



PLAN NH
Visioning *for* Sustainable Communities

APA: Course ID #9268220

Making Room for Solar Energy in New Hampshire

April 18, 2023

Thank you to our event sponsors:



Thank you to our event sponsors!



Thank you to our members, including:

Platinum Members



Gold Members



Plan NH



- 501(c)3 Organization
- Founded in 1989 “to foster excellence in planning, design, and development of New Hampshire’s built environment.”
- Our programs include membership, scholarships, workshops, conferences, Merit Awards, networking opportunities, and community design charrettes.
- Plan NH shares information and inspiration for how community design and the built environment can contribute positively to where we live, work, and play.

Plan NH

JANUARY

AFTER HOURS NETWORKING

January 26
JSA Design, Portsmouth



FEBRUARY

VIRTUAL TOWN HALL

February 28



APRIL

SPRING WORKSHOP: MAKING ROOM FOR SOLAR ENERGY IN NH

April 18
REDC, Raymond



MAY

COMMUNITY DESIGN CHARRETTE

Brentwood, NH

JUNE

NH GIVES DAY SPECIAL

MERIT & SCHOLARSHIP AWARDS EVENING

June 21
Hotel Concord, Concord

JULY

CHARRETTE WALKING TOUR *TBD*

COMMUNITY DESIGN CHARRETTE Manchester, NH

AUGUST

AFTER HOURS NETWORKING

SEPTEMBER

FALL CONFERENCE

September 27
Hotel Concord, Concord

COMMUNITY DESIGN CHARRETTE

Campton, NH

OCTOBER

ANNUAL GOLF CLASSIC

October 4
Beaver Meadow, Concord

Upcoming Deadlines

Plan NH Merit Awards of Excellence

- Nominations – Deadline May 12, 2023
- Awards Evening – June 21, 2023
- Awards recognize and showcase outstanding projects that reflect the mission and values of Plan NH and demonstrate how the built environment can make a positive contribution to people and places
- More information at:
www.plannh.org/programs

InvestNH Municipal Planning & Zoning Grants

- HOP Phase 1 – Deadline June 30, 2023
- HOP Phase 2 – Deadline Nov. 15, 2023
- Grants to help municipalities increase community engagement capacity while working with consultants on regulatory audits and/or development aimed at increasing housing opportunities
- Over \$3.5 million awarded to date!
- More information at:
www.NHHOPgrants.org



Our Speakers



Tony Giunta

Director of
Project Development
Nobis Group



Elizabeth Dragon

City Manager
City of Keene, NH



Shawn Tobey

Project Manager
Hoyle Tanner



Presentation for Plan NH

Energy, Sustainability, and the Future of Renewables

Presented by: Tony Giunta





agenda



- **Energy**
 - Important?
 - How Much Do We Use?
 - Where does it go?
- **Sustainability**
 - Rethink how we do things
 - Capturing energy from unlikely sources
 - Renewable Liquid Fuels
- **Energy Density**
 - Comparisons
 - Tackling NIMBY
- **Discussion**



Why Do We Need Energy?



Why Do We Need Energy?

- Laptops (*Computers*)/Cell Phones
- HD Flatscreens (*Televisions*)
- Cars (*Flying?*)
- Airplanes (*Starships?*)
- Factories
- *Wastewater Treatment Facilities*
- *Drinking Water Plants*





Energy



How Much Do We Use?



Energy



- US Yearly Energy Consumption?
 - 98.5 Quadrillion Btu's
 - 2,415 Million Tons of Oil Equivalents
 - 693 Billion Gallons of Oil Equivalents

2022 Data vs. 97.3 Quadrillion Btu's in 2011

Lake Winnepesaukee



- 72 Square Miles
- Average Depth 43 Feet
- Volume 625B Gallons
- Little less than 11 months supply

Lake Okeechobee

- 730 Square Miles
- Average Depth 9 Feet
- Volume 1.3T Gallons
- 2 Year Supply

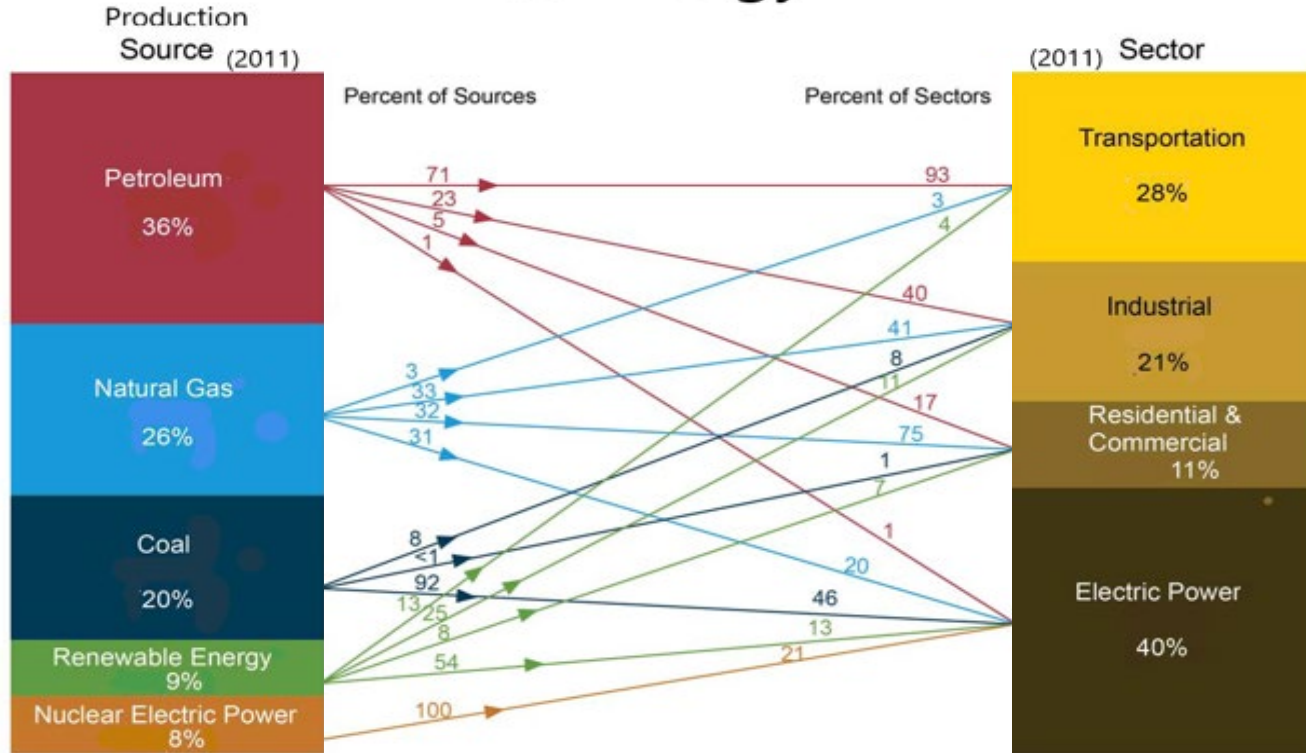


Energy



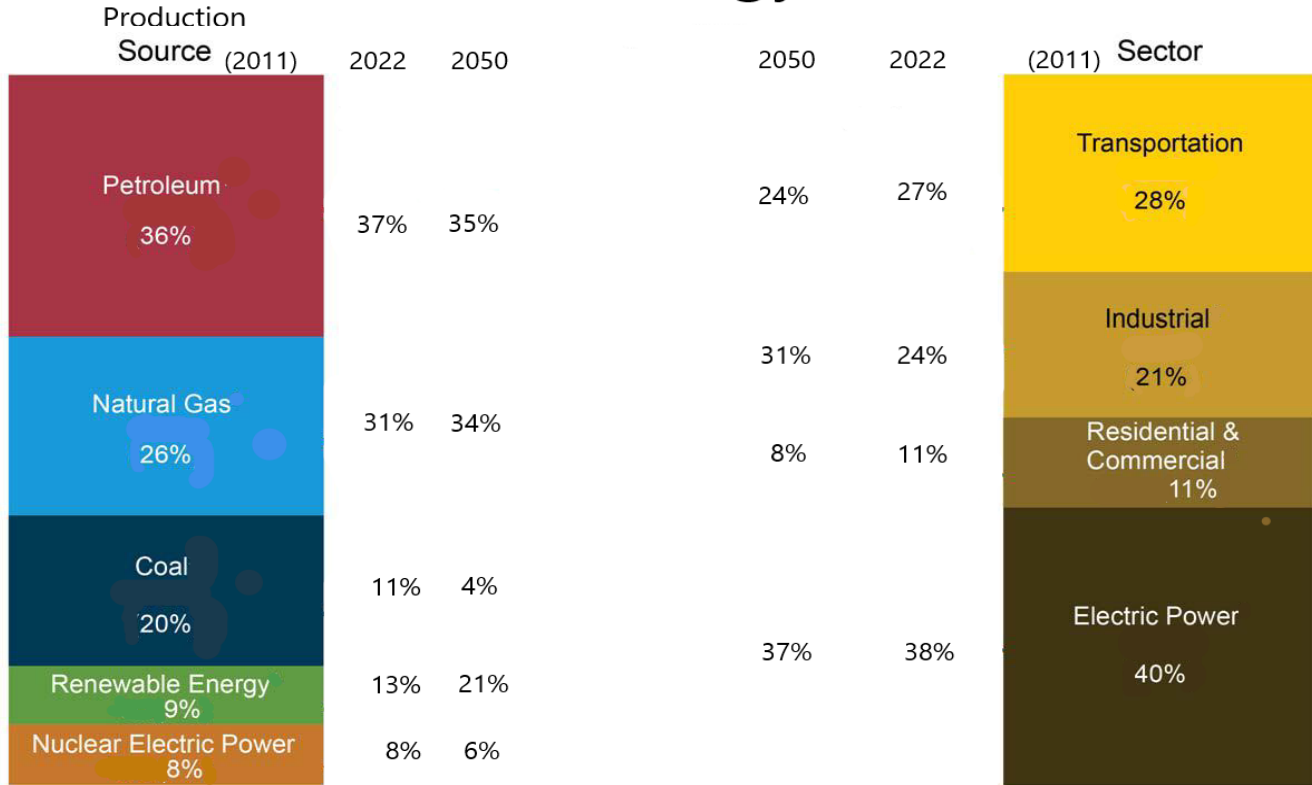
Where Does It Come From?
Where Does It Go?

US Energy



Source: Energy Information Agency Annual Energy Reports 2011

US Energy



Source: Energy Information Agency Annual Energy Reports 2011, 2022



Sustainable

- Replace “Finite” with “Infinite”
- We need to change the “same old, same old...”
 - Critically Rethink Current Energy Cycles!
- How can we recover more energy?



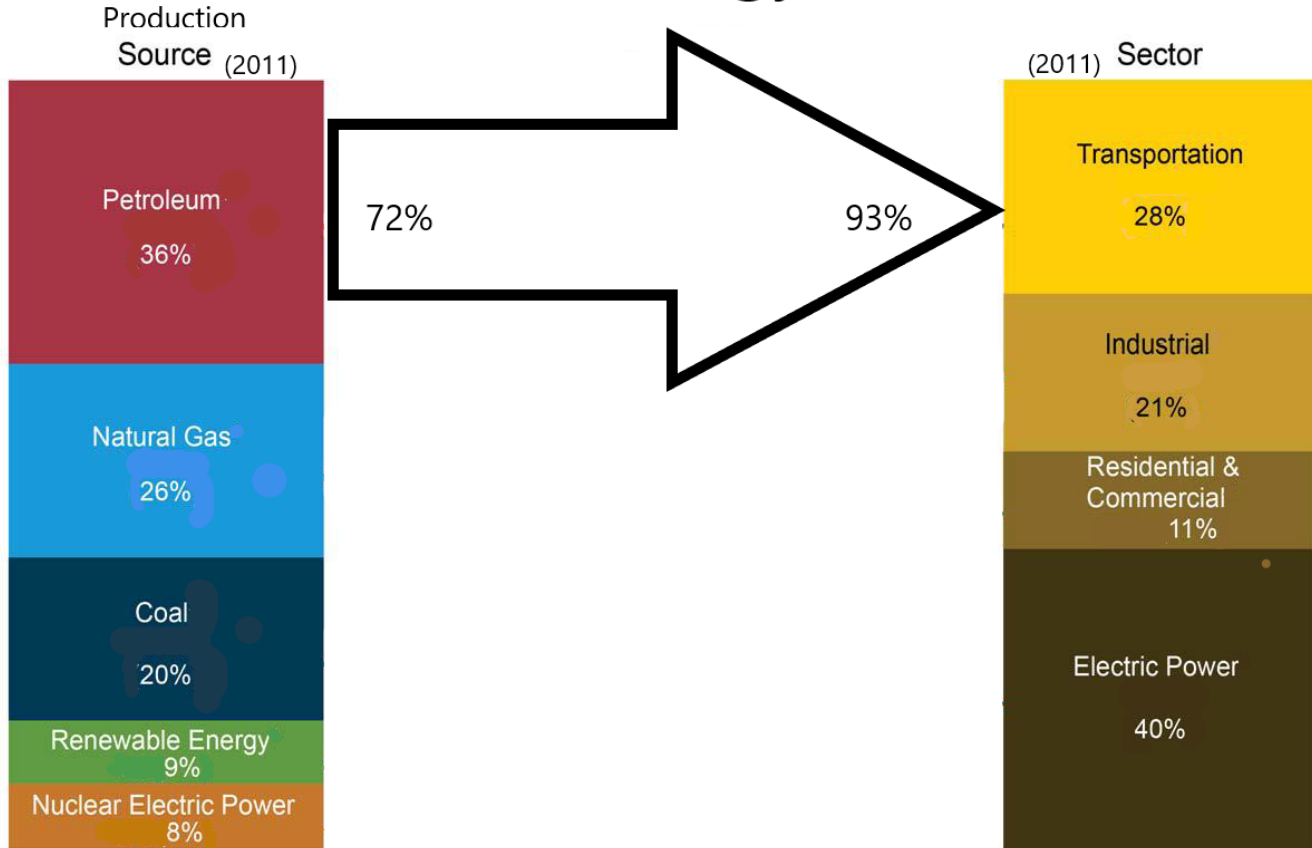
Sustainable

- **Energy Not Used – Net Energy Gain (Efficiency)**
- **Turn Waste Products Into Energy (Energy Recovery)**

Think of things as Btu's!

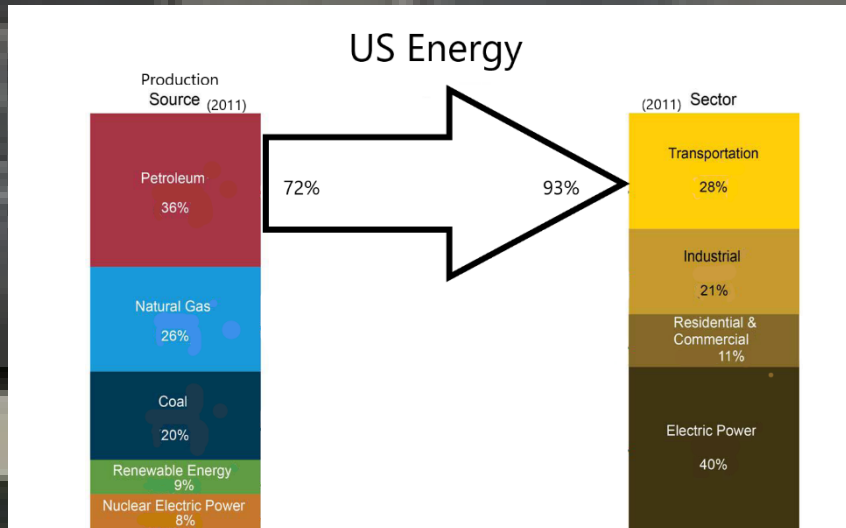
Example: Vegetable Oil

US Energy



Transportation Consumption

- 622 MG/D



American Energy Independence Company



Unprocessed WVO





Current Energy Cycle of Waste Vegetable Oil (Efficiency)

1. Oil Delivered/WVO Removed
2. Trucked to Portsmouth
3. Heated in Tanks
4. Tanker comes Picks up Load
5. Goes to Europe/Asia
6. Offloaded to Heated Tanks
7. Trucked to Processing Facilities
8. Processed
9. Loaded on Trucks
10. Trucked to Dock
11. Shipped to US
12. Offloaded Trucked to Consumer
13. Purchased by Consumers
14. Taken Home and Used

Processed-BioFuel





New Energy Cycle of Waste Vegetable Oil

1. Truck Delivers Oil
2. Truck Retrieves Used Oil
3. Delivers to Local Plant for Recycling
4. Manufactured into Renewable Fuel
5. Shipped to Fuel Depot and Blended with Local Fuel Supply



Which Cycle Has Higher Efficiency?

1. Oil Delivered/WVO removed
2. Trucked to Portsmouth
3. Heated in Tanks
4. Tanker Comes Picks Up Load
5. Goes to Europe/Asia
6. Offloaded to Heated Tanks
7. Trucked to Processing Facilities
8. Processed
9. Loaded on Trucks
10. Trucked to Dock
11. Shipped to US
12. Offloaded Trucked to Consumer
13. Purchased by Consumers

1. Truck Delivers Oil
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Capture More Energy



Gallon of Diesel Fuel

- 140,000 Btu's
- Non-renewable
- Carbon Emitter
- Toxic
- Carcinogenic
- Hazardous

Gallon of BioFuel

- 132,500 Btu's
- Renewable
- Carbon Neutral
- Non-toxic
- Biodegradable
- Non-hazardous

Is this the Answer to our Energy Independence?

**2.4 Million Gallons per year vs. 622
Million gallons per day (gpd)**

Fuel Entire Transportation sector for:

1 second

Is this the Answer to our Energy Independence?

- Total US Biodiesel Production
- 1 Billion gallons per year (vs. 622 Million gpd)
- Fuel transportation sector for:

1-1/2 days!

Keystone XL

- 830,000 barrels per day (vs. 622 Million gallons per day)
- Fuel Transportation Sector for:

20 days!



Energy



Energy Density Comparisons



Electricity Sector-Nuclear vs. Renewables



Seabrook Nuclear Power Plant: 1200 Megawatts



Electricity Sector-Nuclear vs. Renewables



Roscoe Wind Farm, TX : 781.5 MW covering 100,000 Acres



Electricity Sector-Nuclear vs. Renewables



Utility Scale Solar is 10 Acres/MW; 1,200MW is 12,000 Acres



Key Points

- Energy – We Use a Lot of It!
- We Need All Sources
- Priority Factors?
 - Reliability
 - Domestically Produced
 - Low Carbon/Renewable
 - NIMBY Acceptable
- ✓ US Hydro, Nuclear, US Renewables, NA Hydro, Low Carb Fossil



Communication

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Sources

- Energy Information Agency
- www.NHEnergyForum.com
- www.Keystone-xl.com
- Wikipedia
- www.lakesregion.org
- www.thenutgraph.com
- Congressional Research Service
 - US Fossil Fuel Resources: Terminology, Reporting, and Summary
 - November 30, 2010



Renewable Energy Ground Mounted Solar

Presented by Shawn Tobey, Project Manager – Hoyle Tanner

Ground Mounted Solar

- How Does It Work?
- Site Selection
- Permitting Process
- Construction Process



How Does it Work?

- Solar Panels/Modules
- Racking System – Fixed Tilt, Single Axis Trackers, Dual Axis Trackers
- Ground Screws or Piles
- Equipment Pads – Transformers & Invertors
- Street Connection
- Battery Storage
- Megawatts (MW) DC & AC
- Gravel Access Roads
- Fencing



Racking & Ground Screws



Panels & Racking



Site Selection

- 3-Phase Power
- Site Size
- Slopes
- Woods/Fields
- Wetlands/Setbacks
- Floodzone
- Natural Resources



Permitting Process

- Local
 - Planning Board – Site Review
 - Zoning Board
 - Conservation Commission
 - Public Hearings – Public Misconceptions
 - Public Site Walks
- State
 - Stormwater – NHDES Alteration of Terrain
 - Wetlands – Fill/Vegetation Clearing
 - Natural Resources

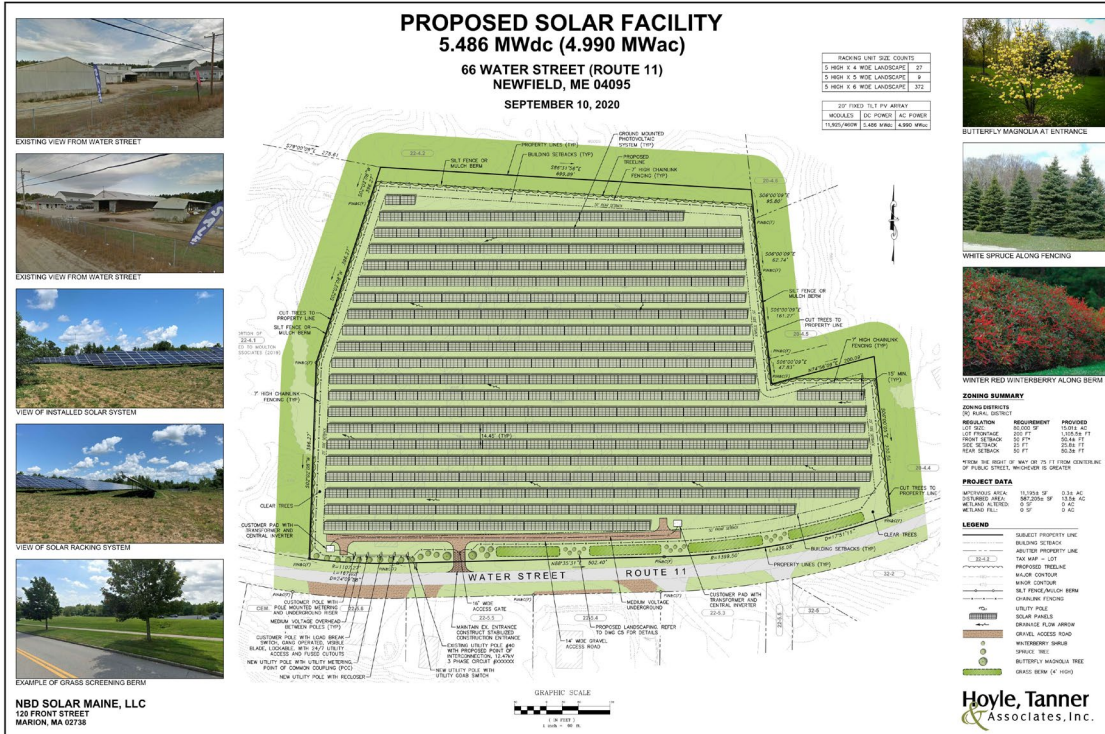


Permitting Process

- Army Corps
 - Wetlands Crossings
 - Wetland Fill
- Interconnection
 - Electrical Permitting



Permitting Process – Sample Plans



BUTTERFLY MAGNOLIA AT ENTRANCE.

WHITE SPRUCE ALONG FENCING

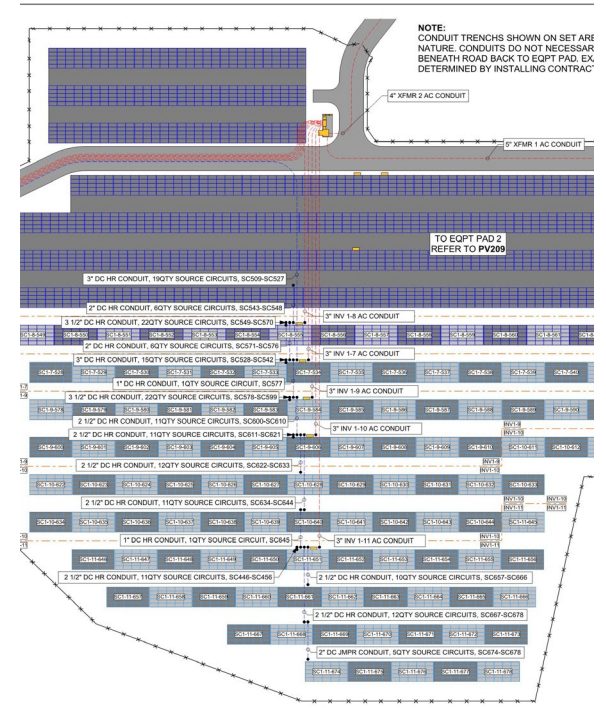
WINTER RED WINTERBERRY ALONG BERM

ZONING SUMMARY

PROJECT DATA

LEGEND

Hoyle, Tanner & Associates, Inc.



Construction Process

- Clear Land
- Grade Site
- Construct Access Roads
- Install Racking
- Install Equipment Pads & Electrical
- Install Panels
- Install Fencing

Typical Install Time is 5-6 Months



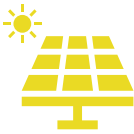
Closing Remarks



Great Benefit to the Community



Low Impact Development



25-Year Panel Life



50-Year Racking Life



1 Megawatt (MW) will power 600+/- houses



Renewable Energy and the City of Keene

Plan NH Presentation

Elizabeth Dragon, Keene City Manager
APRIL 18, 2023 | RAYMOND, NH



Keene's History as a Climate Leader

- City's commitment to energy efficiency and renewable energy
- Keene joined Cities for Climate Protection Campaign and formed the Energy and Climate Committee
- 1994 – Present
In 2007, Keene became one of the first communities in the nation to adopt a climate adaptation plan.



NEW DAM AT ECHO LAKE, LOOKING EAST, NOV. 12, 1910.

Solar is Just One Renewable Energy Strategy...

There is no magic bullet strategy to reach our vision.

The City will need to enact a diverse array of policies, programs and incentives.



City of Keene's Sustainable Energy Goals (2019)

- 100% Electricity from renewable sources by 2030
- 100% of thermal and transportation energy by 2050
- Importance of energy efficiency in achieving these goals



Ribbon cutting for the solar array at 310 Marlboro St, Keene



Keene's Road Map to 2050

- Identified pathways to reaching our energy goals
- Created baselines
- Action plan and prioritized strategies
 - 17 action strategies
 - Identified resources: e.g., Solar Friendly best planning practices
 - Community Power

Community Power

- City-operated group purchasing
- Eversource continues to delivery power and manage billing
- Successful joint bid with Swanzey, Marlborough and Wilton
- Local renewable preference



Town representatives, signing the contract with Community Power



Keene Public Works



Solar Projects

- Keene's Public Works Facility
- Waste Water Treatment Plant
 - Largest energy user in Cheshire County
- Changes brought about by the Inflation Reduction Act (IRA)



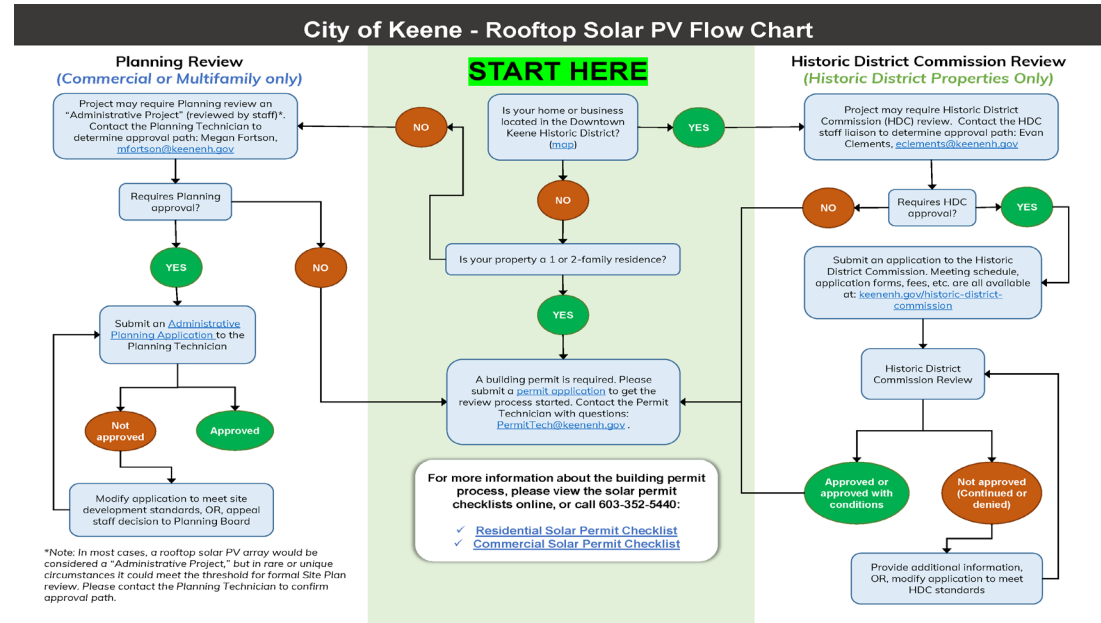
Solar panels on the roof of Waste Water Treatment Plant

Solar Permitting and Zoning

Solar/EV charging building permit checklists:

KeeneNH.gov/community-development/applications-forms

Recent zoning change in regard to solar, as of September 2021



21 in 21 Program

- 21 homes on the East Side of Keene.
- Improving the neighborhood and making sure energy efficiency is a part of each project.
- Improves affordable housing in Keene.
- Lowers energy costs



Residence in Keene, utilizing solar energy



Local Partners

- Clean Energy Keene
- Monadnock Sustainability Hub
- Local investors

Thank You





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Panel Q&A

