

Team Members: Tracy, Jiayuan, Sarosh, Sharmi, Vipul

RE-use of Wind Turbine Blades

MEETING 1 PROGRESSION LOGS

23rd September 2022

Introduction:

- Team Members introduced themselves to each other
- We have a team of 5 members all from different undergrad backgrounds not limited to Computer Science, Statistics and Applied Mathematics

Discussion Done in the Meeting

- We were introduced our project is under the Urban Resource Recovery Department
- We have to understand the project from the POV of Government (New York State just not New York City)
- We have to read the following readings and watch March 25 2021 video to understand the crux of the model we are working upon
 1. Queens University made a project similar to this
 2. Some inspiration can be found from that resource
- We were informed that wind turbines are established on the Long island
- We have lot of information that is available on this following link
<https://www1.nyc.gov/site/ddc/about/town-gown-working-groups.page>
- NYSG has approved sites closer to the New York City area, as part of its expanding renewable energy strategy.
[WINDEchange: Wind Energy in New York](#)
- [Offshore Wind - NYSERDA](#)
- [Construction begins on New York's first offshore wind farm - The Verge](#)
- [NY State Policies](#)

Questions and Answers

- The team decided on the agenda of creating "Phases for the project"
- The phases would look like
 - Domain Research
 - Understand the data
 - Data Correctness

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- Data Relevancy
- Data Exploratory Analysis and Visualization

(These phases are tentative which might change with time/progression of the project)

- Terri phrased the project to look as follows:

INPUT

Decommissioned
Blades
Put
USE

OUTPUT

Blades re-usable
without any extra
resources or into
carbon usage

Expectations for now on 23rd September:

- 1) Team should apply and research the topic
 - 2) Literature Survey should be performed
 - 3) Keeping a notes of Project Progression
 - 4) Keeping the report precise and make it as you go !
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Meeting 2 with Terri

- Data Sets are provided to us on the email
- Information on the wind blades
- Sarosh Suggested a dashboard
- O/P material is generated and is it durable to be used as the raw material and USE is what Terri emphasize on it
- Just try to understand that how NY State Government and local Government understand when can the material be available for use
- Dating site for the material (a link will be asked)
- Data Manipulations that you used / Visualizations used in the dataset for interpretation should be used in the dashboard
- Honestly you can ask out to people who have sent the emails directly
- Jennifer Mc, / some other people would be used for our research marked and mentioned in the Report
- Catheline P. also helpful for technical stuff and information.
- Case Specific bugs / Blades whole and partial blade usage has to be considered as well.
- If in your research you find other reusages needed some extra resources can still be considered
- Simple now: Art Groups -> Blades -> Partially used or Fully used
- Our Stakeholders are to be Art people/ Wind blade interested people who want to use it New York State Energy Research and Development Authority
- Publically available : Website would be awesome
- Our report will be available publicly
- Jennifer McKinley in Ireland - Queen's University did some research on the project similar to ours
- We are not bridges using Wind Turbines is a no
- We are looking at these end products:
 - -Noise Barriers

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- -Park Benches
- -Art Exhibitions
- Reusing stuff in parks on the highway !
- The idea is simple get the Research - Domain Focused and a website is made using our visualizations it would be awesome
- We trying to make a Dating Service so that GHG Emission Reduction
- Whatever we can get us closer to Future Research !
- We are trying to time the windmills
- We are trying to bring the focus to emissions and also bringing the stakeholders near the motive that we have discussed !
- We would get an email from respective researchers which would help us in our report/ domain research : Peter, Jennifer and one more person.
- A professor in Columbia who knows material Science WOULD be introduced to us on Monday

Meeting 3 with Adam

October 3rd 2022

- (maybe) Predict the retirement time for wind farm blades
 - [question for terri]:
 - Decommission time = Year of delivery date + contract?
 - How many wind turbines (and blades) are actually decommissioned before the end of the contract?
 - If decommissioning before contract date is only an edge case (less than 5%), we do not need to do any survival models
- Emphasize that the waste can be a future problem
 - If prediction of retirement age is not the focus (after confirming with terri)
 - Emphasize how many blades will be taken down and we really need to think about the near future
 - (to do from tracy's pov): we need to find the weight of retiring blades in future 10 20 years or find a good way to approximate those blades weight

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- Find EXACT locations that we will repurpose these
 - Parks, artificial reefs (adam's suggestion to maybe take a look)
- Transportation + green gas model
 - Takes in the location of wind farms
 - Draw a radius such that transporting the blades to these repurposing locations is more environmentally friend than [some other alternative]
 - OpenStreetMap - routing data might be useful when calculating locations

Update terri of meeting with adam on monday and some questions

1. Emphasize the waste can be a near future problem
 - a. Need the retiring year for the existing and wind farm projects under development
 - i. Double check if retiring year = year of delivery start date + contract duration
 - ii. Approximately what percentage of blades are actually decommissioned before the end of contract
 - b. Need to find or approximate the weight of blades
 - i. The team will try to see what we can do but let us know if you have any resources
2. Ghg model
 - a. We need to find exact locations of repurposing before analyzing green gas emission. Do you have a list of potential clients or can we make assumptions ex. The park etc
 - b. Our goal is this is to draw a radius such that transporting these blades to repurposing relocations is more environmentally friendly

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Meeting 3

https://www.dec.ny.gov/docs/materials_minerals_pdf/frptbeyondwaste.pdf

Jennifer was introduced

- Imagining a map with 3 offshore wind mills with a radius on the map

Meeting 4 with NYSERDA Abbey

October 13th 2022

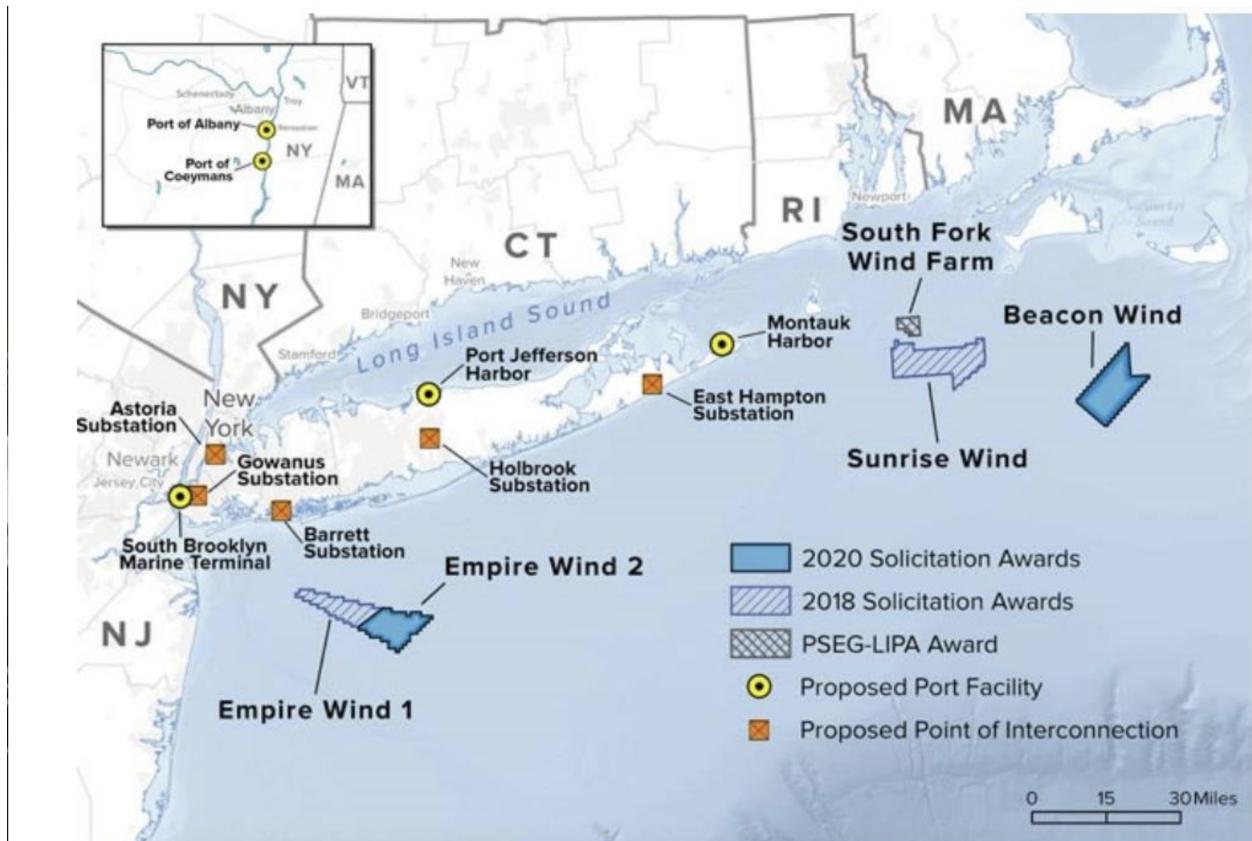
Assumptions of decommissioned year for blades

- right assumptions: decommissioned year = delivery start + contract duration
 - Tier 1: On-shore Windmills ---> is 20 years expiration contract, their contract gets renewed in every six years
- Some exceptions (mostly very early 10 year contract previously)
 - As long as it is not canceled (column X)
 - Cohocton Project
 - ran out of businesses, so they had to repower

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- Otherwise, blades are not replaced except for failure -> so we can basically ignore outliers in the decommissioned year

Off-shore Windmills



- The above image shows the information about the infrastructure regarding the windmills project.
- Lots of info on their websites
 - What we see on the excel is more aggressive timeline (including year of starting delivery)
 - Developers pay for development security for certain amount of time, and they will pay more to extend the timeline if not finished

Where blades are going right now:

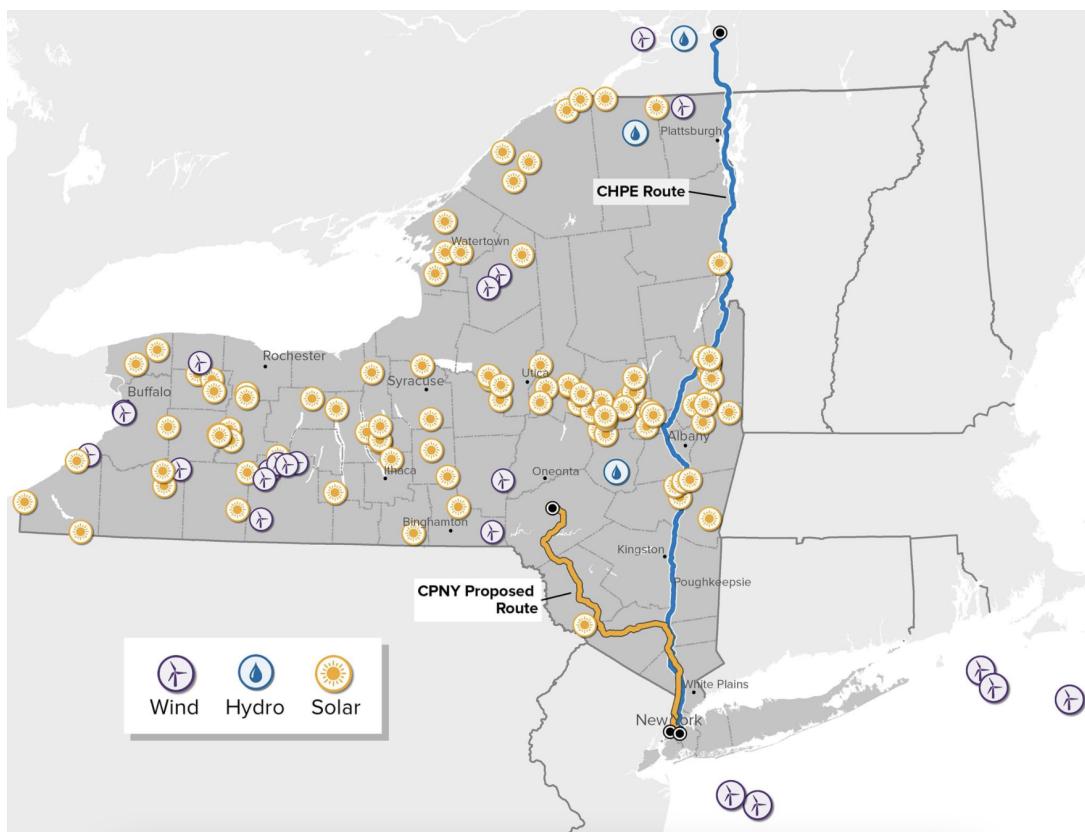
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- Overall ny state doesn't have many cases for decommissioned turbine, compared to states like CA
- The decommissioned blades were disposed of (Cohocton) in a landfill after chopping them up to smaller pieces
- GE and Velvo agreement to recycle the blades
 - There is no much information but approximately 2000 blades which recycled those blades
 - We have techniques which converts the blades into the optic fiber glass for other industries
 - Put them in cement process (also mentioned in literature review)

Regarding the Centres Sites

- Some characteristics
 - Centrally located such that we can pull from all other areas in the state
 - Railway, interstate, utilities (power, water)
 - Future: cost also needs to include tipping fees etc
 - Future: ensure wind turbine blades are not hazardous
 - Ex. air quality etc
 - IDA: Industrial Development Agencies
 - Logistics: windmill transportation company (could be useful)

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Please check NYISO Goldbook for locations of operating wind farms in NYS

<https://eerscmap.usgs.gov/uswtdb/>

<https://www.nyiso.com/interconnections>

Terri Matthews (MatthewTe@ddc.nyc.gov)

Prepared by:
vhh2105 Team

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The screenshot shows a dataset page from data.ny.gov. At the top, there are two tabs: 'Large-scale Renewable Projects Reported by NYS' and 'Large-scale Renewable Projects Reported by NYS'. Below the tabs, the URL is data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye. The page features a header with 'Featured Content Using this Data' and three cards:

- Summary of Tier 1 and OREC Projects**: Shows a wind farm image and text about Tier 1 and OREC-eligible projects.
- Resource Development Status**: Shows a solar panel array image and text about active RES and RPS projects.
- Summary of Non-Tier 1 Projects**: Shows a wind farm image and text about Non-Tier 1 projects operating under RPS solicitations.

Below the featured content is a section titled 'About this Dataset' with the last update date listed as **July 28, 2022**. It includes tables for 'Additional Resources' and 'See Also' links to various NYSERDA programs.

<https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye>

IDAs are trying to find the places :

Places we can keep as our primary place for the recycling units is :

<https://dailygazette.com/2019/06/24/montgomery-county-markets-former-factory-site-with-new-website/>

If you are applying here :

<https://www.nyserda.ny.gov/About/Careers-at-NYSERDA>

Extra references sent by Abbey through email:

- [A look at the labor needs of a wind project](#)
- [how to build a wind turbine](#)
- [how to build a wind turbine - without photo](#)

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Meeting 5 with Terri

October 14th 2022

- [Todo:] send meeting log to jennifer and terri
- Remind terri to include nyserda people in our final presentation
- On Abbey's email about considering electric car
 - Still assume fossil fuel truck for the model
 - Too much uncertainty and unknown for electric trucks at this point
 - Can still mention in the report
- Finding radius will be our next step
- After finding radius, we actually need to go through local gov websites to find uses
 - Terri will do one example with us in one meeting
 - Note: noise barriers will be NY state
- [Todo:] send report progress draft to terri on thursday

Capstone: internal team catch up

Monday, October 17 · 3:30 – 3:45pm

Google Meet joining info

Video call link: <https://meet.google.com/qnx-jvpr-xsa>

Or dial: (US) +1 414-909-7126 PIN: 584 908 548#

More phone numbers: <https://tel.meet/qnx-jvpr-xsa?pin=1259986465485>

ENGI E4800 NYC Matthews Weekly Meeting (with Professor and Cathy)

Monday, October 17 · 4:30 – 4:45pm

Google Meet joining info

Video call link: <https://meet.google.com/bev-ykxt-tsm>

Or dial: (US) +1 662-506-2229 PIN: 526 560 253#

More phone numbers: <https://tel.meet/bev-ykxt-tsm?pin=9510169231956>

Weekly Meeting with Terri

https://teams.microsoft.com/l/meetup-join/19%3ameeting_ZDM1ZTNlYWMtYTA1ZC00NjdiLTg5MDQtMTBiNWJhMzlhMTg4%40thread.v2/0?context=%7b%22Tid%22%3a%2232f56fc7-5f81-4e22-a95b-15da66513bef%22%2c%220id%22%3a%2294b6e48d-330f-492a-a1c4-27ba36c18901%22%7d

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Oct 20th with Terri

Oct 24th internal meeting

- Jillian's dashboard
 - Looks very good
 - Needs a little more description, title, and legend explaining the maps to make them readable to people outside of the team
 - Future improvement for map 2
 - Currently there is a straight line between source and destination. It would be better if it mirrors driving route on google map, rather than just a straight line
- Other next steps
 - Find the GHG emission boundary outside of each wind farm
 - A potential substep is to find nearby landfill and compute the GHG to transport the blades on the farm
 - The GHG emission of transporting to landfill can be the threshold for the boundary
 - Email Irish people to ask if they are willing to share blade dataset so we can develop our own model to predict weight
 - Email Peter Parosh about blade assumptions (decommissioned year and est weight)

Oct 24th Adam meeting

- Discussion of the chapters with Adam
- Improvements needed to be discussed :
These have to be made for the final portion of our project report:
 - Chapter 1 Part 2, under project goal, modeling should be explained in a more explicit way not the mathematical portion but what and how the results would be helping in building and implementing the Data Science component of the project

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- Chapter 2 should be more report-like rather than merely stating facts:- it has to be improved on the basis of reading accessibility by the user.
Before adding a table, readers should be prepared to know what the table is about
- Chapter 3:
 - Missing model results
 - Ex. make one of the EDA map describing GHG emission for each farm etc
 - Model results have to be discussed again and it is quite straightforward but lacks direction in the end by the reader aspect
 - Currently, readers have no idea if the baseline model is a good one or not because the result is missing
- The meeting with Adam would be BI WEEKLY NOW ON!
- The Dashboard is CS Component of the project and DS is Lacking in a way
- (TALK with Terri) Regarding the clarification of the project requirements so that Adam is aware what is going to be delivered and expected in Phase 2 report
- We need to focus on the dashboard and make it as much data sciencty as possible
 - No no more like the content in the dashboard instead of the look of the dashboard

Nov 4th Terri meeting

- Progress report suggestion from terri
 - For industrial mentor, put town+gown instead of terri (we could put terri as the director etc)
- Details and examples of what to look for on gov websites (extension of the document that terri sent out) - syracuse website
 - Visit the parks page
 - Features tab have a list of features - connect features in the park and the reuses in the rewind document that terri first sent us
 - Basically show examples of real places and real parks that will actually use these blades
 - Not necessary to do every park but just maybe 1 park for every ghg circle
 - Google map the maps to see if there are streams in the park and we can possibly do bridges made from blades
 - Note: some towns might have less information and we don't need to kill ourself for this
 - Visit the budget page - capital improvement plan
 - Look by department and a good department for us to find more info is the park department

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- Ex. syracuse plans to spend 300k on park but blades are basically free materials that can build some of the features
- Again, connect what gov is gonna spend money on and rewind document
- Look for examples and give a few facts basically
- Some thoughts from jennifer abou the cost
 - There is always a design cost and maybe we can ask for ireland researchers to see if they can share some of the engineering report, ending up saving end users money in design
 - It wont be zero cost but still
 - Ireland researchers might also be able to connect us with the cost (cost of design and installation)
 - At the end, cost of design maybe equivalent but the material itself prob costs much less
- Question for peter perosh
 - What are they currently doing with those decommissioned blades
 - Do they cut them up on the site? Where they are sending to right now
 - What do they do at the site right now
 - If the city where the wind farm is located want to use the blade for park benches, will the company cut them up and let the city use it for free
 - Do you have a budget when planning the end of life
 - Schedule a meeting maybe to have all the questions answered