Hanover's 2nd Annual Energy Forum

100% Renewable Energy: Let's Make It Happen!

April 24, 2019

2nd Annual Energy Forum

Achieving 100% Renewable Energy

- Welcome
- Speakers
  - Julia Griffin – Manager, Town of Hanover
  - April Salas – Director of Sustainability, Town of Hanover
  - Rosalie Kerr – Director of Sustainability, Dartmouth College
  - Yolanda Baumgartner – Co-Chair, Sustainable Hanover Committee
- Q&A
- 7:30 -- Small Group Discussions + Refreshments

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Julia Griffin – Manager

Town of Hanover

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How does Hanover Attain 100% Green Electricity by 2030?

- Town role – create easy opportunities & programs to enable user groups to purchase green power.
- User groups: Residential, Small Business, Large Business, Institutional, Municipal.
- Town has developed 5 part strategy to get to 100% renewable electricity by 2030.

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Residential Green Power Co-op

- Select Competitive Energy Supplier that will offer 12 month rate for green power.
- Residential customers can opt to purchase green power; CES provides power via Renewable Energy Certificates.
- Liberty remains as power supplier and biller.

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Residential Co-op Option B

- Variation on Co-op: Town works directly with Liberty to provide green power option for all Liberty customers.
- Liberty serves 22 communities in NH but offers no green power option.
- Most progressive utilities across the U.S. provide fully green or partially green power options for their customers

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Large User Power Purchase Agreement

- Issue RFP to procure green power for Dartmouth, Town, School District, large business users.
- Goal to lock into competitive electricity rate for 12-20 years.
- Locking into guaranteed rates for a CES supports construction of renewable energy generators in the ISO New England region.

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Solar Options

- Town currently hosts over 140 residential solar systems plus Town, School and College = 1,587 kW.
- Municipal installation of 3 MW currently in planning stage on Grasse Road.
- Community solar committee has targeted development of 4 additional private community solar sites totaling 4 MW.
- Dartmouth College has made significant investment in rooftop solar; pursuing large ground mounted array option as well.

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Town Support of Renewable Energy Business Assistance

- Sustainable Hanover committee engaged in local business outreach regarding available renewable energy grants, credits and loans.
- Public Works Department providing free office space to representative of NHSaves – involved in extensive local business outreach.

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Hanover Resolves to 'Walk the Talk'

- Rooftop solar on HPD, Town Hall, Wastewater; coming to Fire, RWB and DPW.
- Air source heat pumps installed in Town Hall; RWB and Police coming soon.
- Public Safety Building: new insulation, new siding, new windows, new insulated roof coming to Fire this summer.
- LED lighting upgrades in every building; traffic signals, ornamental streetlights.
- Solar parking pay stations.

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April Salas – Director of Sustainability

Town of Hanover

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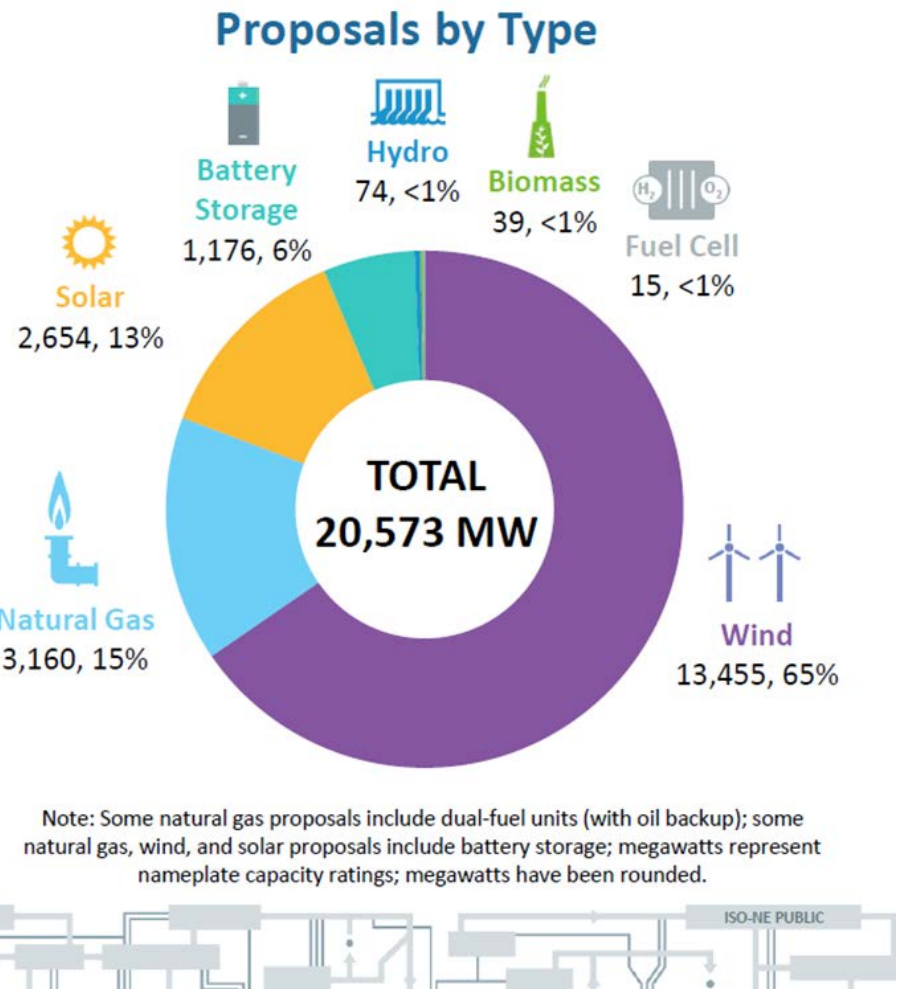

- Hanover is a part of a larger, New England regional grid that is increasingly transitioning to a less centralized, more renewable energy mix
- Wind and solar comprise 78% of the new proposed resources

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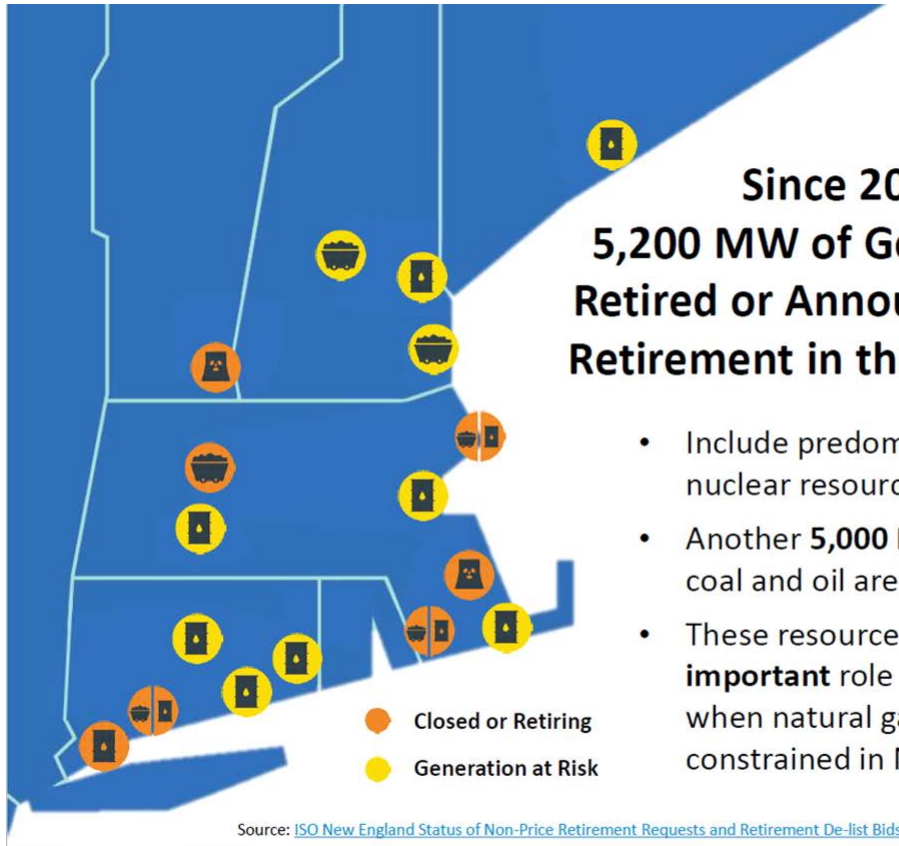
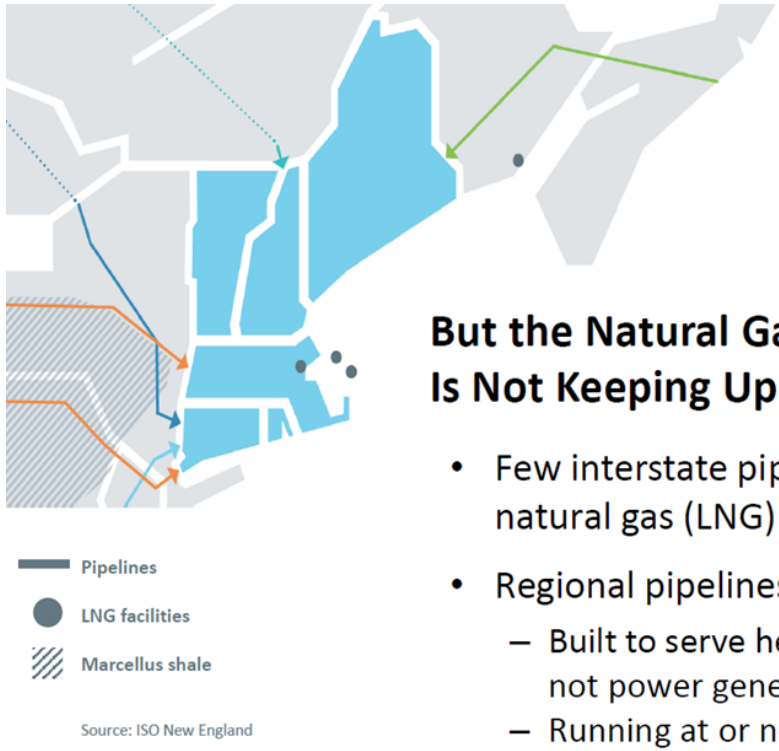


Since 2013, More Than 5,200 MW of Generation Have Retired or Announced Plans for Retirement in the Coming Years

- Include predominantly coal, oil, and nuclear resources
- Another **5,000 MW** of remaining coal and oil are at risk of retirement
- These resources have played an **important** role in recent winters when natural gas supply is constrained in New England

Source: ISO New England Status of Non-Price Retirement Requests and Retirement De-list Bids; August 17, 2018



But the Natural Gas Delivery System Is Not Keeping Up with Demand

- Few interstate pipelines and liquefied natural gas (LNG) delivery points
- Regional pipelines are:
  - Built to serve heating demand, not power generation
  - Running at or near maximum capacity during winter

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Sourcing	Developing local and regional to New England projects	Social and environmental benefits

- green-e certified projects
- cost-effective renewables
- Hanover town boundary
- Neighboring town partnership
- ISO-NE regional grid
- Nationally, when local and regional are not an option
- Addition-allity
- Subtraction-ality
- replicability

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What Values Underpin our Work?

- **Resilient** and healthy community powered by **affordable** and clean **renewable energy**
- We aim for efficient and pollution free electricity, thermal and transportation
- Clean energy related **business opportunities** and living wage jobs
- How we achieve our targets is as important as the vision itself
- Welcome and depend on leadership, ideas and participation from the **entire community**
- Aim to **inspire and assist other communities** to make similar transitions

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We are not alone!

- Clean Energy New Hampshire
- Vital Communities
- Sierra Club of the Upper Valley
- Urban Sustainability Directors Network
- NH Municipal Roundtable Meetings in Concord
- New England Municipal Sustainability Network (NEMS)
- Monthly calls with NH R100 communities
- Businesses, institutions, residents, and more!

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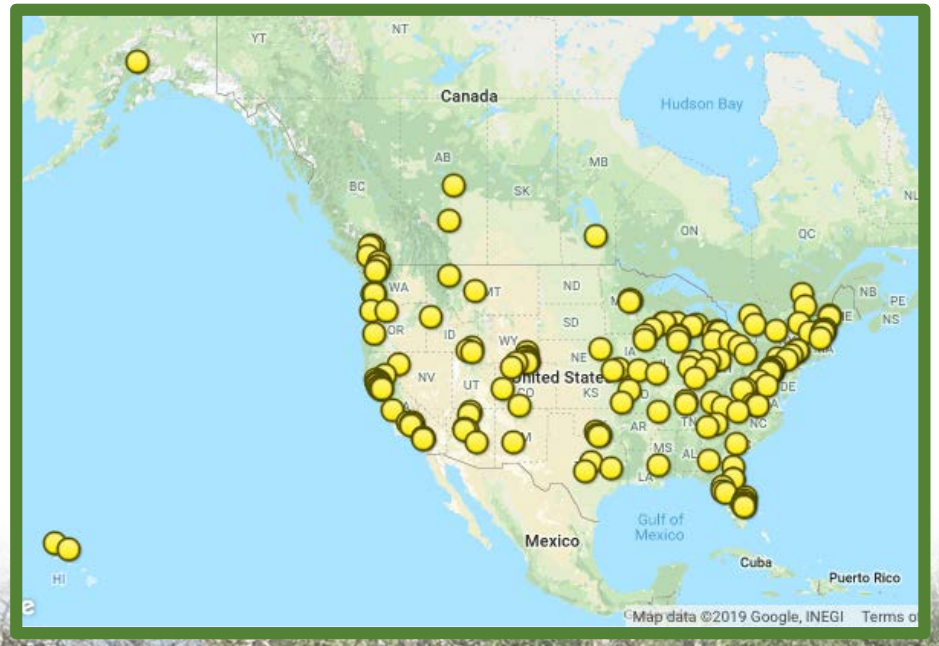

- ✓ R100 NH Communities - as of Jan 2019 - has grown to 5! Concord, Cornish, Hanover, Plainfield, and Keene (104th city in the US!)

- ✓ USDN – the peer-to-peer network of local government & sustainability professionals – connects us to nearly 200 member cities / counties across the United States and Canada, representing over 87 million residents!

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Lessons that guide us this year:

- No one size fits all!
- Tapping into technical resources from our member networks
- Importance of establishing and growing partnerships
- Continue to support the ongoing work across the community

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Rosi Kerr – Director of Sustainability
Dartmouth College

Ready for 100

DARTMOUTH

Sustainability Office


Campus
operations
reflect our
mission.
Photo by Laura Braasch


Students
get their
HANDS
dirty


We tackle the
challenges
of a CHANGING PLANET.
Photo by Robert Gill

Previous Sustainability Efforts

2016 – 2017 Sustainability Planning Effort

Earth Day 2017: Goals Announced

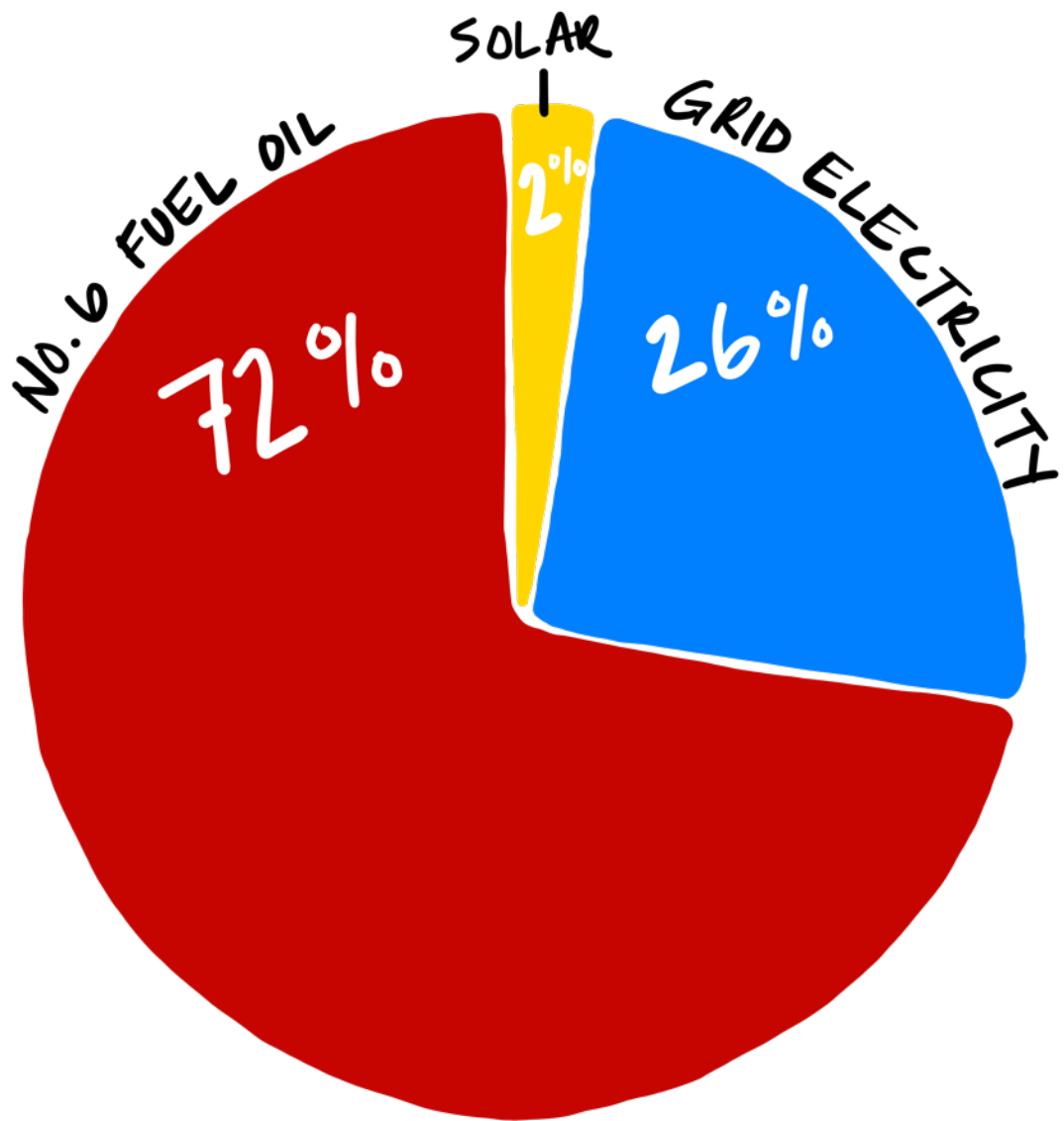
2017 – 2019:
Food Planning
Energy Transition
Waste Planning
Corps Launch

2019:
Energy Transition Announced

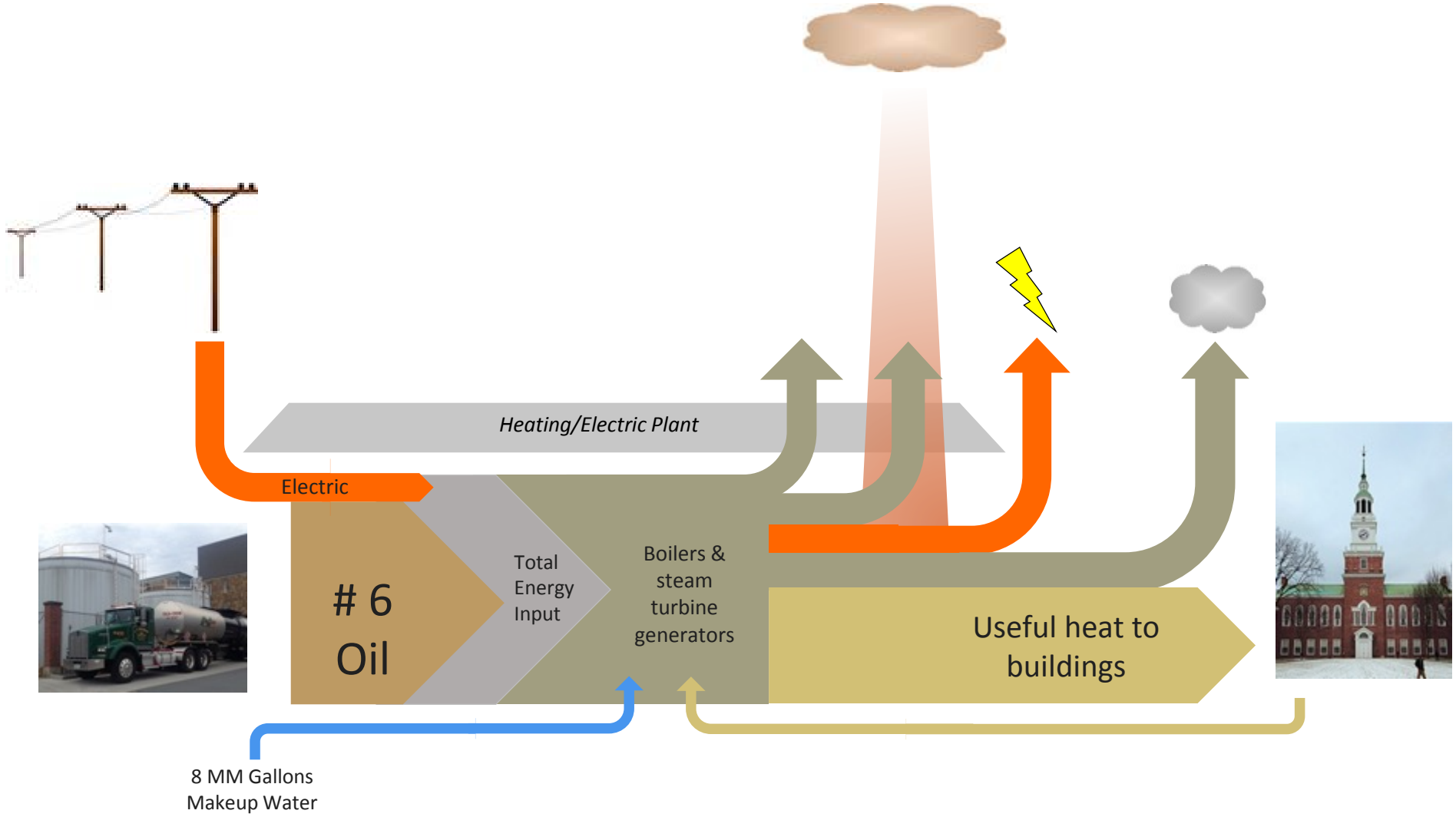
Earth Day
April 22,
2019

Two Year Update

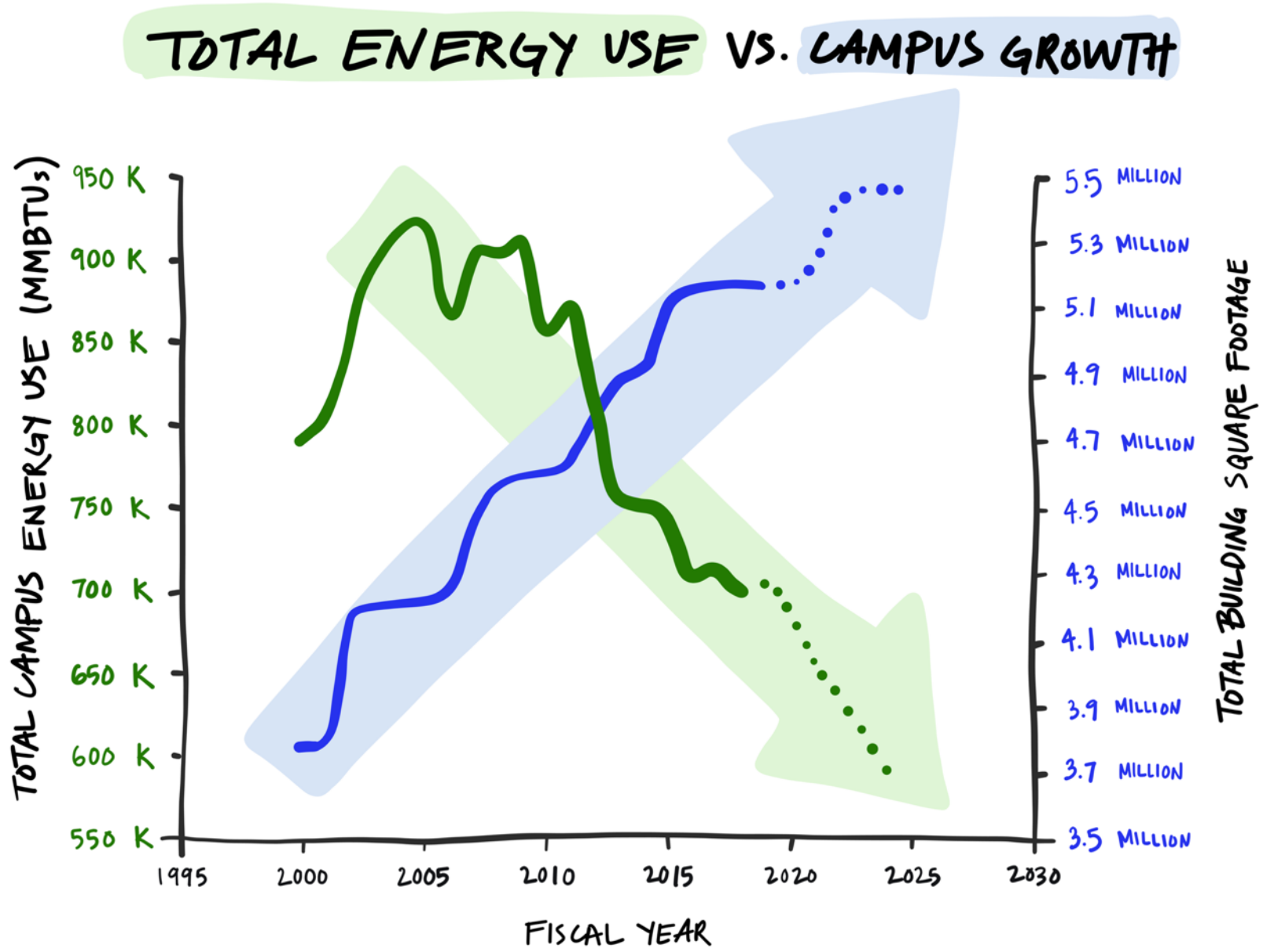
DARTMOUTH'S ENERGY CONSUMPTION 2018



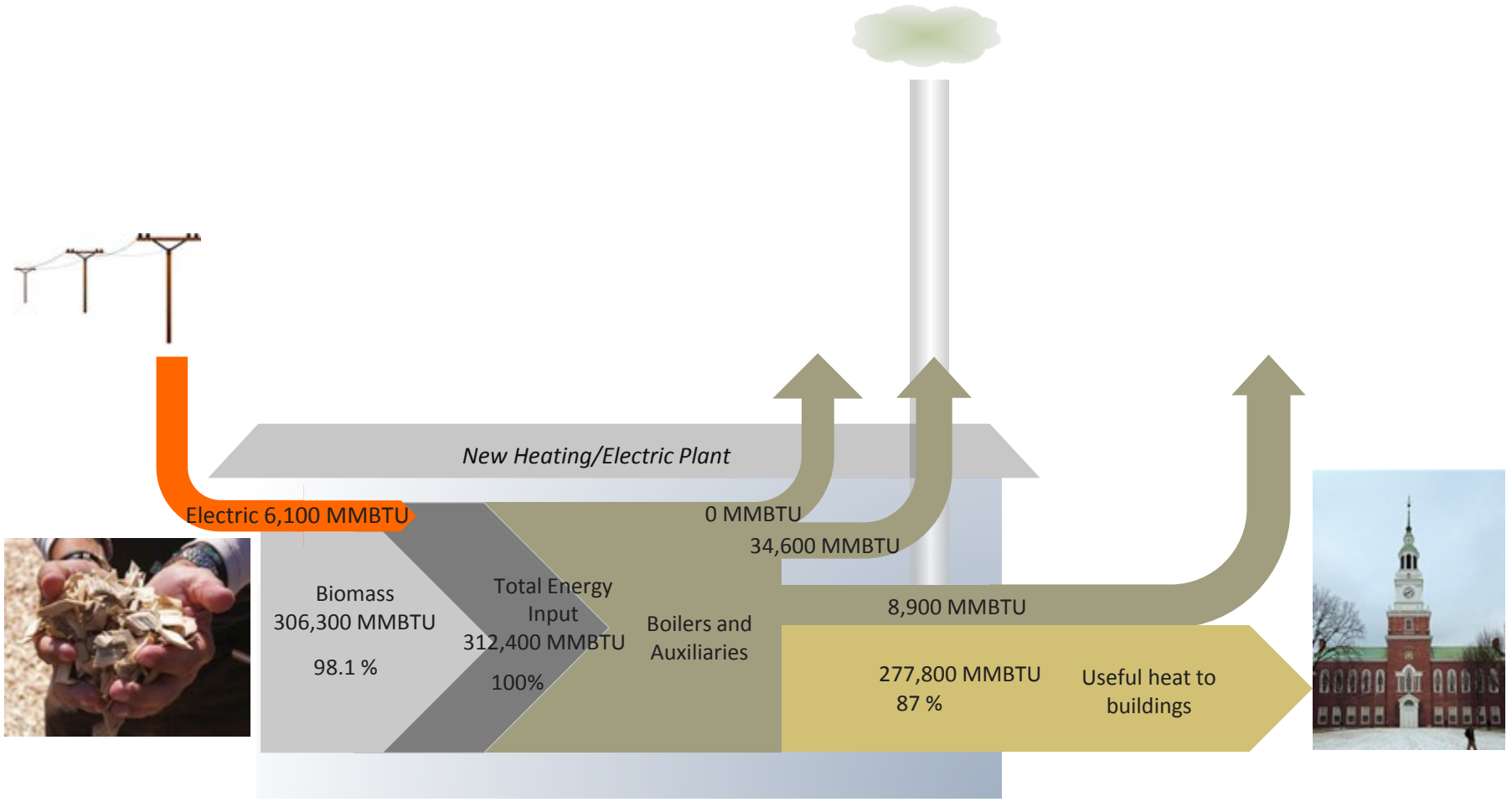
1896



55-65% Net Efficiency


TOTAL ENERGY USE VS. CAMPUS GROWTH
TOTAL CAMPUS ENERGY USE (MMBTUs)
950 K
900 K
850 K
800 K
750 K
700 K
650 K
600 K
550 K
5.5 MILLION
5.3 MILLION
5.1 MILLION
4.9 MILLION
4.7 MILLION
4.5 MILLION
4.3 MILLION
4.1 MILLION
3.9 MILLION
3.7 MILLION
3.5 MILLION
TOTAL BUILDING SQUARE FOOTAGE
1995
2000
2005
2010
2015
2020
2025
2030
FISCAL YEAR


N
W
E
S
Legend
Heating_Type
HW
Hybrid
Steam
600
300
0
600 Feet

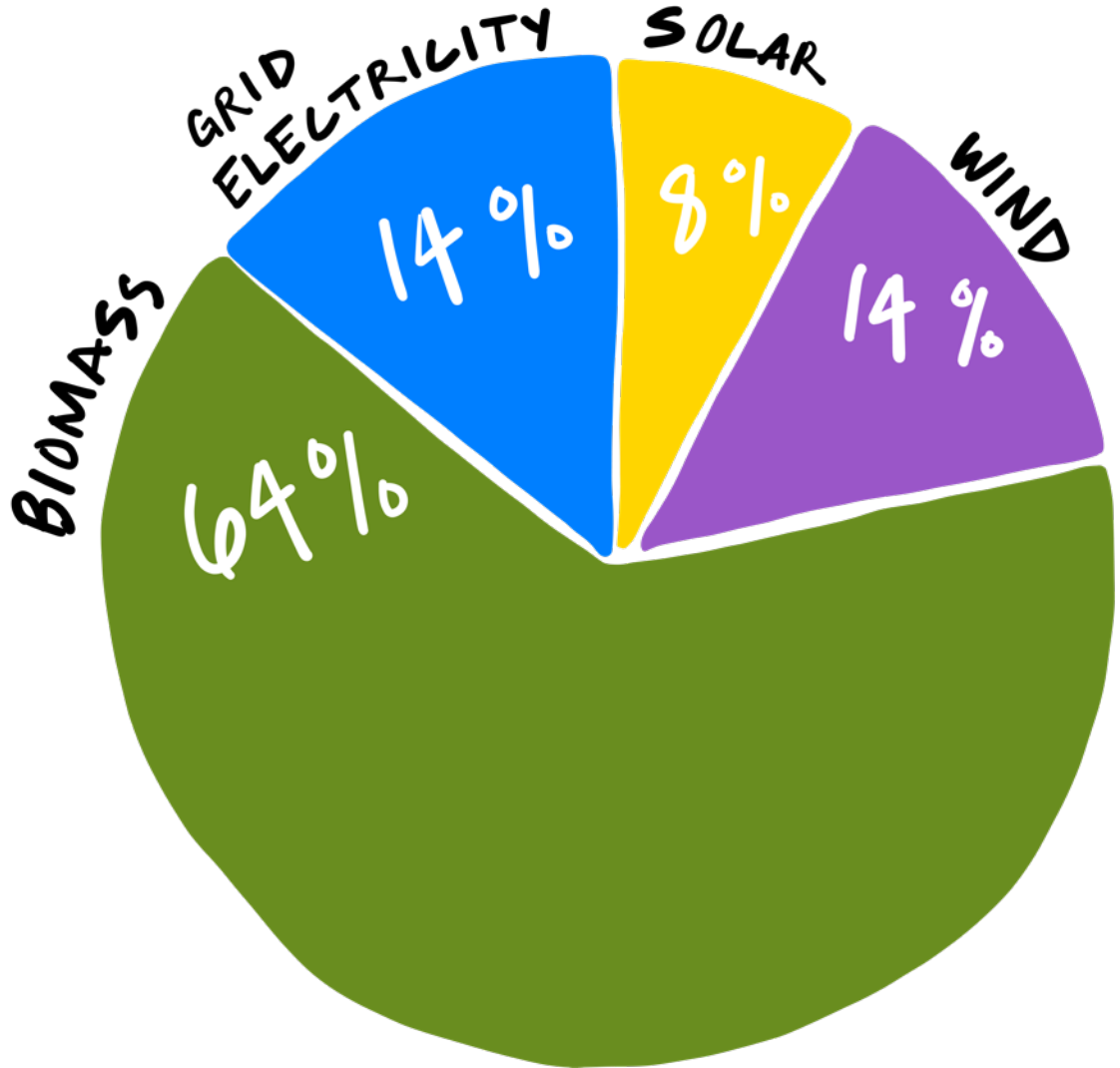


55-65% Net Efficiency

89 % Net Efficiency

	SCENARIO 1 Business as Usual	SCENARIO 2 Buildings & Distribution Only	SCENARIO 3 Biomass HW + Conversions	SCENARIO 4 non-combustion
Capital Cost	Lowest	Medium	High	Highest
Construction Impact	Lowest	High	Highest	Highest
O&M Costs	High	Better	Lowest	Medium
Fossil Fuel Burned	Highest	Better	Lowest	Lowest
Energy Price Volatility	High	High	Low	Medium
Energy Supply Chain Impact	Worst	Worst	Best	Medium
Building Comfort	Lowest	High	High	High
System Efficiency	Lowest	Medium	High	Highest
Carbon Footprint	Highest	Better	Low	Lowest
Operational Resiliency	Medium	Medium	High	Lowest

DARTMOUTH'S ENERGY CONSUMPTION 2025?



ENERGY

Learn about our transition to biomass, explore energy data and see how we're doing in comparison to our goals.

EXPLORE ENERGY PROGRESS

WASTE & MATERIALS

Understand the changing landscape of waste, learn about the challenges Dartmouth faces in reducing waste and explore our current waste streams.

EXPLORE WASTE PROGRESS

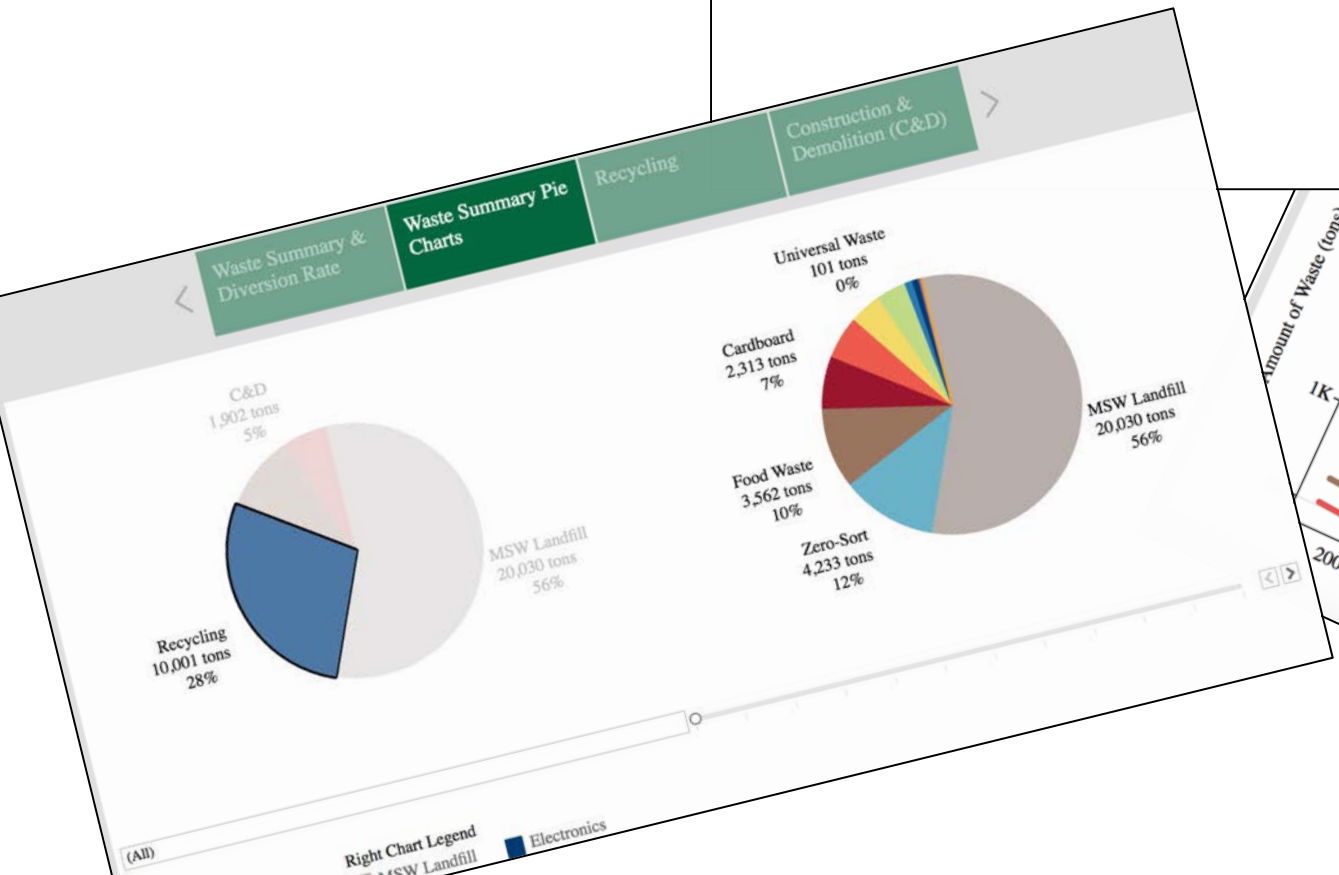
WATER

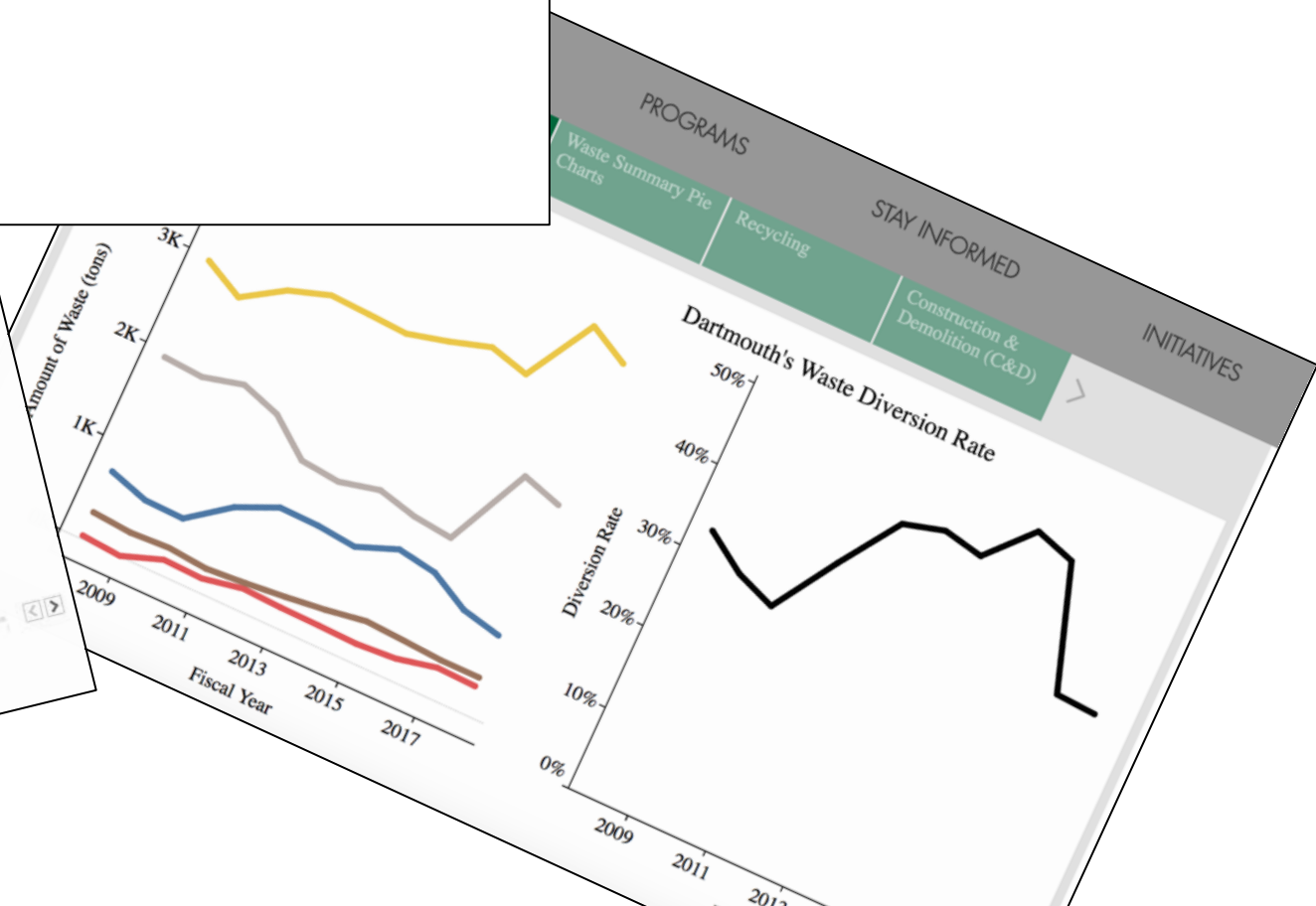
See how and where Dartmouth consumes water.

EXPLORE WATER GOALS

Dartmouth College Waste Report

FISCAL YEAR 2018





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Yolanda Baumgartner – Co-Chair

Sustainable Hanover Committee

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SUSTAINABLE HANOVER – ENERGY SUBCOMMITTEE

Yolanda Baumgartner (Co-Chair)
Stowe Beam
Barbara Callaway
Judi Colla (Co-Chair)
Tony Daigle (Director of Facilities, SAU70)
Julia Griffin (Town Manager)
Mike Hillinger
Rob Houseman (Director, Planning)
Josh Hotvet
Laura Hutchinson (D '19)
Peter Kulbacki (Director, Public Works)
Robin Kaiser
David McManus
Honor Passow
Dennis Robison
Marjorie Rogalski
April Salas (Sustainability Dir.)
Heidi Trimarco

NEIGHBORHOOD ACTION GROUP

Barbara Callaway , Lyn Swett Miller, Rebecca Paquette, Sarah Young

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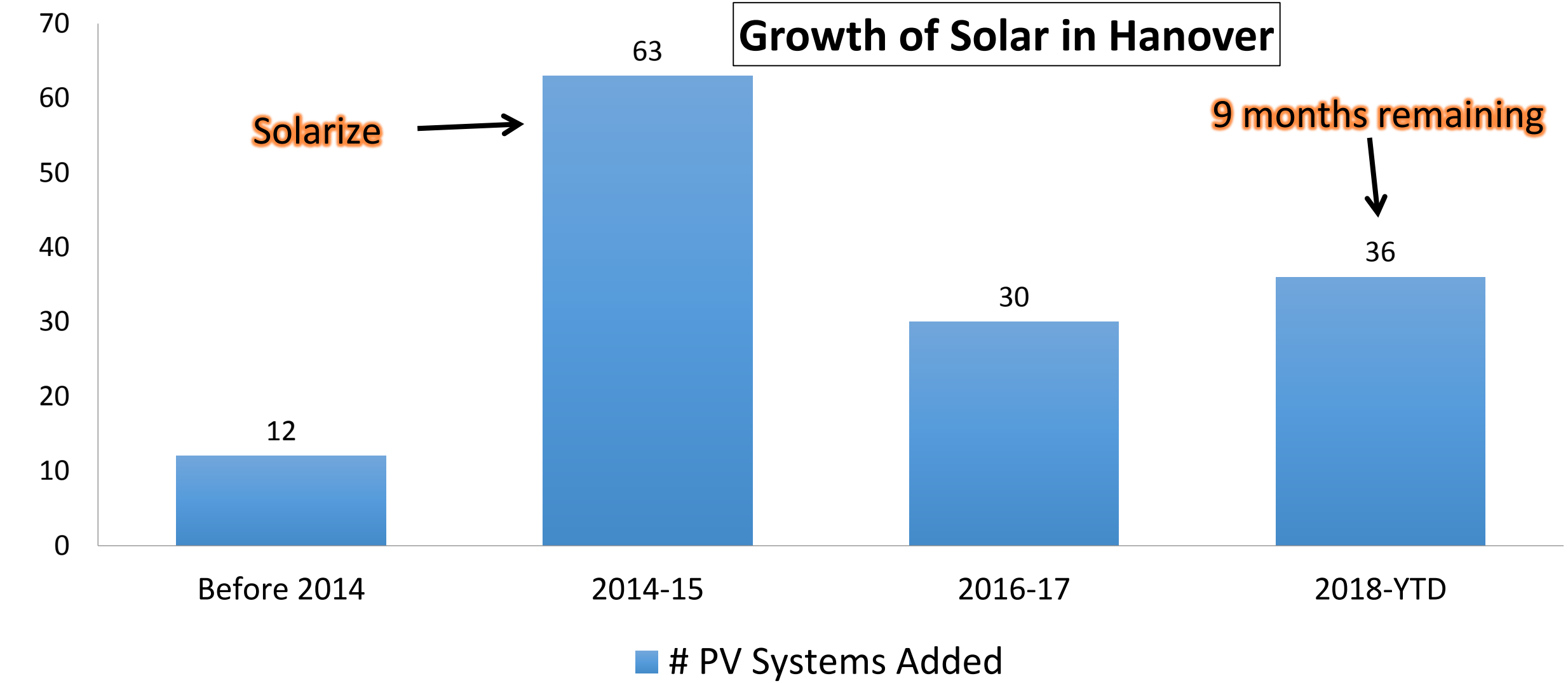

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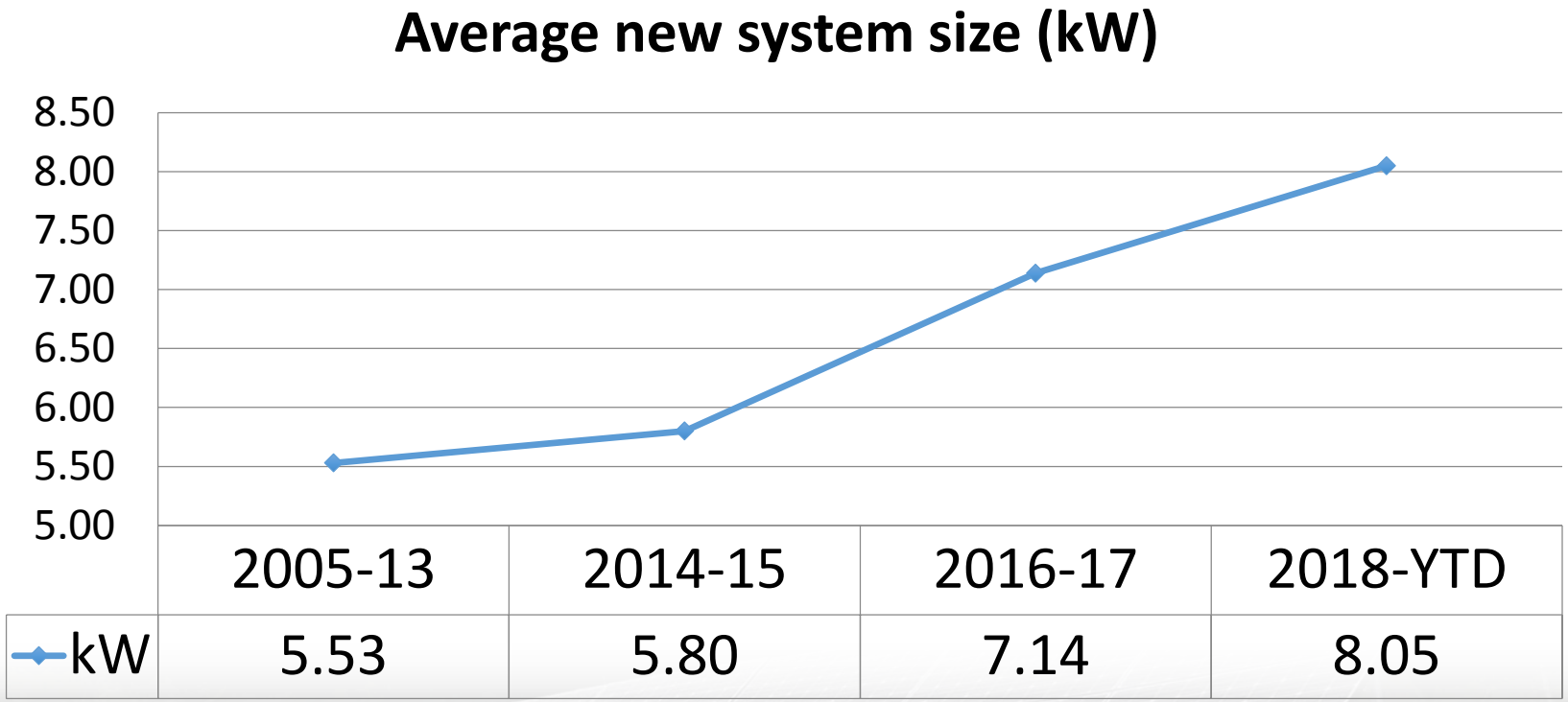
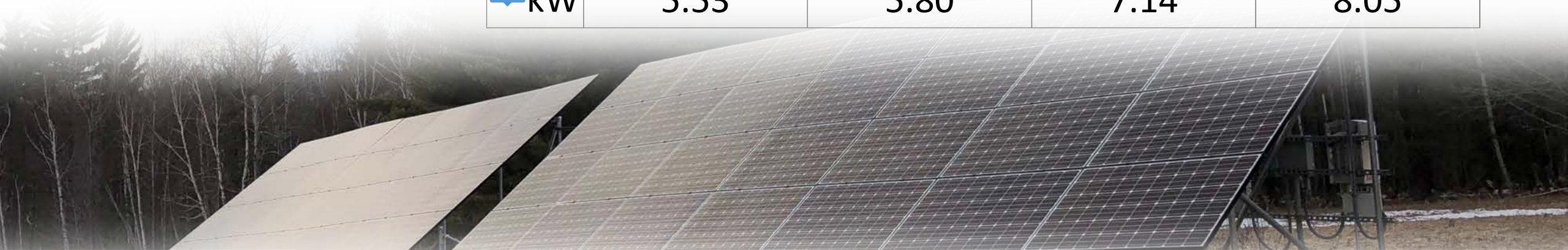
Residential Systems Are Getting Bigger





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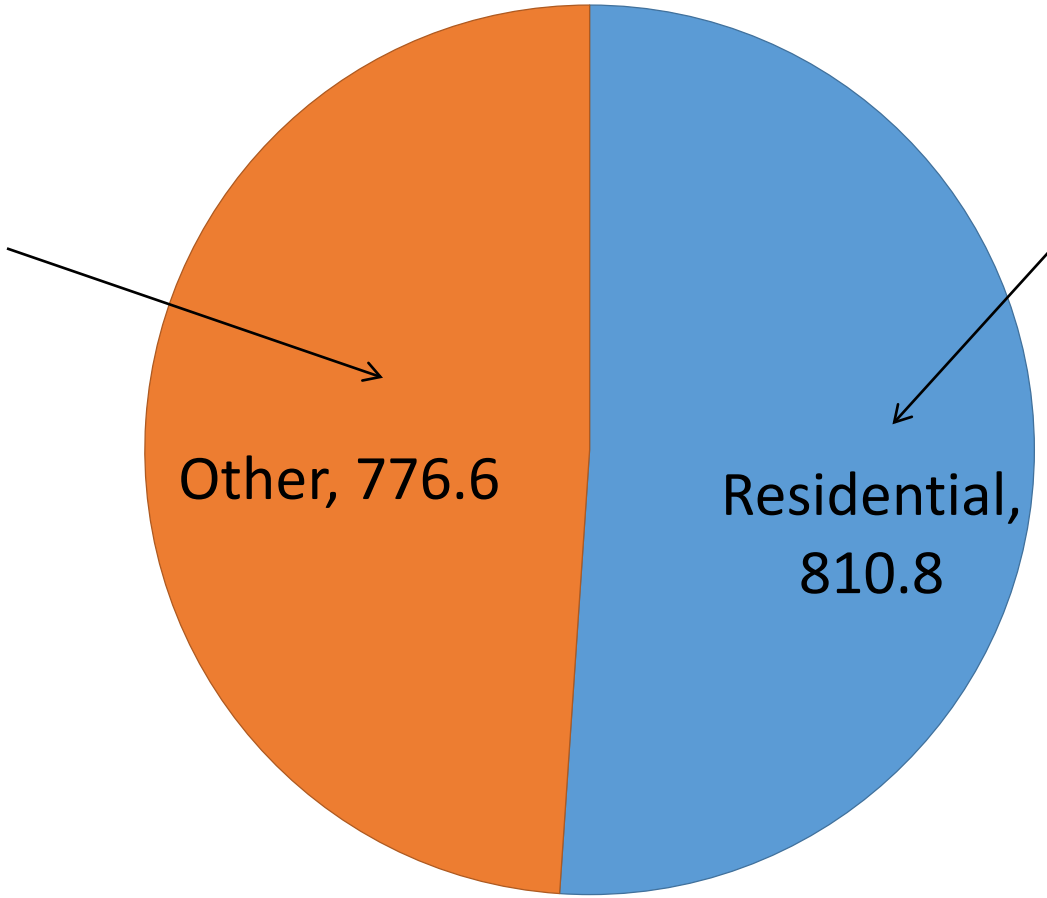
Solar Generation by Sector (kW)



Systems:
13 Dartmouth
2 Town
1 Schools

125 residential solar systems

6% of Hanover's 2,146 single detached houses are generating solar electricity.*

**Housing count from 2014 US Census.*

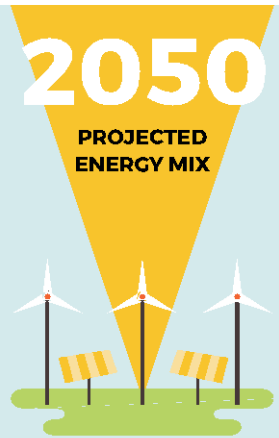
Total = 1,587 kW

100% HANOVER

A vision for the transition to 100% wind, water & solar energy

2050 PROJECTED ENERGY MIX

- Residential rooftop solar **5%**
- Solar plants **24%**
- Concentrating solar plants **0%**
- Onshore wind **40%**
- Offshore wind **20%**
- Commercial & government rooftop solar **3%**
- Wave devices **1%**
- Geothermal **0%**
- Hydroelectric **6%**
- Tidal Turbines **1%**



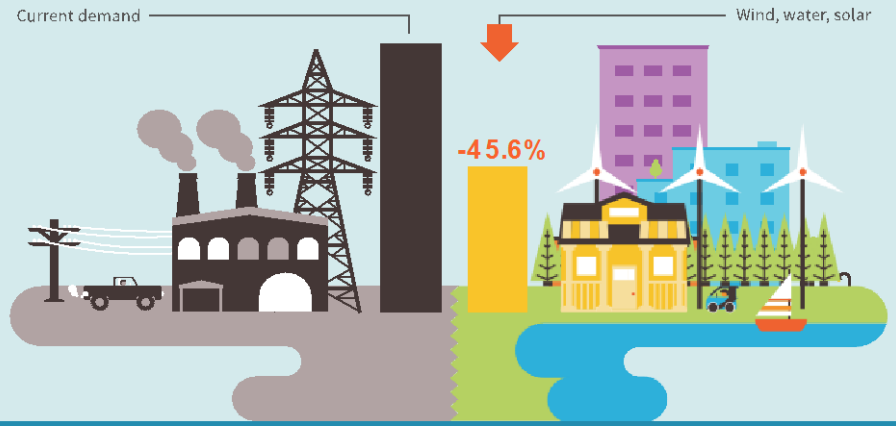
40-Year Jobs Created

Number of jobs where a person is employed for 40 consecutive years

- Construction jobs: **86**
- Operation jobs: **44**

Reducing Energy Demand

Improving energy efficiency and powering the grid with electricity from the wind water and sun positively reduces the overall energy demand.



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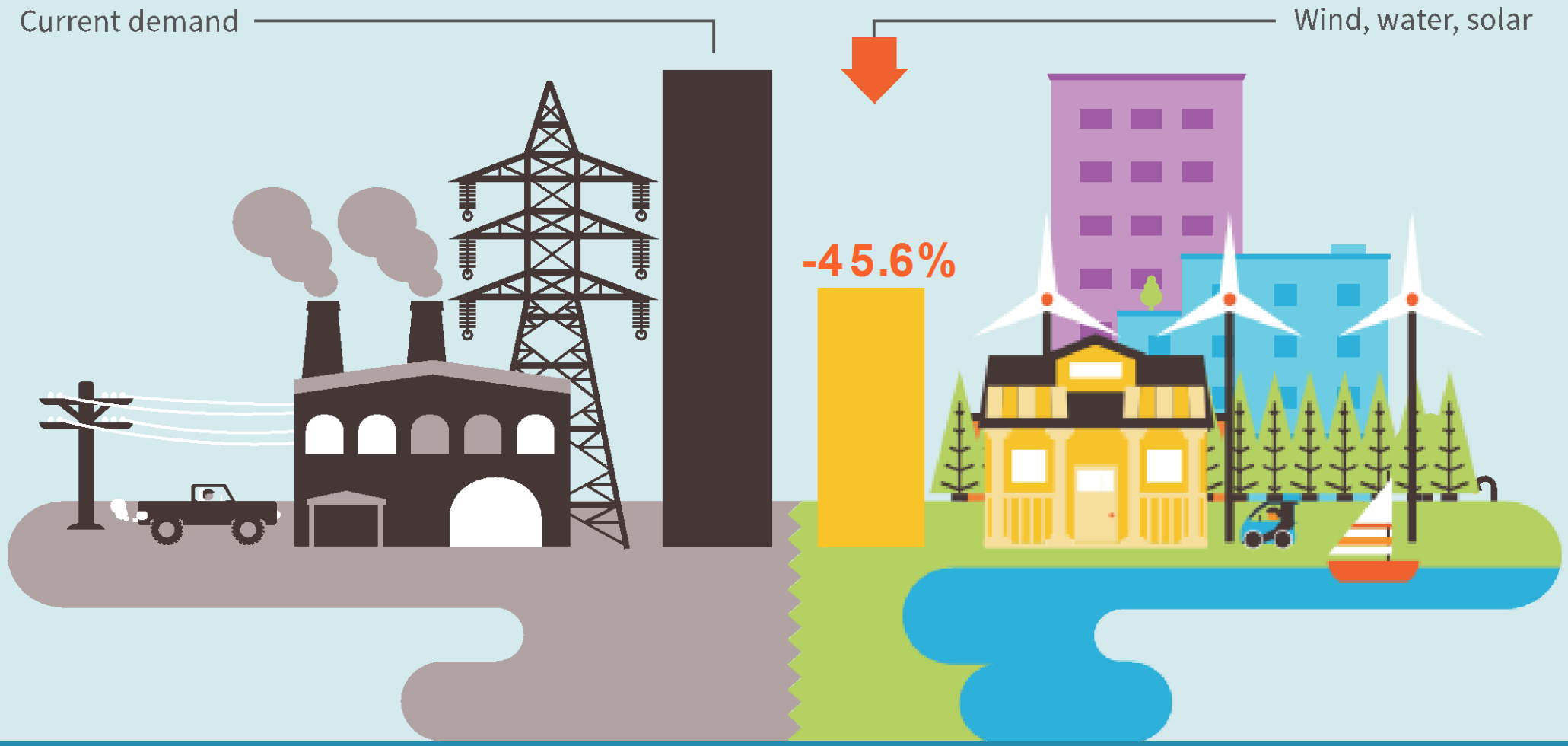

Data from Stanford University

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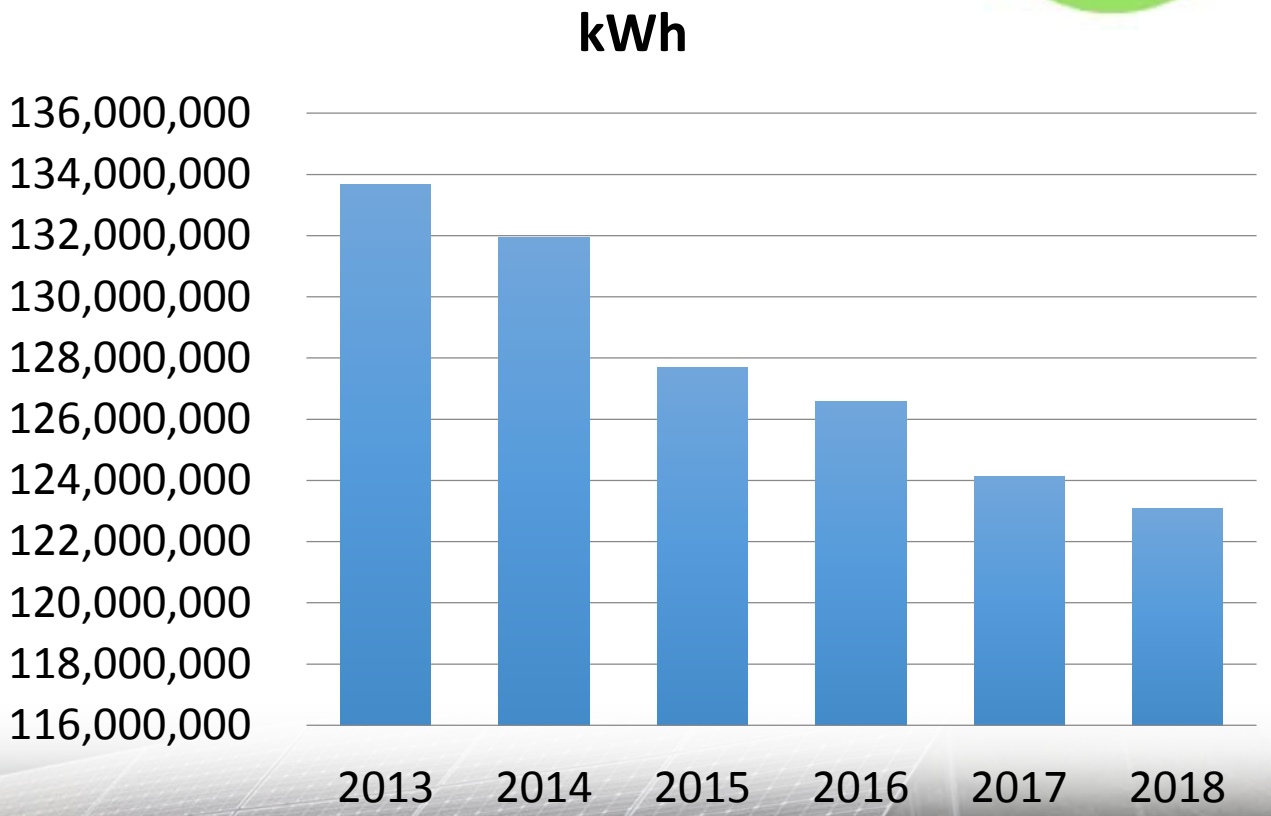
Town-Wide Electricity from Grid:
8% decline from 2013 to 2018



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Efficiency Savings on Main Street

Simplified Lighting Incentive Program

- Pilot Project with NHSaves/Liberty
- Incentives up to $5,000
- Interest-free on-bill financing up to 5 years
- Simplified application process
- Project coordinator based in Town Hall office

Significant reduction in kWh, dollars, emissions

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Try LEDs in your home or office

Borrow this kit from Howe Library.

Check out LED brightness and color.

Includes floodlights, 3-way, track, and candlelabras.

Kit developed with the generous assistance of Mike Campbell, Hanover Hardware Store.

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LEDs: Lower costs, Lower emissions

- 15W LED replaces 100W Incandescent bulb
  - Kilowatts used: 16 kWh vs 110 kWh
  - Electricity Savings: $15*
  - Carbon emissions reduced by 145 pounds**
- Current LEDs are cheaper, offer more choices, and better quality lighting than earlier
- LEDs have expected usage life of 25 years.
- LEDs have no mercury, can be recycled at the Lebanon Recycling Center.

**Based on usage of 3 hrs/day, 365 days/year at 16¢ per kWh*

***From EPA Greenhouse Equivalencies Calculator*

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Climate solutions depend on community, collaboration and cooperation. At the end of the day, every solution in Drawdown is initiated and promoted by groups of people forming new and perhaps unlikely alliances.

Paul Hawken, *Drawdown*

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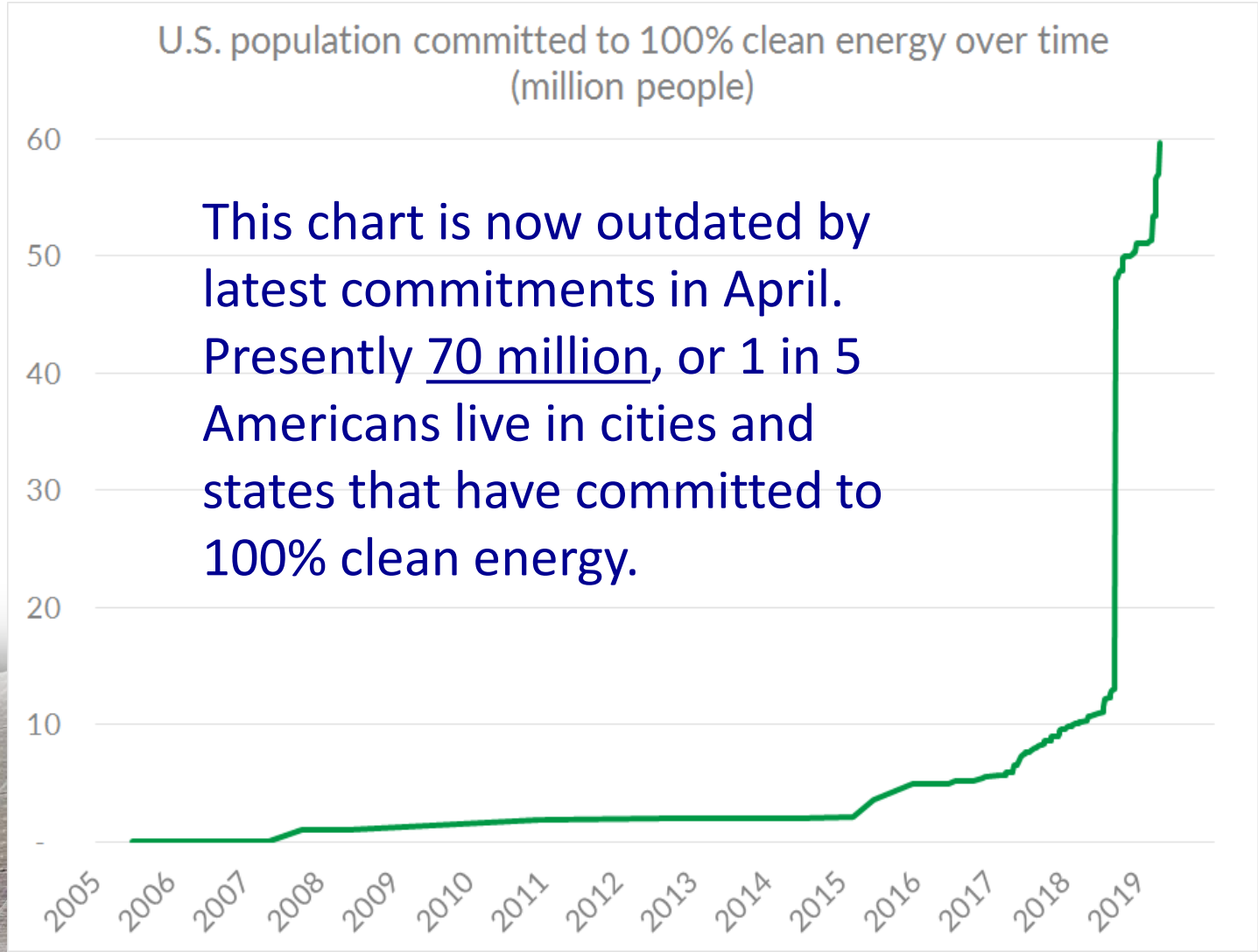
Ready for 100 Update: Momentum is off the chart - literally!



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Q&A

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Prize Drawing

Black & Decker 40V Cordless String Trimmer

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- Thanks to
  - RMS Middle School and SAU 70
  - Neighborhood Action Group
  - SHC committee and town staff that support and contribute to this work

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- Thanks to the Poster Presenters:
  - Co-op Food Stores
  - Hanover Friends Meeting House
  - Hanover Parks and Recreation
  - LED Design & Defiance Electric
  - Neighborhood Action Groups
  - NH Saves & Liberty Utilities
  - RMS 7th Grade
  - Robin Kaiser and Peter Gish
  - St. Thomas Episcopal Church
  - Twin Pines Summer Park
  - UK Architects

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- Small Group Discussion + Refreshments
  - Energy Efficiency: Mike Hillinger, David McManus, April Salas, Sol Diamond
  - Residential Solar: Robin Kaiser, Lyn Swett-Miller, Erzo Luttner
  - Community Solar: Josh Hotvet, Marjorie Rogalski, Heidi Trimarco

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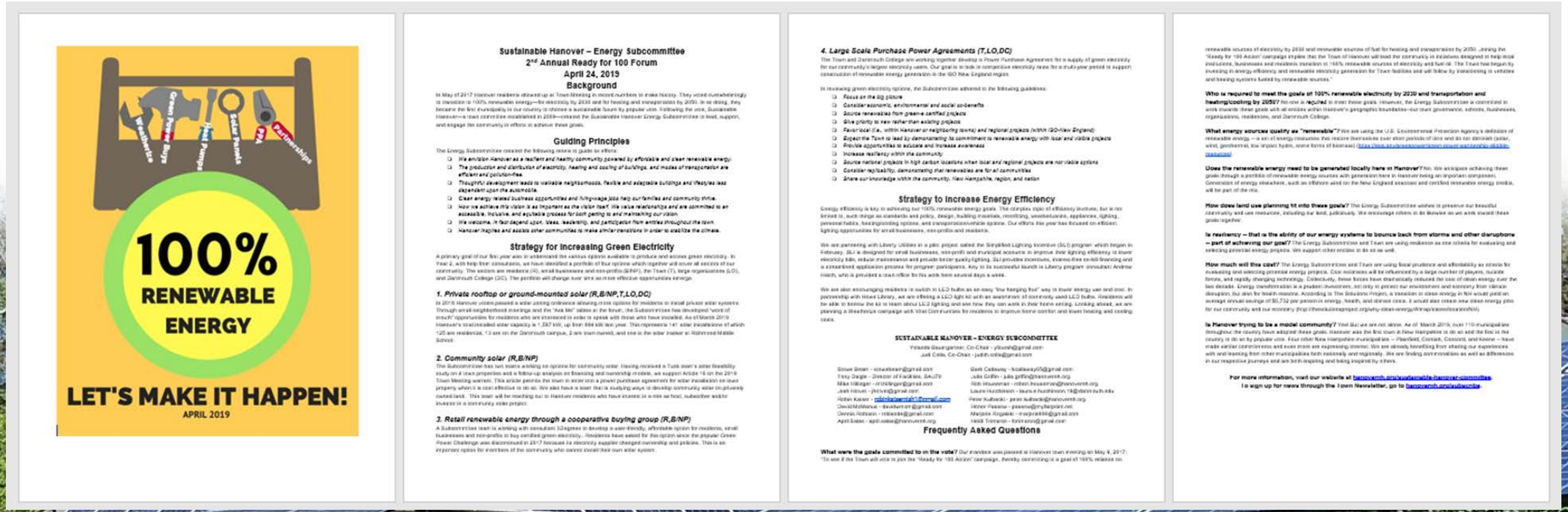
- Stay up to date until next year's forum:
  - https://www.hanovernh.org/sustainable-hanover-committee
  - Our new quarterly newsletter
  - Annual Summary Report



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Thanks for coming!

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