

# Apex Clean Energy

## Downeast Wind Project Congestion Study Report

October 25, 2017

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## EXECUTIVE SUMMARY

ABB has been contracted by Apex Clean Energy, Inc. (“Apex”) to perform a congestion and curtailment study for the proposed Downeast Wind Project (hereinafter referred to as “Project” or “QP 400”) for the year 2020. [REDACTED]

[REDACTED]

[REDACTED]

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## 1 Introduction

ABB has been contracted by Apex Clean Energy, Inc. (“Apex”) to perform a congestion and curtailment study for the proposed Downeast Wind Project for the year 2020. [REDACTED]

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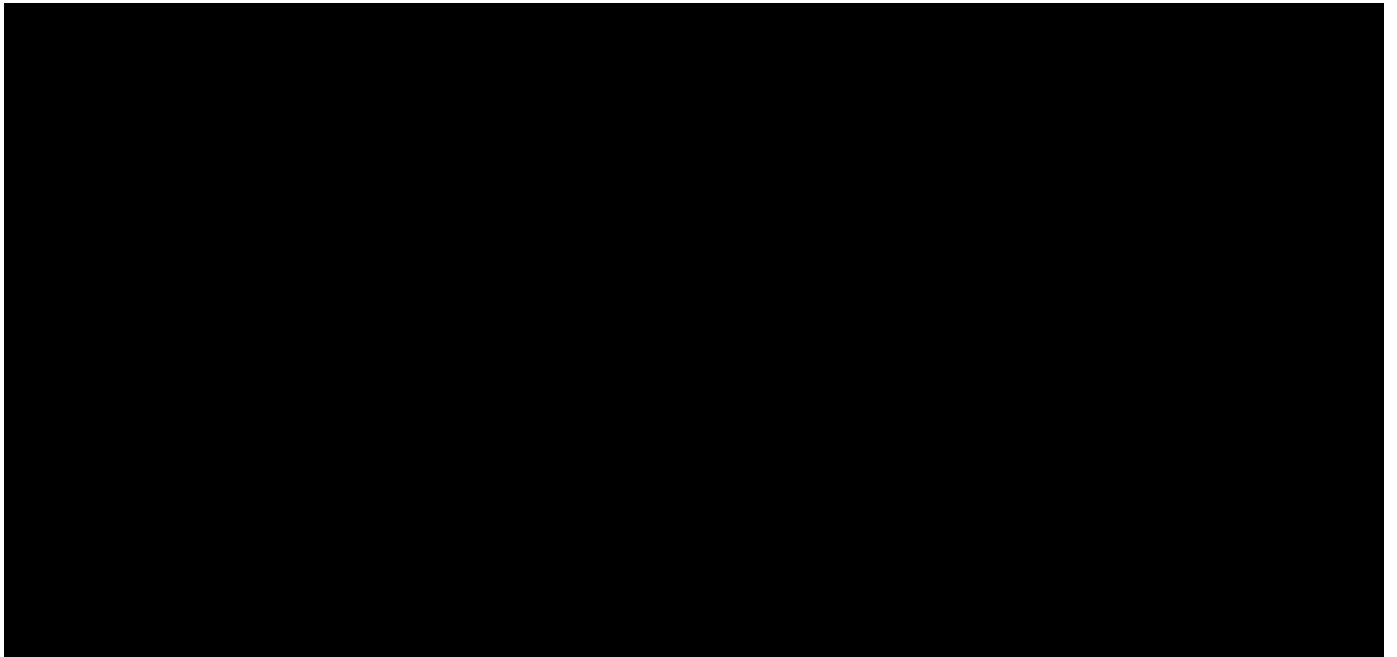
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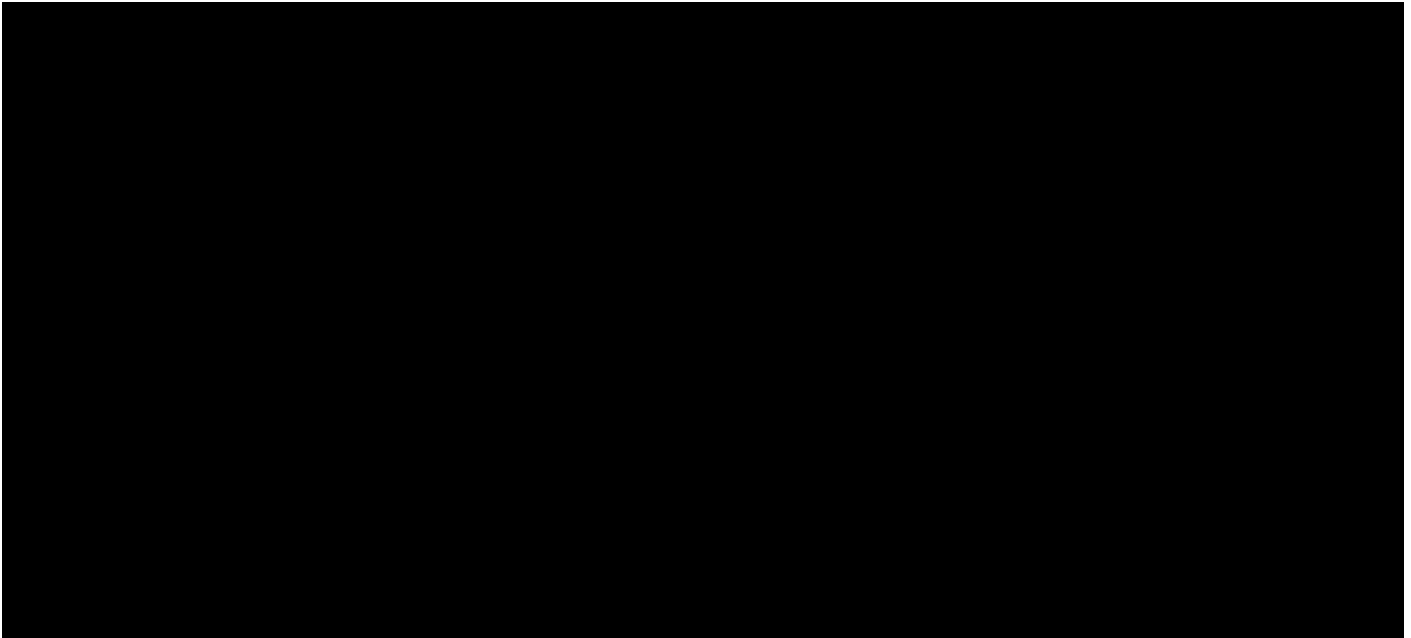
## 2 Study Assumptions

ABB used GridView to perform the market studies.

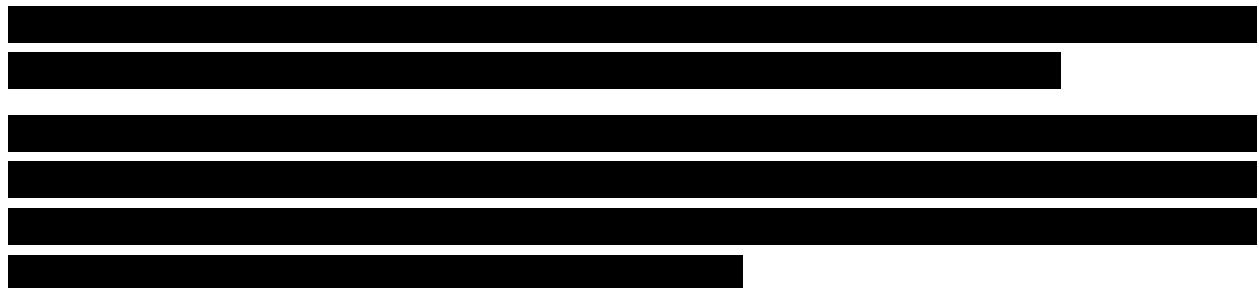
### *2.1 GridView Database*

The GridView database was updated from 2017 ABB simulation ready database with a 2020 CEII powerflow case.

The Henry Hub gas price for study year 2020 is shown in Table 2-1.



### *2.2 Modeling of the Downeast Wind Farm*

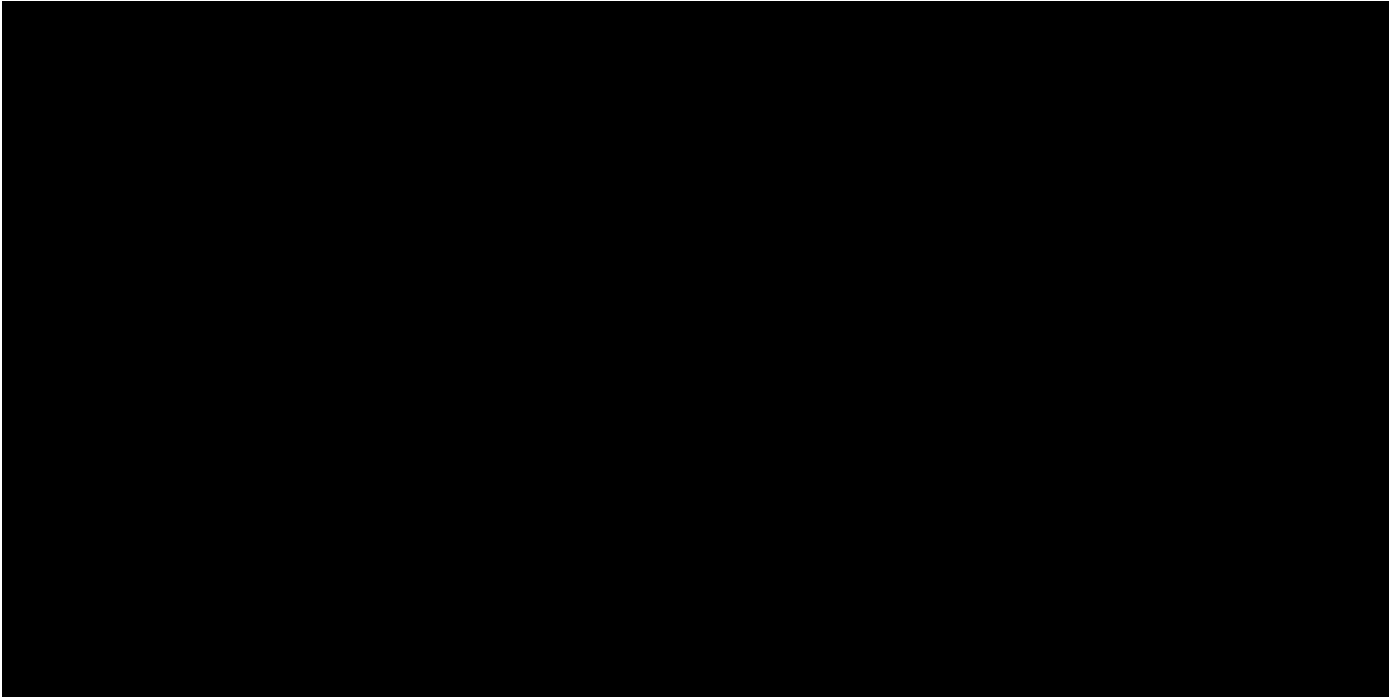


2.3 Wind Curve



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2.4 ISO-NE Stack Chart



## 2.5 Recent Transmission Projects

Below in Table 2-3 is the list of transmission projects in Maine, recently proposed or under construction, as per the ISO-NE queue. These projects are included in the GridView model.

**Table 2-3: Transmission Projects in Maine (Proposed or Under Construction)**

Project ID	State	Primary Equipment Owner	Projected In-Service Month/Year	Major Project	Project
1411	ME	Central Maine Power Company	09/2017	Maine Power Reliability Program (MPRP)	Add a new 115 kV transmission line (255) between Larrabee Road and Middle Street (Lewiston Loop)
1413	ME	Central Maine Power Company	09/2018	Maine Power Reliability Program (MPRP)	Add a new 115 kV transmission line (256) between Middle Street and Lewiston Lower (Lewiston Loop)
1441	ME	Central Maine Power Company	12/2017	Maine Power Reliability Program (MPRP)	Expand Norway 115 kV Substation interconnecting lines 61, 61A and 87 between stations Larrabee Road, Hotel Road and Kimball Road (Lewiston Loop)
1442	ME	Central Maine Power Company	09/2018	Maine Power Reliability Program (MPRP)	Expand Lewiston Lower 115 kV Substation interconnecting lines 256 and 202 between stations Middle Street and Crowleys (Lewiston Loop)
1443	ME	Central Maine Power Company	09/2018	Maine Power Reliability Program (MPRP)	Add a new Middle Street 115/34/12 kV Substation interconnecting lines 255 and 256 between Lewiston Lower and new Larrabee Road (Lewiston Loop)
1501	ME	Central Maine Power Company	06/2020	CMP- LSP Lakes Region	Add a second 115/34.5 kV autotransformer at the existing Kimball Road 115 kV Substation and move one of the 115 kV 30 MVAR capacitor banks from bus 4 to bus 3
1514	ME	Central Maine Power Company	05/2020	CMP- LSP County Road S/S	Construct a new County Road Substation that sectionalizes Section 241 by adding four 115 kV circuit breakers in a ring bus configuration and install two 115/34.5 kV 30/56 MVA transformers at a new green field site. This new substation will replace the existing Rice Rips Substation. Construct 6.5 miles of new 115 kV (1192 kcmil 45/7 ACSR) conductor from the Section 241A tap point to the new County Road Substation.
1499	ME	Central Maine Power Company	06/2019	Newcastle Substation Upgrades Project	Addition of two 115 kV circuit breakers at the existing 115 kV bus at Newcastle substation to reconfigure the existing 115 kV bus to a 4-breaker ring bus
1696	ME	Emera Maine	12/2018	Queue Position 400	Add breaker to existing Epping Switching station to accommodate QP-400
1300	ME	Central Maine Power Company	12/2020	Central New Hampshire Solution	Install transfer trip at Kimball Road disconnect Lovell from 115 kV, Lovell load will continue to be served from CMP sub-transmission
1280	ME	Central Maine Power Company	04/2020	Mid-Coast Spur	New 115 kV line section 244 and upgraded line section 80 between Coopers Mill and Highland Substations



Project ID	State	Primary Equipment Owner	Projected In-Service Month/Year	Major Project	Project
1650	ME	Blue Sky	12/2016	Queue Position 333	Add a new 34.5/115 kV substation Blue Sky West
1667	ME	Emera Maine	12/2016	Queue Position 397	Add tap to existing Bull Hill Switching station to accommodate QP-397

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**Table 3-1: Scenario List**

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### 3.1 Wind Farm Energy Output

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The results of Scenarios 0 in Tables 3-2 and 3-3 show that most of the curtailment on the proposed Project was due to congestion on the Columbia – Epping 115 kV line. After this 115 kV line is upgraded to 229 MVA (summer rating), the curtailment on the Downeast Wind Project will be eliminated (Table 3-2 shows a negligible amount of curtailment on the Project, 53 MWh or 0.02%; this is due to congestion upstream on the Rebel Hill – Graham 115 kV line).

Results of Scenario 2 show that the addition of a future wind farm at the Bull Hill 115 kV substation (QP 420, 72.6 MW) results in a curtailment of 1.7% on QP 400. This is mainly due to congestion upstream on the Rebel Hill – Graham 115 kV line. As shown in Table 3-2, QP400 will be curtailed for 314 hours.

With NCFs of nearby wind farms QP420, QP317 and QP397 reduced, the curtailment on Downeast Wind project reduced from 1.7% to 0.35% and congestion on the upstream transmission facilities reduced. Compare Scenario 3 vs. Scenario 2 results in Tables 3-2 and 3-3.

The result of Scenario 5 show that adding more wind production to the local area (by adding QP435 instead of QP420), the congestion and consequently curtailment will increase. Compare Scenario 3 vs. Scenario 5 results in Tables 3-2 and 3-3.

### 3.2 LMP Price and Basis for Downeast Wind Farm

Table 3-4 shows the annual generator weighted average LMP at Downeast and the nearest hub.

**Table 3-4: Annual Generator Weighted Average LMP (\$/MWh) of Downeast and nearby Hubs**

Scenario	Maine Bangor	Downeast
0	33.65	7.15
1	35.40	36.68
2	34.04	23.12
3	34.69	29.98
4*	34.35	26.44
5	33.91	22.50

\* This LMP is for QP435 (not Downeast).

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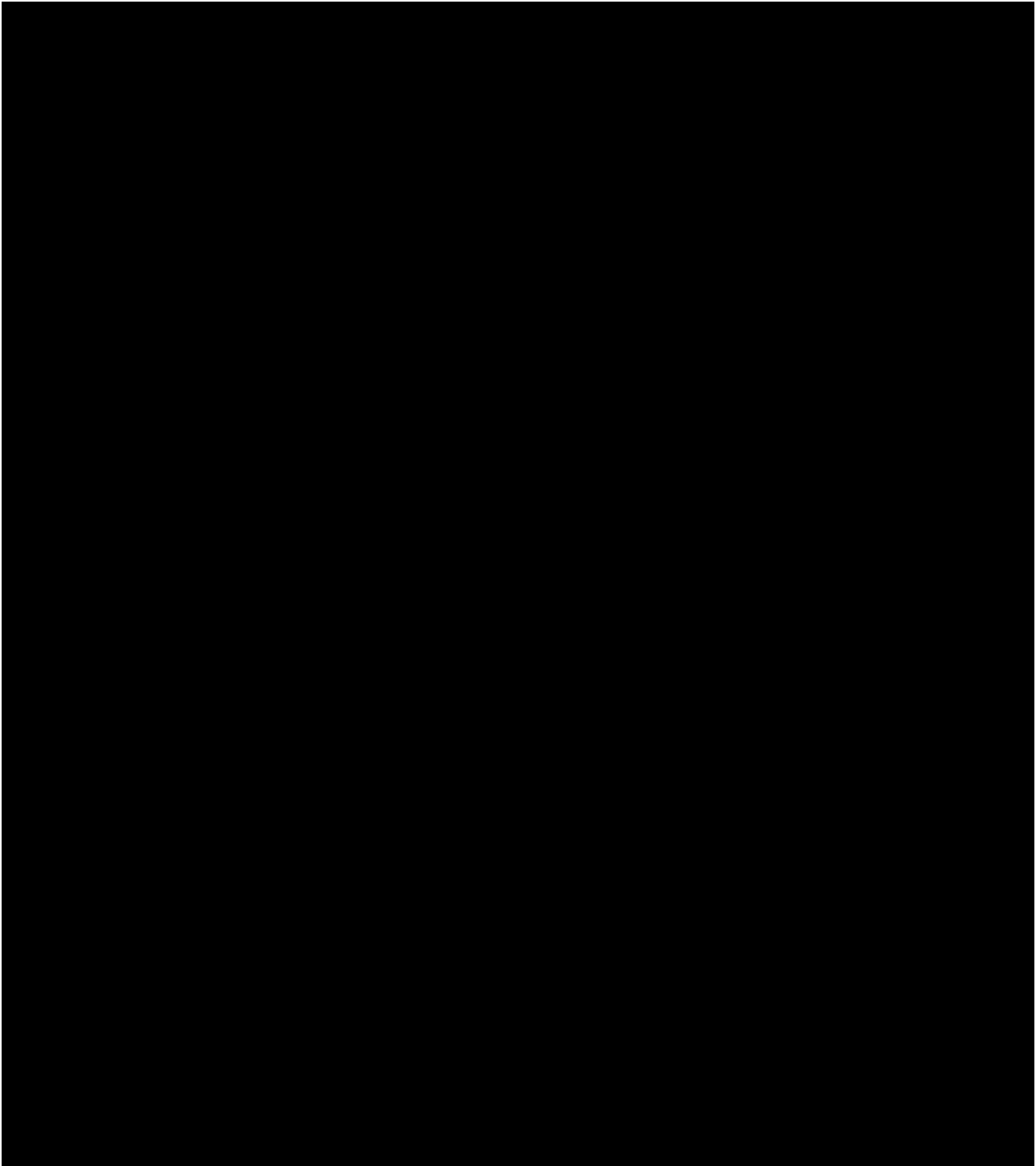
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## 4 Conclusions

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