

2015 CARIS 1: Follow-Up Items

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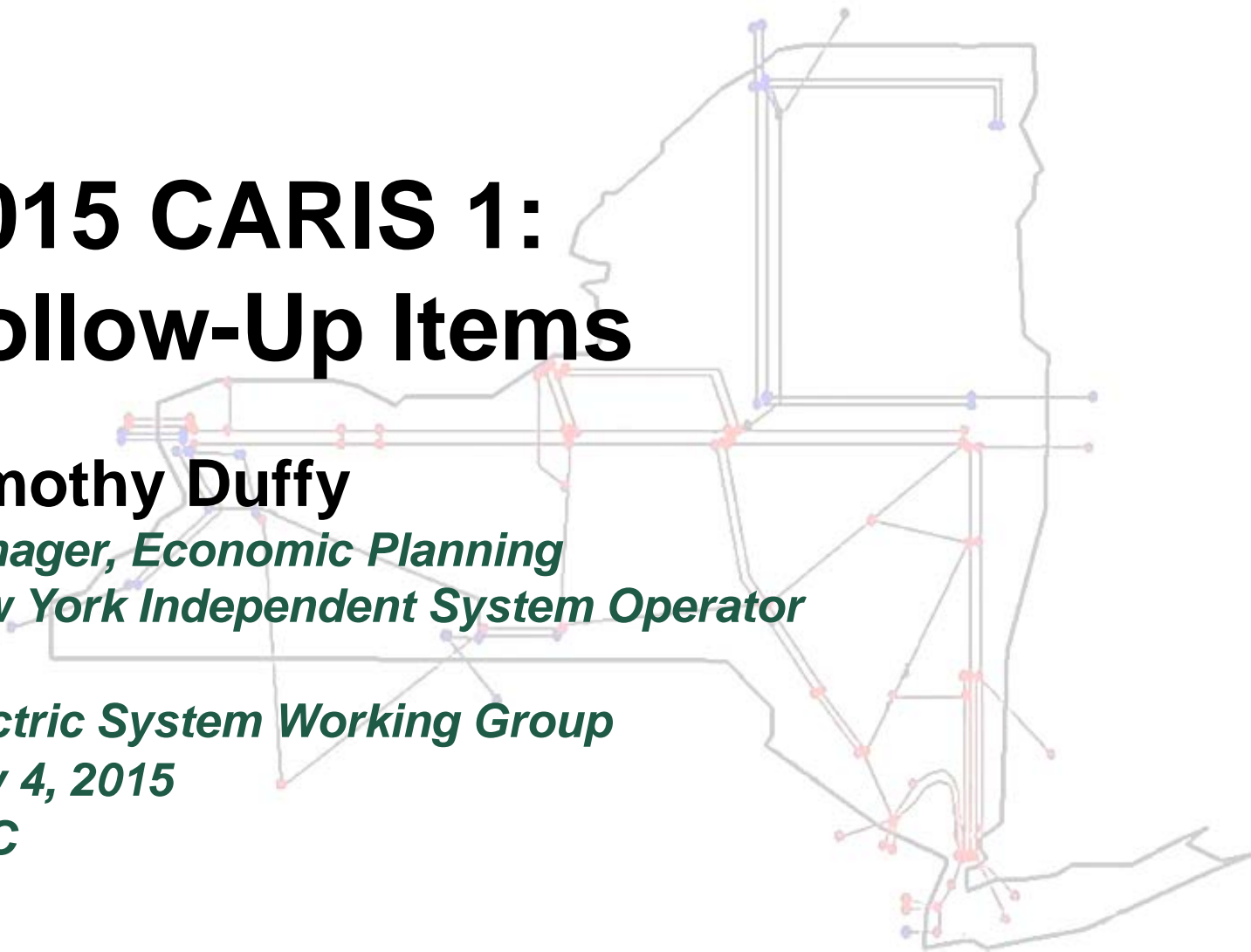
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KCC



Emission Allowance Price Forecasts

2015 CARIS Allowance Prices (2015\$/ton)				
	CO ₂	SO ₂	ANO _x	OS NO _x
2015	5.70	100.00	100.00	125.00
2016	7.65	90.00	90.00	112.50
2017	9.61	112.50	112.50	140.63
2018	9.97	90.00	90.00	112.50
2019	10.27	72.00	72.00	90.00
2020	13.50	57.60	57.60	72.00
2021	14.27	46.08	46.08	57.60
2022	15.19	36.86	36.86	46.08
2023	16.08	29.49	29.49	36.86
2024	16.97	23.59	23.59	29.49
ANO _x - Annual CSAPR NO _x Program effective for each CY				
OS NO _x - Ozone Season Program effective during May 1-Sept 30				

NYSDEC has initiated the development of a State Implementation Plan (SIP) to take direct allocation of CASPR Allowances from USEPA. They propose to auction a portion of the allowances and to give the remainder of the allowances directly to generators based on historic heat input. This is forecasted to increase SO₂ and NO_x allowance costs in 2017 with prices falling throughout the period thereafter.

Model Hurdle Rates

- ◆ **Developed in 2013 Benchmarking study**
- ◆ **Initiated modeling with historic market transaction costs¹**
- ◆ **Adjusted IESO-NYISO upward to better align model imports with historic actuals**

¹ Export Transmission Service (ETS) Tariff Study, IESO, Charles River Associates, May 16, 2012

Model Hurdle Rates

Commitment Hurdle Rate	Export (from NYCA)			Import (to NYCA)		
	Market Rate	2014 CARIS 2	2015 CARIS 1	Market Rate	2014 CARIS 2	2015 CARIS 1
PJM	\$ 8.0	\$ 10.0	\$ 8.0	5.0	\$ 4.0	\$ 5.0
Linden VFT	\$ 8.0	\$ 10.0	\$ 8.0	5.0	\$ 3.8	\$ 5.0
Neptune	\$ 8.0	\$ 10.0	\$ 8.0	5.0	\$ 3.6	\$ 5.0
HTP	\$ 8.0	\$ 10.0	\$ 8.0	5.0	\$ 4.0	\$ 5.0
ISONE	\$ 2.0	\$ 3.0	\$ 2.0	2.0	\$ 3.0	\$ 2.0
Cross Sound Cable	\$ 2.0	\$ 2.2	\$ 2.0	2.0	\$ 2.2	\$ 2.0
Northport Norwalk Cable	\$ 2.0	\$ 2.5	\$ 2.0	2.0	\$ 2.5	\$ 2.0
IMO	\$ 6.0	\$ 6.0	\$ 6.0	4.0	\$ 11.5	\$ 8.0

Model Hurdle Rates

Dispatch Hurdle Rate	Export (from NYCA)			Import (to NYCA)		
	Market Rate	2014 CARIS 2	2015 CARIS 1	Market Rate	2014 CARIS 2	2015 CARIS 1
PJM	\$ 6.0	\$ 8.0	\$ 6.0	3.0	\$ 2.0	\$ 3.0
Linden VFT	\$ 6.0	\$ 8.0	\$ 6.0	3.0	\$ 1.8	\$ 3.0
Neptune	\$ 6.0	\$ 8.0	\$ 6.0	3.0	\$ 1.6	\$ 3.0
HTP	\$ 6.0	\$ 8.0	\$ 6.0	3.0	\$ 2.0	\$ 3.0
ISONE	\$ 0.0	\$ 1.0	\$ 0.0	0.0	\$ 1.0	\$ 0.0
Cross Sound Cable	\$ 0.0	\$ 0.2	\$ 0.0	0.0	\$ 0.2	\$ 0.0
Northport Norwalk Cable	\$ 0.0	\$ 0.5	\$ 0.0	0.0	\$ 0.5	\$ 0.0
IMO	\$ 4.0	\$ 4.0	\$ 4.0	2.0	\$ 9.5	\$ 6.0

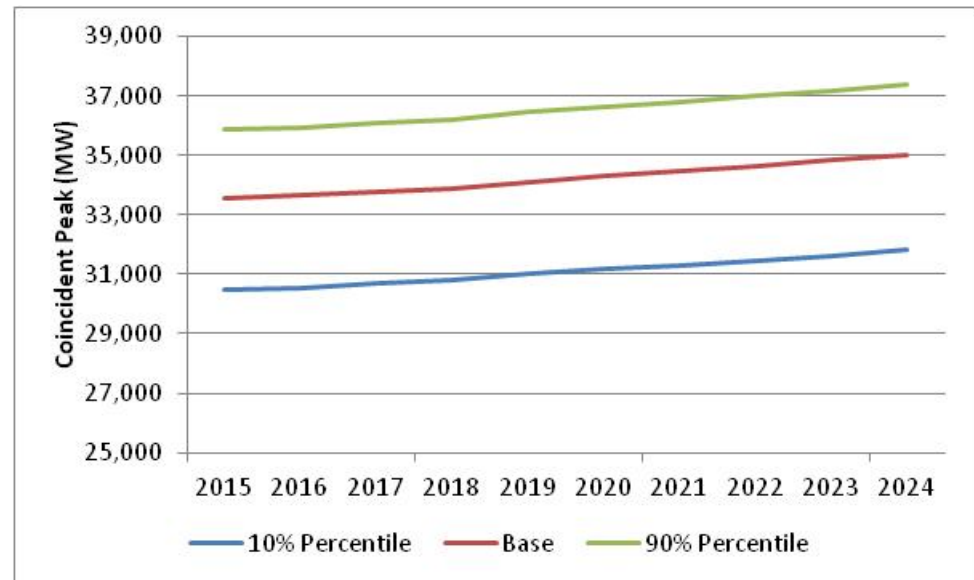
Proposed 2015 CARIS 1 Scenarios

Scenario	New/Previously Studied	Variables
Higher Load Forecast	Previously Studied	90 th Percentile (2015 Gold Book, Table I-2f)
Lower Load Forecast	Previously Studied	10 th Percentile (2015 Gold Book, Table I-2e)
Athens SPS Out of Service	Previously Studied	2015-2024 (June)
High Solar Penetration	New	4,500 MWs of Solar-PV (distributed state-wide) by 2024; NY-SUN*1.5
Higher Natural Gas Prices	Previously Studied	Derived from 2015 EIA AEO High Forecast
Lower Natural Gas Prices	Previously Studied	Derived from 2015 EIA AEO Low Forecast
Higher CO ₂ Emissions Cost	New	Increased growth rate for CO ₂ Allowance Costs (high range of forecasted values)
Higher Natural Gas Prices in Mid-State	Previously Studied	Midstate & New England / Upstate differential doubled

Load Forecast Scenarios

Forecast of Coincident Summer Peak Demand by Zone - MW

Year	10% Percentile	Base	90% Percentile
2015	30,494	33,567	35,862
2016	30,555	33,636	35,932
2017	30,685	33,779	36,084
2018	30,778	33,882	36,191
2019	30,997	34,119	36,443
2020	31,171	34,309	36,645
2021	31,315	34,469	36,815
2022	31,470	34,639	36,997
2023	31,636	34,823	37,192
2024	31,805	35,010	37,391



High Solar Penetration Scenario

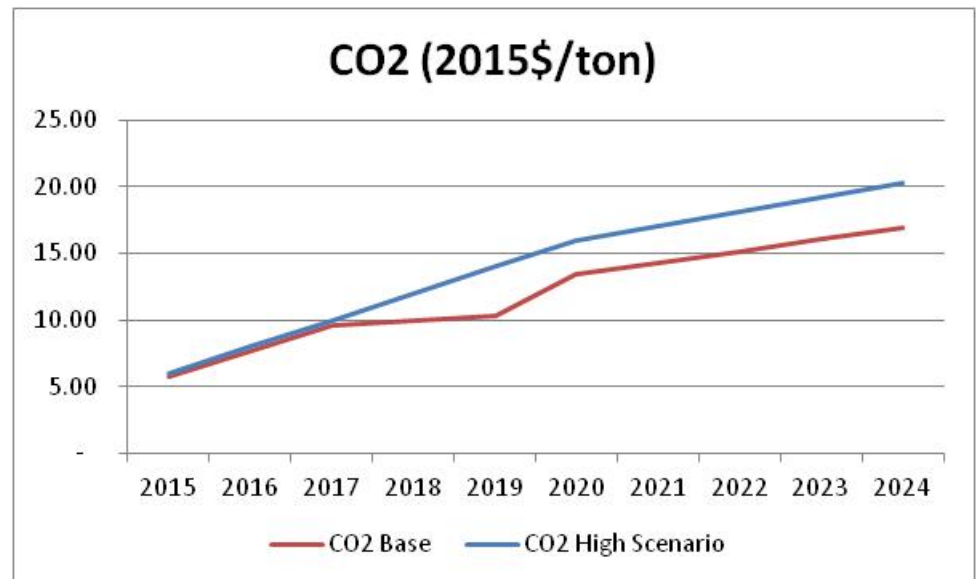
Forecast of Reductions in Coincident Summer Peak Demand by Zone - MW

Year	A	B	C	D	E	F	G	H	I	J	K	NYCA
2015	8	3	8	2	5	25	17	3	2	17	19	110
2016	20	5	20	2	12	58	37	7	3	32	134	331
2017	31	8	31	2	17	90	54	10	7	56	171	477
2018	42	12	42	2	25	131	75	14	12	88	190	633
2019	56	15	56	3	32	175	95	19	17	131	190	789
2020	66	19	66	3	39	217	112	27	22	178	188	938
2021	75	22	76	3	46	249	124	34	31	246	188	1,094
2022	78	24	81	3	49	271	132	39	39	312	188	1,218
2023	80	24	85	3	51	285	137	42	44	355	188	1,294
2024	81	24	87	3	53	293	139	44	47	380	187	1,338

Based on 4,500 MWs installed MW and a coincidence factor of 30%.

High CO₂ Forecast

	CO ₂ (2015\$/ton)	
	CO ₂ Base	CO ₂ High Scenario
2015	5.70	6.00
2016	7.65	8.00
2017	9.61	10.00
2018	9.97	12.00
2019	10.27	14.00
2020	13.50	16.00
2021	14.27	17.00
2022	15.19	18.10
2023	16.08	19.20
2024	16.97	20.30



Next Steps

- ◆ **Finalize 10-Year Study Base Case**
- ◆ **Continue cost data collection**
 - *WACC (Weighted-Average Cost of Capital) for Transmission Owners*
 - *Generic solution costs*
- ◆ **Present Historic and Forecasted Congestion Analysis**
- ◆ **Discuss Generic Solutions**
- ◆ **Discuss “Study Cases”**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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