

NYSERDA Much Colder Than Normal Weather Case Results

November 2009

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Sensitivity Assumptions



- Case assumes temperatures from the years 1976-1977, the coldest winter on record, occur in the forecast years 2017-2018.
 - The much colder than normal weather conditions cause a sharp increase in residential/commercial gas demand and gas prices, relative to the Bas Case which assumes normal weather.
 - In response to high gas prices, industrial and electric generation gas demand decrease.

- Average monthly and peak day power generation gas demand are based on GEMAPS results provided by NYSERDA.

Peak Day Power Generation Gas Consumption

Region	Reference Case				Much Colder Than Normal Weather			
	Firm	Interruptible	Total	Percent	Firm	Interruptible	Total	Percent
Upstate East	130	352	482	36%	41	158	199	31%
Upstate West	177	9	186	14%	44	0	44	7%
Downstate	<u>527</u>	<u>157</u>	<u>685</u>	<u>51%</u>	<u>347</u>	<u>56</u>	<u>403</u>	<u>62%</u>
Total New York	835	518	1,353	100%	432	215	646	100%

Caveats for the Much Colder Than Normal Weather Analysis



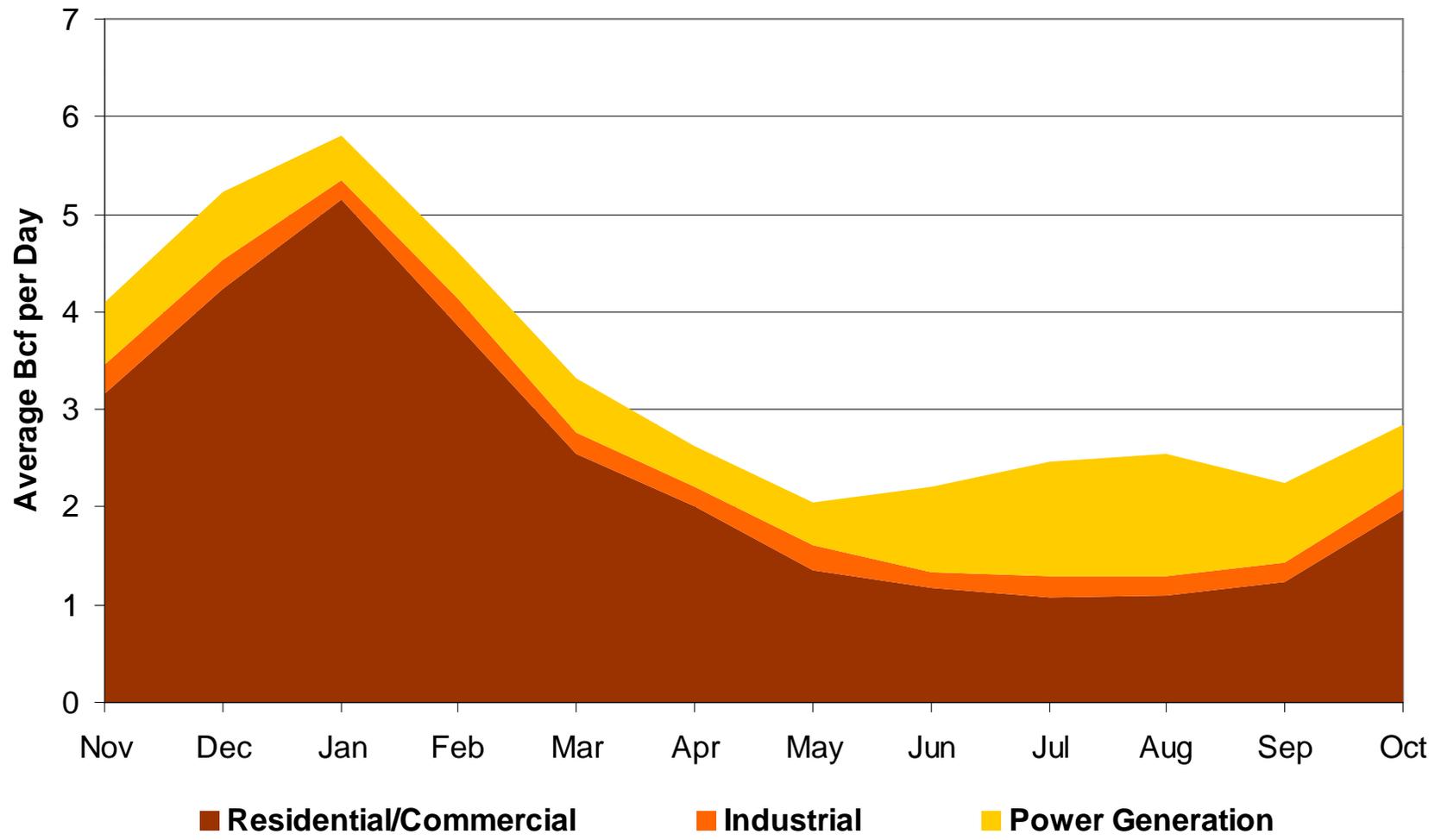
This analysis of the impacts of much colder than normal weather on the natural gas pipeline system is dependant on a number of assumptions that lessen the impacts on gas consumers in New York and New England.

- In the Much Colder Than Normal Weather cases, Iroquois flows nearly full from the Canadian border. However, there may not be that much gas available under Much Colder Than Normal weather conditions due to either pipeline constraints at Parkway or gas supply constraints in eastern Canada.
- The RIAMS model optimizes the use of storage to help meet peak day demands. In the real world, storage withdrawals and the use of peak-shaving plants would not necessarily be optimally timed throughout the month. The projection, therefore presents the greatest possible volume that can be available and there would likely be less storage withdrawals available on peak days.
- One of the ways the GMM responds to increased gas demand and gas prices is to increase the volume of LNG imports into New England and Eastern Canada. While LNG imports may increase in response to Much Colder Than Normal weather, there may be less additional LNG available, or additional supplies may not be delivered when they are most needed. A delay of days or weeks in obtaining shipments would result in a more constrained market.
- Much Colder Than Normal weather can also have an impact on the ability to deliver fuels to consumers. Much Colder Than Normal cold can disrupt oil deliveries and therefore limit the amount of gas-to-oil switching at power plants. Moreover, the analysis assumes that on-site fuel inventories are intact and available.

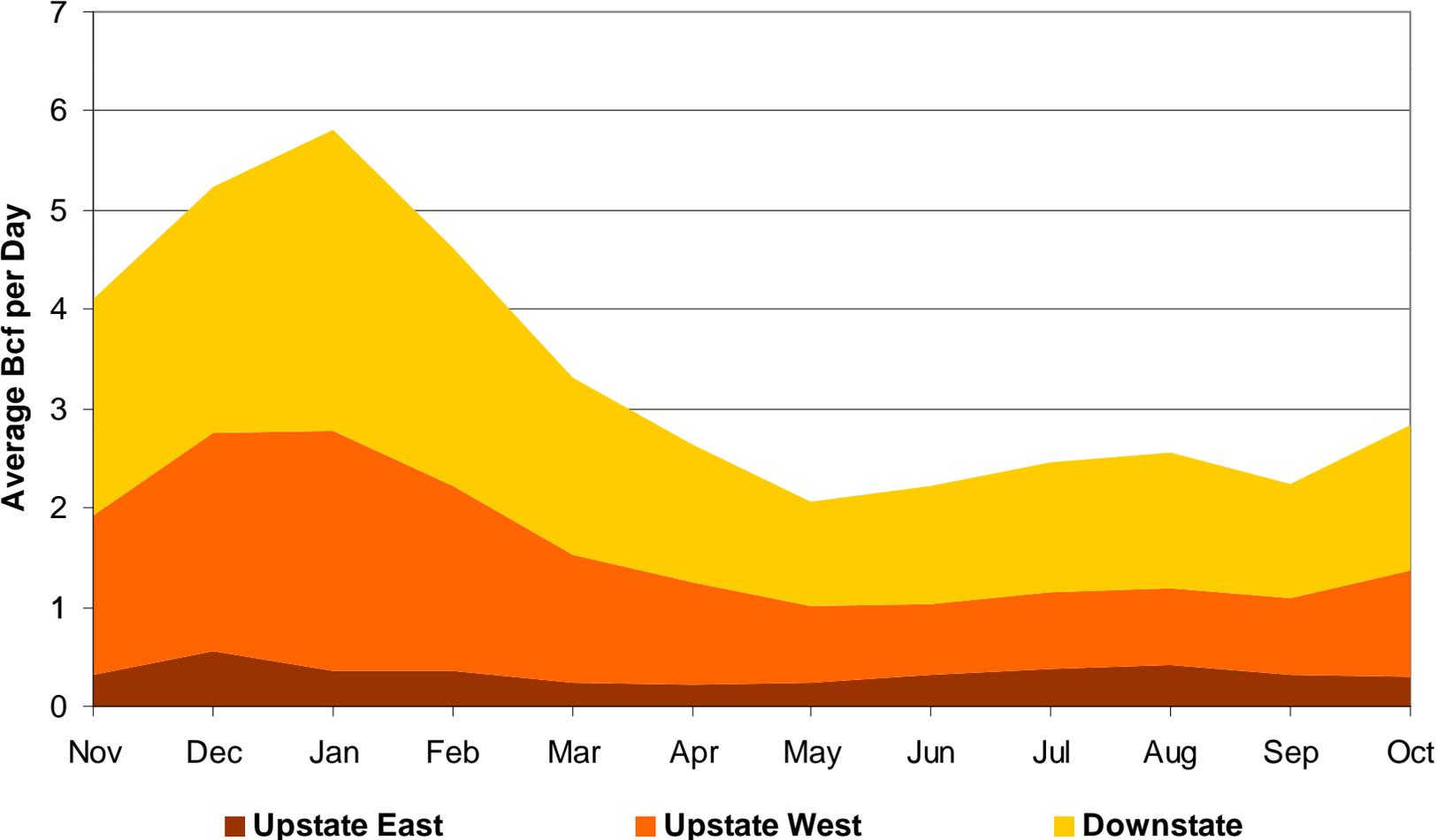
Due to these and other factors, the projections for unmet demands in this analysis should be viewed as the minimum levels of demand disruption.

RIAMS Results

Seasonal Consumption by Sector: 2017 -2018



Seasonal Consumption by Region: 2017 -2018

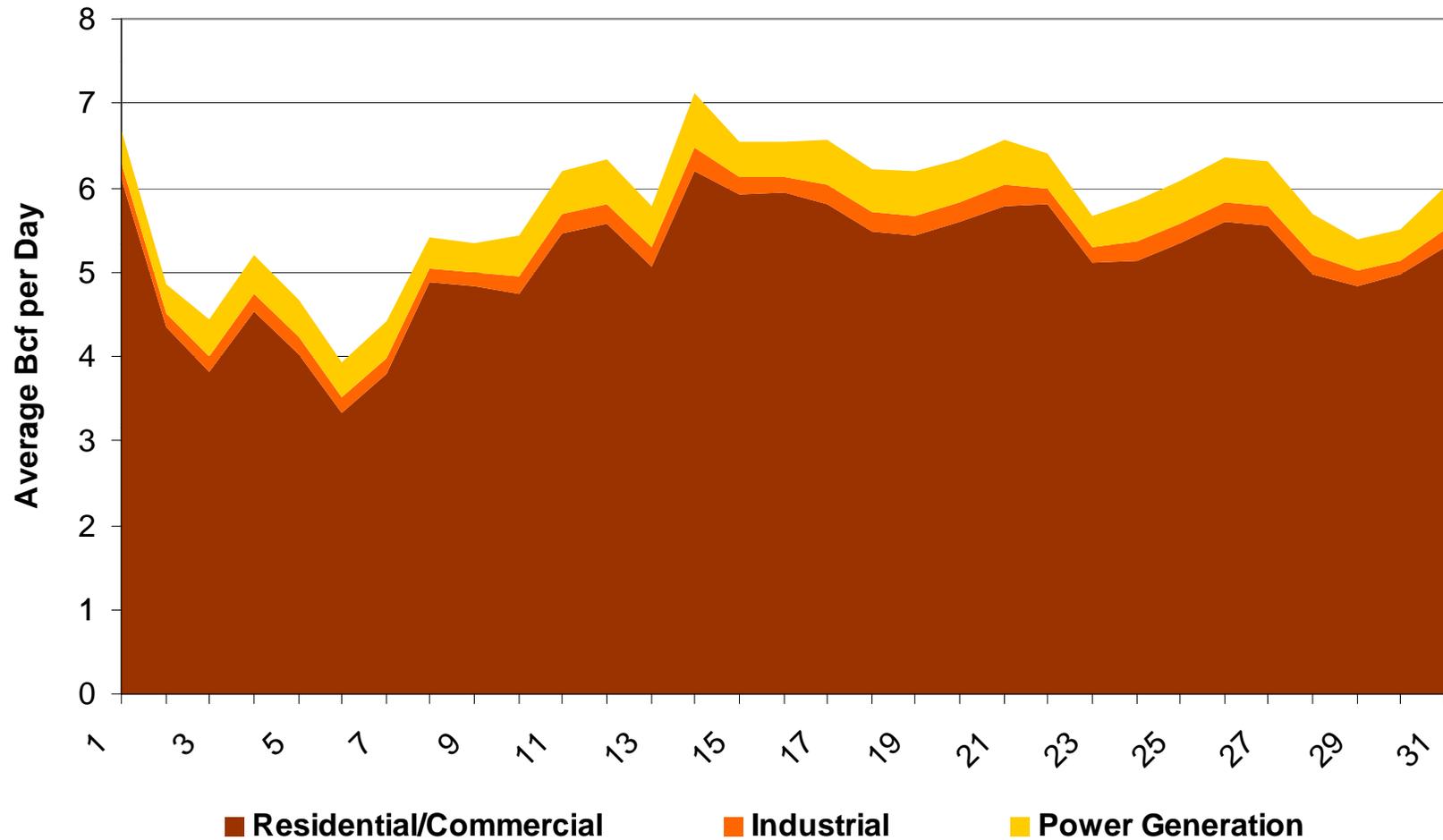


Daily RIAMS Conditions

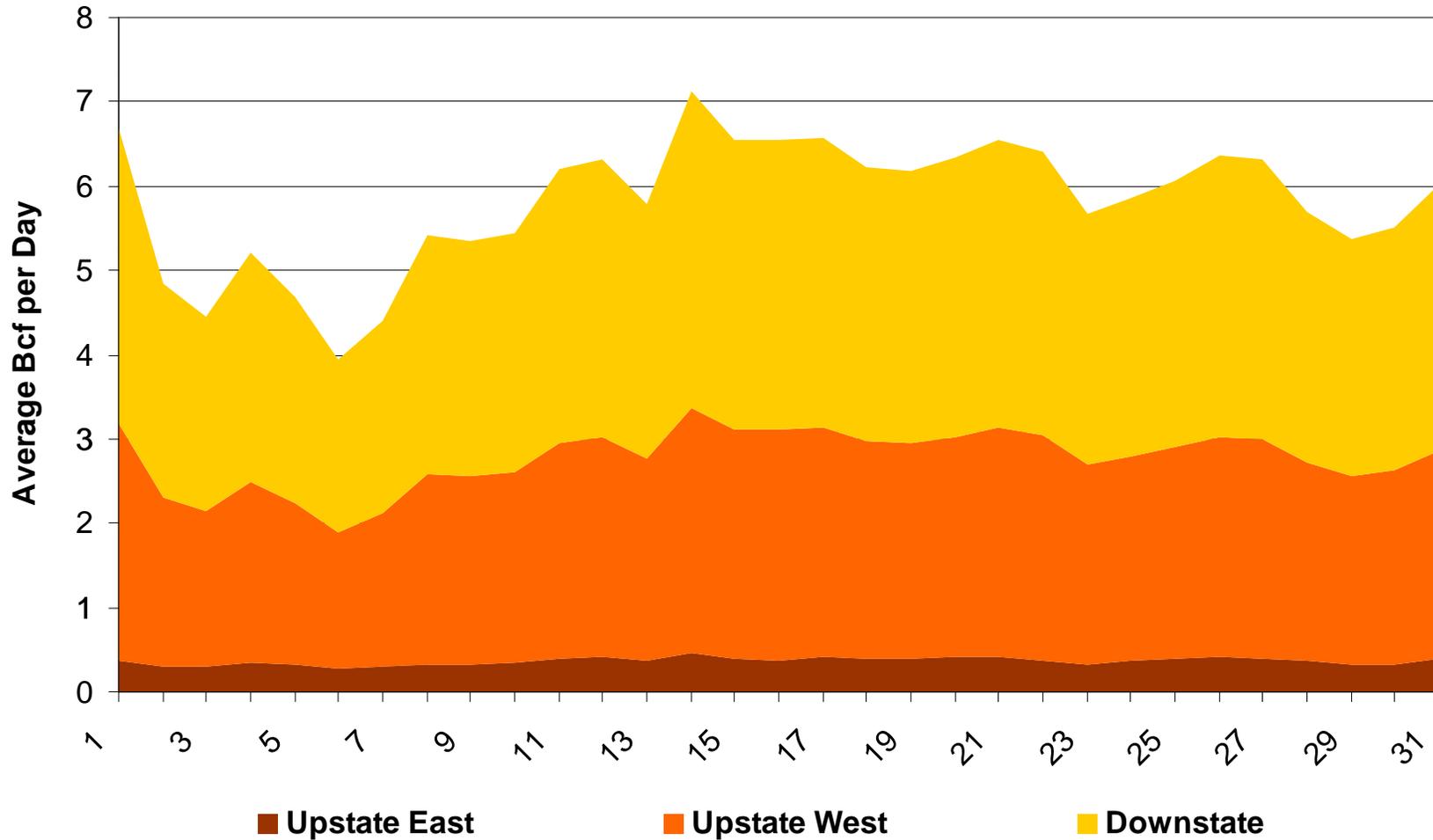


- Projection is for January 2018.
- Assumed temperatures on the peak day:
 - New York City is 2 degrees Fahrenheit on the peak gas demand day, 3 degrees colder than the average peak day.
 - Average temperature for the month is 22 degrees, 11 degrees colder than an average January.
 - Buffalo is -5 degrees Fahrenheit on the peak gas demand day, 2 degrees colder than the average peak day.
 - Average temperature in January is 14 degrees, 11 degrees colder than an average January.

Daily Consumption by Sector: Jan 2018



Daily Consumption by Region: Jan 2018



New York Gas Peak and Average Day Imports/Exports (MMcfd)



Location	Case	Capacity	Peak Day	Avg Day
Algonquin Exports to CT	Base	1,375	1,375	998
	MCTN	1,375	1,293	982
Algonquin Imports from NJ	Base	1,069	1,069	946
	MCTN	1,069	1,069	907
Columbia Imports from Western PA	Base	45	27	22
	MCTN	45	18	16
Dominion Imports from Western PA	Base	1,600	1,119	799
	MCTN	1,600	868	700
Empire State Receipts from Transcanada	Base	820	465	176
	MCTN	820	475	243
Iroquois Net Exports to CT	Base	1,000	420	308
	MCTN	1,000	323	311
Iroquois Deliveries to New York City	Base	778	437	362
	MCTN	778	622	375
Iroquois Receipts from Transcanada	Base	1,195	1,035	825
	MCTN	1,195	1,182	789
Millennium Deliveries to New York City	Base	167	167	26
	MCTN	167	157	31
National Fuel Imports from PA	Base	385	231	192
	MCTN	385	222	151
National Fuel Receipts from Transcanada	Base	426	99	38
	MCTN	426	101	52
Tennessee Exports to MA	Base	1,170	1,055	507
	MCTN	1,318	980	446
Tennessee Imports from NJ	Base	377	377	76
	MCTN	377	308	69
Tennessee Imports from Western PA	Base	774	550	393
	MCTN	773	439	339
Tennessee Receipts from Transcanada	Base	1,051	256	97
	MCTN	1,050	261	133
Texas Eastern Downstate Deliveries	Base	705	705	340
	MCTN	705	705	247
Transco NJ to Long Is & Staten Is	Base	689	578	325
	MCTN	689	578	248
Transco NJ to Manhattan	Base	1,007	1,007	819
	MCTN	1,007	1,007	750

New York Monthly Average Gas Imports/Exports



Location	Case	Capacity	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Algonquin Exports to CT	Base	1,375	1,010	1,283	1,362	1,278	1,086	1,054	843	735	782	765	733	1,063
	MCTN	1,375	1,138	1,361	1,130	1,175	1,038	1,065	746	718	825	825	723	1,054
Algonquin Imports from NJ	Base	1,069	1,069	1,069	1,069	1,069	1,069	1,069	860	743	760	777	742	1,069
	MCTN	1,069	1,069	1,069	928	1,069	1,069	1,067	758	726	671	670	731	1,069
Columbia Imports from Western PA	Base	45	27	27	27	27	27	18	18	18	18	18	18	27
	MCTN	45	18	18	18	18	18	18	18	18	9	9	9	18
Dominion Imports from Western PA	Base	1,600	960	996	998	960	960	767	640	633	592	640	640	817
	MCTN	1,600	840	840	825	840	843	657	640	640	537	520	563	669
Empire State Receipts from Transcanada	Base	820	114	146	465	263	113	113	113	113	242	201	113	113
	MCTN	820	114	542	475	364	113	109	109	121	380	350	118	109
Iroquois Net Exports to CT	Base	1,000	587	522	468	588	594	276	-	53	200	200	-	222
	MCTN	1,000	600	687	362	645	601	258	-	-	85	116	-	400
Iroquois Deliveries to New York City	Base	778	169	367	416	300	290	110	367	622	679	664	205	133
	MCTN	778	381	225	602	311	311	311	428	245	617	489	399	165
Iroquois Receipts from Transcanada	Base	1,195	858	1,123	1,040	1,093	1,147	471	484	761	1,086	1,005	324	501
	MCTN	1,195	1,177	1,065	1,188	1,150	957	605	456	299	784	718	467	623
Millennium Deliveries to New York City	Base	167	2	67	100	92	33	-	-	-	-	-	-	18
	MCTN	167	56	102	99	89	25	-	-	-	-	-	-	-
National Fuel Imports from PA	Base	385	231	231	231	231	231	154	154	154	154	154	154	231
	MCTN	385	154	154	154	154	200	154	154	154	154	77	154	154
National Fuel Receipts from Transcanada	Base	426	25	32	99	56	24	24	24	24	52	43	24	24
	MCTN	426	25	119	101	78	24	23	23	26	82	76	25	23
Tennessee Exports to MA	Base	1,170	487	1,006	1,120	1,067	691	408	103	59	234	122	234	576
	MCTN	1,318	565	821	935	788	453	398	201	118	239	234	235	379
Tennessee Imports from NJ	Base	377	66	66	200	66	66	66	66	57	66	66	61	66
	MCTN	377	66	66	141	66	66	66	66	54	55	55	59	66
Tennessee Imports from Western PA	Base	774	464	545	536	549	464	395	309	283	240	257	289	396
	MCTN	773	395	395	381	395	395	345	309	309	240	246	288	375
Tennessee Receipts from Transcanada	Base	1,051	61	79	256	145	62	62	62	62	133	111	62	62
	MCTN	1,050	61	291	261	200	62	60	60	66	211	195	65	60
Texas Eastern Downstate Deliveries	Base	705	417	564	627	564	423	314	282	26	102	79	282	405
	MCTN	705	282	564	565	477	282	141	88	147	-	141	-	282
Transco NJ to Long Is & Staten Is	Base	689	413	487	551	541	448	413	193	138	138	138	185	276
	MCTN	689	409	517	551	413	275	255	-	138	33	46	131	222
Transco NJ to Manhattan	Base	1,007	885	1,007	1,007	1,007	1,007	806	675	541	714	665	640	879
	MCTN	1,007	962	1,007	1,007	1,007	790	604	468	604	621	640	579	724

RIAMS Model Projections for Peak Day Unmet Gas Demand (MMcfd)



Peak Day Jan 2018	FIRM				INTERRUPTIBLE				TOTAL UNMET DEMAND			
	Power	Industrial	Residential/ Commercial	Total	Power	Industrial	Residential/ Commercial	Total	Power	Industrial	Residential/ Commercial	Total
Upstate East	0	0	0	0	-10	-1	-1	-12	-10	-1	-1	-12
Upstate West	0	0	-3	-3	0	-3	-2	-5	0	-3	-5	-8
Downstate	0	0	-3	-4	-4	-2	-10	-15	-4	-2	-13	-18
Total New York	0	0	-6	-7	-13	-6	-12	-32	-14	-6	-18	-39
New England	Not Broken Out Firm and Int				-122	-35	-212	-369	-122	-35	-212	-369
Total New York and New England	0	0	-6	-7	-135	-41	-225	-401	-136	-41	-231	-407

- A little over 400 MMcfd of unmet demand on a peak day.
 - 90% of unmet demand is in New England.
 - Remaining 10% of unmet demand (39 MMcfd) is in New York State.
 - About half of New York’s unmet demand (15 MMcfd) is Downstate.
 - Less than 20% of unmet demand (7 MMcfd) is associated with Firm load.

RIAMS Model Conclusions

Much Colder Than Normal Weather Case



- Flows on most pipelines similar to reference 2018 case.
 - Most pipelines are very full on a peak day.
- Unmet demand of about 400 MMcf per day in New York and New England due to pipeline constraints.
 - The majority of unmet demand is in New England.
- Relative to the Reference Case, on a Peak Day 2018:
 - Decrease of throughput on Algonquin, Iroquois, and Tennessee to New England, which are down a combined total of 250 MMcfd.
 - New England's LNG imports are up by 120 MMcfd.
 - New England's imports from Canada (which includes LNG from the Canaport terminal) are up by 260 MMcfd.

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