

2020 IRM High Renewable Sensitivity Assumptions

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NYSRC Installed Capacity Subcommittee
Meeting #223

September 4th, 2019

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Background

Date	Working Group	Discussion points and links to materials
03-10-17	NYSRC Executive Committee (Mtg. #215)	Wind and solar sensitivity analysis See minutes, ICS Chair Report (Section 4.1.iv) “Impact of a High Penetration of Renewable Resources on the IRM” - http://nysrc.org/pdf/MeetingMaterial/ECMeetingMaterial/EC%20Agenda%202016/ECMinutes215Draft.pdf
07-30-19	NYSRC Installed Capacity Subcommittee (Mtg. #222)	Initial presentation of High Penetration of Renewables Sensitivity Case

Background

- The NYSRC ICS agreed to look at 2020 IRM sensitivity containing greater quantities of renewable resources than exist in the NYCA today
- The sensitivity was agreed to be an extension of the 2018 IRM sensitivity to include off-shore wind
 - The 2018 IRM sensitivity added 2,000 MW of on-shore wind and solar
 - The 2018 IRM sensitivity showed that the 4,000MW of renewables added would have resulted in an IRM of 26.3% (relative to a final base case IRM of 18.2%)
 - <http://nysrc.org/pdf/MeetingMaterial/ICSMeetingMaterial/ICS%20Agenda%20201/Agenda%20Item%204.2%20-%20Sensitivity%20results%20-Table%20B%2012%20v7.pdf>

Method and Assumptions

- **Begin with the 2020 IRM preliminary base case**
- **Add incremental renewable resource ICAP**
 - 4,000 MW of incremental on-shore wind and 4,000 MW of solar consistent with the 2018 IRM sensitivity's resource locations and output shapes (see next slide)
 - Add 4,000 MW of off-shore wind, evenly split between NYC and LI
 - General Electric consulting has been retained to provide off-shore wind production shapes (5 years) for interconnection locations near NYC and LI
- **Calculate an IRM for the high renewable sensitivity using the TAN45 method**

Assumed location of solar, on-shore and offshore wind (ICAP MW)

Zone	Solar (MW)	On-Shore (MW)	Off-Shore (MW)	Total (MW)
A	874	1,030		1,904
C	406	994		1,400
D		894		894
E		1,082		1,082
F	1,884			1,884
G	448			448
J			2,000	2,000
K	388		2,000	2,388
Total	4,000	4,000	4,000	12,000

Location of onshore wind and solar

- **Based on NYSDPS' projection of wind and solar installations**

- The primary source of projections for the quantity and location of qualified CES renewable generation is the NYSDPS Final Supplemental Environmental Impact Statement (“Final EIS”) in CASE 15-E-0302 using the “Blend Base Case.”
- E.g., slide 32 from this MIWG presentation:

http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_miwg/meeting_materials/2017-04-24/MIWG%20Public%20Policy%20Update%2020170424.pdf

- **Resource quantities were scaled on a zonal basis to the 2,000 MW being evaluated in the 2018 IRM sensitivity case**

- Resources were only distributed across zones that had substantial renewable build outs in the CES (i.e., zones with few MWs in the CES order will not receive MWs in the sensitivity)

Preparation of on-shore wind and solar data

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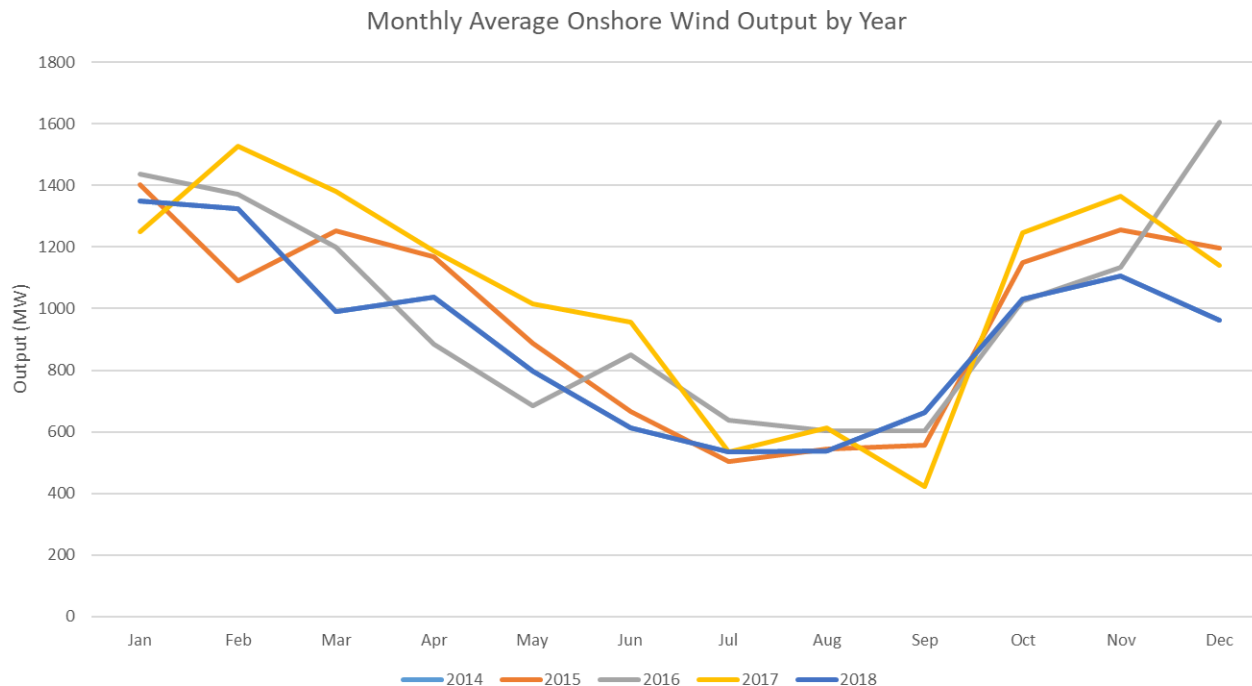
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On-shore wind data overview

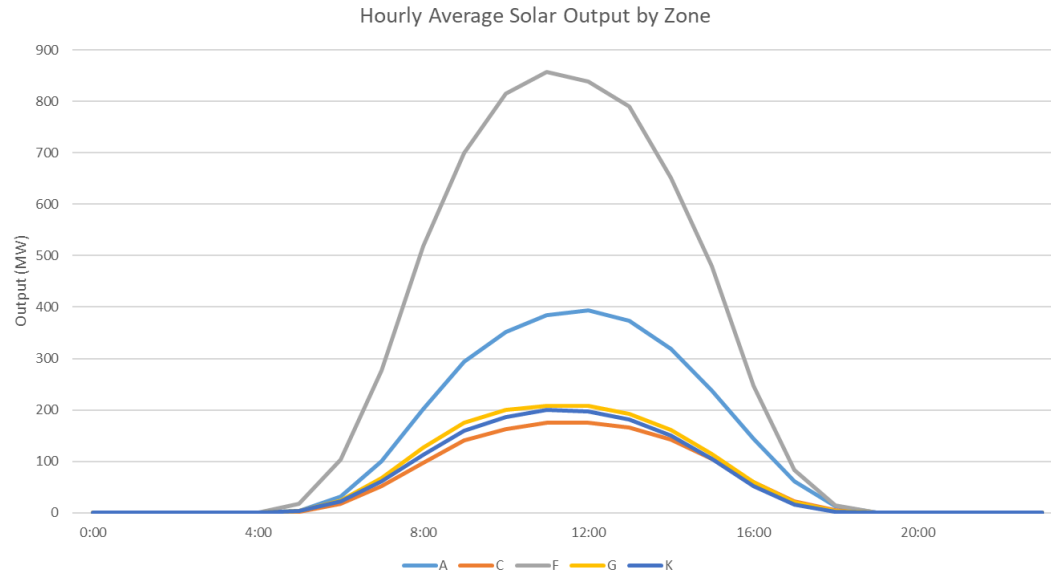
- Five years of billing-quality meter data was used (i.e., 1/1/2014 – 12/31/2018)
- Only wind facilities with CRIS were included in the dataset
- Production curves are scaled up from the IRM base case

Monthly average output data



Solar data overview

- Use normalized CARIS 2019 Solar PV Profiles
- MW scaled up by zone:



Preparation of off-shore wind data

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Offshore Wind Shapes Summary

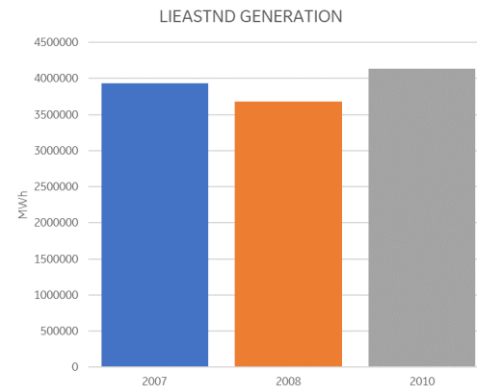
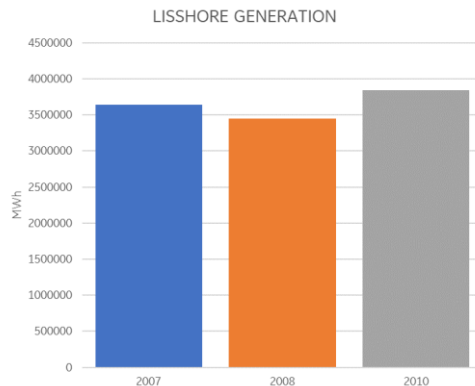
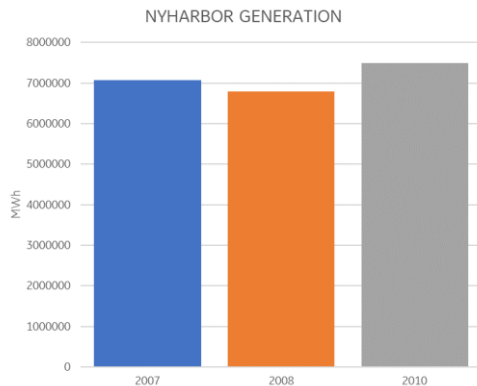
August 29, 2019

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NYHARBOR [2000 MW]

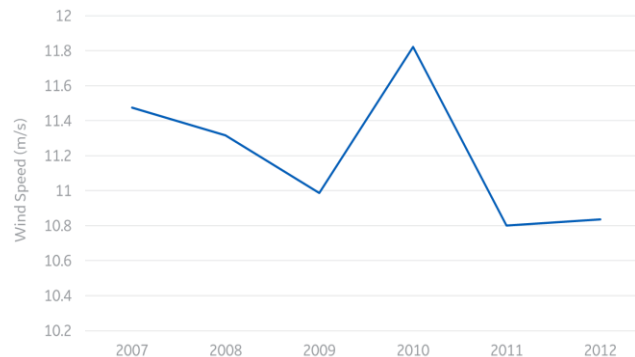


Wind Speeds



Row Labels	Average of DailyAverageWindSpeed	Delta	
2007	11.47	0.27	
2008	11.32	0.11	Average Year
2009	10.99	-0.22	
2010	11.82	0.62	High Year
2011	10.80	-0.41	
2012	10.84	-0.37	
Grand Total	11.21		

JFK Historic Ave Wind Speeds



Losses and Map

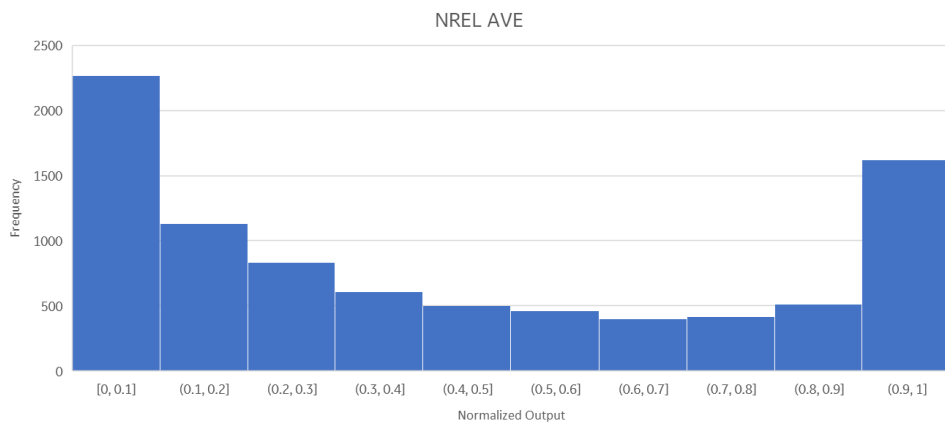
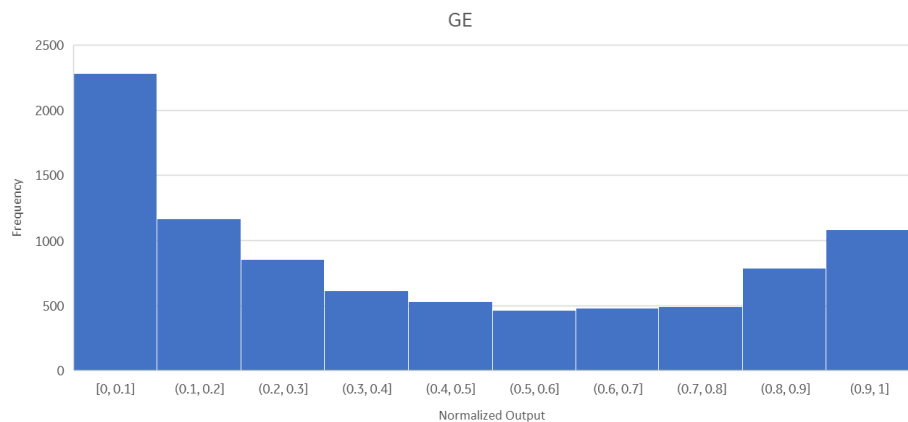


- Wake Losses ~ 5%
- Random Outages ~ 3%
- Electrical Losses ~ 3%
- Total Losses before MARS ~ 11%



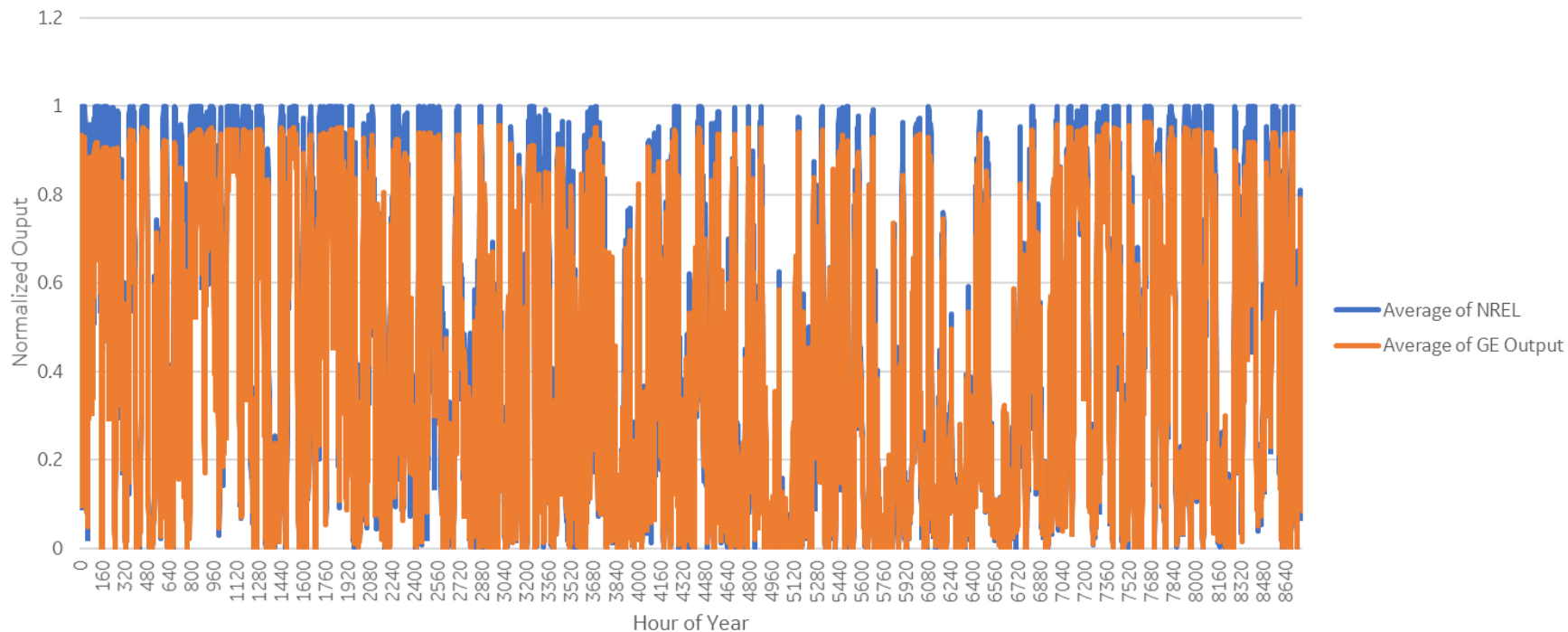
Overall Comparison

- Shapes were normalized to easily compare against each other.
- Compared our shapes to 5 NREL sites for each Plant area.



Annual Hourly Shape

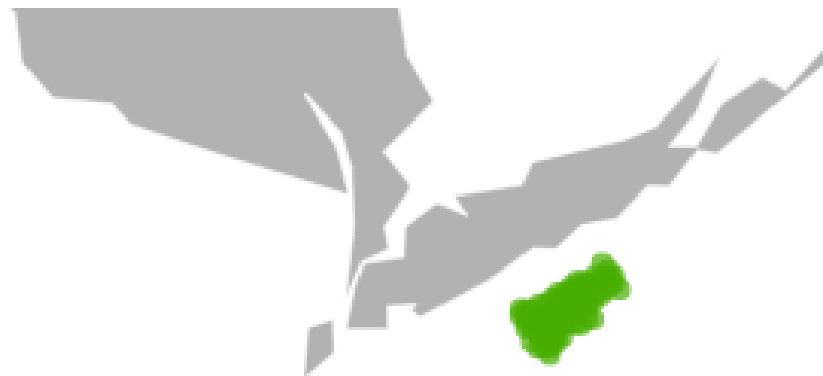
NYHARBOR 2007



LISSHORE [1000 MW]



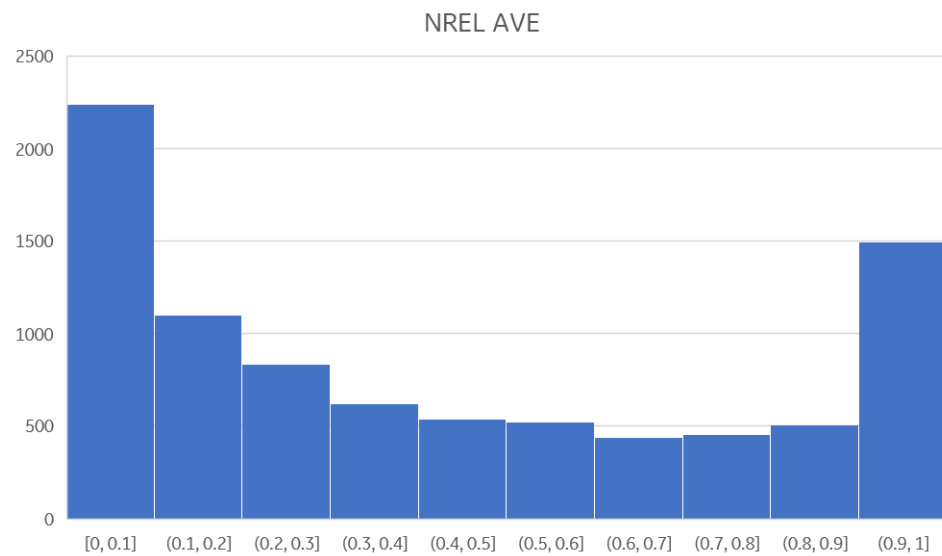
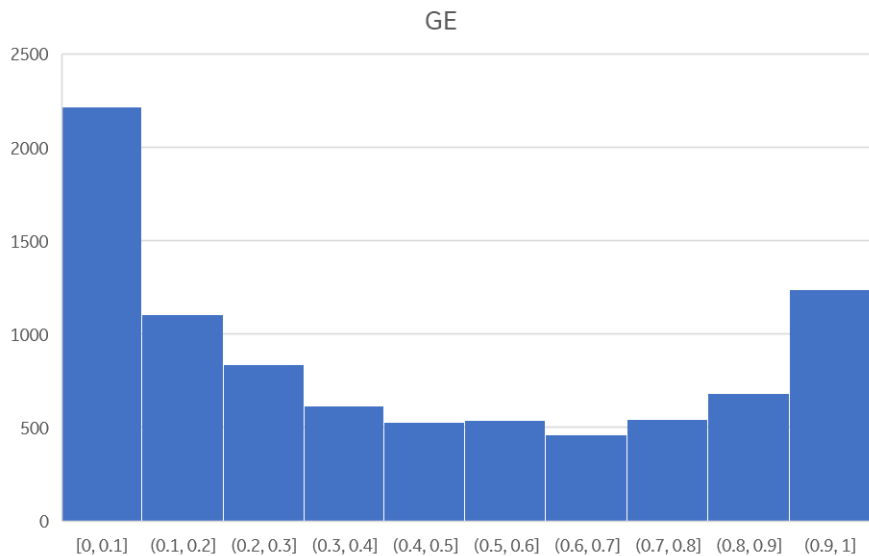
Losses and Map



- Wake Losses ~ 5%
- Random Outages ~ 3%
- Electrical Losses ~ 3.5%
- Total Losses before MAPS ~ 11.5%

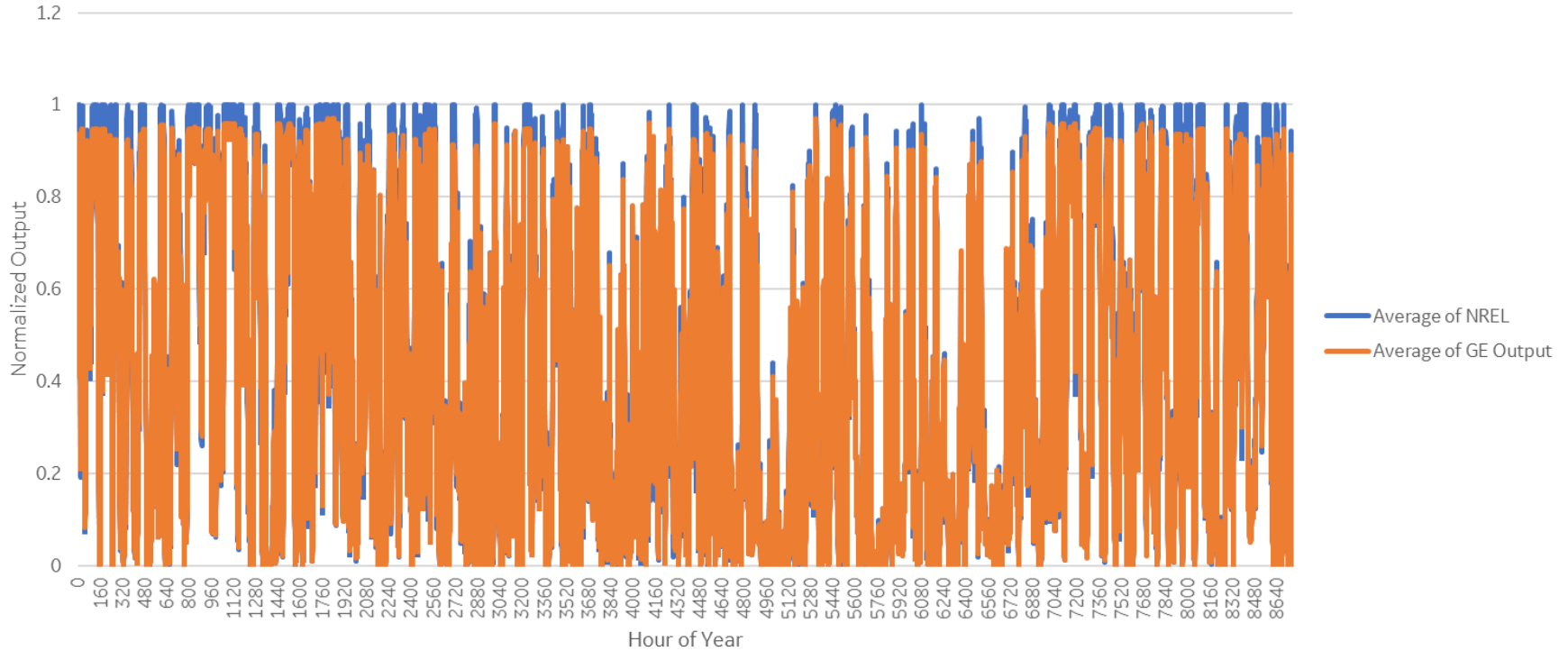


Overall Comparison



Annual Hourly Shape

LISSHORE 2007

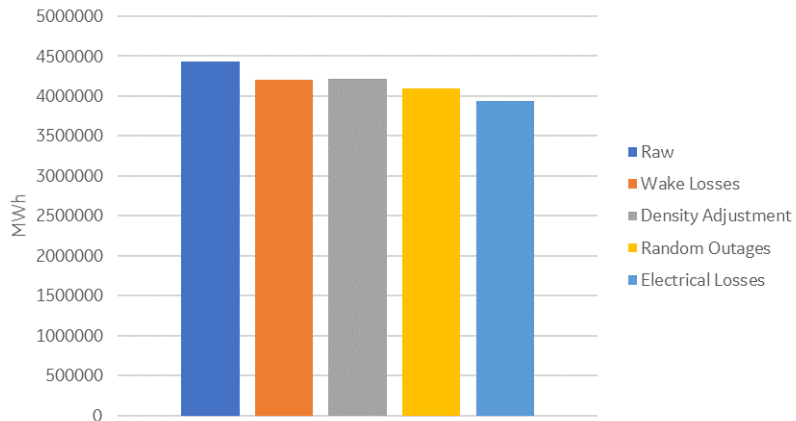


LIEASTND [1000 MW]



Losses and Map

Annual Losses

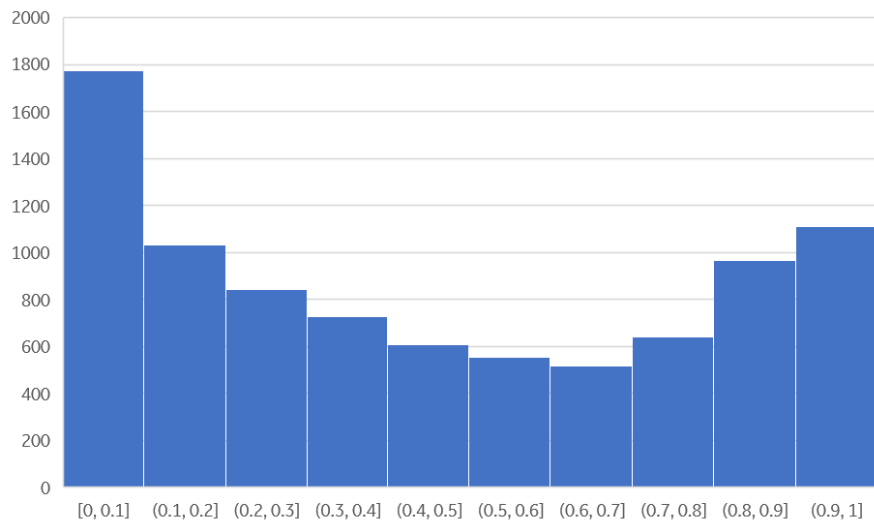


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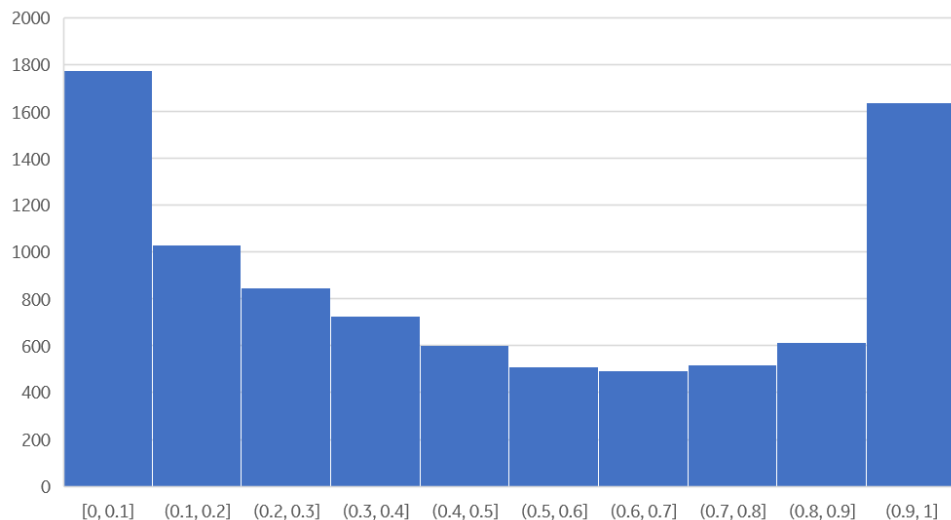


Overall Comparison

GE

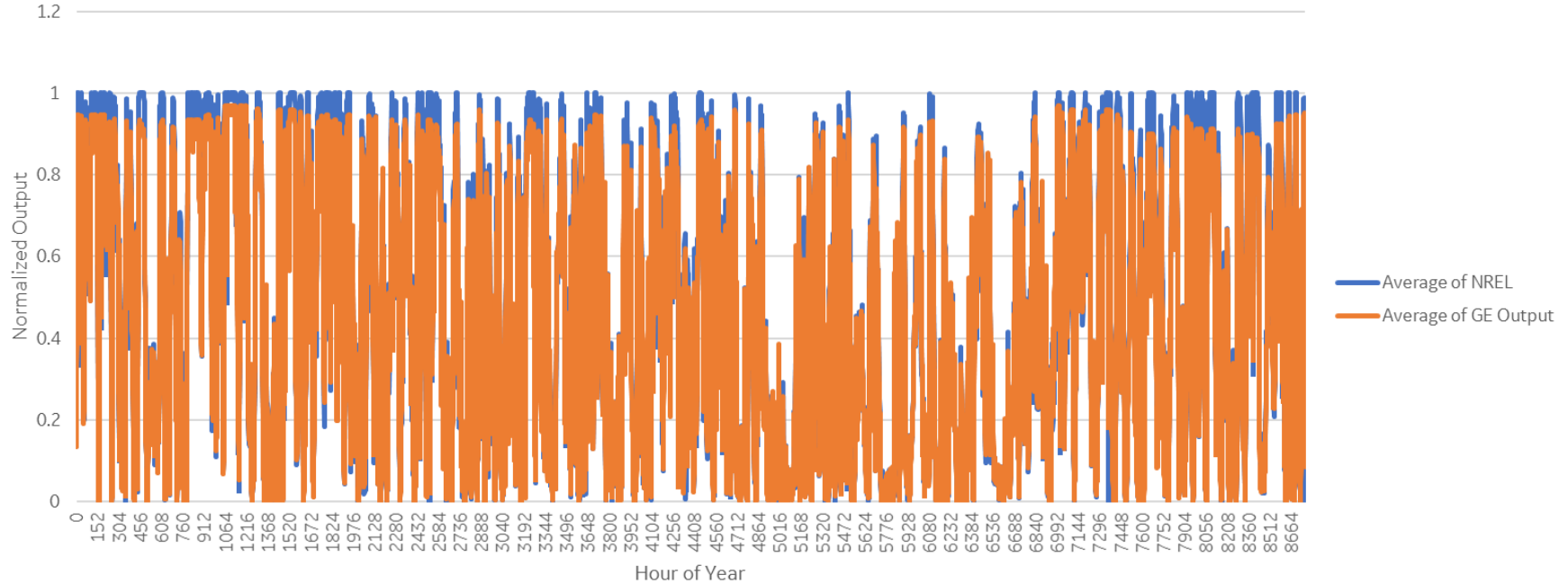


NREL AVE



Annual Hourly Shape

LIEASTND 2007

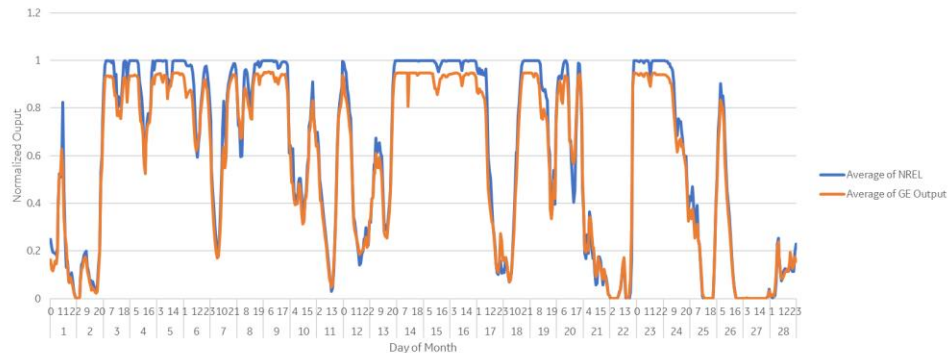


Extra Shapes (2007)

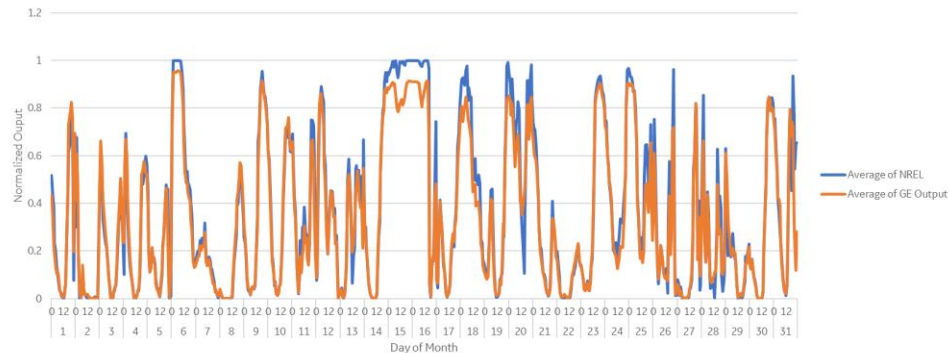


Monthly Hourly Shapes NYHARBOR

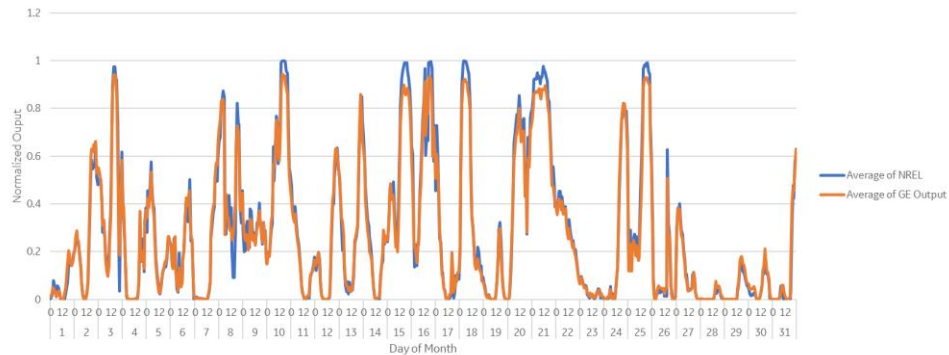
NYHARBOR 2007 February



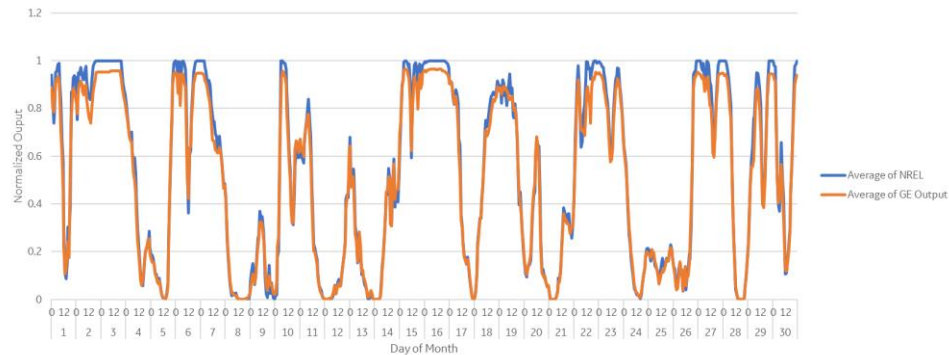
NYHARBOR 2007 May



NYHARBOR 2007 August

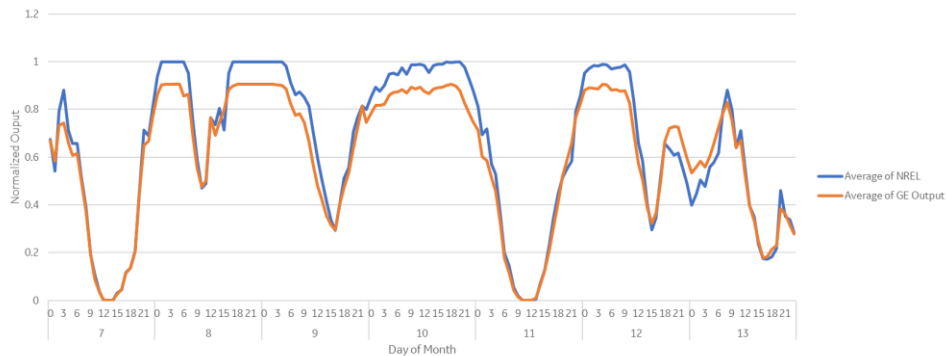


NYHARBOR 2007 November

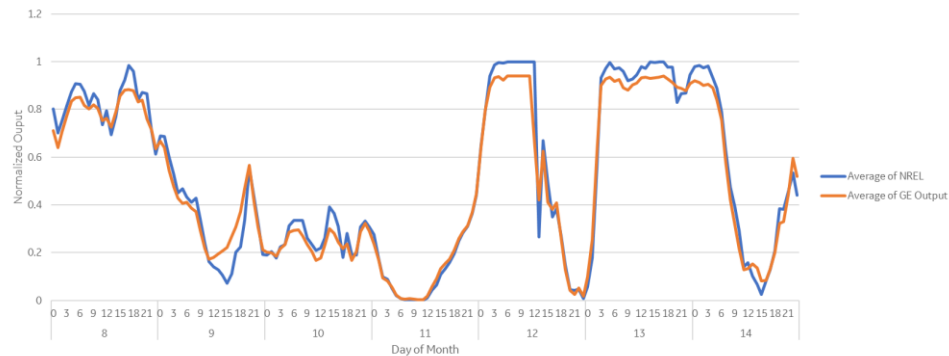


Weekly Hourly Shapes NYHARBOR

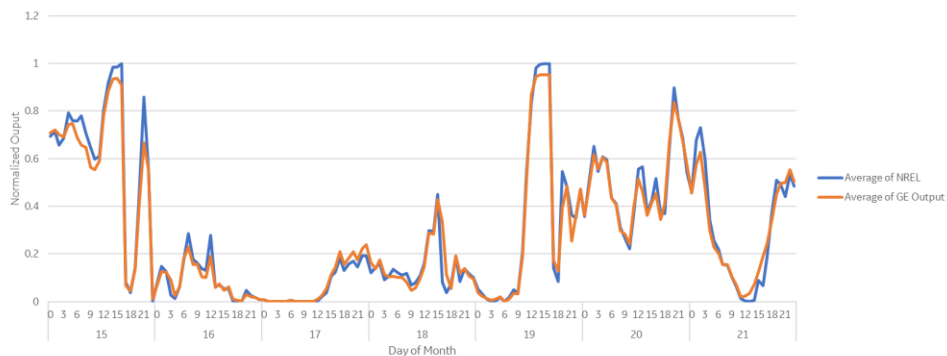
NYHARBOR 2007 Jan 7-13



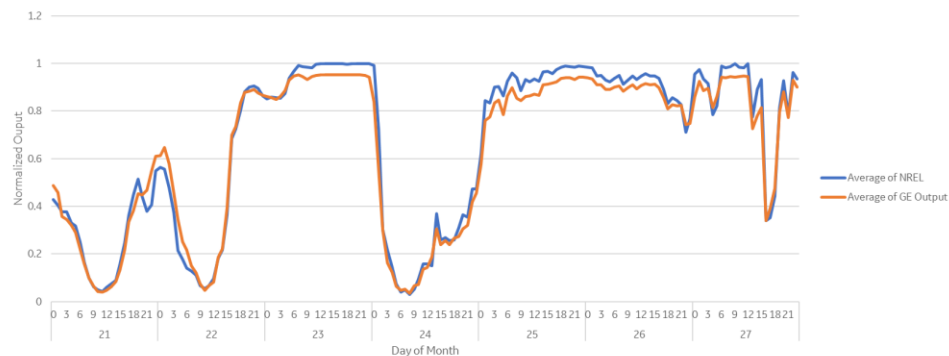
NYHARBOR 2007 Apr 8-14



NYHARBOR 2007 Jul 15-21

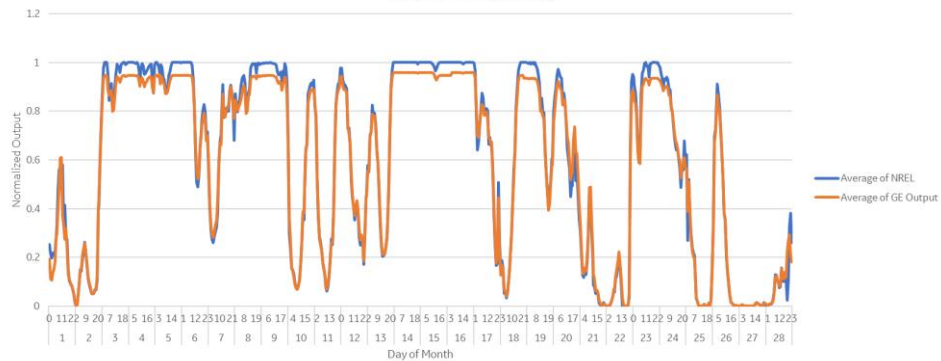


NYHARBOR 2007 Oct 21-27

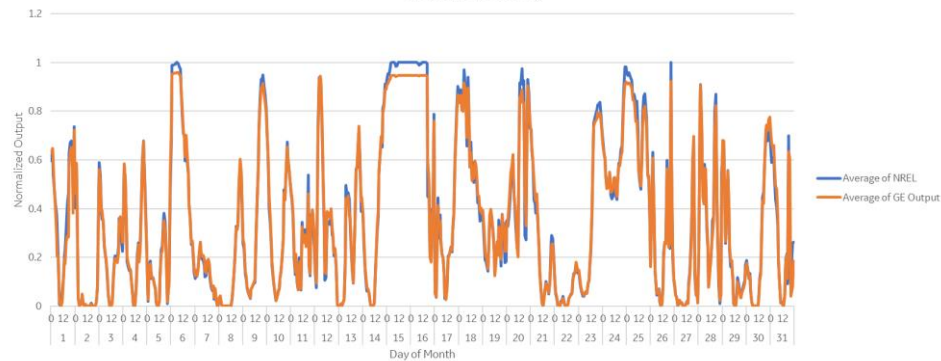


Monthly Hourly Shapes LISSHORE

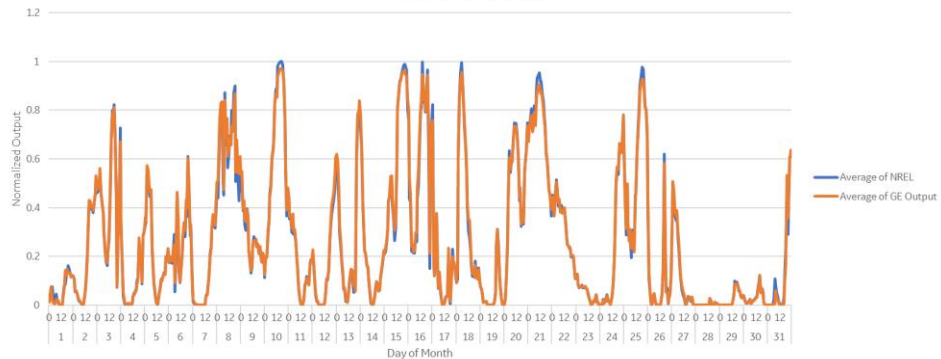
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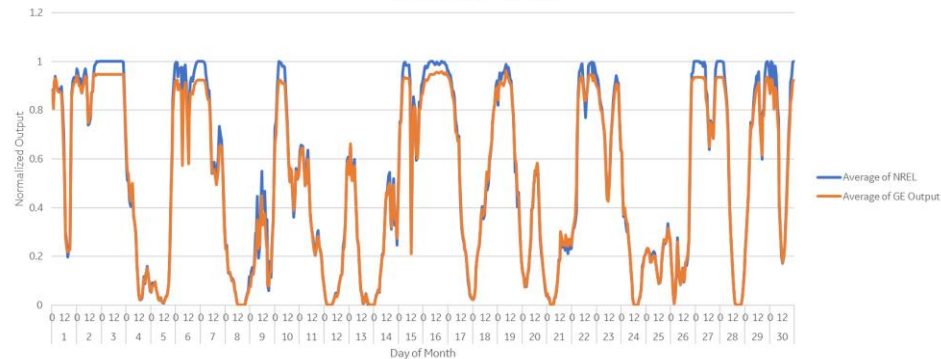
LISSHORE 2007 May



LISSHORE 2007 August

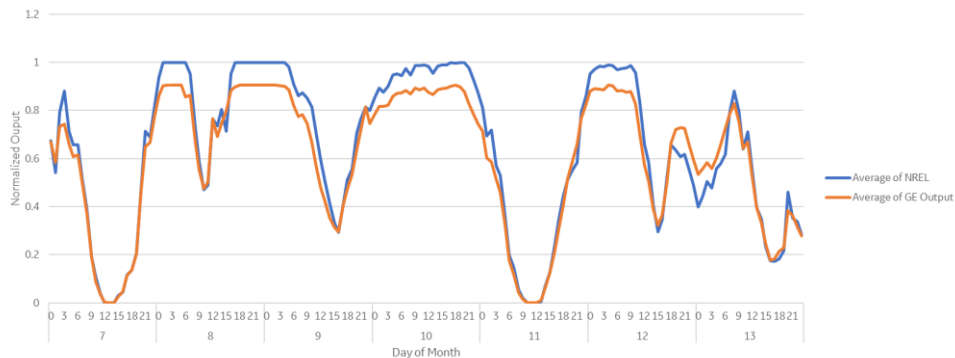


LISSHORE 2007 November

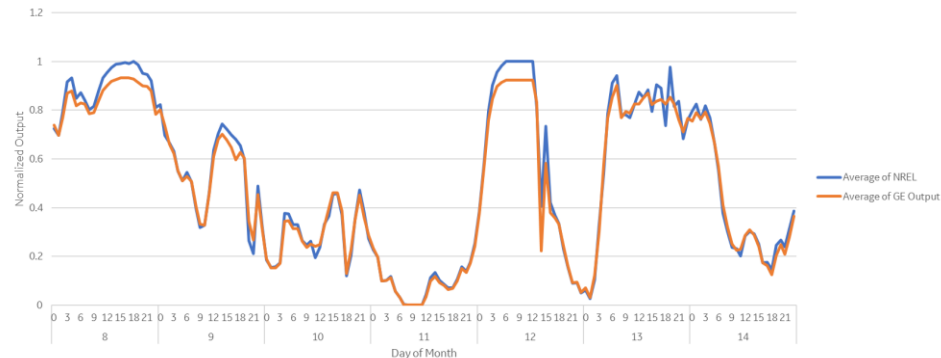


Weekly Hourly Shapes LISSHORE

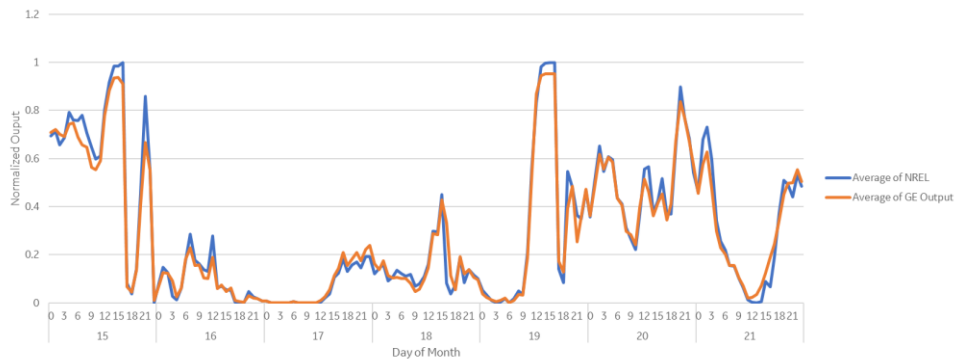
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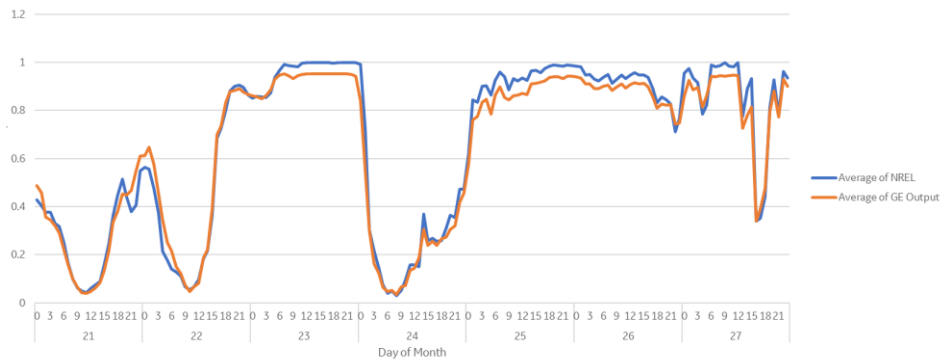
LISSHORE 2007 Apr 8-14



NYHARBOR 2007 Jul 15-21

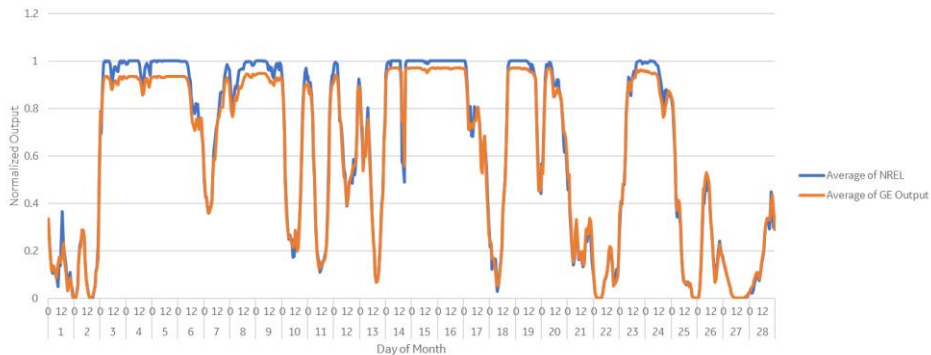


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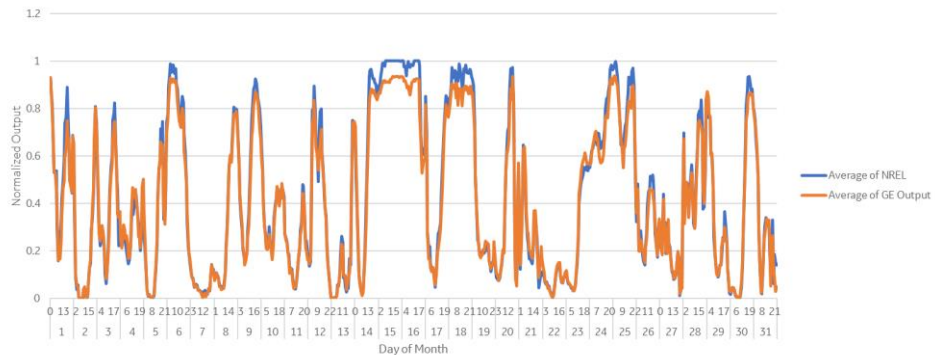


Monthly Hourly Shapes LIEASTND

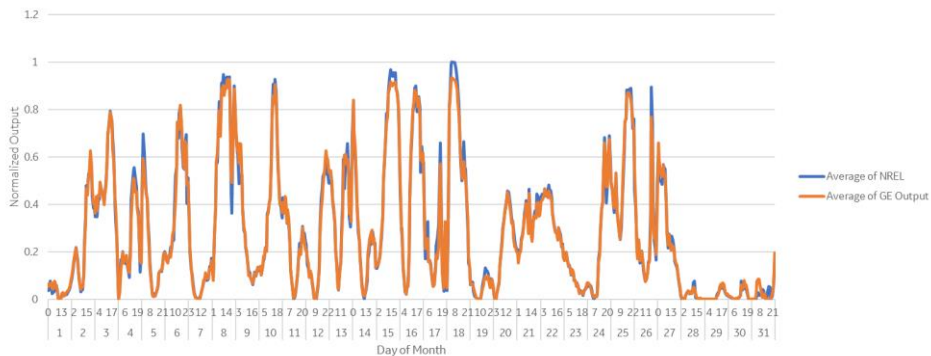
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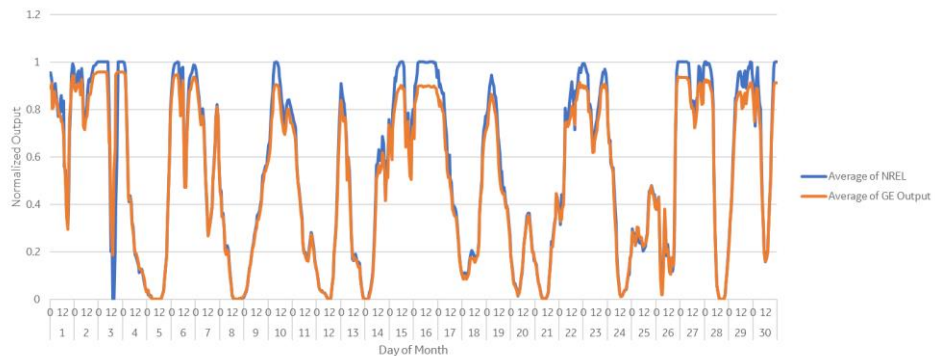
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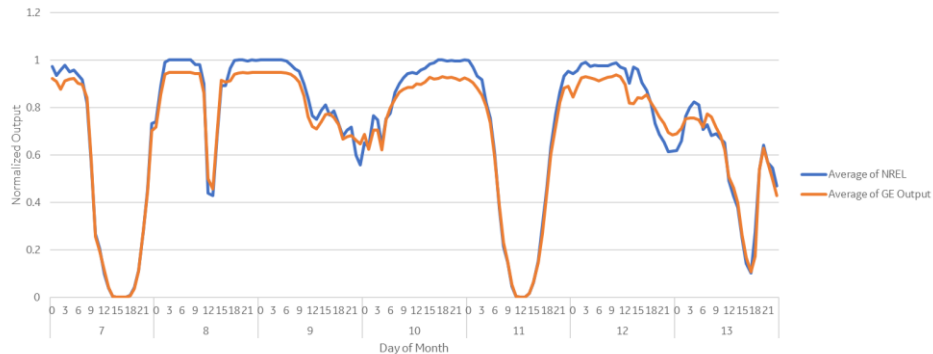


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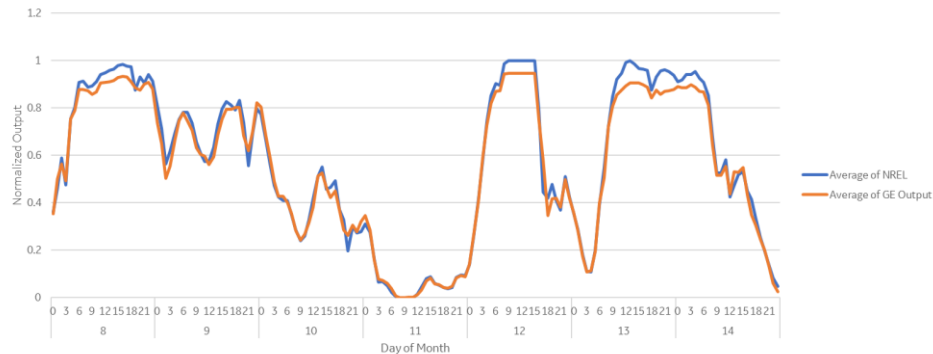


Weekly Hourly Shapes LIEASTND

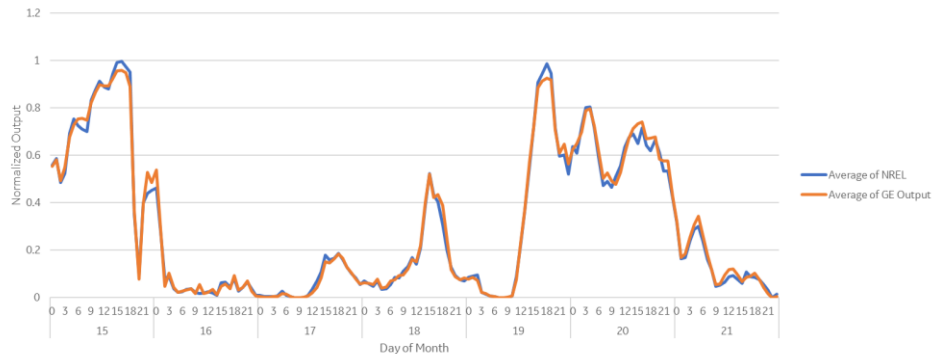
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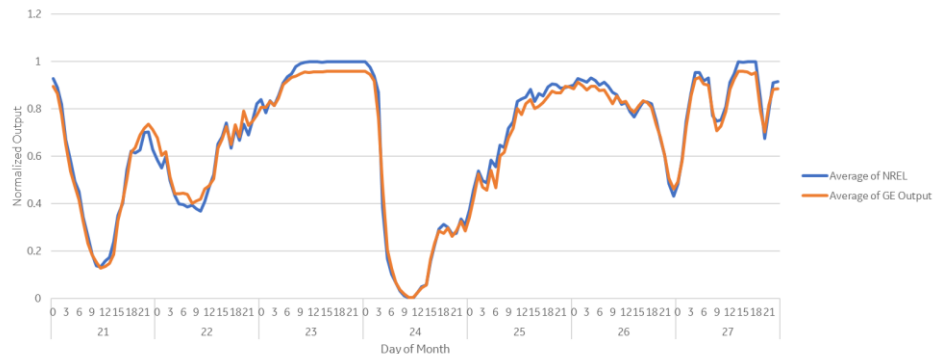
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LIEASTND 2007 Jul 15-21



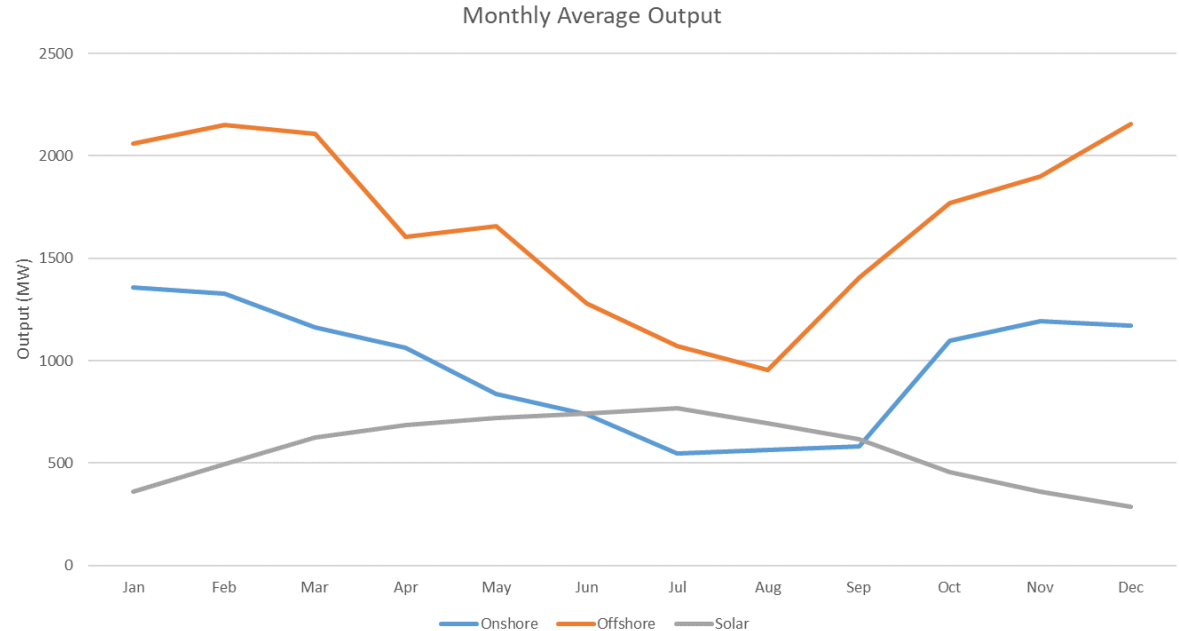
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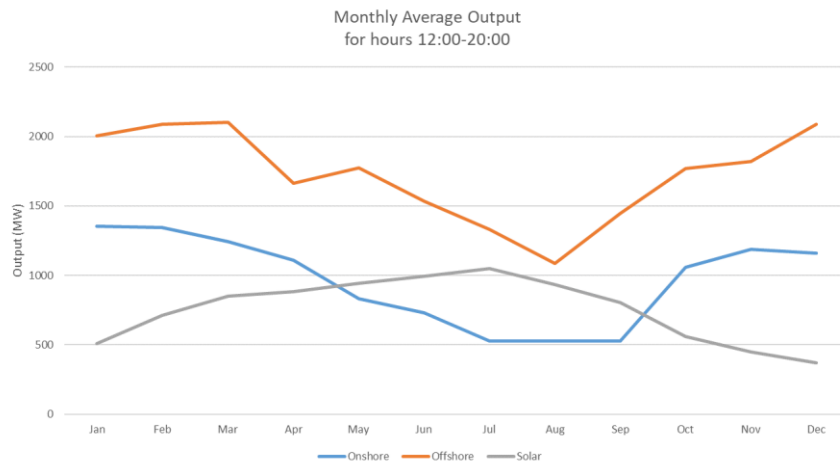
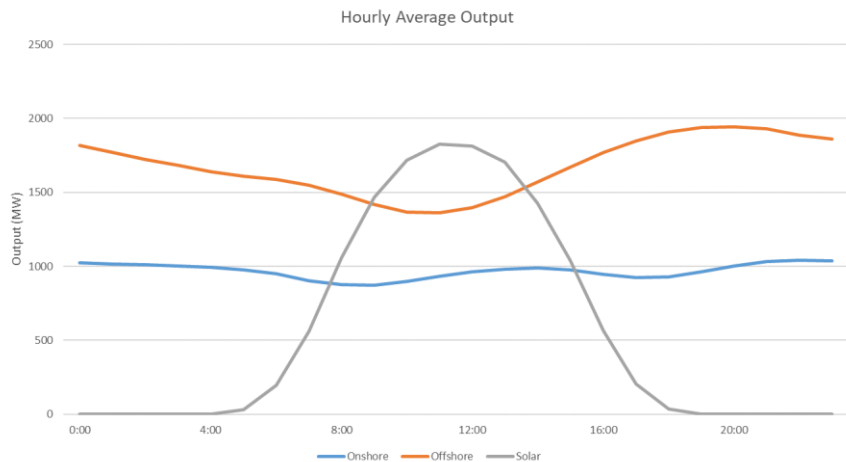
Data Summary

Output data summary

- 6 years of off-shore
- 5 years of on-shore
- 1 year of solar



Output data summary



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Next steps

- GE finishes compiling off-shore wind data
- Run sensitivity case concurrently with the other 2020 IRM sensitivities
- Prepare report document on results of high renewable penetration on IRM and present to future ICS

Questions?

We are here to help. Let us know if we can add anything.

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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