Building an Energy Efficient Community: West Hartford

AEE CT Chapter Meeting

February 11, 2020

Catherine Diviney, Energy Specialist

catherine.diviney@westhartfordct.gov

Before we start..

- Pretty basic
- West Hartford example, not “the answer”
- Today’s solutions are not tomorrow’s
- Municipal operations <5% of a town’s energy use
- MUCH more West Hartford could/should be doing

West Hartford		
(Millions)	kWh	CCF
Residential	196	21
Business	172	12
Municipal	18	1
Total	368	33

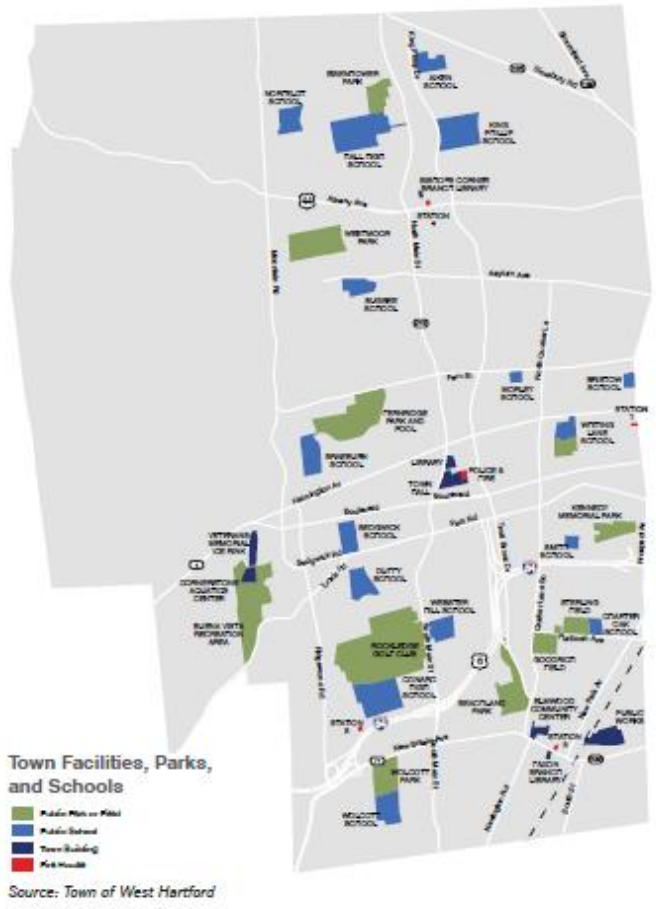
2018 data, EnergizeCT.com

My lessons

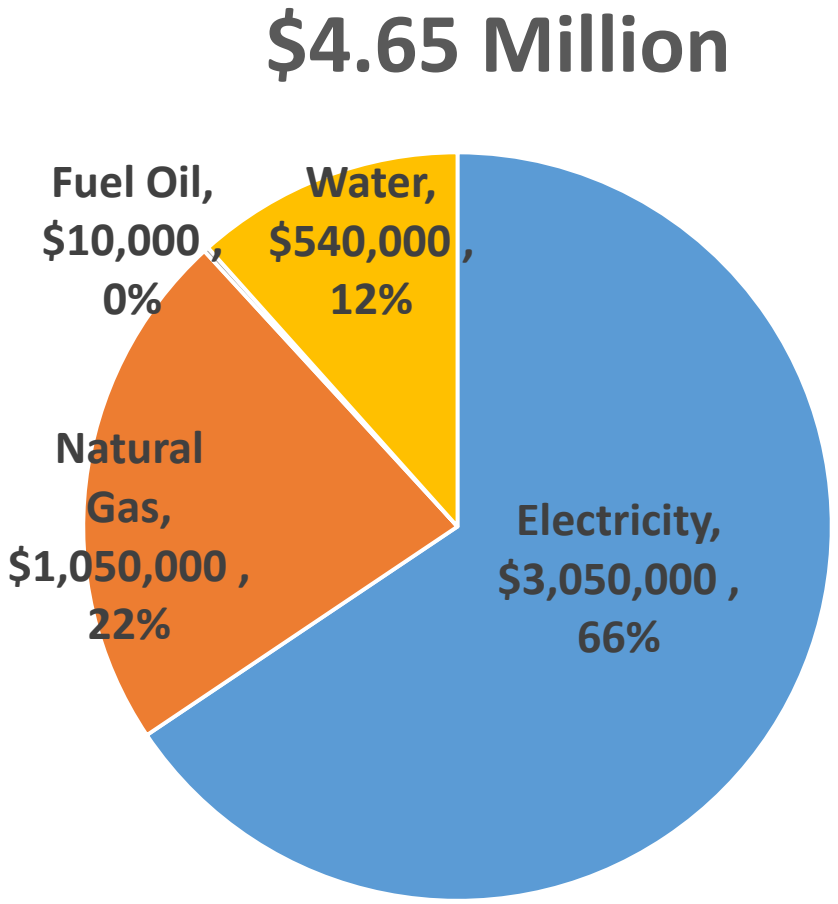
- Data speaks – gather it, use it, don’t keep it to yourself
- Network – get your name out there
- Figure out what’s right for your town, organization
- Have a vision: it won’t happen overnight
- Do something!
- Be flexible – ask questions, learn, adjust, improve
- Share

West Hartford

- 63,000 residents
- 22.2 sq miles, 24,000 households, 9,600 students
- 60+ Town and BOE-owned facilities
  - 33 Major – 16 schools, town hall, police HQ, indoor aquatics, indoor ice rink, 5 fire houses, 3 libraries, community center, public works, 2 municipal garages, data hub
  - 30 Miscellaneous – parks, fields, outdoor pools, golf courses, gardens, cemeteries, farm, historic/museum, parking lot, maintenance, grounds
  - 3 million sq ft, most facilities 1950s -60s
- 100+ Traffic Signals and 6,500+ Street Lights



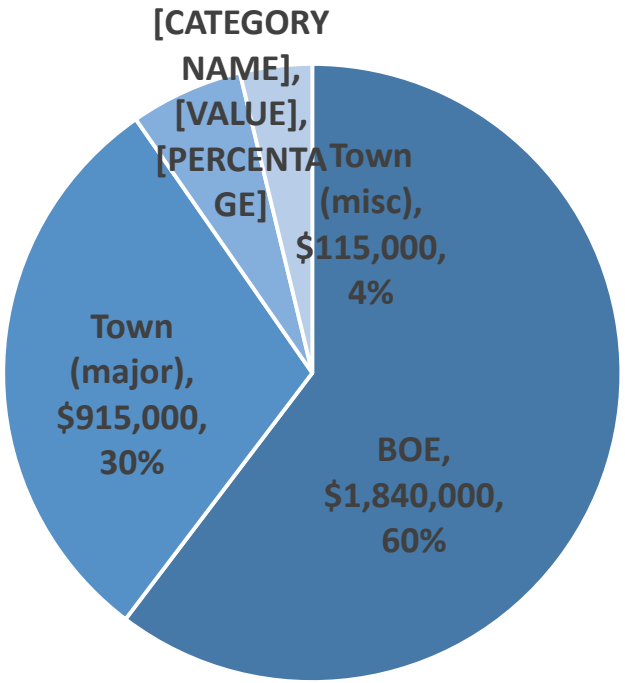
FY19 expenditures



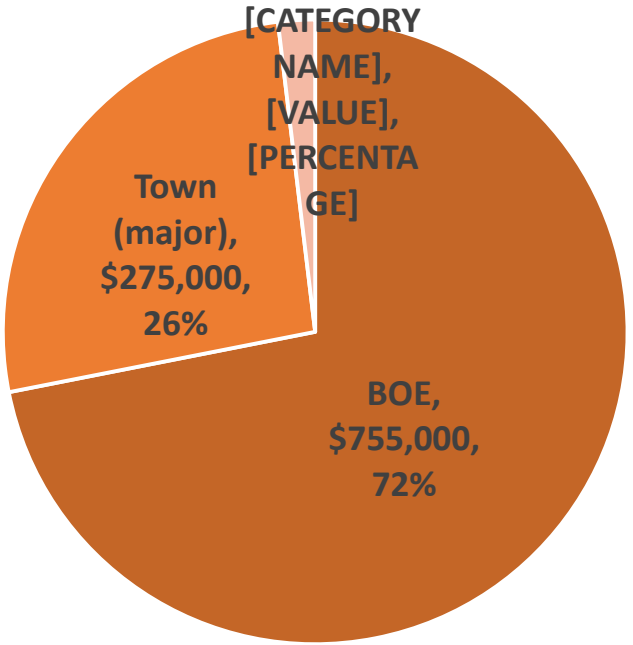
- 300 bills per month
- 3,600 bills per year
- Eversource, CNG, MDC
- Other - Solar PPAs, VNM

FY19 expenditures

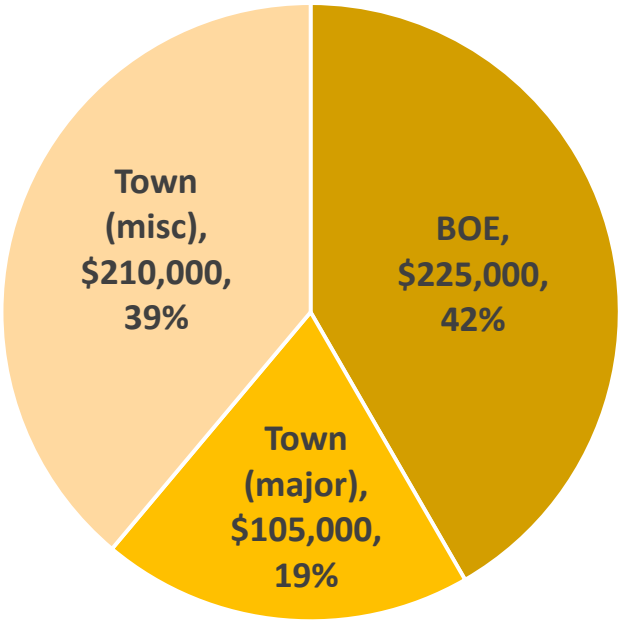
Electricity, $3.05 Million



Natural Gas, $1.05 Million

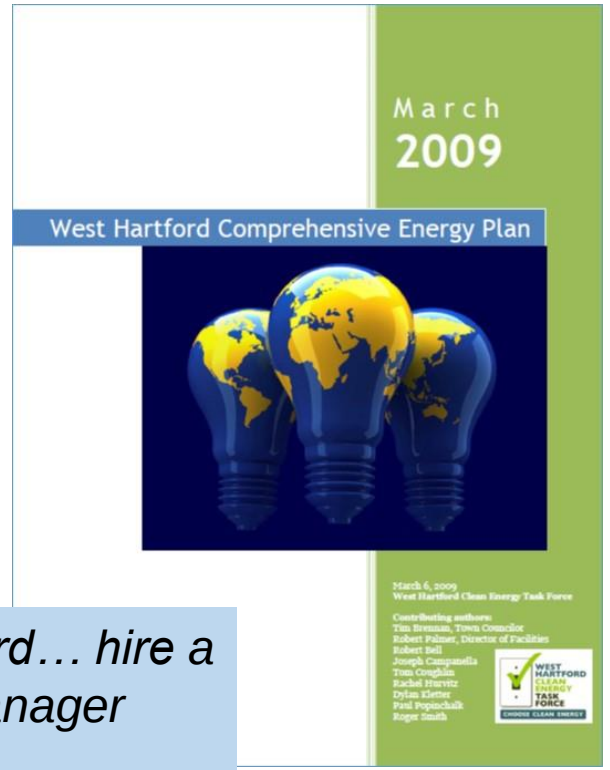


Water, $0.54 Million



Energy Specialist since 2011

- Initially, role fulfilled by Director of Plant & Facilities
- Identified as a key action in 2009 Comprehensive Energy Plan
- In 2011, “stars-aligned”
  - Part-time position funded with settlement received from street light overbilling
  - Received my resume
  - Hired



“We recommend that West Hartford… hire a full-time, in-house town energy manager paid for through energy savings.”

https://www.westhartfordct.gov/gov/whgreen/energyplan.asp

Energy Specialist job

- In-house, staff position – BOE, Plant & Facilities
- Work for <u>both</u> Town/BOE
- Part-time - 20 hrs/wk, paid hourly, no benefits, flex schedule
- Job description (happy to share)
- Never had to justify “paid for through energy savings”
  - Track data/results
  - Feel position adds value to town (more than just energy savings)
- Town just hired Recycling Coordinator

West Hartford unique. Plant & Facilities joint for Town/BOE.

What I do

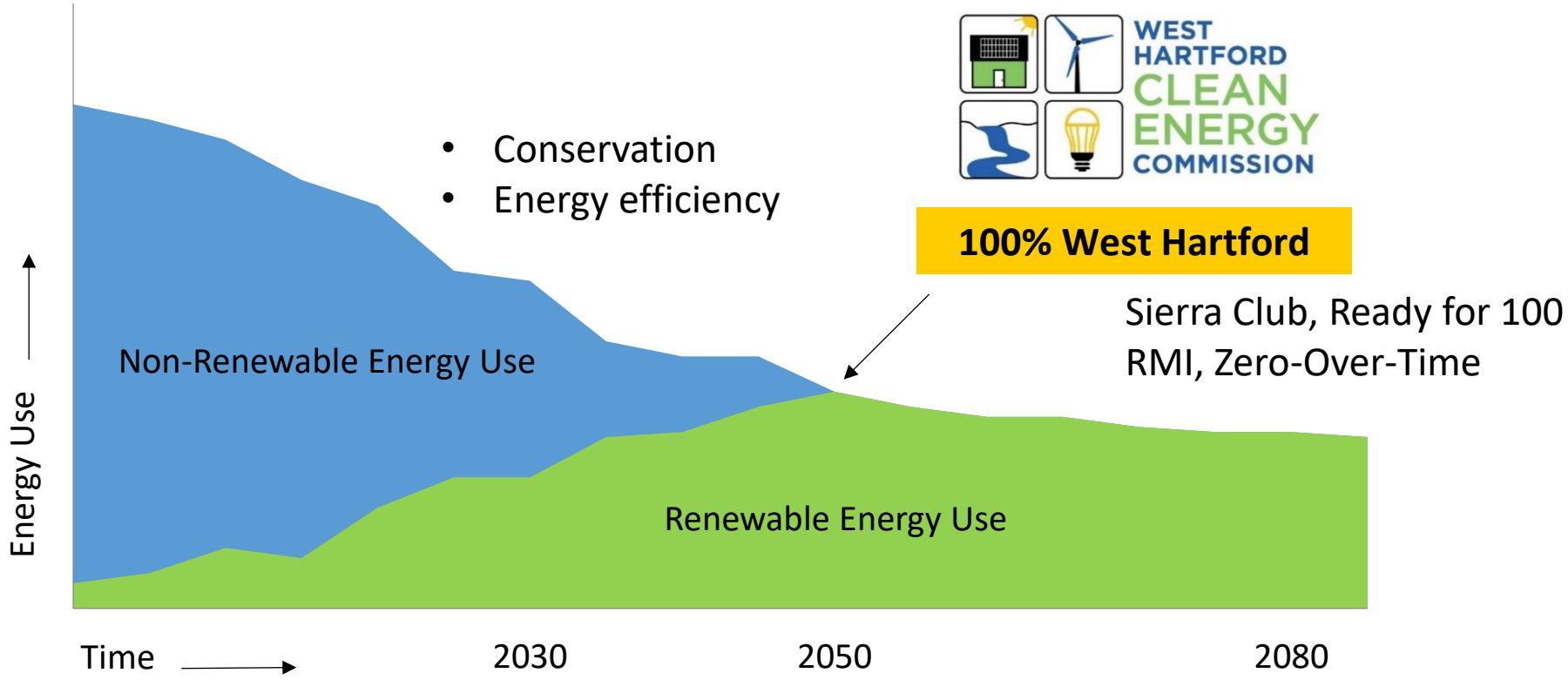
- Track energy use/cost
- Energy Procurement
- Energy Program – education/outreach, resource, advocate
- Energy Projects – capital, efficiency, new constr, renewable
- Clean Energy Commission
- Sustainable CT
- Other: water, recycling, food waste, liaison, events, grants, electric vehicle charging stations, water barrels, classroom...

Clean Energy Commission

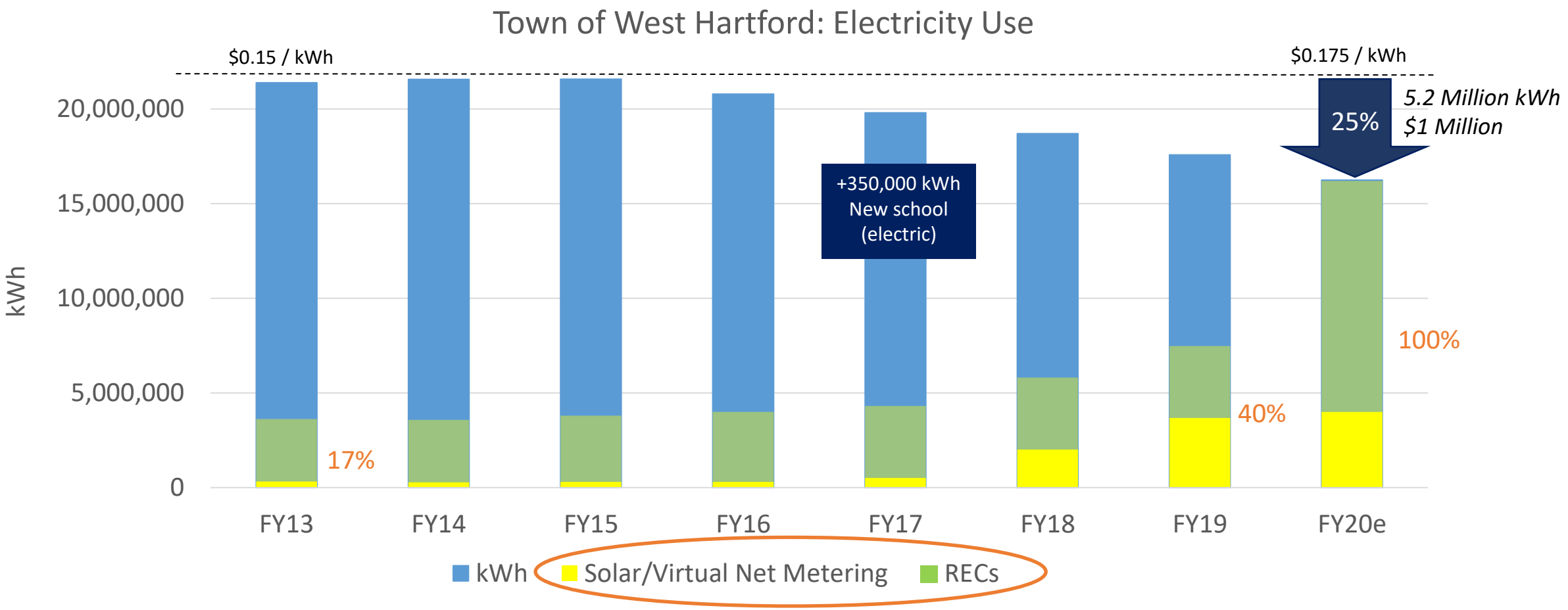
- Active since 2005
- Wrote 2009 Energy Plan, 2020 Energy Plan coming…
- Focus on community outreach, events, planning, legislative support
- Collaborate with other Commissions, towns
- Energy Specialist is staff liaison

WEST HARTFORD CLEAN ENERGY COMMISSION

Vision – 2020 Energy Plan



Last 8 years…


Town of West Hartford: Electricity Use
$0.15 / kWh
$0.175 / kWh
20,000,000
15,000,000
10,000,000
5,000,000
0
kWh
17%
+350,000 kWh
New school
(electric)
25%
5.2 Million kWh
$1 Million
40%
100%
FY13
FY14
FY15
FY16
FY17
FY18
FY19
FY20e
kWh
Solar/Virtual Net Metering
RECs

Solar

- On-Site / Behind the Meter
  - 12 installations since 2009, 2 MW
  - Large ones under PPAs, no cost to town, supply price fixed for 20 years
  - New roofs (capital), before solar
  - Direct, visible, preferred
- Off-Site / Virtual Net Metering
  - 2.4 MW in Thompson, CT
  - $ credit on West Hartford “host” bill for solar production
  - Indirect, financial transaction

Conard HS, 357 KW

Barrette Farm, 2.4 MW

Charter Oak Int'l Academy

- Built 2016 to replace 1929 building
- LEED Gold certified
- Design supports IB philosophy
- Energy Use Index in low 30s kBtu/sf (old EUI = 92)
  - 40% larger sq ft
  - More community use

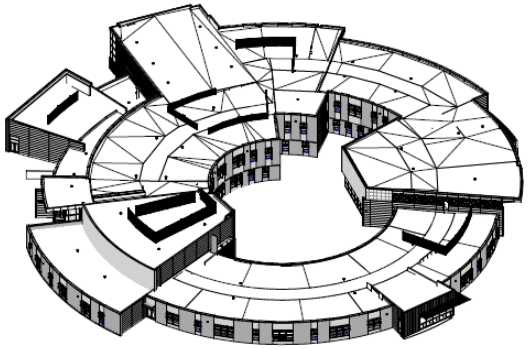
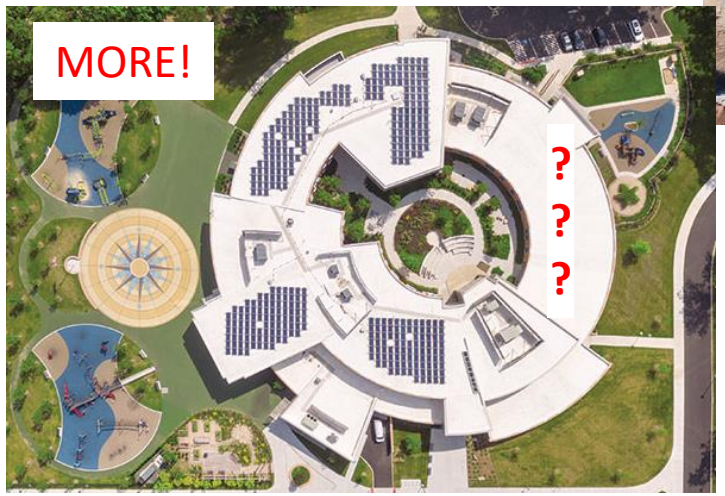


Photo: Perkins-Eastman

Charter Oak Int'l Academy

- Envelope – insulation, high performance glazing, sunscreens
- Geothermal, 64 heat pumps
- 100 KW solar
- LED lighting/controls
- EMS
- Water efficient fixtures, Native plants, garden
- Why not net zero?

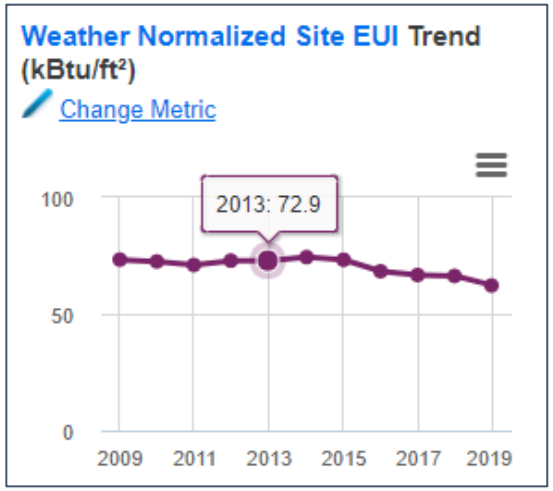


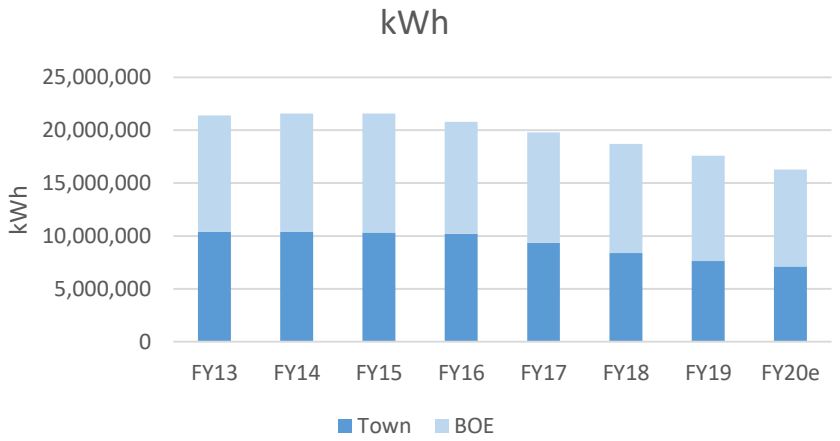
Energy projects – setting the stage

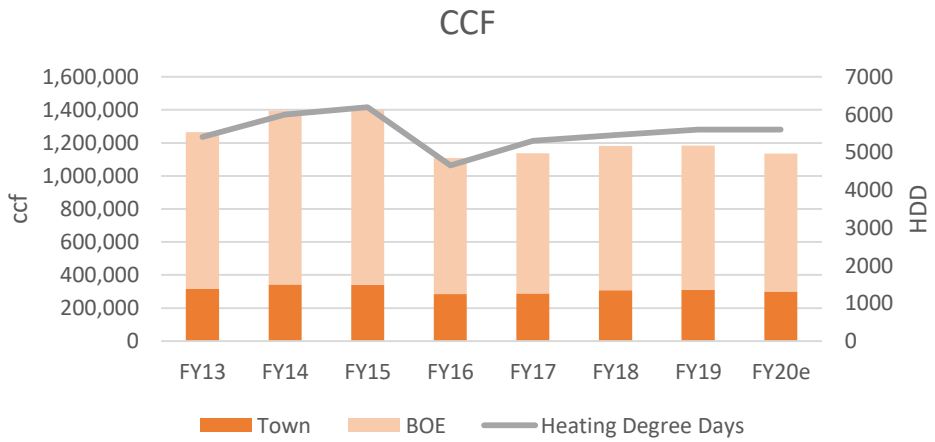
- Flat energy use, EUI = low 70s kBtu/sf
- Improvements where specific projects done, but drop in bucket
- Investment needed to make a dent

Capturis an NISC company	Monthly, bill scans, data entry, payment file
ENERGY STAR® PortfolioManager®	Annual, reporting

If anyone finds the perfect database, let me know!







Energy projects – getting going

- Hired performance contractor (2013)
- Useful process (2013-14), learned about our facilities and ourselves
  - Audits documented projects/savings
  - Needs across portfolio
  - Capital needs, too large/expensive
  - Projects to implement pretty straightforward
  - WH very "hands-on," institutional knowledge
  - Did not need "extras" – financing, guarantee, project pitch/presentations
- Decided to manage implementation ourselves (end of 2014)

Town budget

No separate referendum, adopted as part of FY16 budget

Usual	FY16 (proposed early 2015)	Actual (still going 2020)
$100,000 for Energy Conservation Projects	$4.4 Million • $3.25M bonds • $1.15M revenue, est. 28% utility incentives	$5.6 Million • $3.25M bonds + $250,000 • $2.10M revenue, est. 40% utility incentives
	Phased with incentives being reinvested in projects	Phased with incentives being reinvested in new projects. Higher incentives, lower project cost → more projects
1 or 2 projects	Steam traps, Street Lights (major roads), Exterior LED lighting, Select Interior LED Lighting, Energy Management Systems, Select VFDs & DCV	Steam traps, Street Lights (all roads), Exterior LED lighting, Select Interior LED Lighting, Energy Management Systems, Select VFDs & DCV, Select Motors, Steam traps (w/ insulation jackets), Type B/direct wire LEDT8 & LEDT5
Minor impact	$500,000 cost savings 15% energy savings Net payback: 6.5 years	$1,000,000 cost savings 20% energy savings (25% electric) Net payback: 3.5 - 4 years

Projects – typical

- LED street lights
- Steam traps
- Pipe insulation
- Exterior LED / some interior LED (new fixtures)
- Energy management systems
  - Web-based
  - Scheduling/programing
  - Additional buildings, equipment
  - VFDs, DCV, kitchen hoods, motors where applicable
- LEDT8/T5

Implementation – unique

- Self-managed
- Good timing (LED)
- Multiple measures, facilities, years (program)
- Gas and electric measures (comprehensive)
- Multiple contractors
- Worked closely with utilities
  - 38 buildings/LOAs, 113 measures (amended)
  - Very “hands-on,” always looking for additional savings
  - Lower cost, higher incentives reinvested in additional work

Street Lights 2016-2018

- 6000+ cobra heads
  - Aggressive energy savings, mock-ups, 200 removals
  - 70W, 100W, 150W HPS →15W, 25W, 32W, 41W LED
  - Started with 4000K, moved to 3000K
- Cost: $1.75 Million, incl. police and removals
- Net Cost: $1 Million (>$175 each), 40% incentive
- Savings: 2 Million kWh, $250,000, 4.2 yr payback
- Occasional complaints (compliments)
- Still to do – Decorative post-tops, lingering bill discrepancies

Before

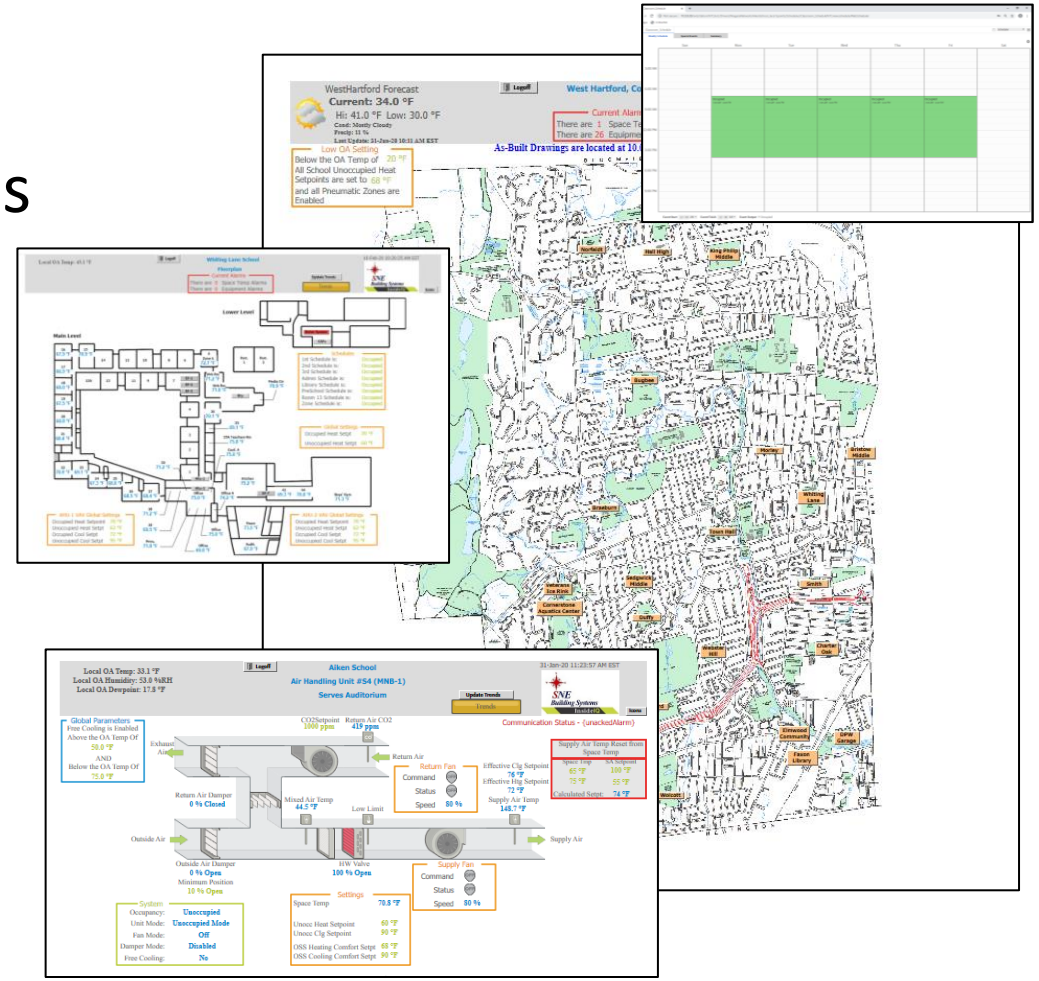
After

BMS/EMS 2017-2019

- No system or dial-up modem, DOS-based from 1990s
- Only upgraded as capital budgets allowed
- Some DDC, lots of pneumatics
- 24 buildings
  - Upgraded all to web-based
  - Verified existing and added additional calendars/scheduling, programming – e.g., set-backs, optimal start, economizer, DCV
  - Added additional large equipment, exhaust fans
  - VFDs, DCV/CO2 in strategic spaces
  - Some motors, kitchen hoods

BMS/EMS 2017-2019

- Cost: $1.60 Million
- Net cost: $1.1 Million, 14-40% incentives
- Savings: Hard to isolate
- Additional benefits – equipment functioning, comfort improved, maintenance/troubleshooting, snow day!
- Much more to do – hybrid systems for foreseeable future



Steam traps 2019

- 7 steam-heated buildings (5 schools)
- Our worst energy users, EUI = 95-100+
- Replace/repair 995 steam traps, some jackets
- Net Cost: $65,000, incl. survey at 100%
- Savings: look promising
- Long term – covert to hot water or heat pumps (King Philip MS, 2020)

	July-Dec		
	FY13-19	FY20	%Δ
CCF	180,100	175,739	-2.4%
HDD	1,941	2,138	10.1%
CCF/HDD	92.8	82.2	**-11.4%**

Lighting 2016-ongoing

- Fortunate on timing (LEDs)
- Hands-on approach
  - Used audits, walked schools ourselves
  - Mockups, “scouting” led to standardized fixtures, wattages
  - Handled incentive paperwork ourselves; Eversource helped streamlined process
  - Multiple contractors – in-house, bid, on-call
  - Inspections and close out directly with Eversource
- Ongoing…

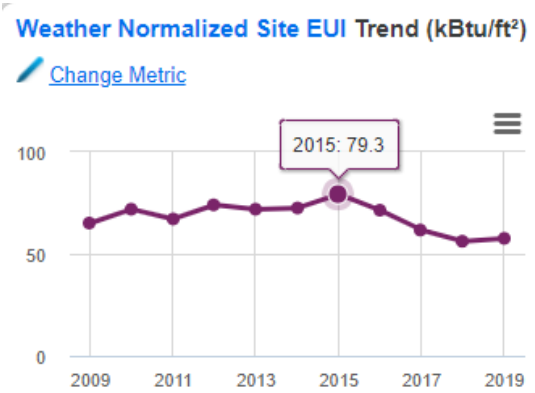
DLC-Listed?
20W vs 10W

Type B LEDT8
No ballasts

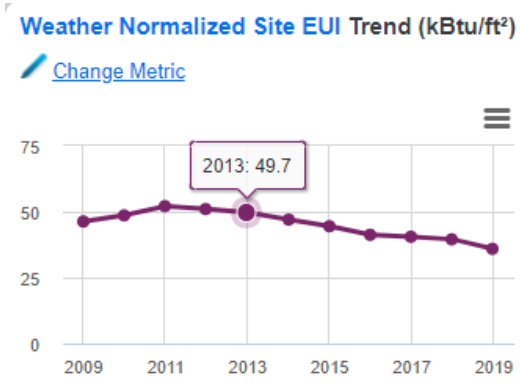
Impact

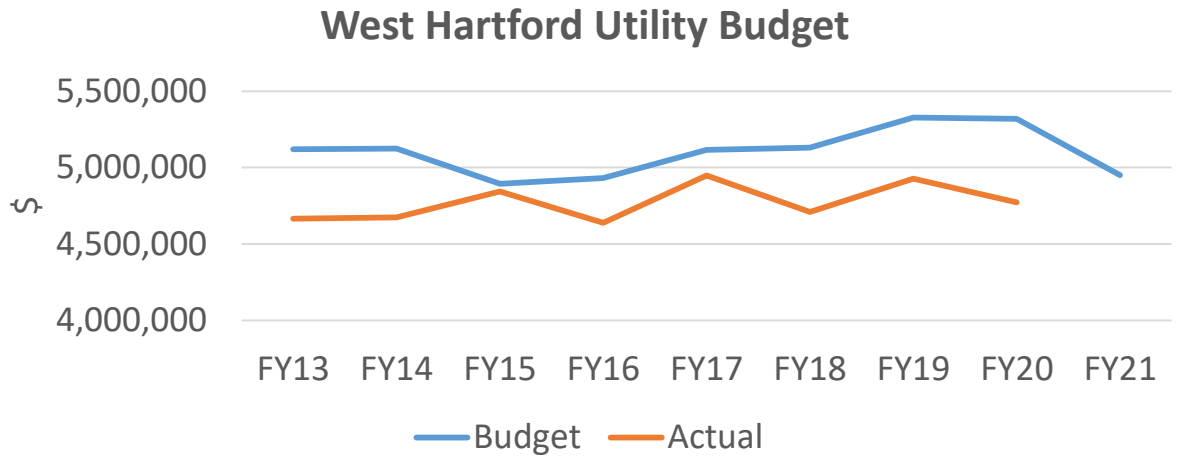
- Energy efficiency works
  - Portfolio EUI 73 → 64
  - Smith ES EUI 79 → 65
  - Town Hall EUI 50 → 36
- Significant maintenance benefits
- West Hartford FY21 utility budget down for the 1st time in 5 yrs – savings have finally outstripped rate increases

Smith ES



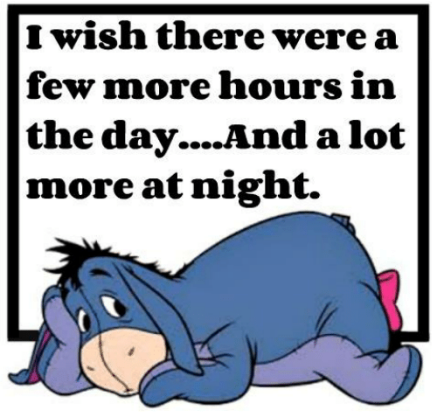
Town Hall

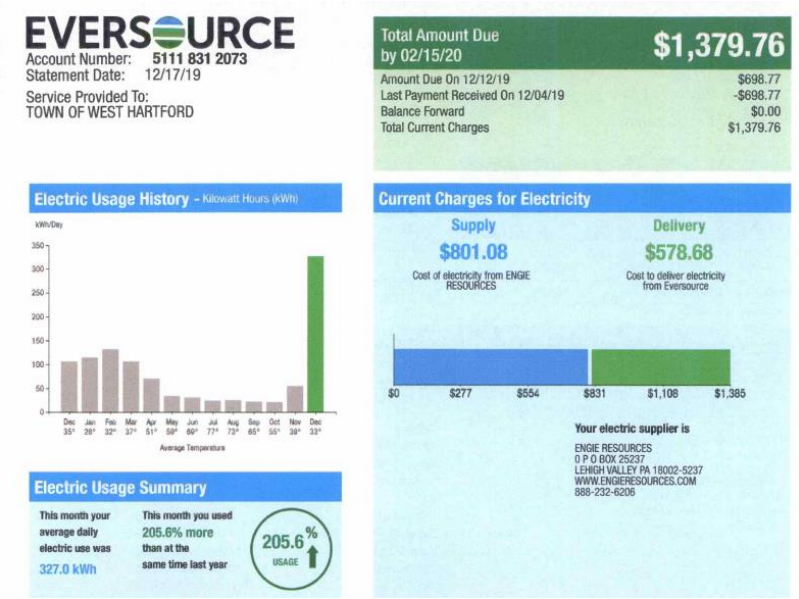




To do list

- Real time data / demand management
- Additional projects – bond or $1M on-bill financing
- More lighting (controls), EMS (economizers), EE capital projects
- Water conservation
- More regular outreach / reporting – website, social media, in-person
- Collaborate with Recycling coordinator, custodians, green teams
- Night audits
- Town v Town energy competition
- School presentations
- Find the perfect utility database
- Sustainable CT – Silver certification, 2020
- Finish 2020 Energy Plan
- Energy campaign (low-income, businesses)
- Higher profile w/ Town Council





Buena Vista Maintenance electric use +205%!!