

# NYSERDA Repower Case Results

**July 1, 2009**

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# Sensitivity Assumptions



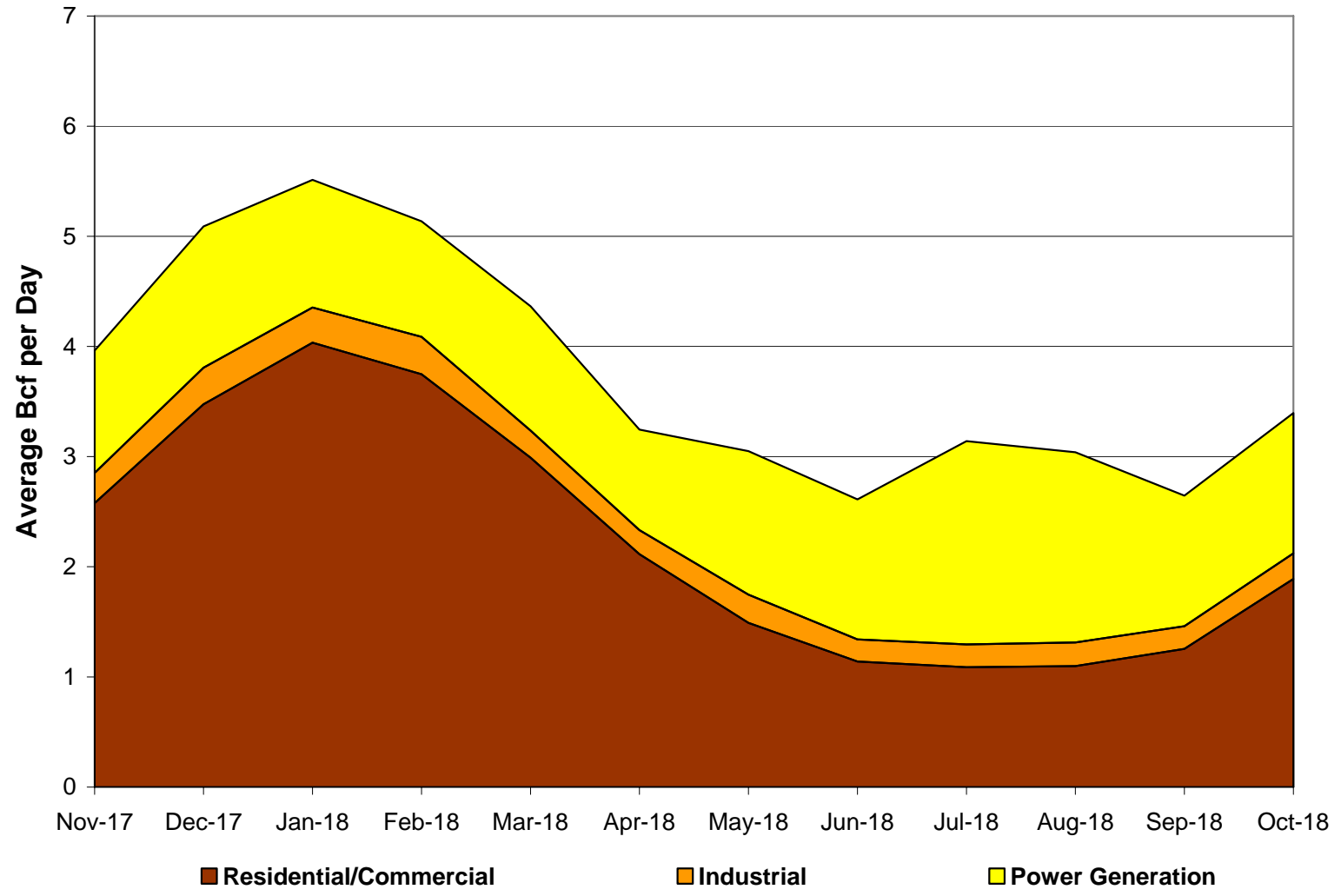
- Case assumes that 20 ST units (7,200 MWs) were repowered to CC units all in Downstate New York.
- On a 2018 peak day, total New York gas consumption for Power increases by 110 MMcfd.
- There is a shift to downstate consumption of 450 MMcfd.

## Peak Day Gas Consumption

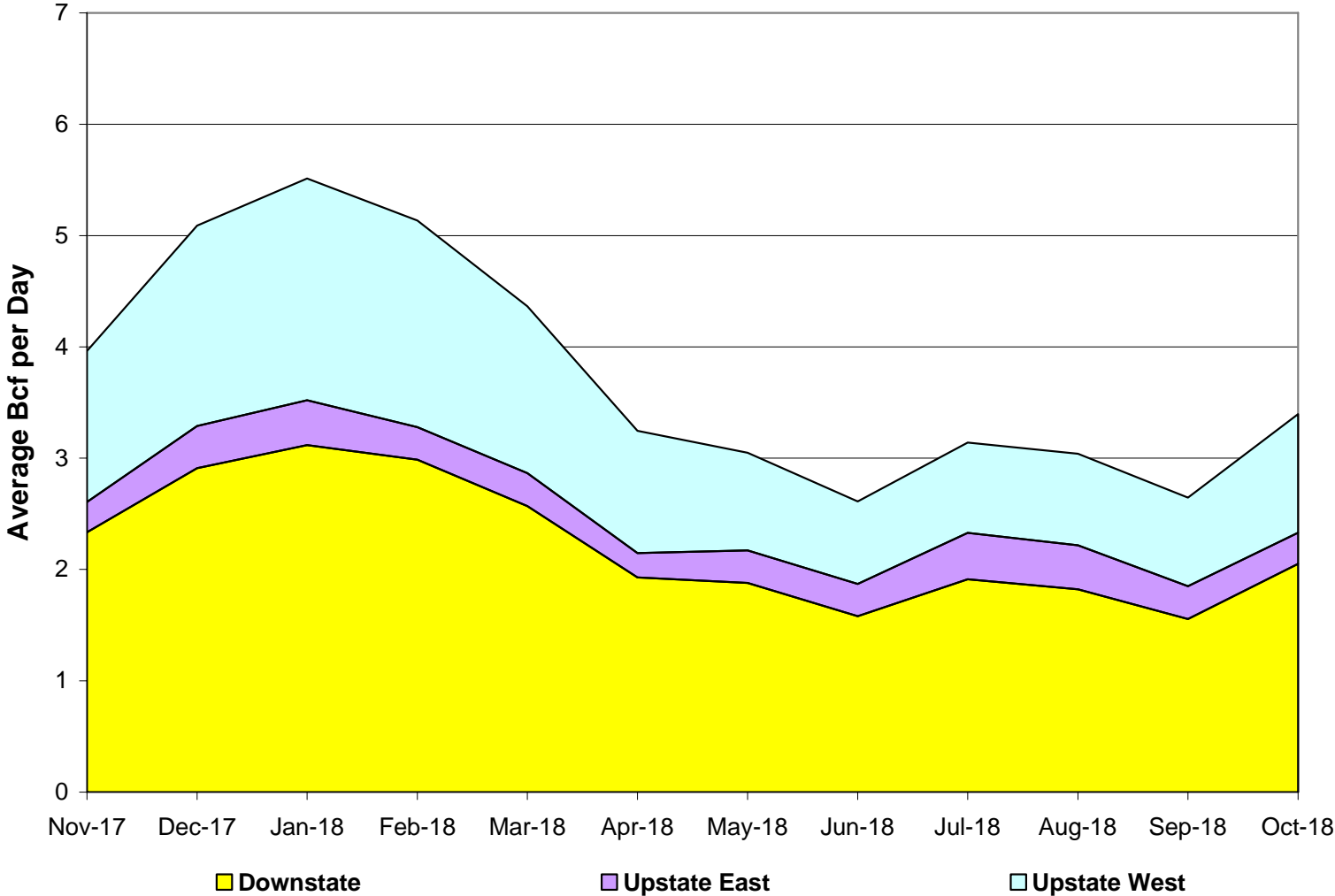
Region	Reference Case				Repower Case			
	Firm	Interruptible	Total	Percent	Firm	Interruptible	Total	Percent
Upstate East	130	352	482	36%	59	186	246	17%
Upstate West	177	9	186	14%	81	6	86	6%
Downstate	<u>527</u>	<u>157</u>	<u>685</u>	<u>51%</u>	<u>577</u>	<u>555</u>	<u>1,132</u>	<u>77%</u>
Total New York	835	518	1,353	100%	717	747	1,464	100%

# Peak Day – RIAMS Results January 2018

# Seasonal Consumption by Sector: 2017 -2018



# Seasonal Consumption by Region: 2017 -2018



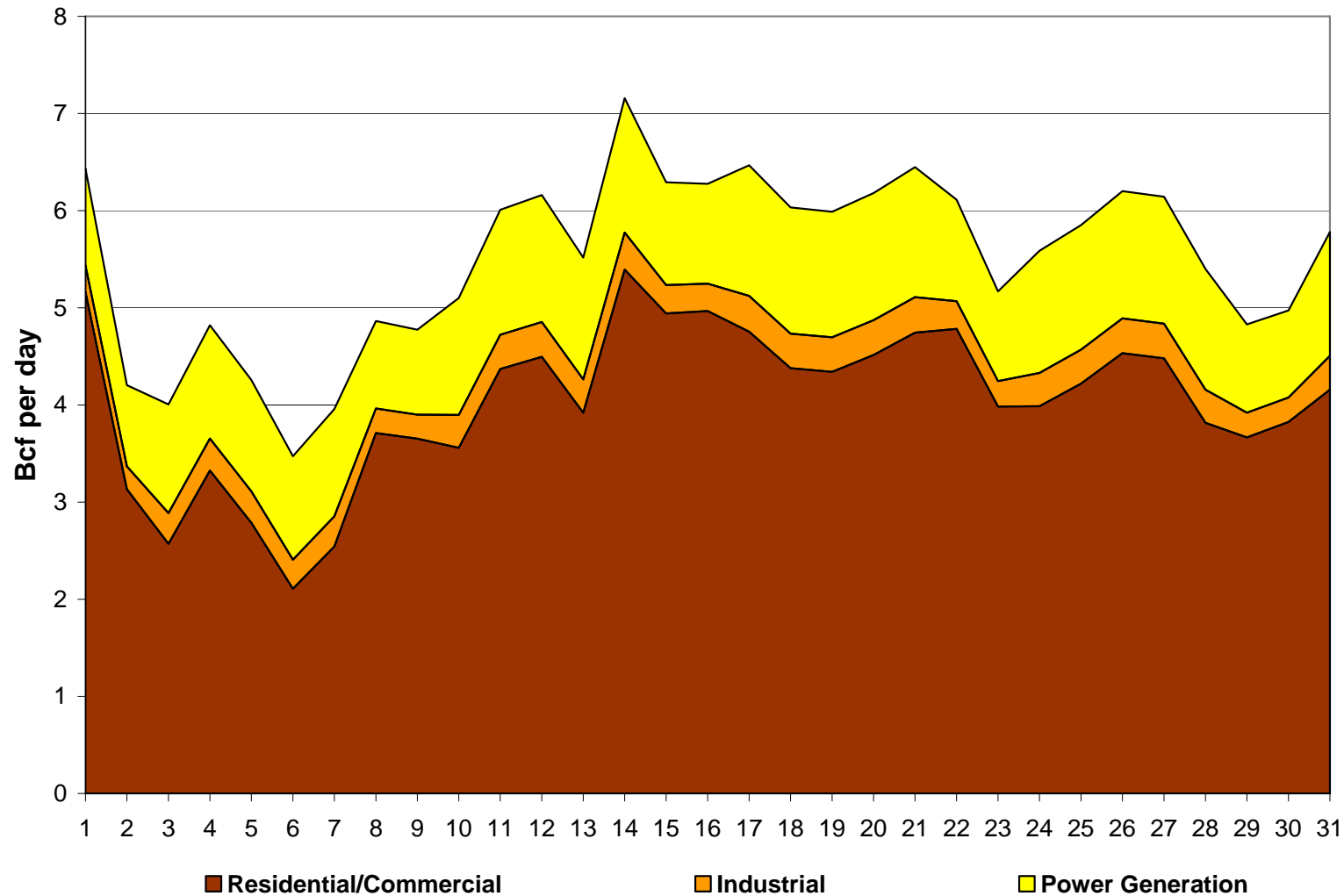
# Daily RIAMS Conditions

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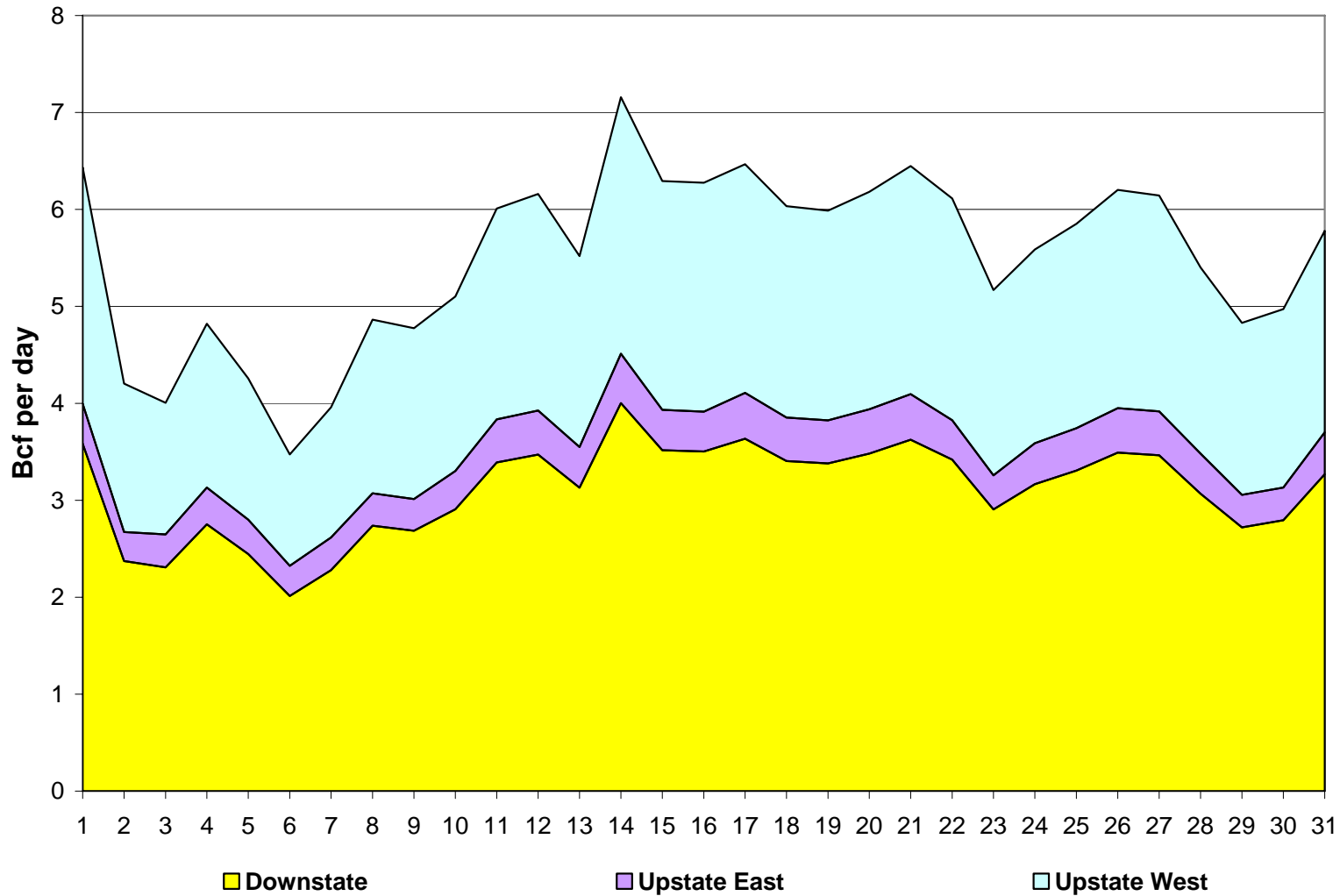


- Projected for January 2018.
- Assumed temperatures on the peak day
  - New York City is 5 degrees Fahrenheit on the peak gas demand day
    - Average temperature in January is 33 degrees; Average minimum is 15 degrees
  - Buffalo is -3 degrees Fahrenheit on on the peak gas demand day
    - Average temperature in January is 25 degrees; Average minimum is 7 degrees

# Daily Consumption by Sector: Jan 2018



# Daily Consumption by Region: Jan 2018





# New York Gas Peak and Average Day Imports/Exports



Location	Case	Capacity	Peak Day	Avg Day
Algonquin Exports to CT	Base	1,375	1,375	998
	Repower	1,375	1,217	968
Algonquin Imports from NJ	Base	1,069	1,069	946
	Repower	1,069	1,069	981
Columbia Imports from Western PA	Base	45	27	22
	Repower	45	27	22
Dominion Imports from Western PA	Base	1,600	1,119	799
	Repower	1,600	1,160	795
Empire State Receipts from Transcanada	Base	820	465	176
	Repower	820	465	176
Iroquois Net Exports to CT	Base	1,000	420	308
	Repower	1,000	309	293
Iroquois Deliveries to New York City	Base	778	437	362
	Repower	778	643	424
Iroquois Receipts from Transcanada	Base	1,195	1,035	825
	Repower	1,195	1,042	828
Millennium Deliveries to New York City	Base	167	167	26
	Repower	167	167	104
National Fuel Imports from PA	Base	385	231	192
	Repower	385	231	211
National Fuel Receipts from Transcanada	Base	426	99	38
	Repower	426	99	38
Tennessee Exports to MA	Base	1,170	1,055	507
	Repower	1,318	1,199	551
Tennessee Imports from NJ	Base	377	377	76
	Repower	377	377	91
Tennessee Imports from Western PA	Base	774	550	393
	Repower	773	550	451
Tennessee Receipts from Transcanada	Base	1,051	256	97
	Repower	1,050	256	97
Texas Eastern Downstate Deliveries	Base	705	705	340
	Repower	705	705	321
Transco NJ to Long Is & Staten Is	Base	689	578	325
	Repower	689	578	307
Transco NJ to Manhattan	Base	1,007	1,007	819
	Repower	1,007	1,007	823

# New York Monthly Average Gas Imports/Exports



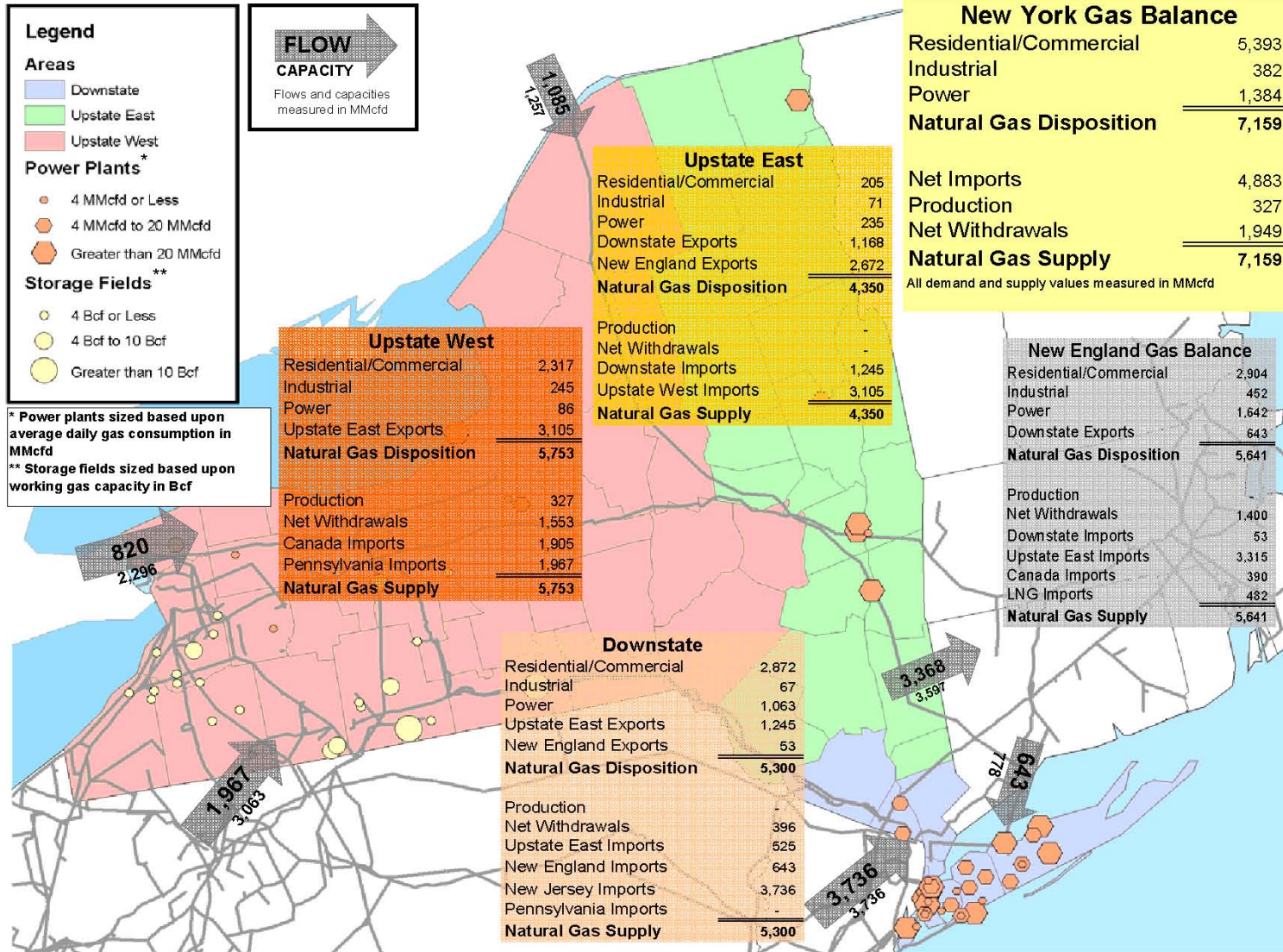
Location	Case	Capacity	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Algonquin Exports to CT	Base	1,375	1,010	1,283	1,362	1,278	1,086	1,054	843	735	782	765	733	1,063
	Repower	1,375	998	1,183	1,245	1,226	996	1,001	857	714	792	792	825	1,002
Algonquin Imports from NJ	Base	1,069	1,069	1,069	1,069	1,069	1,069	1,069	860	743	760	777	742	1,069
	Repower	1,069	1,069	1,069	1,069	1,069	1,069	1,069	922	777	855	855	888	1,069
Columbia Imports from Western PA	Base	45	27	27	27	27	27	18	18	18	18	18	18	27
	Repower	45	27	27	27	27	27	18	18	18	18	18	18	27
Dominion Imports from Western PA	Base	1,600	960	996	998	960	960	767	640	633	592	640	640	817
	Repower	1,600	896	920	960	1,006	981	811	640	640	640	640	640	782
Empire State Receipts from Transcanada	Base	820	114	146	465	263	113	113	113	113	242	201	113	113
	Repower	820	114	146	465	263	113	113	113	113	242	201	113	113
Iroquois Net Exports to CT	Base	1,000	587	522	468	588	594	276	-	53	200	200	-	222
	Repower	1,000	584	459	385	468	619	250	2	77	268	231	-	184
Iroquois Deliveries to New York City	Base	778	169	367	416	300	290	110	367	622	679	664	205	133
	Repower	778	233	481	578	498	339	180	433	622	622	645	226	225
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
	Repower	1,195	863	1,131	1,051	1,100	1,159	471	479	764	1,086	1,005	323	504
Millennium Deliveries to New York City	Base	167	2	67	100	92	33	-	-	-	-	-	-	18
	Repower	167	115	167	167	167	87	92	43	65	102	75	53	118
National Fuel Imports from PA	Base	385	231	231	231	231	231	154	154	154	154	154	154	231
	Repower	385	231	265	253	231	308	231	154	154	154	154	154	244
National Fuel Receipts from Transcanada	Base	426	25	32	99	56	24	24	24	24	52	43	24	24
	Repower	426	25	32	99	56	24	24	24	24	52	43	24	24
Tennessee Exports to MA	Base	1,170	487	1,006	1,120	1,067	691	408	103	59	234	122	234	576
	Repower	1,318	502	1,169	1,318	1,235	756	486	88	56	156	65	142	675
Tennessee Imports from NJ	Base	377	66	66	200	66	66	66	66	57	66	66	61	66
	Repower	377	66	66	302	131	66	66	66	66	66	66	66	66
Tennessee Imports from Western PA	Base	774	464	545	536	549	464	395	309	283	240	257	289	396
	Repower	773	549	576	549	618	549	430	309	309	309	309	309	607
Tennessee Receipts from Transcanada	Base	1,051	61	79	256	145	62	62	62	62	133	111	62	62
	Repower	1,050	61	79	256	145	62	62	62	62	133	111	62	62
Texas Eastern Downstate Deliveries	Base	705	417	564	627	564	423	314	282	26	102	79	282	405
	Repower	705	423	564	575	484	452	371	141	23	128	141	282	282
Transco NJ to Long Is & Staten Is	Base	689	413	487	551	541	448	413	193	138	138	138	185	276
	Repower	689	322	432	551	551	413	276	264	138	138	90	179	346
Transco NJ to Manhattan	Base	1,007	885	1,007	1,007	1,007	1,007	806	675	541	714	665	640	879
	Repower	1,007	1,007	1,007	1,007	1,007	1,007	800	769	533	684	630	608	824

# Peak Day Maps January 2018

# New York State Balance

## NYSDERA Repower Case

Peak Day 2018

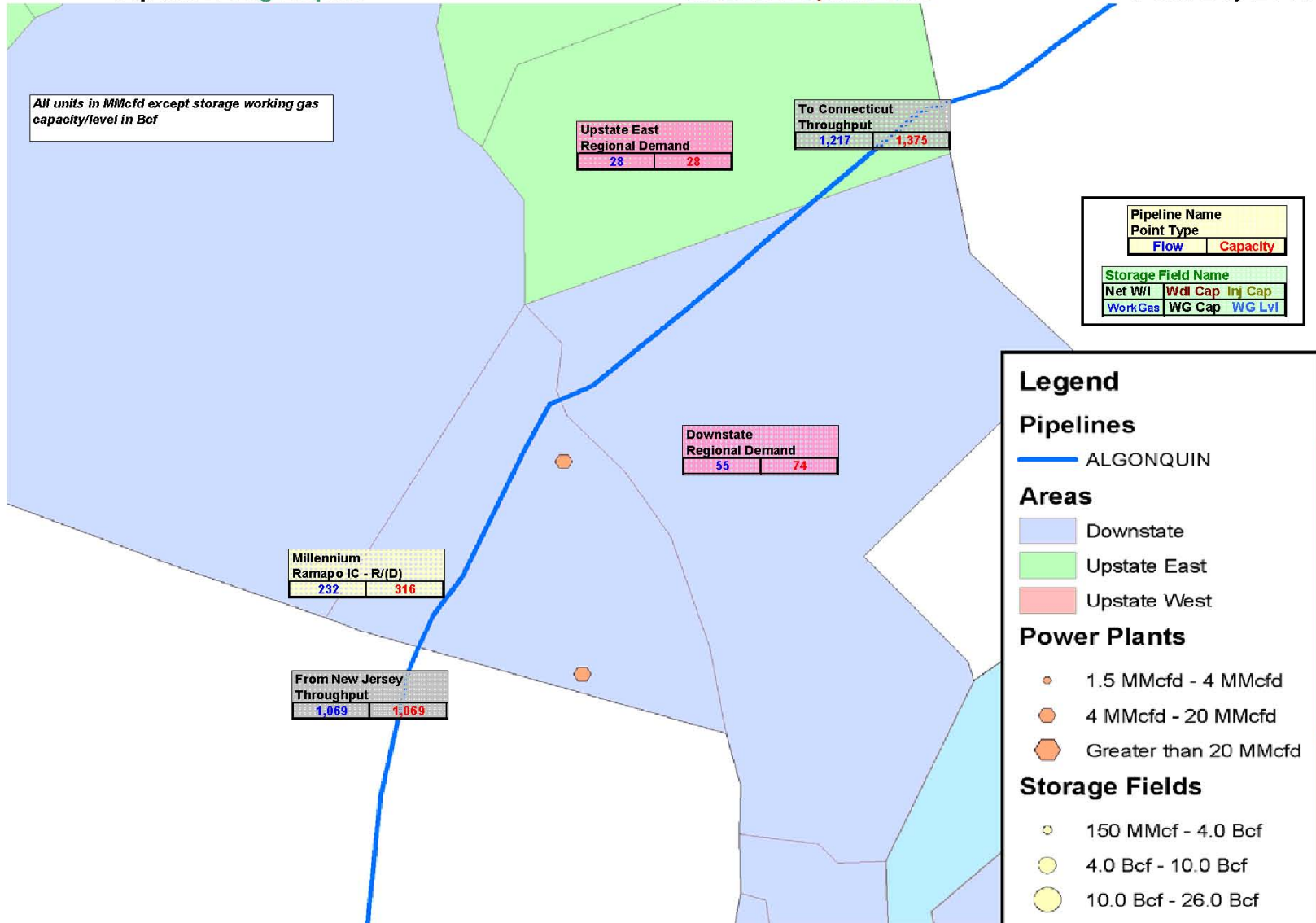


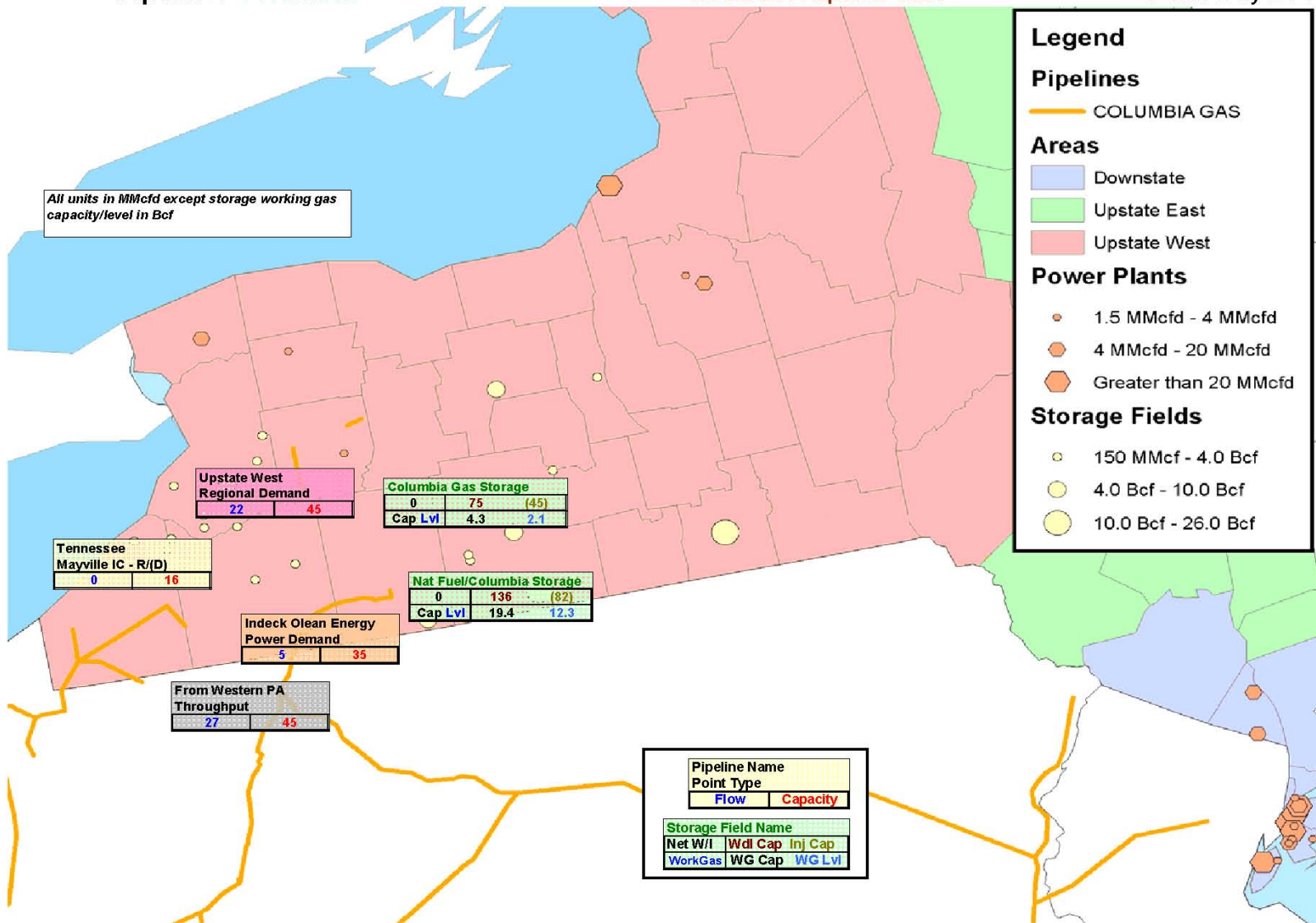
# Pipeline: Algonquin

## NYSERDA Repower Case

Peak Day 2018

All units in MMcfd except storage working gas capacity/level in Bcf





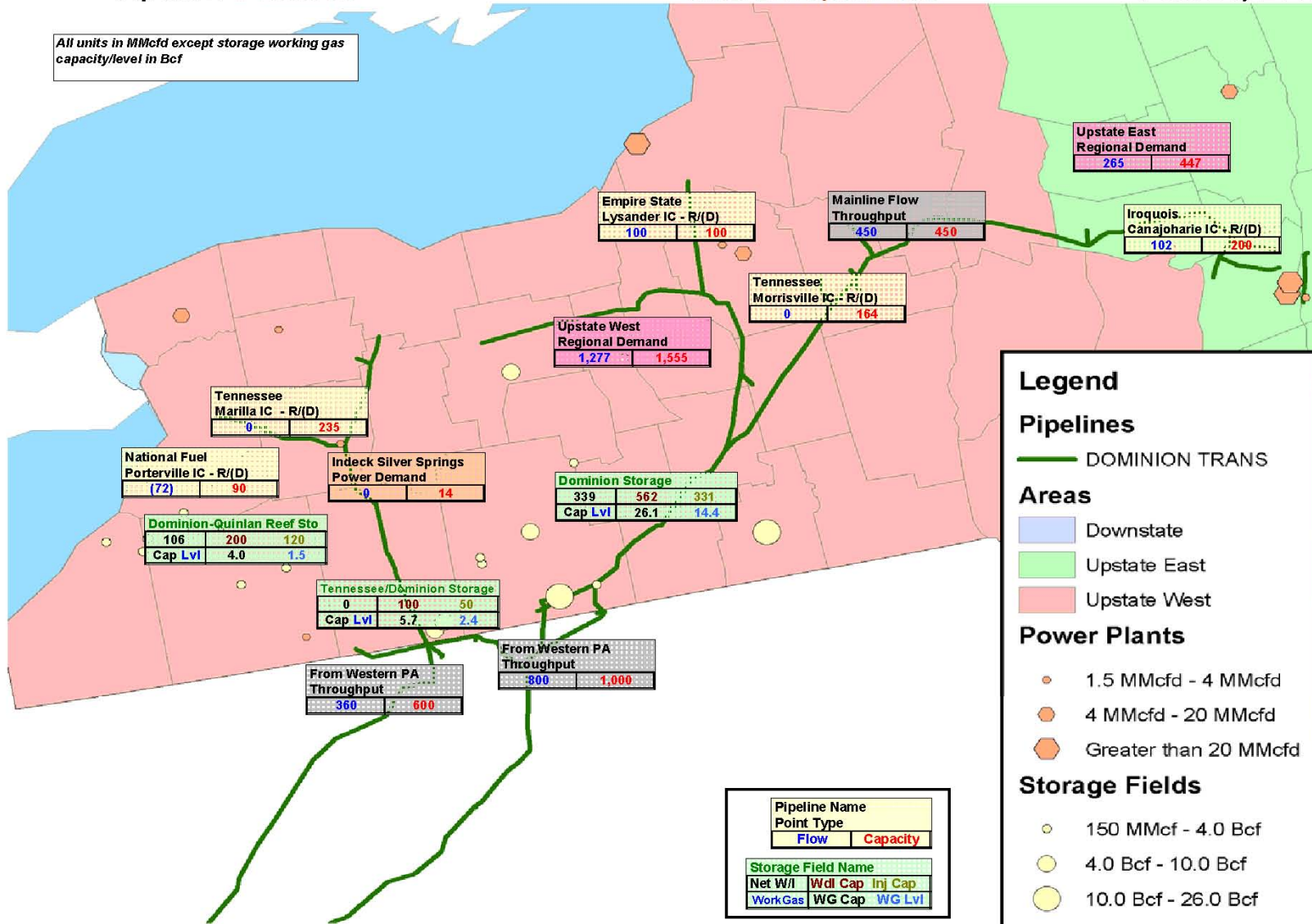
All units in MMcfd except storage working gas capacity/level in Bcf

# Pipeline: Dominion

## NYSERDA Repower Case

Peak Day 2018

All units in MMcfd except storage working gas capacity/level in Bcf

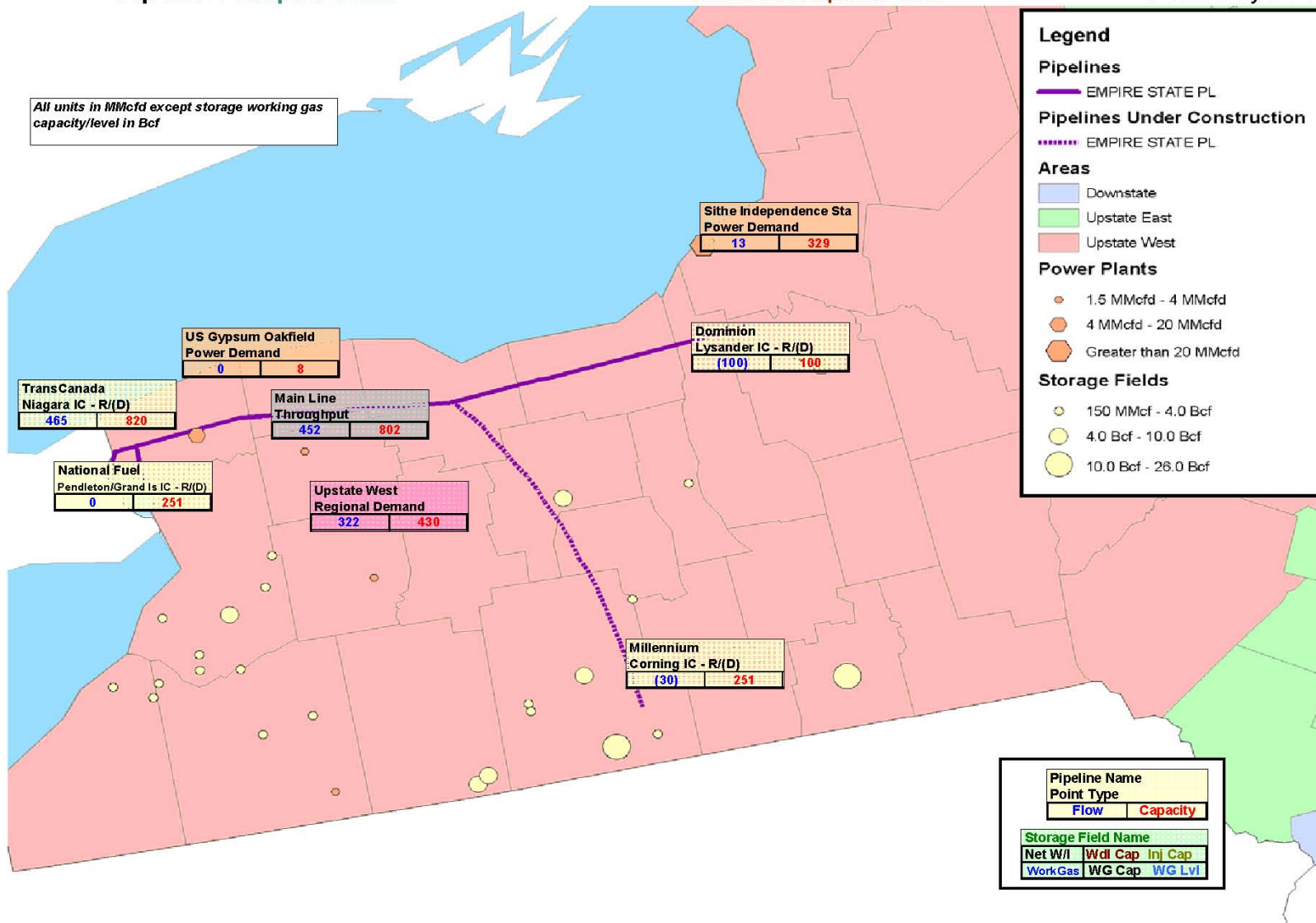


# Pipeline: Empire State

## NYSERDA Repower Case

Peak Day 2018

All units in MMcfd except storage working gas capacity/level in Bcf



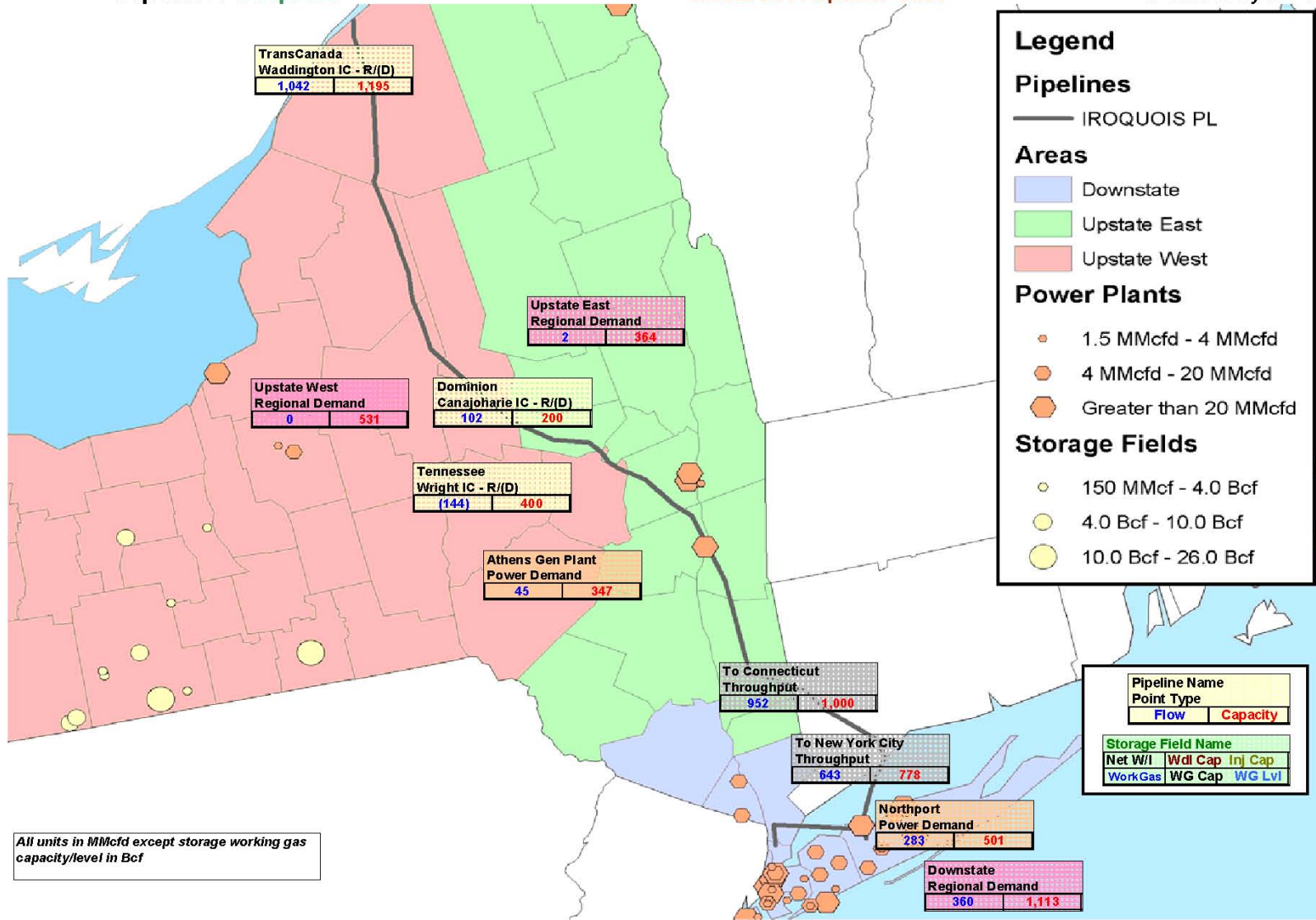
Pipeline Name	
Point Type	
Flow	Capacity
Storage Field Name	
Net W/I	Wd Cap Inj Cap
WorkGas	WG Cap WG LVI



# Pipeline: Iroquois

## NYSERDA Repower Case

Peak Day 2018



All units in MMcfd except storage working gas capacity/level in Bcf

# Pipeline: Millennium

# NYSERDA Repower Case

# Peak Day 2018

All units in MMcf/d except storage working gas capacity/level in Bcf

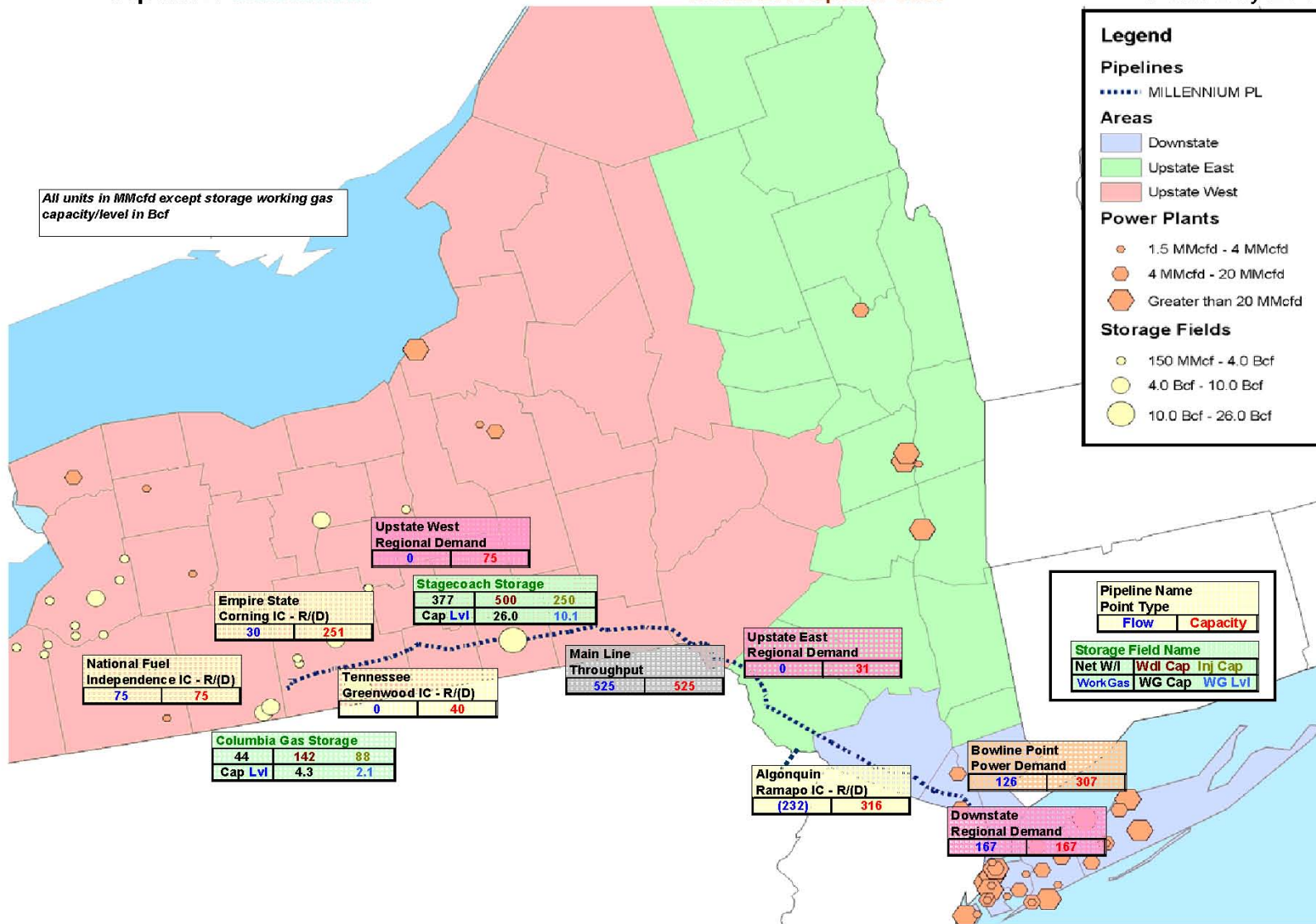
**Legend**

**Pipelines**  
 ..... MILLENNIUM PL

**Areas**  
 Downstate  
 Upstate East  
 Upstate West

**Power Plants**  
 1.5 MMcf/d - 4 MMcf/d  
 4 MMcf/d - 20 MMcf/d  
 Greater than 20 MMcf/d

**Storage Fields**  
 150 MMcf - 4.0 Bcf  
 4.0 Bcf - 10.0 Bcf  
 10.0 Bcf - 26.0 Bcf



**Upstate West Regional Demand**

0	75
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**Stagecoach Storage**

377	500	250
Cap Lvl	26.0	10.1

**Empire State Corning IC - R/(D)**

30	251
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**National Fuel Independence IC - R/(D)**

75	75
----	----

**Columbia Gas Storage**

44	142	88
Cap Lvl	4.3	2.1

**Tennessee Greenwood IC - R/(D)**

0	40
---	----

**Main Line Throughput**

525	525
-----	-----

**Upstate East Regional Demand**

0	31
---	----

**Algonquin Ramapo IC - R/(D)**

(232)	316
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**Bowline Point Power Demand**

126	307
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**Downstate Regional Demand**

167	167
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**Pipeline Name**

**Point Type**

Flow	Capacity
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**Storage Field Name**

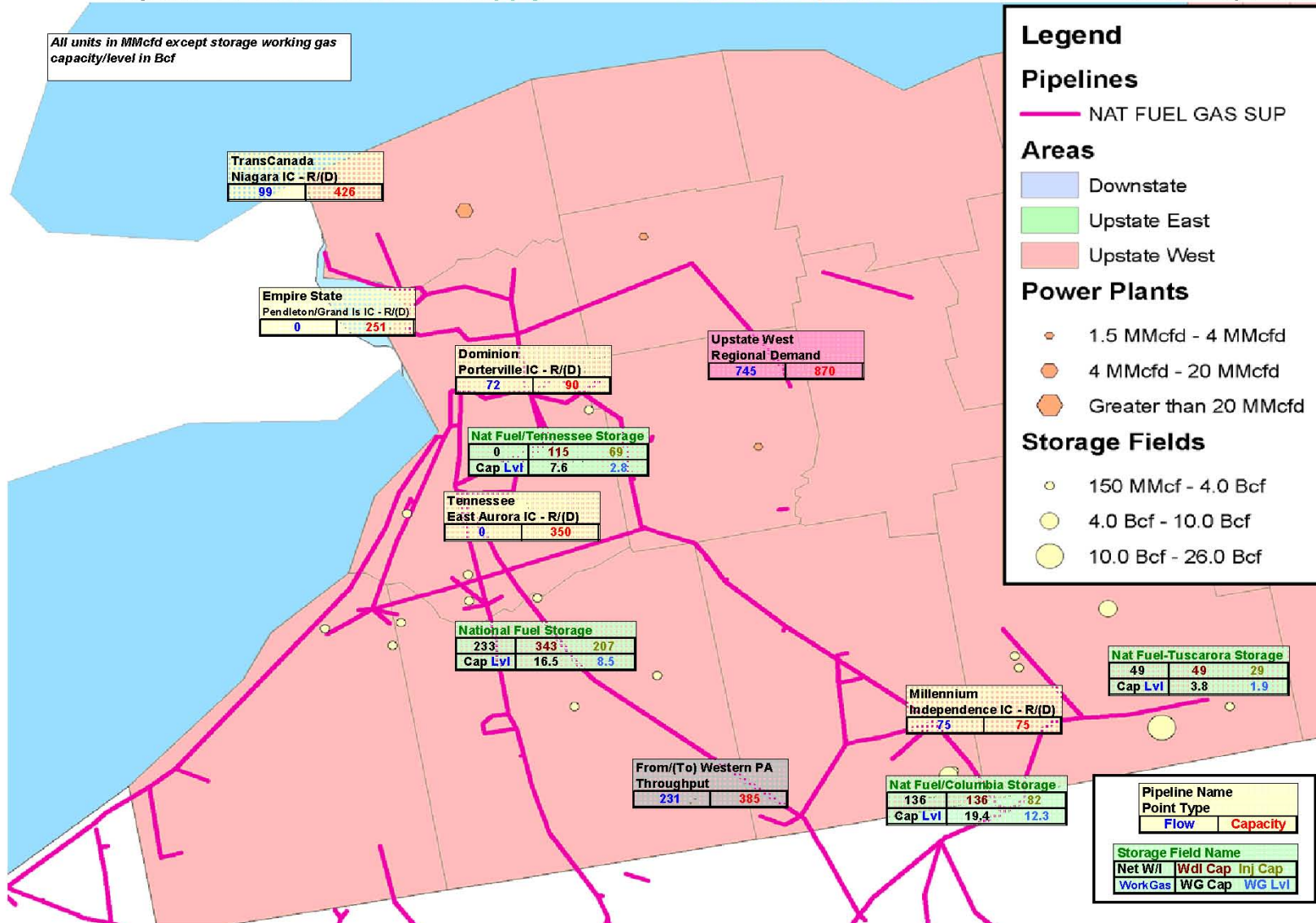
Net W/l	Wdl Cap	Inj Cap
WorkGas	WG Cap	WG Lvl

# Pipeline: National Fuel Gas Supply

## NYSERDA Repower Case

Peak Day 2018

All units in MMcfd except storage working gas capacity/level in Bcf



Pipeline: Tennessee Gas PL

NYSERDA Repower Case

Peak Day 2018

Pipeline Name	
Point Type	
Flow	Capacity
Storage Field Name	
Net W/I	Wdl Cap Inj Cap
WorkGas	WG Cap WG Lvl

All units in MMcfd except storage working gas capacity/level in Bcf

**Legend**

**Pipelines**

- TENNESSEE GAS PL

**Areas**

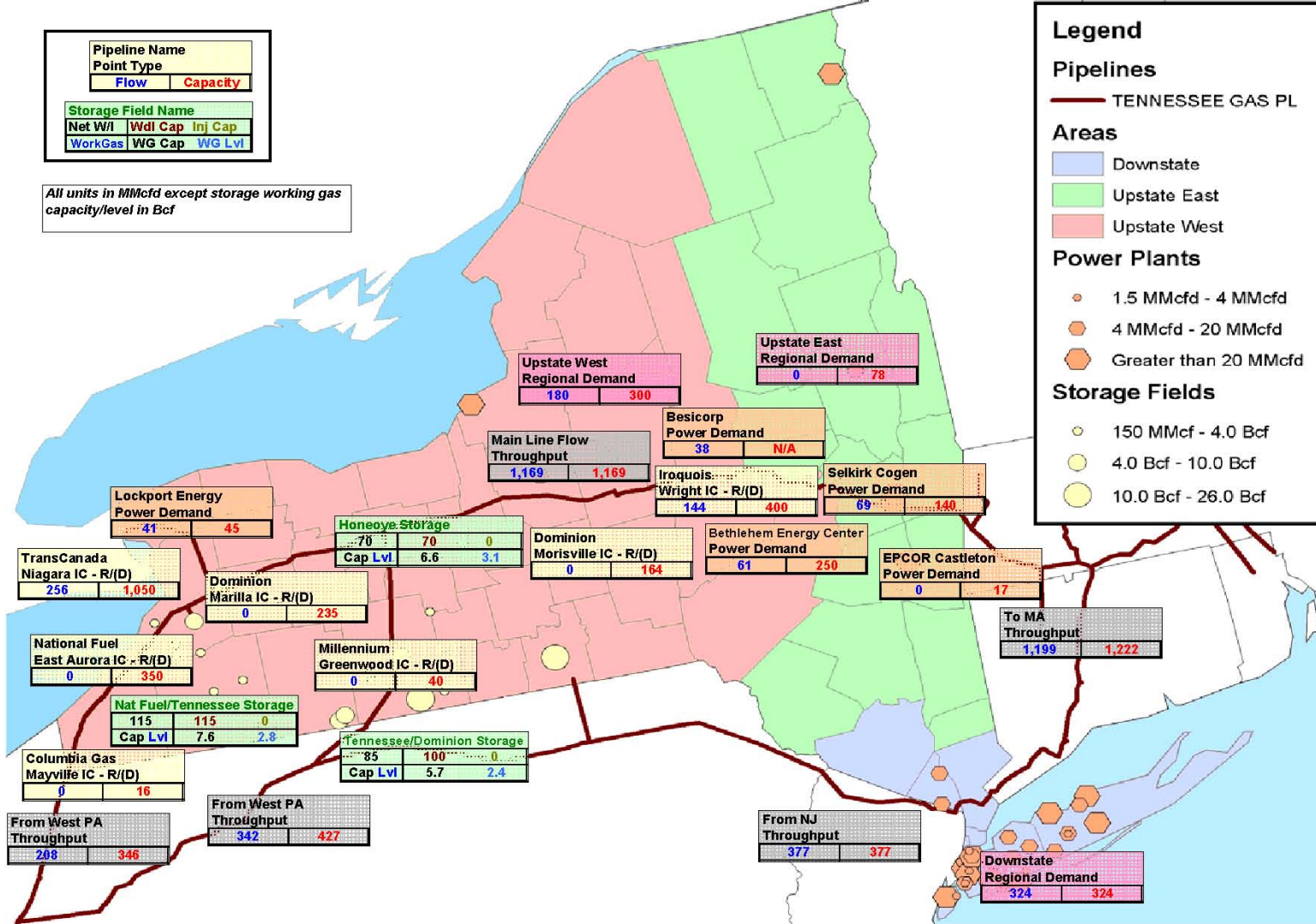
- Downstate
- Upstate East
- Upstate West

**Power Plants**

- 1.5 MMcfd - 4 MMcfd
- 4 MMcfd - 20 MMcfd
- Greater than 20 MMcfd

**Storage Fields**

- 150 MMcf - 4.0 Bcf
- 4.0 Bcf - 10.0 Bcf
- 10.0 Bcf - 26.0 Bcf

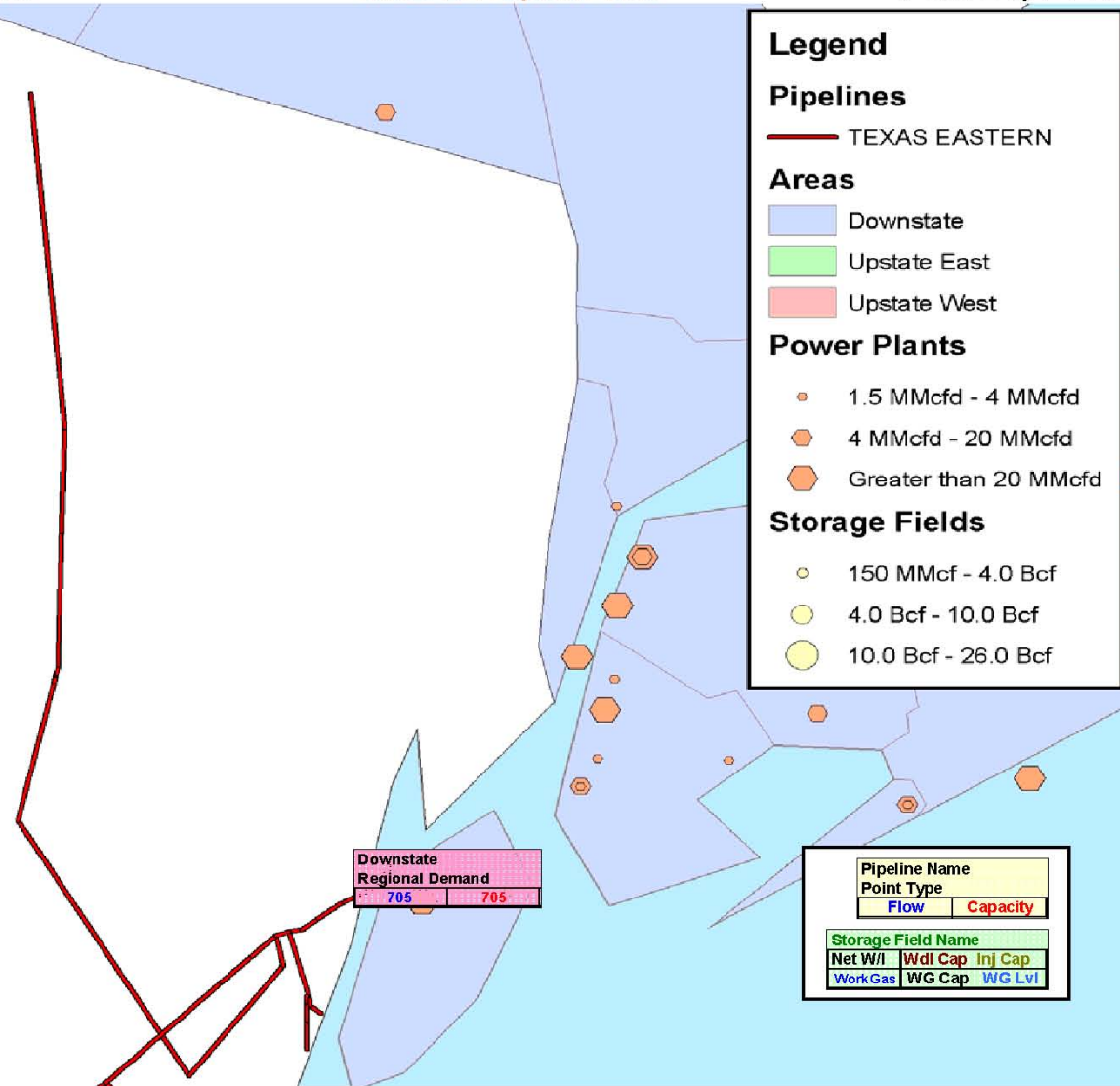


# Pipeline: Texas Eastern

NYSERDA Repower Case

Peak Day 2018

All units in MMcfd except storage working gas capacity/level in Bcf



**Legend**

**Pipelines**

- TEXAS EASTERN

**Areas**

- Downstate
- Upstate East
- Upstate West

**Power Plants**

- 1.5 MMcfd - 4 MMcfd
- 4 MMcfd - 20 MMcfd
- Greater than 20 MMcfd

**Storage Fields**

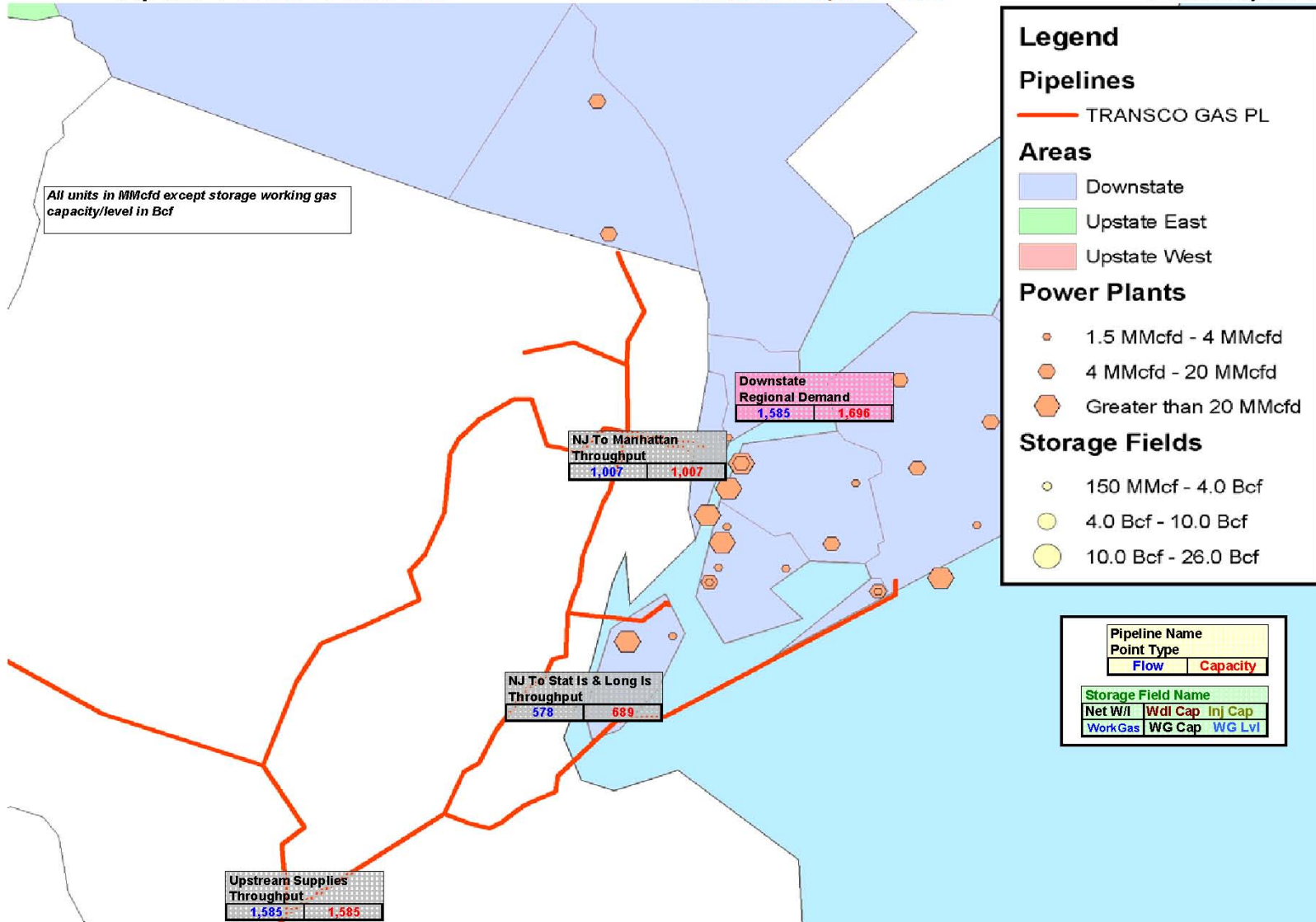
- 150 MMcf - 4.0 Bcf
- 4.0 Bcf - 10.0 Bcf
- 10.0 Bcf - 26.0 Bcf

Pipeline Name		
Point Type		
Flow	Capacity	
Storage Field Name		
Net W/l	W/dl Cap	Inj Cap
WorkGas	WG Cap	WG Lvl

Pipeline: **Transcontinental**

**NYSERDA Repower Case**

Peak Day 2018



# RIAMS Model Curtailments Repower Case



Peak Day 2018 Repower Case	Firm				Interruptible				Total Unmet Demand			
	Power	Industrial	Residential / Commercial	Total	Power	Industrial	Residential / Commercial	Total	Power	Industrial	Residential / Commercial	Total
New York												
Upstate East	0	0	0	0	-11	-2	-1	-13	-11	-2	-1	-14
Upstate West	0	0	-2	-3	0	-4	-2	-7	0	-5	-4	-9
Downstate	-36	-4	-36	-77	-33	-16	-17	-66	-69	-21	-54	-144
Total New York	-37	-5	-39	-80	-44	-23	-20	-86	-81	-27	-59	-166
New England	Not Broken Out Firm and IT				-120	-33	-212	-365	-120	-33	-212	-365
Total New York and New England	-37	-5	-39	-80	-163	-56	-232	-451	-200	-60	-271	-531

- Case has about 530 MMcf per day of unmet demand on a peak day.
  - 68% in New England
  - Remaining 32% in New York
    - 86% of curtailments in New York or 144 MMcfd per day in Downstate
    - Approximately 50% of curtailments are firm

# RIAMS Model Conclusions

## Repower Case

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- Flows on most pipelines similar to reference 2018 case.
  - Most pipelines are very full on a peak day.
- Unmet demand of about 530 MMcf per day in New York and New England due to pipeline constraints.
- Relative to the Reference Case, on a Peak Day 2018:
  - Increased use of Iroquois into Long Island, 200 MMcfd
    - Reduced deliveries to Dominion on Iroquois
  - Decrease of throughput on Algonquin to New England, -150 MMcfd

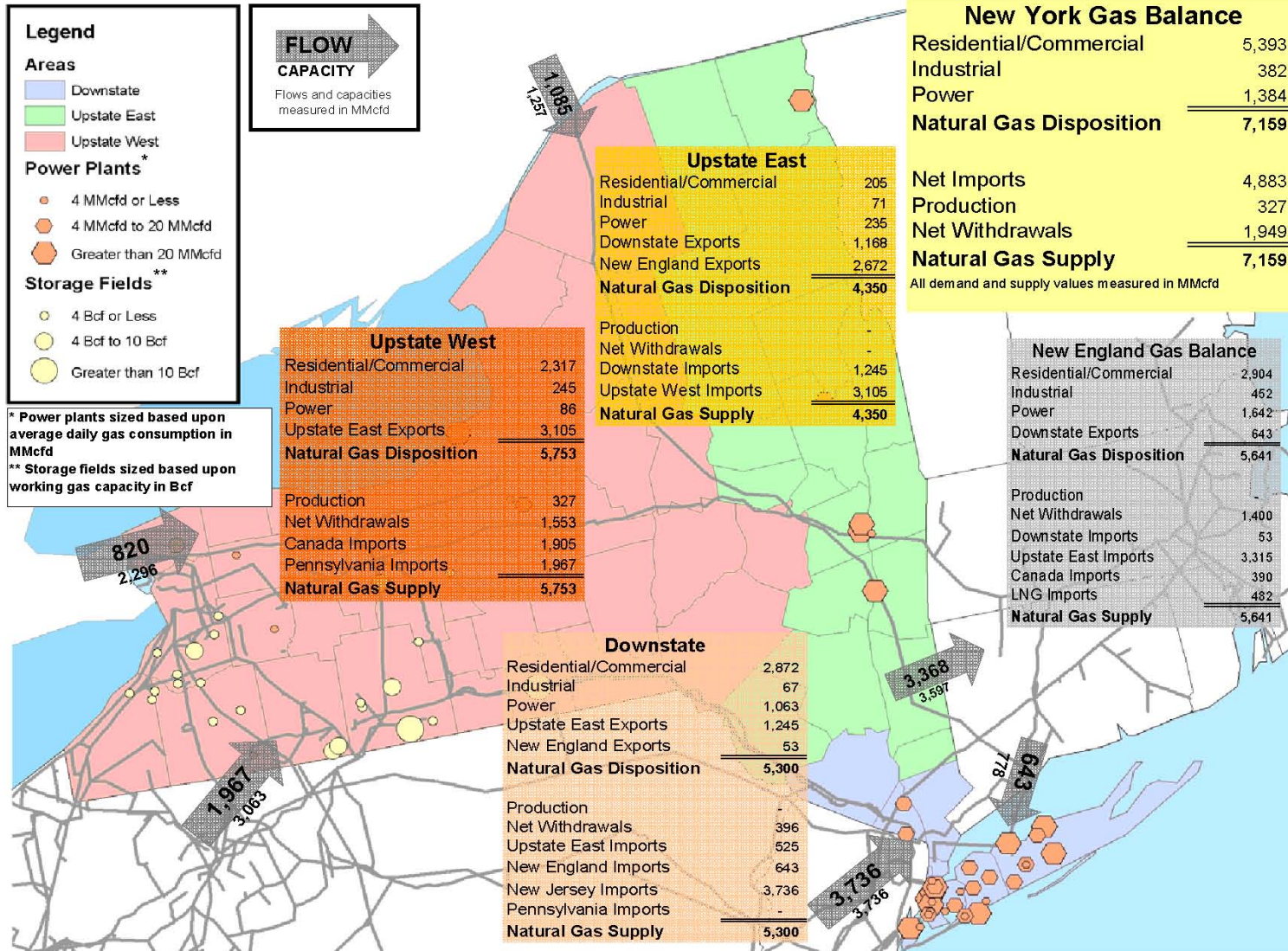


# 2017-18 Average Day Flow Maps

# New York State Balance

## NYSDERA Repower Case

Peak Day 2018

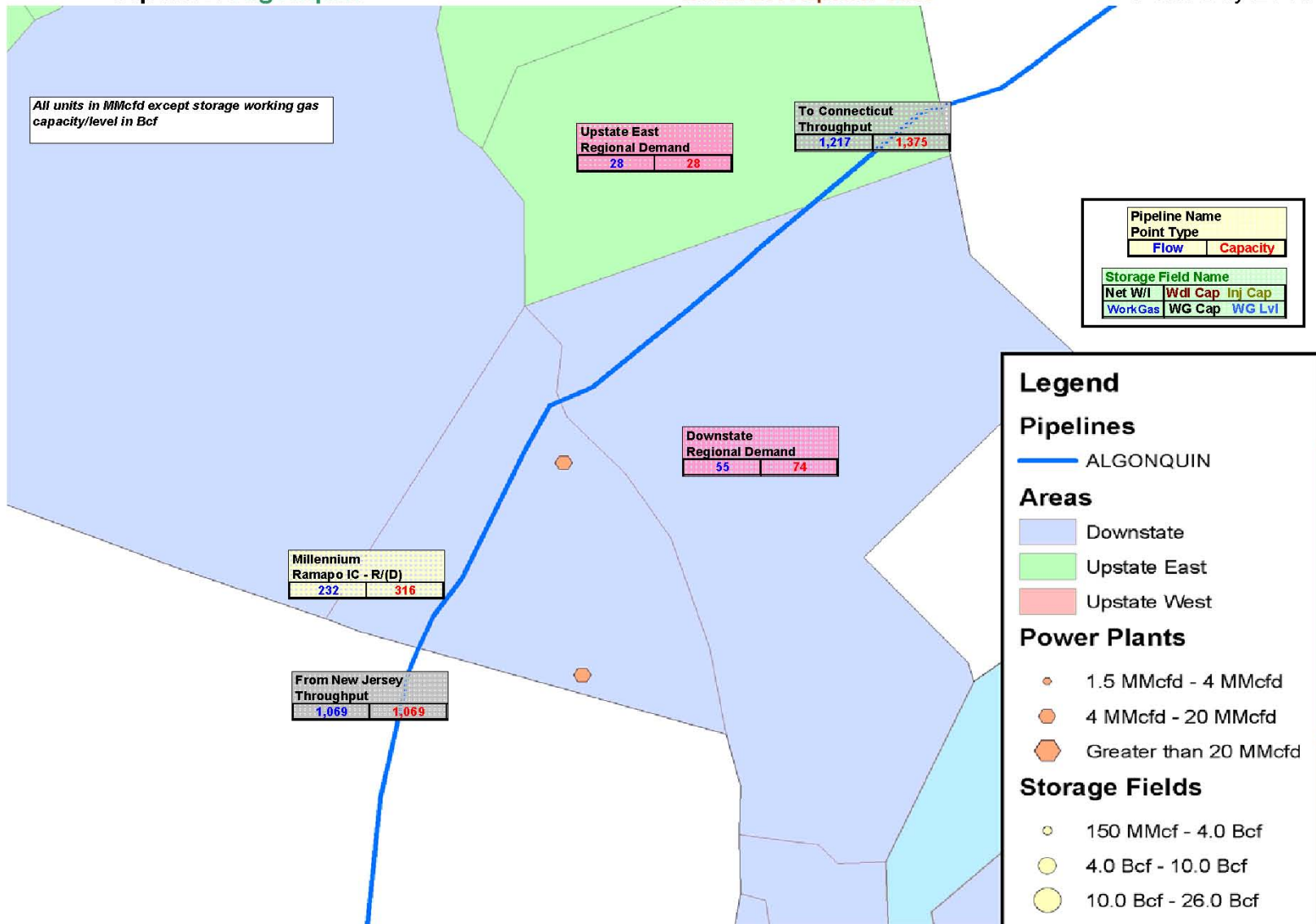


# Pipeline: Algonquin

## NYSERDA Repower Case

Peak Day 2018

All units in MMcf/d except storage working gas capacity/level in Bcf



Upstate East Regional Demand	
28	28

To Connecticut Throughput	
1,217	1,375

Pipeline Name		
Point Type		
Flow	Capacity	
Storage Field Name		
Net W/I	Wd Cap	Inj Cap
WorkGas	WG Cap	WG Lvl

Downstate Regional Demand	
55	74

Millennium Ramapo IC - R/(D)	
232	316

From New Jersey Throughput	
1,069	1,069

### Legend

**Pipelines**

- ALGONQUIN

**Areas**

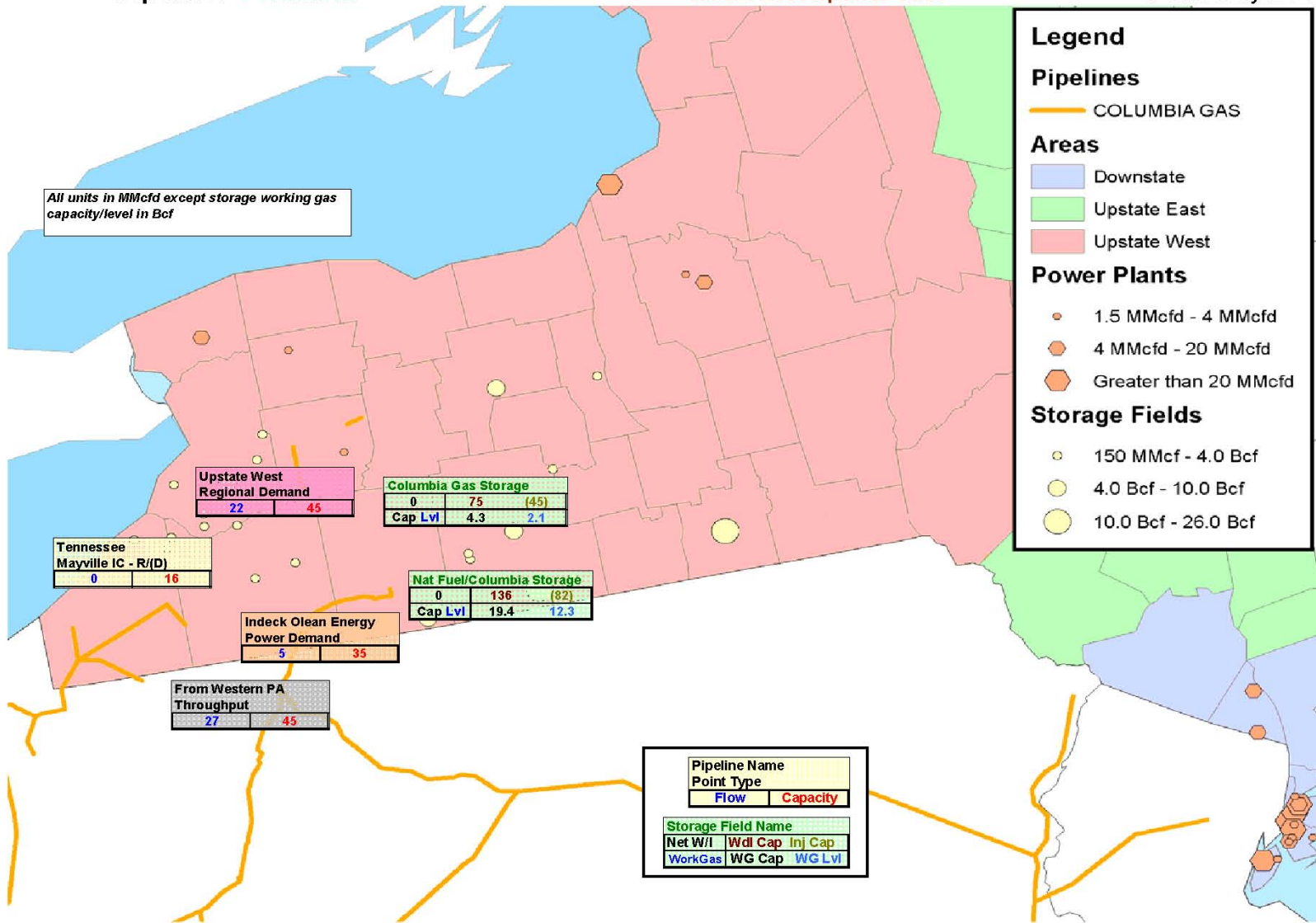
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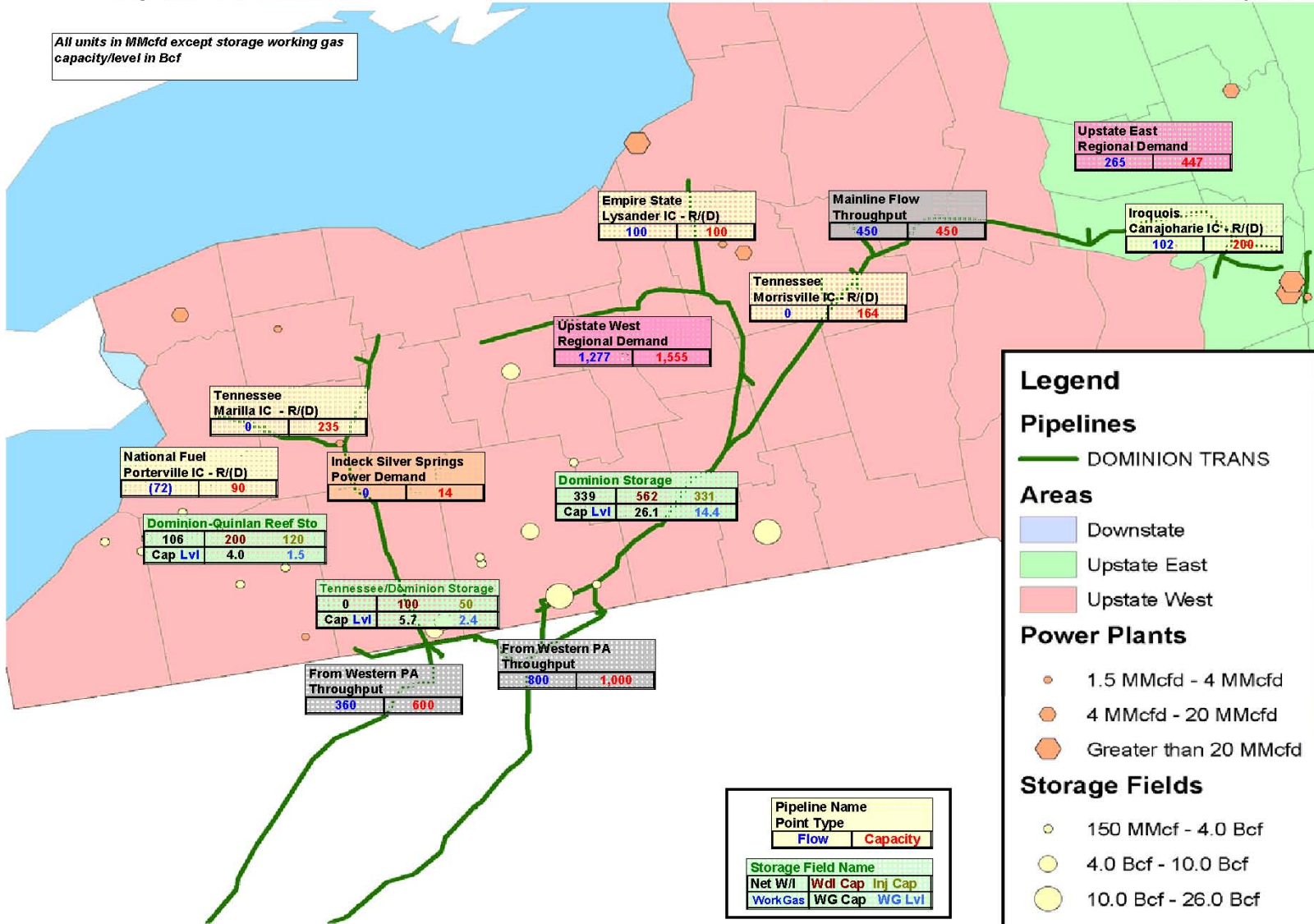
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# Pipeline: Dominion

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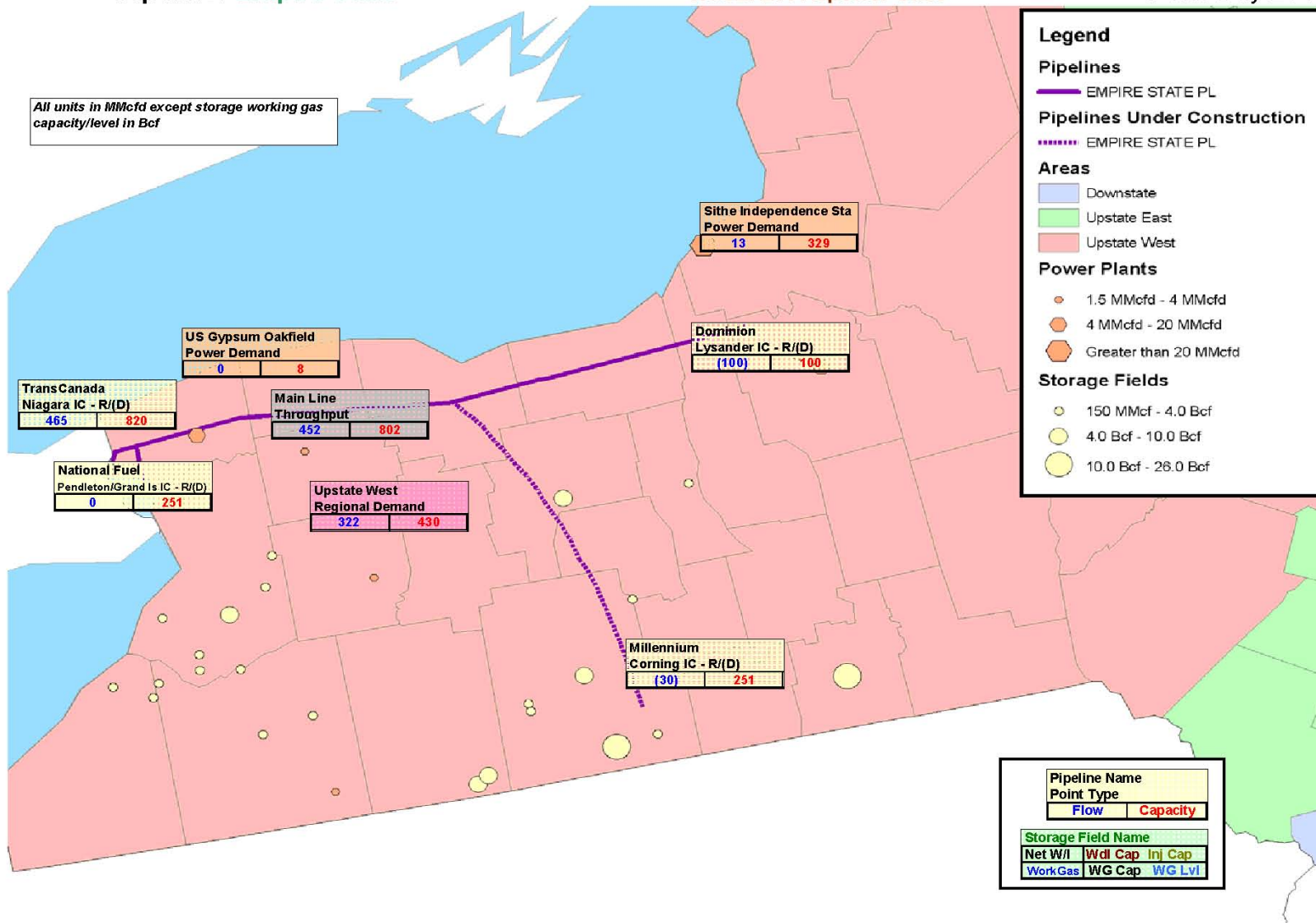


# Pipeline: Empire State

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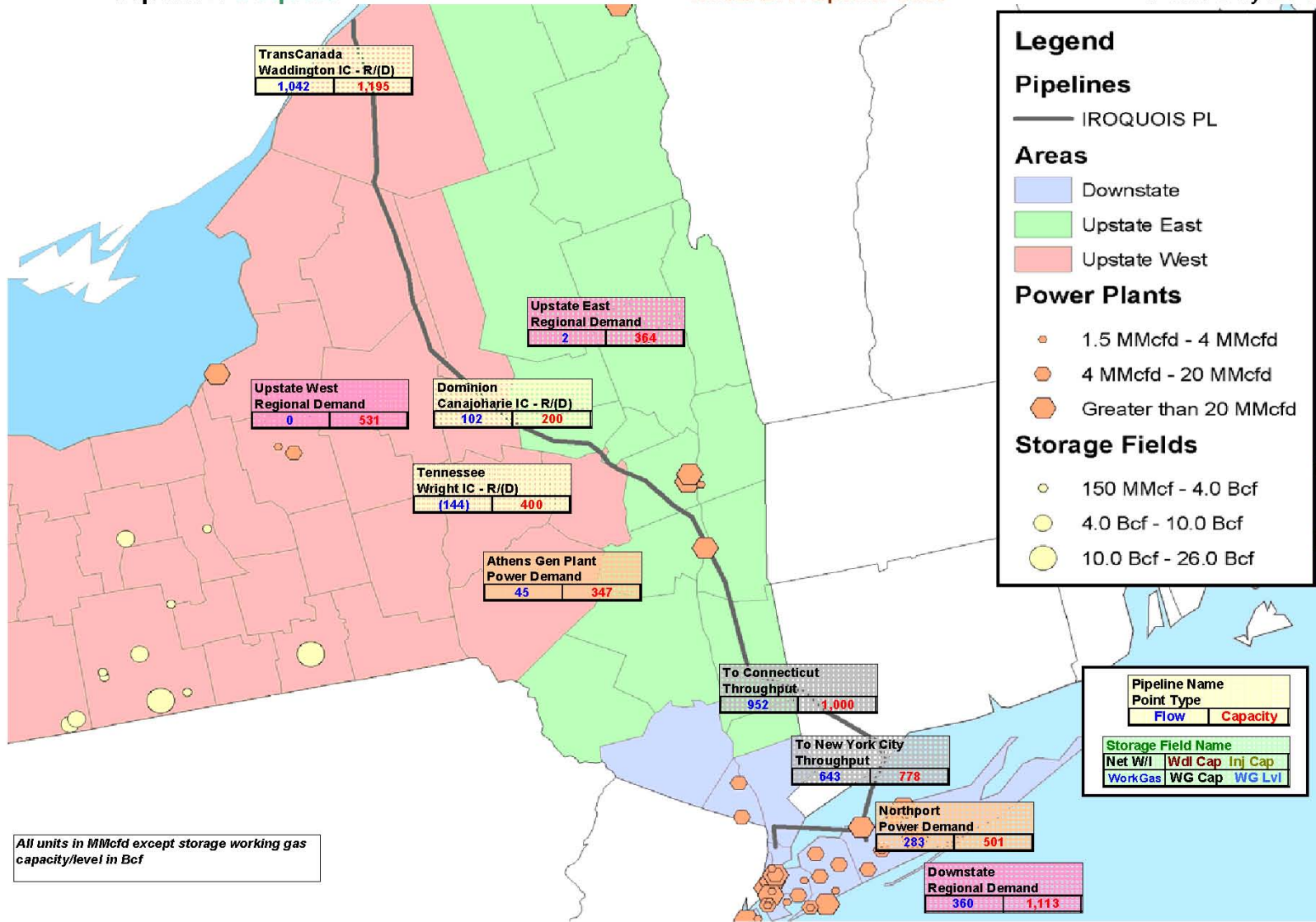


Pipeline Name	
Point Type	
Flow	Capacity
Storage Field Name	
Net W/I	Wd Cap Inj Cap
WorkGas	WG Cap WG Lvl

# Pipeline: Iroquois

## NYSERDA Repower Case

Peak Day 2018



All units in MMcfd except storage working gas capacity/level in Bcf

# Pipeline: Millennium

# NYSERDA Repower Case

# Peak Day 2018

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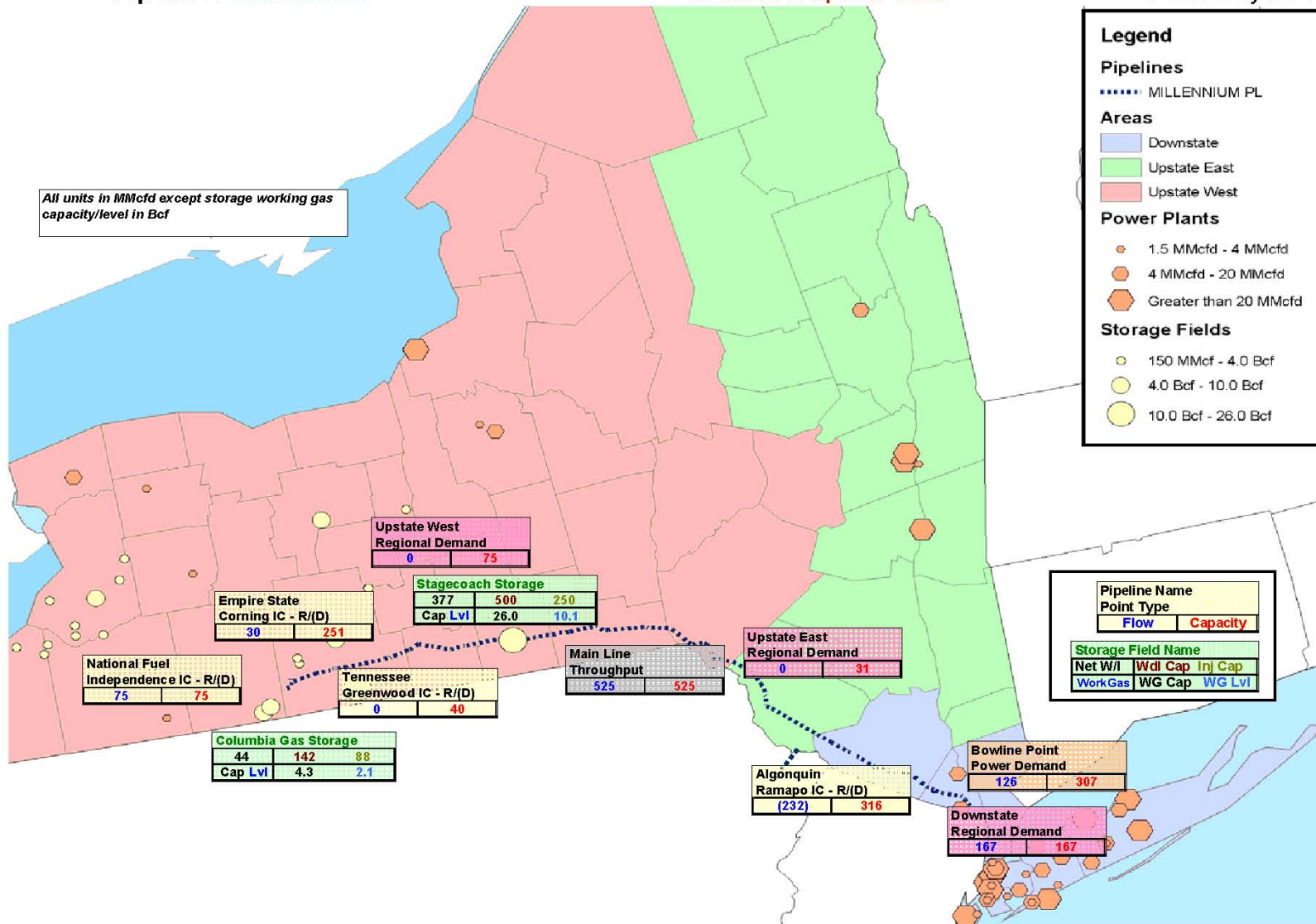
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**Point Type**

Flow	Capacity
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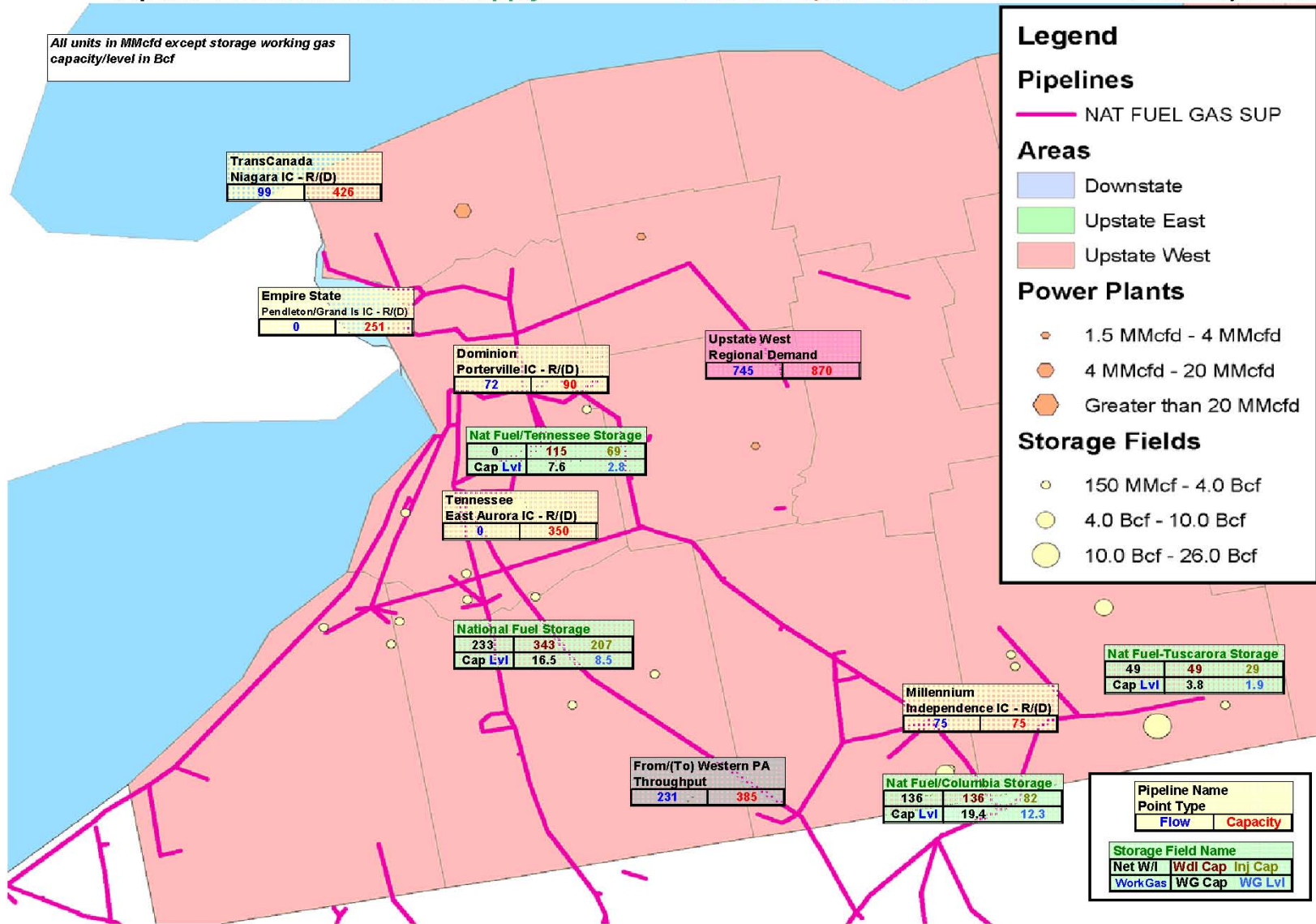


# Pipeline: National Fuel Gas Supply

## NYSERDA Repower Case

Peak Day 2018

All units in MMcfd except storage working gas capacity/level in Bcf



Pipeline: Tennessee Gas PL

NYSERDA Repower Case

Peak Day 2018

Pipeline Name	
Point Type	
Flow	Capacity
Storage Field Name	
Net W/I	Wdl Cap Inj Cap
WorkGas	WG Cap WG Lvl

All units in MMcfd except storage working gas capacity/level in Bcf

**Legend**

**Pipelines**

- TENNESSEE GAS PL

**Areas**

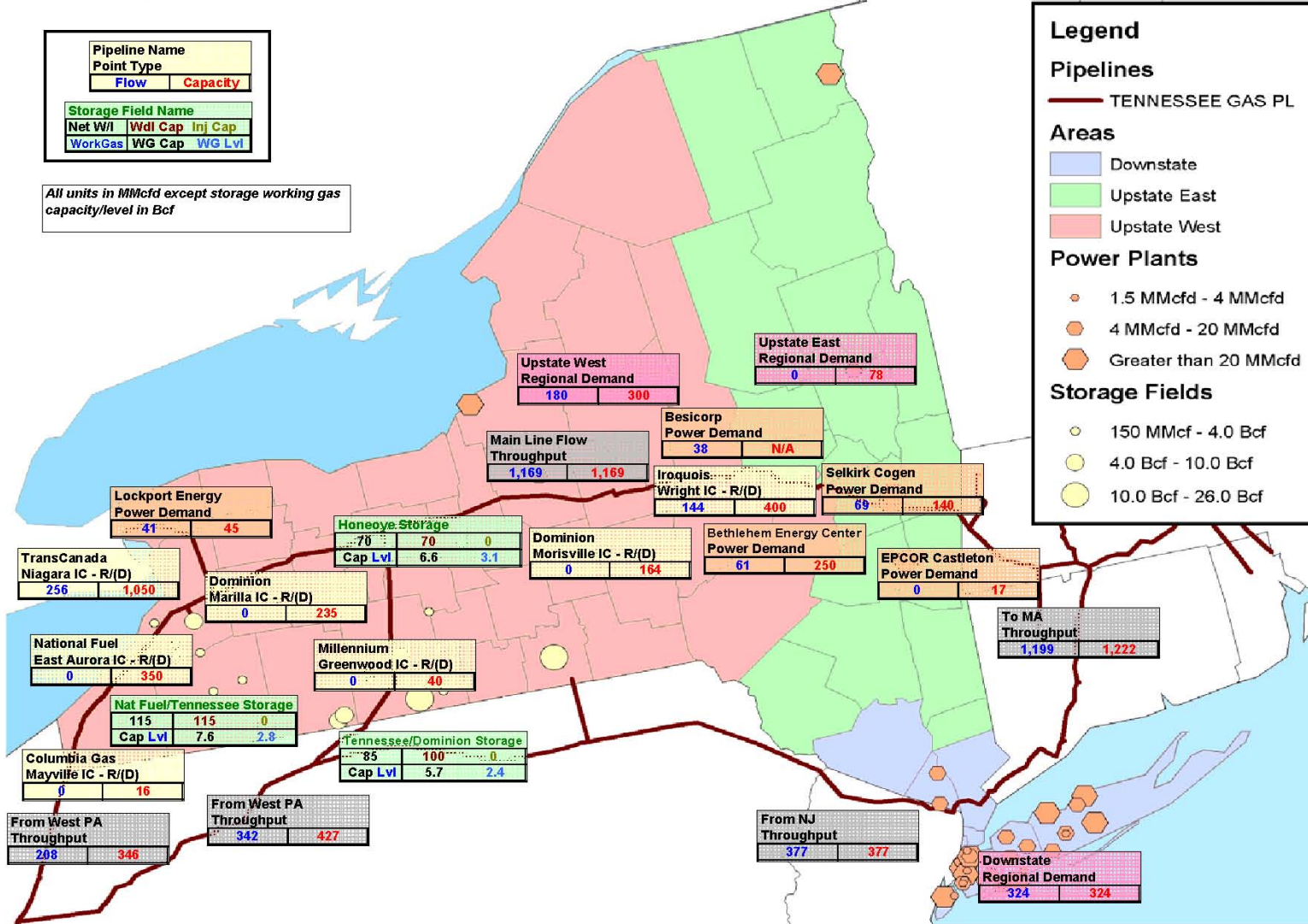
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# Pipeline: Texas Eastern

NYISERDA Repower Case

Peak Day 2018

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**Legend**

**Pipelines**

- TEXAS EASTERN

**Areas**

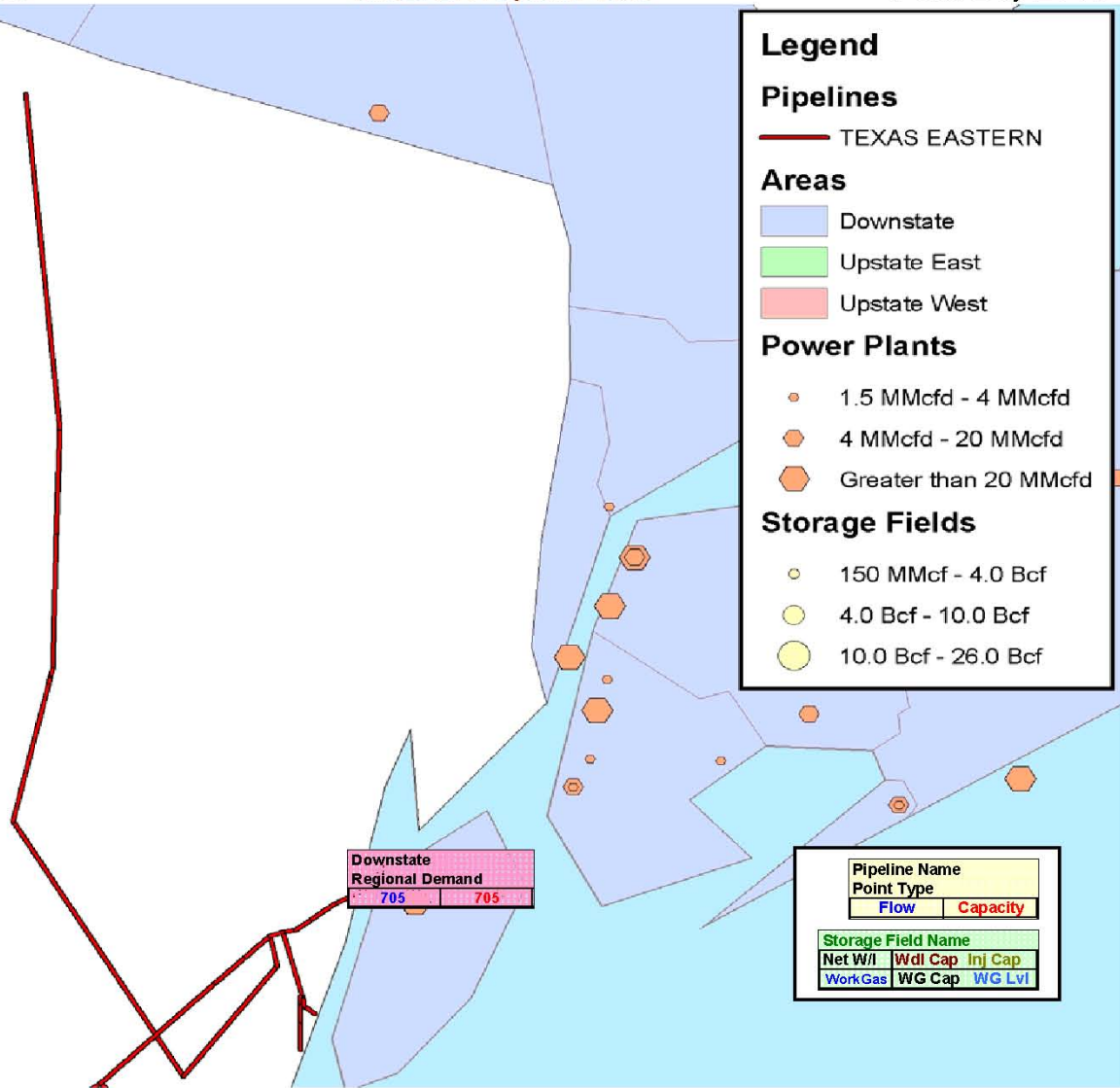
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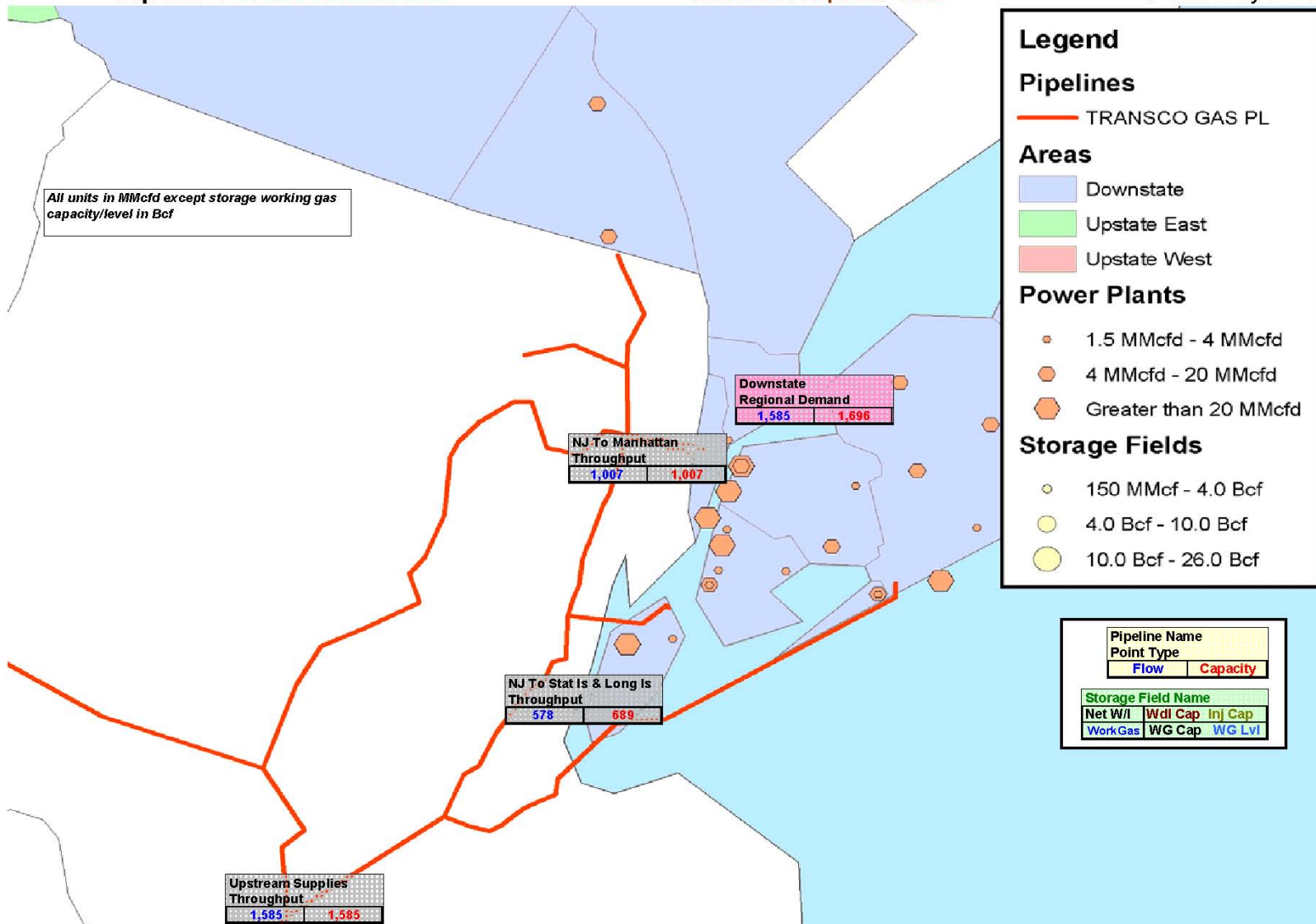
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- 150 MMcf - 4.0 Bcf
- 4.0 Bcf - 10.0 Bcf
- 10.0 Bcf - 26.0 Bcf



Downstate Regional Demand	
Flow	Capacity
705	705

Pipeline Name		
Point Type		
Flow	Capacity	
Storage Field Name		
Net W/l	W/dl Cap	Inj Cap
WorkGas	WG Cap	WG Lvl



**Legend**

**Pipelines**

- TRANSCO GAS PL

**Areas**

- Downstate
- Upstate East
- Upstate West

**Power Plants**

- 1.5 MMcf - 4 MMcf
- 4 MMcf - 20 MMcf
- Greater than 20 MMcf

**Storage Fields**

- 150 MMcf - 4.0 Bcf
- 4.0 Bcf - 10.0 Bcf
- 10.0 Bcf - 26.0 Bcf

Pipeline Name	
Point Type	
Flow	Capacity
Storage Field Name	
Net W/1	Wdl Cap Inj Cap
WorkGas	WG Cap WG Lvl



**Energy and Environmental Analysis, Inc.**  
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# NYSERDA Repower Case Results

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