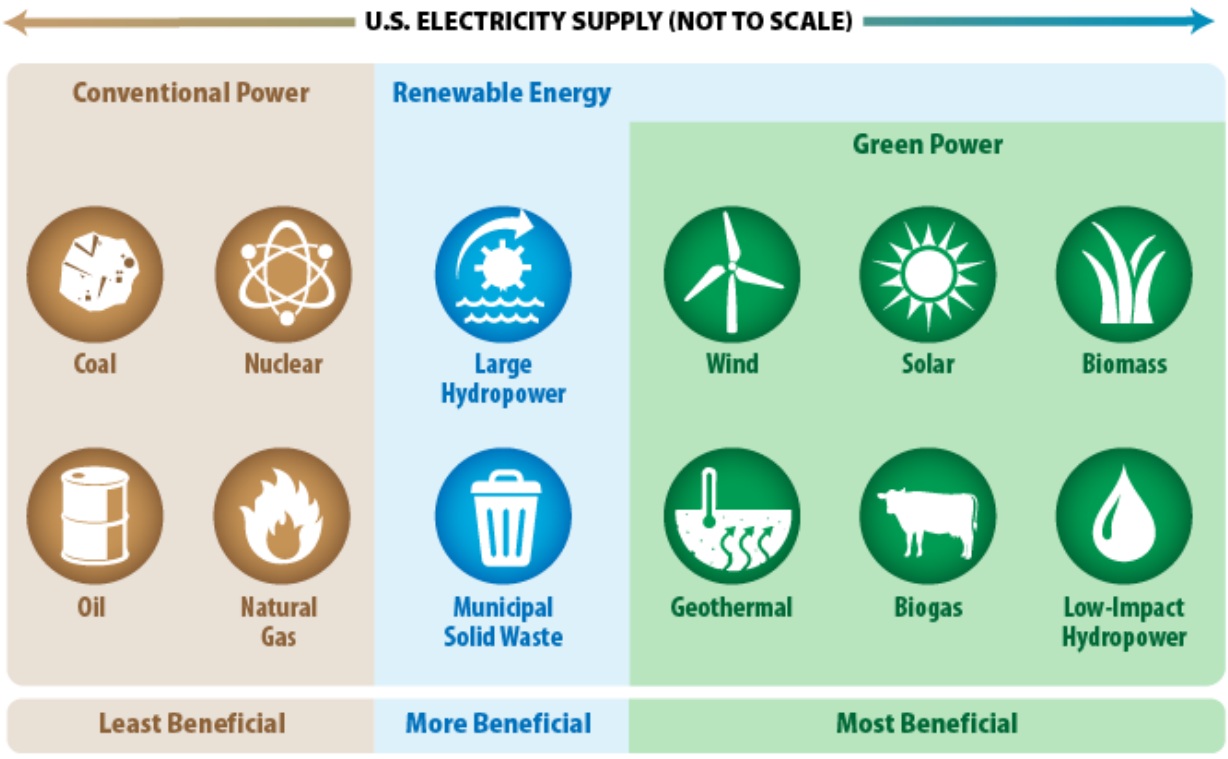
From EPA "What is Green Power?"
(https://www.epa.gov/greenpower/what-green-power)
The U.S. energy supply is composed of a wide variety of energy resources; however, not all energy resources have the same environmental benefits and costs.

Green power is a subset of renewable energy and represents those renewable energy resources and technologies that provide the highest environmental benefit. EPA defines green power as electricity produced from solar, wind, geothermal, biogas, eligible biomass, and low-impact small hydroelectric sources. Customers often buy green power for its zero emissions profile and carbon footprint reduction benefits.

Renewable energy includes resources that rely on fuel sources that restore themselves over short periods of time and do not diminish. Such fuel sources include the sun, wind, moving water, organic plant and waste material (eligible biomass), and the earth's heat (geothermal). Although the impacts are small, some renewable energy technologies can have an impact on the environment. For example, large hydroelectric resources can have environmental trade-offs on such issues as fisheries and land use.

Conventional power includes the combustion of fossil fuels (coal, natural gas, and oil) and the nuclear fission of uranium. Fossil fuels have environmental costs from mining, drilling, or extraction, and emit greenhouse gases and air pollution during combustion. Although nuclear power generation emits no greenhouse gases during power generation, it does require mining, extraction, and long-term radioactive waste storage.

The following graphic depicts how EPA defines different types of energy resources based on their relative environmental benefits.



Email from Tom Webler, January 5, 2019

I'm interested in the conversation about the difference between clean energy and renewable energy. What's the difference?

Usually renewable energy means that the source of energy is not limited – thus wind, solar, water (hydro, tidal, wave), geothermal, biofuel/bioenergy. But some people like to talk about municipal solid waste being renewable (see the EPA diagram) and trash gas (gas from landfills) being renewable. That assumes that the current solid waste flows we have in America will continue forever and many people contest that assumption. Some of the bioenergy, for example from human solid waste systems is called renewable too, but you could argue it depends on an impermanent waste stream.

"Clean energy" can mean a lot of things. The gas companies like to argue natural gas is clean because when it's burned you don't get pollutants that endanger health (no VOCs, SOx, mercury, lead…). But others argue that, since burning gas produces CO2, it is not clean, that CO2 is a pollutant. Then there's talk of "clean coal" which basically means turning coal into gas. In some cases, nuclear is considered "clean" again, because it does not pollute. But if pollution is your concern, then biomass and biofuels are probably not clean since when they are burned they produce a lot of pollutants.

Mark Jacobson at Stanford – who is pushing the 100% wind water solar world, excludes biofuels because of health effects of pollutants as well as the compromise they mean for food systems. He also excludes gas and clean coal because they are not renewable. And he excludes nuclear because it is not renewable and it produces long term ecological and human health threats.

California used the term zero-carbon energy. Of course, nothing is zero carbon because the technology needs to be manufactured. There is cement in wind turbine towers, cement in nuclear power plants, and metal and silicon in solar cells. But if you read "zero" as "low" carbon, then this class of energy systems would include some renewables, certainly wind, solar, hydro, tidal, wave, and geothermal. But whether it would include biofuels is controversial because some calculations show that resource flows based on forest extraction do have a net carbon contribution that is not that low. The big issue here is that low carbon energy would include nuclear power.

Here's a chart that summarizes what I tried to write above.

Resource	Renewable	Clean	Low carbon	Jacobson
Wind	x	x	x	x
Solar	x	x	x	x
Hydro - small	x	x	x	x
Hydro - large	x	x	O[1]	x
Tidal	x	x	x	x
Wave	x	x	x	x
Geothermal	x	x	x	x
Nuclear		x	x	
Gas		O		
Oil				
Coal				
Coal with CCS		O	x	
Trash gas	O	O		
Municipal solid waste	O			
Biomass burning	x		O	
Liquid biofuels	x		O	
Bioenergy	x		O	

I have not included hydrogen since it needs to be manufactured with input from any of the above energy systems. It can be made from water or from natural gas.
X = yes, this resource is a member of this category.
O = Whether this resource is a member of this source is contested
[1] There have been some studies that show new, large hydropower reservoirs can release a large amount of carbon while the vegetation decays, which can take a decade.
--
We need to add "energy conservation and efficiency." It's not really a resource like all the others are, but negawatts are clean (they don't pollute), low carbon (actually zero carbon), and one of the modes Jacobson includes. I don't know if we can say negawatts are renewable, though. That's a bit obscure to me. I suppose you could argue that negawatts – whether they are gained by weatherization/capital upgrades or by behavioral change (walk to work) are persistent over time and not subject to resource decline and in that sense kind of renewable. But then again, if I stop walking to work, the energy savings are reversed. I don't know, it's hard for me to wrap my brain around negawatts. Still, we should include them because Jacobson does. They are an important part of the energy transition.

Dr. Thomas Webler
Assistant Professor of Environmental Studies
Keene State College
Thomas.webler@keene.edu

ECC RESOURCES & LINKS

JANUARY 24, 2019 MEETING PACKET

1. Keene Comprehensive Master Plan (full document):
   https://ci.keene.nh.us/sites/default/files/planning/CMPprint-final-1027-fullversion_2.pdf

2. Energy and Climate Committee – Link to Shared Drive:
   https://drive.google.com/drive/folders/1O1WlR0fADTNijRt13v3DU7k2FxwXDcGs?usp=sharing

3. Climate Change Resources/News Items:

   a. Fourth National Climate Assessment (released November 23, 2018):
      https://nca2018.globalchange.gov/

   b. Washington Post series of opinion articles – "How we can Combat Climate Change":
      https://www.washingtonpost.com/news/opinions/wp/2019/01/02/feature/opinion-here-are-11-climate-change-policies-to-fight-for-in-2019/?noredirect=on&utm_term=.9c78acb9fd12#5