Addressing Vulnerabilities and Emergency Power Capacities in the Wastewater Sector of Massachusetts

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Flooding from the Cape Fear River into downtown Wilmington, NC

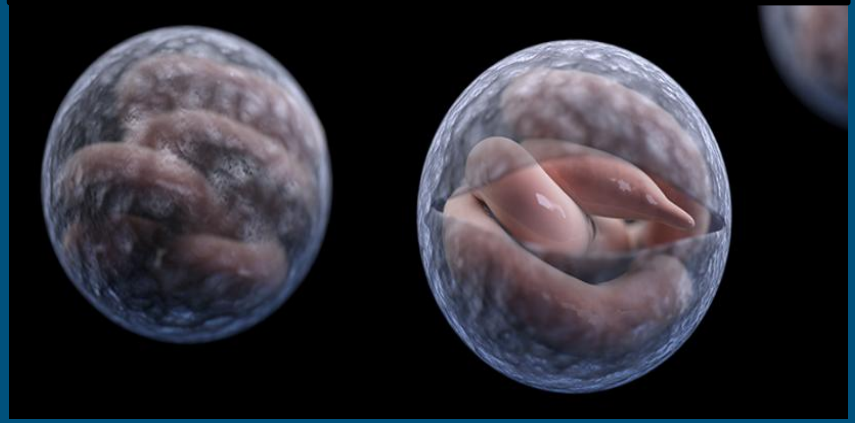

In 2017 Greater Lawrence Sanitary District experienced a 13 hour power outage
CAUTION
GREATER LAWRENCE SANITARY DISTRICT
Wet Weather
SEWAGE DISCHARGE
OUTFALL # 004
8 million gallons of partially treated sewage

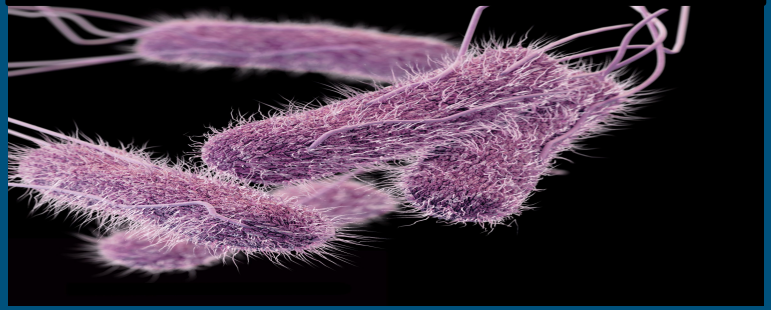
So what?

E. Coli

- Fever
- Diarrhea
- Severe Stomach Cramps
- Vomiting

Cryptosporidium

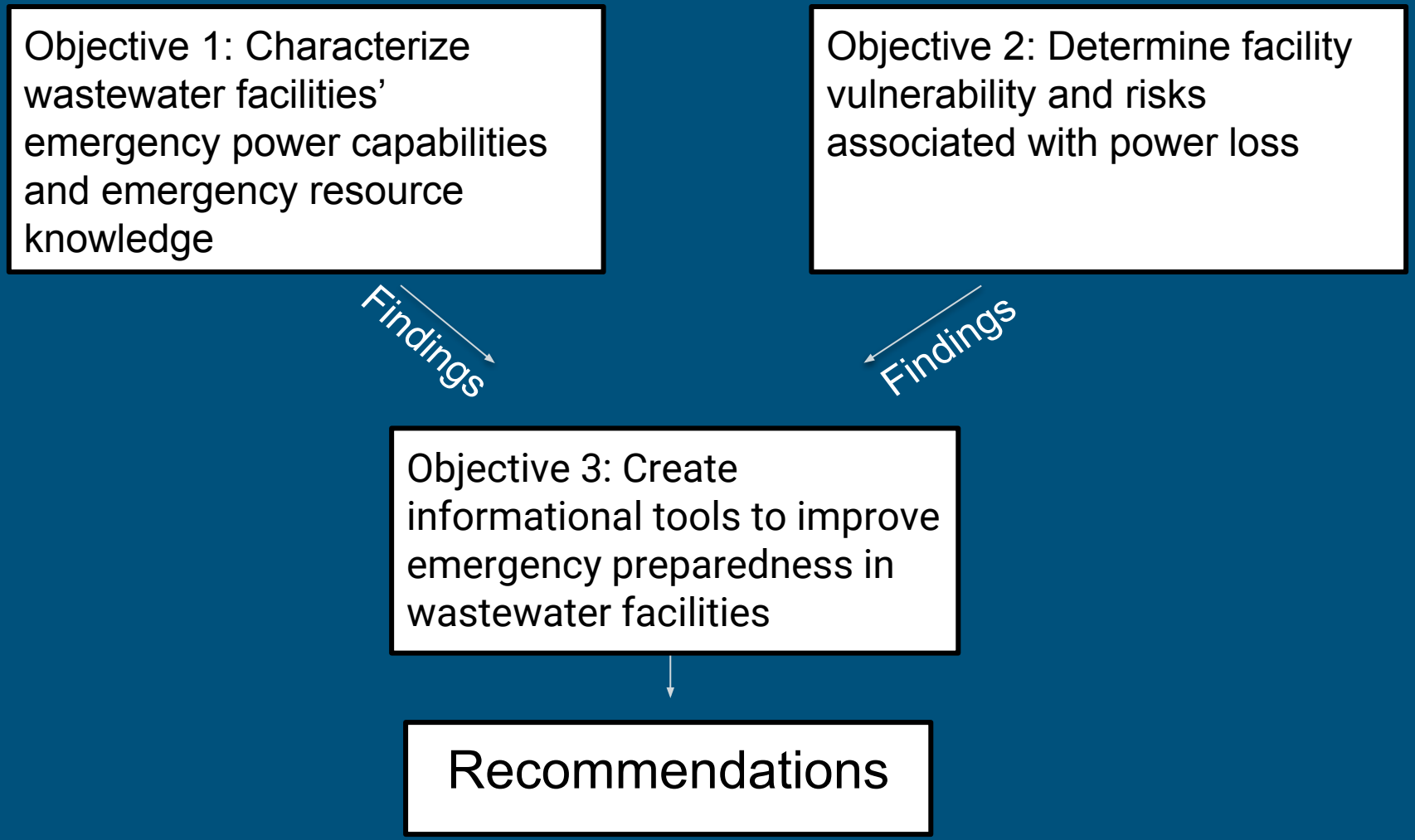




Salmonella

Goal

The goal of this project was to assess backup power capacities and needs of municipal wastewater facilities in Massachusetts and to develop informational resources for regulators and emergency planners.


Objective 1: Characterize wastewater facilities' emergency power capabilities and emergency resource knowledge
Objective 2: Determine facility vulnerability and risks associated with power loss
Findings
Findings
Objective 3: Create informational tools to improve emergency preparedness in wastewater facilities
Recommendations

1. Characterize wastewater facilities' emergency power capabilities and emergency resource knowledge

Interviews with Deputy Regional Directors (DRDs) and Section Chiefs.

- Background of how wastewater systems work
- General information on backup power
- Past incidents
- Helped us understand what information they want to know

2. Determining facility vulnerability and risks associated with power loss

- A facility's ability to cope with an outage is a function of vulnerability
  - Adequate Backup power
  - Mutual aid
  - Generator age
- The likelihood and severity of a power outage is a function of risk
  - Flood zones
  - Self reported flood risk

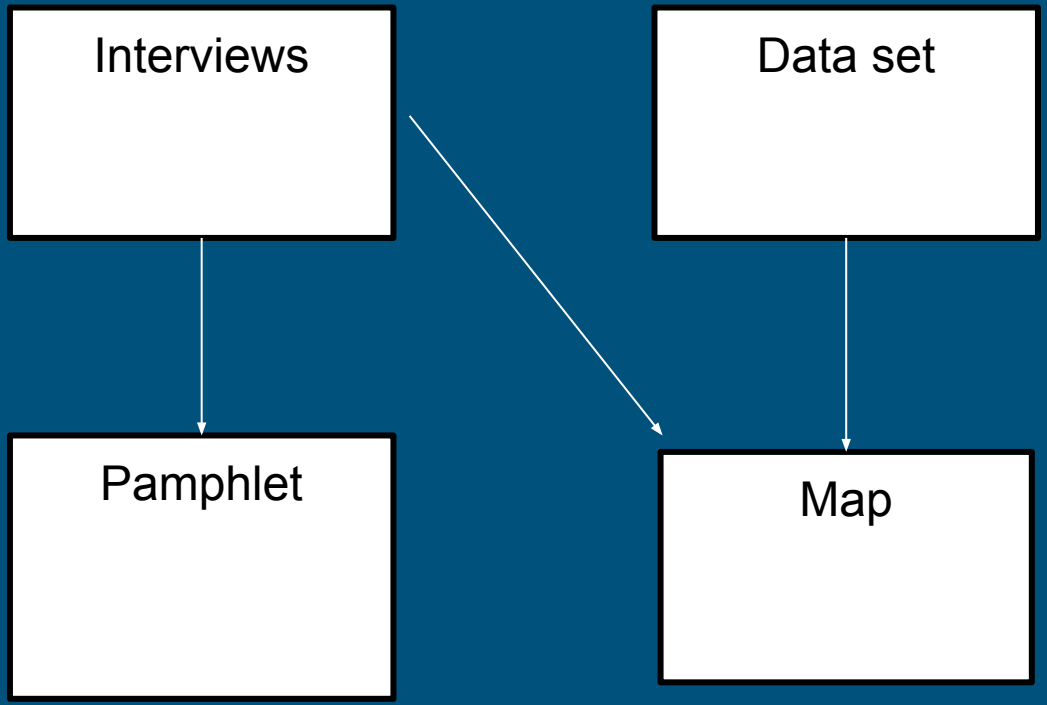
2. Determine facility vulnerability and risks cont...

- Assess vulnerability through data from DEP survey and EPA map
  - Point system:
    - Assign values based off answer in category (i.e. ‘yes’ = 1, ‘no’ = 0)
    - Add values together for each facility
  - Outcome: Range of vulnerability from least vulnerable to most vulnerable

Are you in mutual aid?	How much of your facility can be run on backup power: (All, Partial, None)	How frequently is your backup system tested? (Weekly, Monthly, Quarterly)	How long can your facility run on backup power?	What is the age of generators in years?	Vulnerability score
Yes= 0 No= 1	All= 0 Partial= 1	Weekly= 0 Monthly= .5 Quarterly= 1	0-5 days= 1 5+ days= 0	0-30 years= 0 30+ years= 1	Column 1 + column 2+ …. = vuln. score

3. Create informational tools to improve emergency preparedness in wastewater facilities

- Interview feedbacks
- Combined data
- Deliverables:
  - Map
  - Pamphlet



Lack of funding impedes emergency preparations

Problem?

- Generators need to be updated
- Maintenance of equipment is expensive

Solution:

- Grant programs!

Datasets available to DEP are incomplete

Combining data

- Not all facilities responded
- Not all questions answered
- Does the facility have emergency backup power?
  - Yes: 56/169
  - No: N/A
  - No Information: 113/169
- Does the facility have adequate backup power to run the facility during an outage?
  - Yes: 51/169
  - No: 5/169
  - No Information: 113/169

N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
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N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A

Data on emergency backup power helps determine vulnerability but...

- Incomplete data hinders vulnerability assessments
- Original plan:
  - Do a vulnerability assessment on facilities
  - Incomplete data prevented assessment
    - Point system requires completed information
    - Can not assign points for “N/A”

Mutual aid enhances emergency response in WWTF

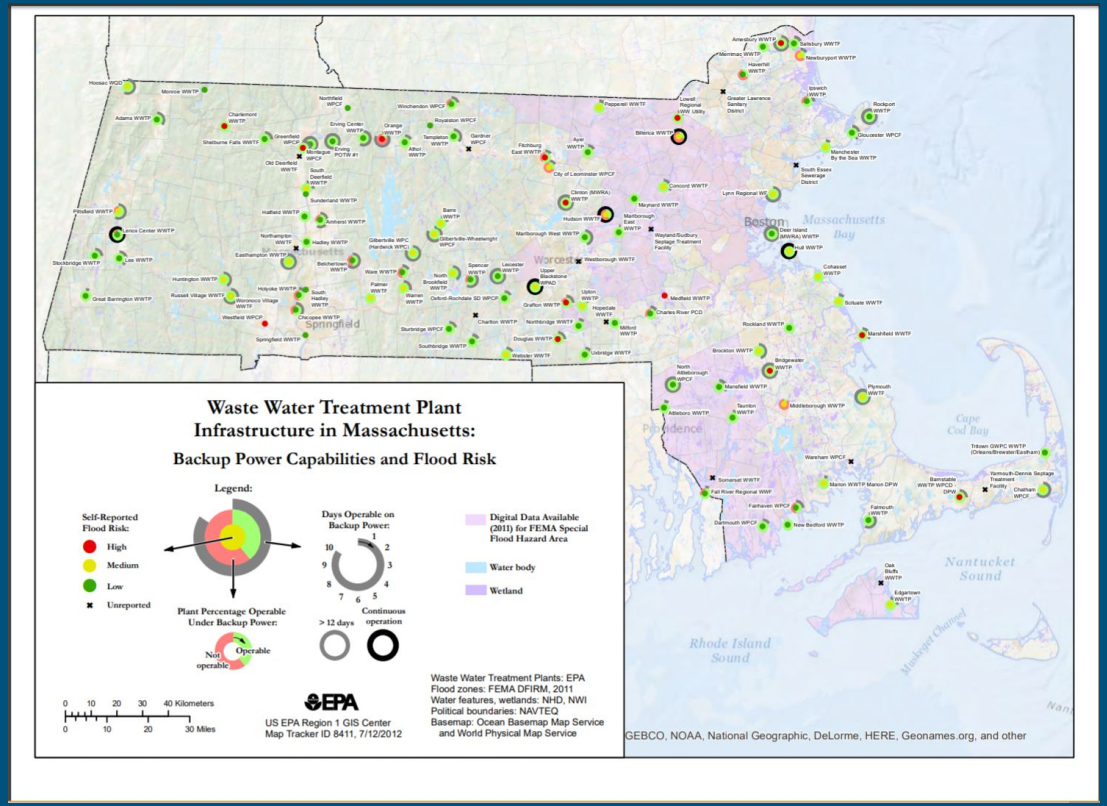
Facilities helping facilities!

What can facilities share?

- Chemicals
- Personnel
- Generators

Water and Wastewater Agency Response Networks (WARN)

Map works as visual representation of vulnerabilities

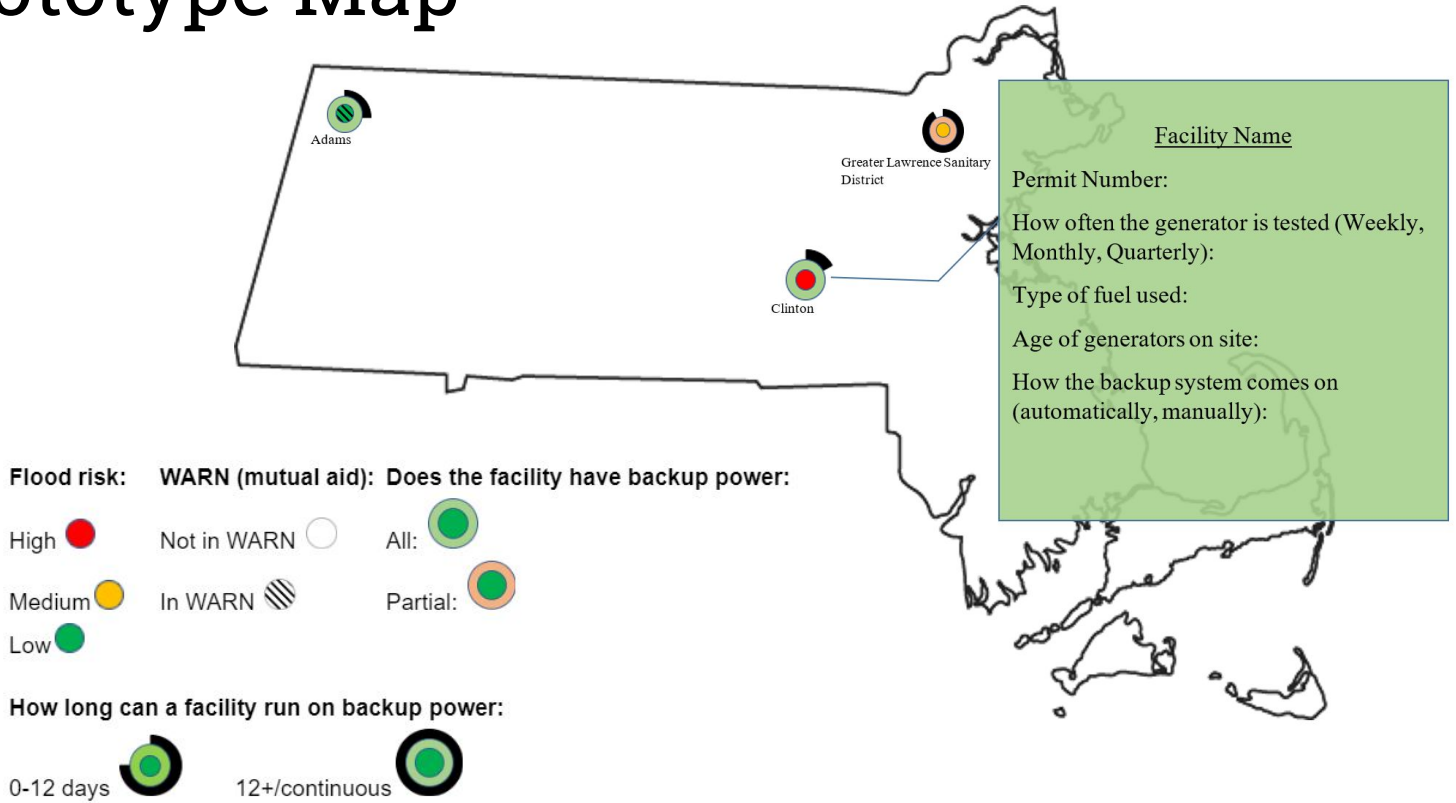


Map works as visual representation of vulnerabilities

The interviews with the DRDs and Section Chiefs showed:

- Knowing how much of a facility can run on backup power should be represented in the map
- What fuel a facility uses for generators is important
- A “hot button” to show more data on each facility would also be very helpful
- Liked the EPA map setup

Prototype Map



Informational Resource

- Problem:
  - Information on resources is scattered
- Solution:
  - Compiling information in one source
  - Easily accessible and available
  - Can be distributed

Informational Resource

Contents:

- Planning assistance:
  - Water and Wastewater Agency Response Network (WARN)
  - Municipal Vulnerability Preparedness Program (MVP)
  - Water Utility Resilience Program (WURP)
- Grant programs:
  - FEMA Hazard Mitigation Grant
  - Rural Development Grant
- Energy options

Recommendations

Require Data Reporting

- A lot of important/useful data is not in the data spreadsheet
  - Would help MassDEP understand where facilities are in need
- Revise Regulations
  - Require facilities to report their information to MassDEP
  - Help fill all the gaps in data

Conduct vulnerability assessments

- With completed data sets,
  - Vulnerability assessment could be performed
    - Use of point system similar to the one we had initially created
    - Allows MassDEP to establish a scale of vulnerability for municipal facilities in Massachusetts

Recreate/finish the map

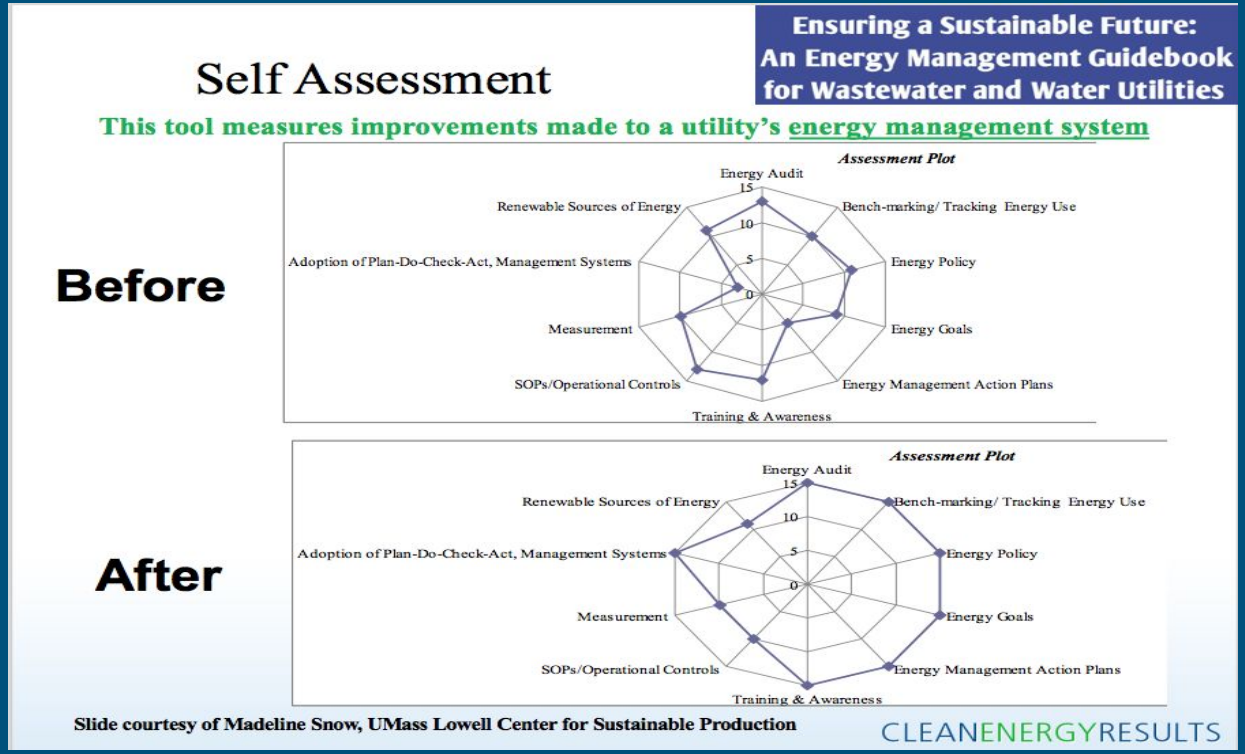
Recreate Map

- With data available, a complete map could be created
- Will be useful in assessing and prioritizing facilities
- Could be available to facility managers

Self assessment tool

Example questions:

- How long can your facility run on backup power?
- How many generators do you have onsite?
- How many times do you test your generators?



Highlight opportunities on website

Increase focus on grant availability:

- Compile information
- Webpage with the different sources for the grants

Webpage can be organized by:

- Facility size requirements
- Public and private grants
- Energy options

In conclusion..

Through this project we have concluded that the lack of data inhibits the MassDEP from understanding vulnerabilities and needs of municipal wastewater facilities. Further efforts need to be taken to improve data quality and increase focus on the needs of facilities.

Acknowledgements

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- Brian Brodeur
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Thank you

Questions?

https://www.trendsmap.com/twitter/tweet/1040681868809654273

http://www.merrimack.org/web/sewage-overflow-dumped-into-merrimack-river/

https://healthblog.uofmhealth.org/wellness-prevention/what-you-should-know-about-e-coli-outbreaks

https://www.foodsafetynews.com/2014/03/cdc-posts-surveillance-data-on-32-salmonella-serotypes/

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