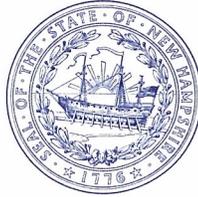


THE STATE OF NEW HAMPSHIRE

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PUBLIC UTILITIES COMMISSION

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October 4, 2011

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Debra A. Howland, Executive Director
N.H. Public Utilities Commission
21 South Fruit Street, Suite 10
Concord, NH 03301

Re: DG 10-041 National Grid NH Integrated Resource Plan
Staff Response to Additional SENDOUT® Modeling



Dear Ms. Howland:

At the hearing held on July 14, 2011, Staff presented five recommendations; the fifth recommendation requested the Commission order National Grid NH to file an updated resource mix analysis that incorporates the methodological changes contained in Staff's testimony and identifies the least cost mix of supply- and demand-side resources. In its rebuttal testimony, ENGI stated that it is willing to accept all five recommendations including the recommendation to update its resource mix analysis, however, Staff and National Grid NH did not agree on the time for completion.

On August 23, 2011, National Grid NH informed the Commission that its vendor, Ventyx, had recently provided an updated version of the SENDOUT® model and that the company had successfully rerun the resource mix analysis and had provided revised information to Staff for its review. National Grid NH stated it sought Staff's review to "confirm that the results are consistent with its expectations." National Grid NH also stated that "[b]ecause of the timing of providing an updated resource mix analysis had been left as an open issue to be addressed by the Commission in its order, and the Staff and Company had not been able to agree on a date for submission of this information" National Grid NH wanted to "apprise the Commission that it has now provided the requested information."

At this time, Staff wishes to forward the rerun of the resource mix analysis to the Commission for inclusion in its docket filings. Staff also wishes to respond to the Company's statement that it has now provided the requested information.

Staff has reviewed the work papers attached to National Grid's August 22, 2011 letter and has concluded that the revised analysis does not meet the requirements of Staff's fifth recommendation. For this reason, Staff disputes National Grid's assertion that it has provided the requested information. Specifically, Staff does not agree that Attachment Staff 1-35 (Supp.) Revised demonstrates that the corrected Ventyx SENDOUT@ gas dispatch model is functioning

adequately. While some of the results of the resource mix rerun are in line with expectations, others require further investigation. This conclusion has been conveyed to the Company. Second, the resource mix rerun was conducted without incorporating any of the methodological changes described in Staff's testimony and included in its fifth recommendation. These include: 1) using a resource mix model that produces rational results; 2) using a resource mix model that has the capability to dispatch any particular tier of demand-side resources multiple times if it is economic to do so; 3) allowing resource mix model to displace the Granite Ridge, LNG and propane supply resources with lower cost demand-side resources; 4) escalating gas supply demand and commodity costs over the life of the demand-side resources in a way that reflects expected increase in those cost components; 5) conducting the cost-benefit analysis over the useful life of the demand-side resources; and 6) identifying on an annual basis the net savings/costs associated with the demand-side resources, expressing them in present value terms, and summing the resulting values to arrive at the overall net saving/cost. Without including these methodological changes, it is not possible for Staff to identify the least cost mix of supply- and demand-side resources.

Rather than leave these modeling changes until National Grid's next IRP, as recommended by the Company, Staff urges the Commission to order National Grid to re-run the model promptly with the above changes included and to report the results to Staff for its review. This way, we believe there will be fewer disputes over what is expected of the Company going forward.

Sincerely,



Marcia A. B. Thunberg
Staff Attorney

Attachments
cc: Service List



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August 22, 2011

VIA ELECTRONIC MAIL AND U.S. MAIL

Marcia Thunberg, Esq.
NH Public Utilities Commission
21 S. Fruit Street, Suite 10
Concord, NH 03301

Re: DG 10-041; National Grid NH Integrated Resource Plan

Dear Attorney Thunberg:

As you know, National Grid NH had agreed to request that the vendor of the SENDOUT® gas dispatch modeling program rewrite the source code to enable the model to properly value DSM resources when SENDOUT® is run in the resource mix mode. After working with Ventyx, the vendor of SENDOUT®, the Company has now confirmed that the model produces proper DSM values and has corrected the errors that it was previously producing in the resource mix mode.

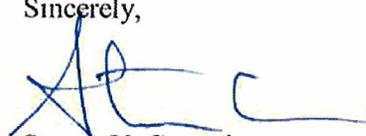
Enclosed for Staff's information and review are the following revised pages to the Company's 2010-2015 least cost integrated resource plan ("IRP"):

- Redlined revisions to page IV-38 of the IRP, describing the optimal mix of DSM measures in the Company's resource mix analysis;
- Revised versions of the five model results pages that appeared in Appendix D, Pages 77-81 of the IRP;
- Revised version of Attachment Staff 1-35 (Supp.), provided to Staff during discovery (the document that initially provided the indication that the as-modeled Total DSM Cost was being calculated incorrectly due to a coding error within the SENDOUT model); and
- An exhibit demonstrating that the Total DSM Cost in Attachment Staff 1-35 (Supp.) REVISED is the proper calculation of the cost of the installed DSM programs.

Marcia Thunberg, Esq.
August 22, 2011
Page 2

Please let me know if Staff has any questions regarding the enclosed materials.

Sincerely,



Steven V. Camerino

cc: Discovery Service List

3. Descriptive Results of Scenarios

Chart IV-D-5 indicates that, relative to the 2008/09 springboard year, annual implementation of the Low Case demand side management programs can result in a reduction in customer requirements of 553,629 MMBtu/year by 2014/15. Relative to the 2008/09 springboard year, annual implementation of the Base Case demand side management programs can result in a reduction in customer requirements of 824,425 MMBtu/year by 2014/15. Under the resource mix simulation of the High Case demand side management programs, the model is allowed to choose the optimum mix and timing of the six programs available under Tiers 1, 2, and 3. Simulation results indicate that the Tier 1 Residential, Tier 1 C&I, Tier 2 Residential, Tier 3 Residential, and Tier 3 C&I programs are all favorable beginning in 2010/11. ~~The Tier 1 Residential programs are favorable beginning in 2011/12. And, then, the Tier 2 Residential, Tier 3 Residential and Tier 3 C&I programs all become favorable in 2012/13.~~ In isolation, the Tier 2 C&I programs are not favorable. Relative to the 2008/09 springboard year, annual implementation of the High Case demand side management programs can result in a reduction in customer requirements of 812,319,858,100 MMBtu/year by 2014/15.

4. Cold Snap Analysis

In addition to the design day, design year and normal year planning standards, the Company also evaluates the capability of the resource portfolio to

meet sendout requirements during a protracted period of very cold weather, which is referred to as a "cold snap."

Reduction in Total Resource Costs
 Base Case Design Year
 Resource Mix Scenario without DSM vs. Resource Mix Scenario with DSM

| Resource Mix Scenario without DSM | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|--|---------------|---------------|---------------|---------------|---------------|
| Total Gas Resource Cost | \$116,033,464 | \$123,998,279 | \$127,339,390 | \$130,922,420 | \$134,513,641 |
| <u>Total DSM Cost</u> | <u>\$0</u> | <u>\$0</u> | <u>\$0</u> | <u>\$0</u> | <u>\$0</u> |
| Total Resource Cost | \$116,033,464 | \$123,998,279 | \$127,339,390 | \$130,922,420 | \$134,513,641 |
| Total Gas Customer Requirements (MMBtu) | 14,149,800 | 14,608,800 | 14,905,000 | 15,265,200 | 15,625,300 |
| <u>Total DSM Customer Requirements (MMBtu)</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| Total Annual Customer Requirements (MMBtu) | 14,149,800 | 14,608,800 | 14,905,000 | 15,265,200 | 15,625,300 |
| Average System Cost (\$/MMBtu) | \$8.2004 | \$8.4879 | \$8.5434 | \$8.5765 | \$8.6087 |

| Resource Mix Scenario with DSM | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|--|------------------|------------------|--------------------|--------------------|--------------------|
| Total Gas Resource Cost | \$113,088,103 | \$119,611,995 | \$121,723,921 | \$123,982,209 | \$126,117,887 |
| <u>Total DSM Cost</u> | <u>\$470,264</u> | <u>\$940,528</u> | <u>\$1,410,793</u> | <u>\$1,881,057</u> | <u>\$2,351,321</u> |
| Total Resource Cost | \$113,558,367 | \$120,552,523 | \$123,134,714 | \$125,863,266 | \$128,469,208 |
| Total Gas Customer Requirements (MMBtu) | 13,806,600 | 14,134,400 | 14,304,300 | 14,535,800 | 14,767,200 |
| <u>Total DSM Customer Requirements (MMBtu)</u> | <u>343,200</u> | <u>474,400</u> | <u>600,600</u> | <u>729,400</u> | <u>858,100</u> |
| Total Annual Customer Requirements (MMBtu) | 14,149,800 | 14,608,800 | 14,904,900 | 15,265,200 | 15,625,300 |
| Average System Cost (\$/MMBtu) | \$8.0254 | \$8.2520 | \$8.2614 | \$8.2451 | \$8.2219 |

| DSM Reduction in Requirements (BBtu) | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|
| Program 1 - Residential - 2009 | 30.200 | 30.300 | 30.200 | 30.200 | 30.200 |
| Program 1 - C&I - 2009 | 53.600 | 53.900 | 53.600 | 53.600 | 53.600 |
| Program 2 - Residential - 2010 | 30.200 | 30.300 | 30.200 | 30.200 | 30.200 |
| Program 2 - C&I - 2010 | 53.600 | 53.900 | 53.600 | 53.600 | 53.600 |
| Program 2 - Residential - 2010 (Incremental) | 21.300 | 21.400 | 21.300 | 21.300 | 21.300 |
| Program 2 - C&I - 2010 (Incremental) | 25.600 | 25.700 | 25.600 | 25.600 | 25.600 |
| Tier1 - Residential | 30.200 | 60.600 | 90.600 | 120.800 | 151.000 |
| Tier1 - C&I | 53.600 | 107.800 | 160.800 | 214.400 | 268.000 |
| Tier2 - Residential | 21.300 | 42.800 | 63.900 | 85.200 | 106.500 |
| Tier2 - C&I | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Tier3 - Residential | 7.600 | 15.400 | 22.800 | 30.400 | 38.000 |
| Tier3 - C&I | 16.000 | 32.200 | 48.000 | 64.000 | 80.000 |
| Total | 343.200 | 474.300 | 600.600 | 729.300 | 858.000 |
| DSM Cost Savings By Program | | | | | |
| Program 1 - Residential - 2009 | \$217,797 | \$220,127 | \$211,424 | \$209,497 | \$212,753 |
| Program 1 - C&I - 2009 | \$386,554 | \$391,580 | \$375,242 | \$371,823 | \$377,601 |
| Program 2 - Residential - 2010 | \$217,797 | \$220,127 | \$211,424 | \$209,497 | \$212,753 |
| Program 2 - C&I - 2010 | \$386,554 | \$391,580 | \$375,242 | \$371,823 | \$377,601 |
| Program 2 - Residential - 2010 (Incremental) | \$153,612 | \$155,469 | \$149,117 | \$147,758 | \$150,054 |
| Program 2 - C&I - 2010 (Incremental) | \$184,623 | \$186,709 | \$179,220 | \$177,587 | \$180,347 |
| Tier1 - Residential | \$217,797 | \$440,255 | \$634,272 | \$837,990 | \$1,063,764 |
| Tier1 - C&I | \$386,554 | \$783,159 | \$1,125,727 | \$1,487,293 | \$1,888,005 |
| Tier2 - Residential | \$153,612 | \$310,939 | \$447,351 | \$591,032 | \$750,271 |
| Tier2 - C&I | \$0 | \$0 | \$0 | \$0 | \$0 |
| Tier3 - Residential | \$54,810 | \$111,880 | \$159,618 | \$210,885 | \$267,702 |
| Tier3 - C&I | \$115,389 | \$233,931 | \$336,038 | \$443,968 | \$563,583 |
| Total | \$2,475,097 | \$3,445,756 | \$4,204,676 | \$5,059,154 | \$6,044,433 |

Example of Anticipated Costs of Each DSM Tiered Program
Under Resource Mix Scenario
Base Case Design Year

| | Tier 1 Res | Tier 1 C&I | Tier 2 Res | Tier 2 C&I | Tier 3 Res | Tier 3 C&I |
|------------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| No. of Years Lifetime | 15 | 15 | 15 | 15 | 15 | 15 |
| No. of Months Lifetime | 180 | 180 | 180 | 180 | 180 | 180 |
| Cost Per Year | \$1,807,764 | \$1,450,375 | \$2,221,388 | \$4,047,691 | \$602,252 | \$972,184 |
| Monthly Levelized Cost | \$10,043 | \$8,058 | \$12,341 | \$22,487 | \$3,346 | \$5,401 |
| Annual Levelized Cost | \$120,518 | \$96,692 | \$148,093 | \$269,846 | \$40,150 | \$64,812 |

Tiered DSM Programs Installed By Year

| | <u>2010/11</u> | <u>2011/12</u> | <u>2012/13</u> | <u>2013/14</u> | <u>2014/15</u> |
|---------------------|----------------|----------------|----------------|----------------|----------------|
| Tier1 - Residential | 1 | 2 | 3 | 4 | 5 |
| Tier1 - C&I | 1 | 2 | 3 | 4 | 5 |
| Tier2 - Residential | 1 | 2 | 3 | 4 | 5 |
| Tier2 - C&I | 0 | 0 | 0 | 0 | 0 |
| Tier3 - Residential | 1 | 2 | 3 | 4 | 5 |
| Tier3 - C&I | 1 | 2 | 3 | 4 | 5 |

Expected Annualized Cost of Tiered DSM Programs Installed By Year

| | <u>2010/11</u> | <u>2011/12</u> | <u>2012/13</u> | <u>2013/14</u> | <u>2014/15</u> |
|------------------------|-----------------|------------------|------------------|------------------|------------------|
| Tier1 - Residential | \$120,518 | \$241,035 | \$361,553 | \$482,070 | \$602,588 |
| Tier1 - C&I | \$96,692 | \$193,383 | \$290,075 | \$386,767 | \$483,458 |
| Tier2 - Residential | \$148,093 | \$296,185 | \$444,278 | \$592,370 | \$740,463 |
| Tier2 - C&I | \$0 | \$0 | \$0 | \$0 | \$0 |
| Tier3 - Residential | \$40,150 | \$80,300 | \$120,450 | \$160,601 | \$200,751 |
| <u>Tier3 - C&I</u> | <u>\$64,812</u> | <u>\$129,625</u> | <u>\$194,437</u> | <u>\$259,249</u> | <u>\$324,061</u> |
| Total | \$470,264 | \$940,528 | \$1,410,793 | \$1,881,057 | \$2,351,321 |

Total Annualized Cost of Tiered DSM Programs Installed By Year From SENDOUT Model

| | <u>2010/11</u> | <u>2011/12</u> | <u>2012/13</u> | <u>2013/14</u> | <u>2014/15</u> |
|------------|----------------|----------------|----------------|----------------|----------------|
| Total | \$470,264 | \$940,528 | \$1,410,793 | \$1,881,057 | \$2,351,321 |
| Difference | \$0 | \$0 | \$0 | \$0 | \$0 |

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2010-11: Resource Mix DSM with Marcellus
(MMBtu)

| REQUIREMENTS | 11/2010 | 12/2010 | 01/2011 | 02/2011 | 03/2011 | 04/2011 | 05/2011 | 06/2011 | 07/2011 | 08/2011 | 09/2011 | 10/2011 | Heating Season (Nov-Mar) | Non-Heating Season (Apr-Oct) | TOTAL | Peak Day |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|---------|---------|-----------------------------|---------------------------------|------------|----------|
| Firm Sendout | 1,465,262 | 2,143,052 | 2,413,503 | 2,064,259 | 1,806,417 | 1,037,575 | 514,792 | 379,876 | 369,017 | 368,398 | 428,043 | 816,415 | 9,892,493 | 3,914,116 | 13,806,609 | 137,410 |
| Refill | | | | | | | | | | | | | | | | |
| Underground Storage | 63,686 | 0 | 0 | 0 | 0 | 314,953 | 335,598 | 324,763 | 335,230 | 333,732 | 251,810 | 0 | 63,686 | 1,896,086 | 1,959,772 | 0 |
| LNG | 2,845 | 2,940 | 63,512 | 24,912 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| Propane | 0 | 0 | 74,116 | 19,342 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,458 | 19,193 | 112,651 | 0 |
| Total Requirements | 1,531,793 | 2,145,992 | 2,551,131 | 2,108,513 | 1,812,207 | 1,352,528 | 871,379 | 715,166 | 707,192 | 705,075 | 682,703 | 819,360 | 10,149,636 | 5,853,403 | 16,003,039 | 141,410 |
| RESOURCES | | | | | | | | | | | | | | | | |
| PNGTS | 7,290 | 9,362 | 10,974 | 8,680 | 8,308 | 5,790 | 4,588 | 3,240 | 3,100 | 3,193 | 3,660 | 5,704 | 44,614 | 29,275 | 73,889 | 354 |
| TGP | | | | | | | | | | | | | | | | |
| AES-Londonderry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dawn Supply | 120,000 | 124,000 | 124,000 | 112,000 | 124,000 | 56,986 | 2,706 | 0 | 0 | 0 | 0 | 45,667 | 604,000 | 105,359 | 709,359 | 4,000 |
| Niagara Supply | 93,660 | 93,660 | 65,562 | 78,249 | 24,976 | 40,503 | 0 | 0 | 0 | 0 | 0 | 20,732 | 356,107 | 61,235 | 417,342 | 3,122 |
| Dracut Baseload | 0 | 768,102 | 768,102 | 693,770 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,229,974 | 0 | 2,229,974 | 24,777 |
| Dracut Swing | 642,358 | 46,799 | 9,918 | 43,313 | 1,169,761 | 832,929 | 504,552 | 373,786 | 362,972 | 362,260 | 421,533 | 741,367 | 1,912,149 | 3,599,399 | 5,511,548 | 9,918 |
| Gulf Supply | 342,133 | 358,465 | 359,476 | 324,688 | 359,476 | 324,909 | 335,598 | 324,763 | 335,230 | 333,732 | 251,810 | 0 | 1,744,238 | 1,906,042 | 3,650,280 | 11,596 |
| Storage | 20,663 | 456,535 | 759,381 | 629,310 | 46,652 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,912,541 | 0 | 1,912,541 | 28,115 |
| Marcellus Shale | 300,000 | 283,189 | 152,740 | 129,995 | 70,303 | 88,560 | 0 | 0 | 0 | 0 | 0 | 0 | 936,227 | 88,560 | 1,024,787 | 10,000 |
| CityGate Delivery | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DOMAC Liquid | 2,845 | 2,940 | 63,512 | 24,912 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| LNG From Storage | 2,845 | 2,940 | 70,040 | 24,912 | 2,940 | 2,850 | 2,945 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 103,677 | 20,330 | 124,007 | 10,528 |
| Propane Vapor | 0 | 0 | 93,309 | 19,342 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 112,651 | 0 | 112,651 | 35,000 |
| Truck | 0 | 0 | 74,116 | 19,342 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,458 | 19,193 | 112,651 | 0 |
| Total Resources | 1,531,794 | 2,145,992 | 2,551,130 | 2,108,513 | 1,812,206 | 1,352,527 | 871,378 | 715,166 | 707,192 | 705,075 | 682,703 | 819,360 | 10,149,635 | 5,853,401 | 16,003,036 | 141,410 |

COMPARISON OF RESOURCES AND REQUIREMENTS
 Base Case Design Year 2011-12: Resource Mix DSM with Marcellus
 (MMBtu)

| REQUIREMENTS | 11/2011 | 12/2011 | 01/2012 | 02/2012 | 03/2012 | 04/2012 | 05/2012 | 06/2012 | 07/2012 | 08/2012 | 09/2012 | 10/2012 | Heating Season (Nov-Mar) | Non-Heating Season (Apr-Oct) | TOTAL | Peak Day |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|---------|---------|-----------------------------|---------------------------------|------------|----------|
| Firm Sendout | 1,488,110 | 2,170,221 | 2,442,335 | 2,174,723 | 1,831,595 | 1,057,799 | 531,524 | 393,942 | 383,070 | 382,565 | 442,997 | 835,539 | 10,106,984 | 4,027,436 | 14,134,420 | 138,669 |
| Refill | | | | | | | | | | | | | | | | |
| Underground Storage | 65,359 | 0 | 0 | 0 | 0 | 314,818 | 335,033 | 324,864 | 334,390 | 333,813 | 324,707 | 0 | 65,359 | 1,967,625 | 2,032,984 | 0 |
| LNG | 2,845 | 2,940 | 62,693 | 25,731 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| Propane | 0 | 0 | 87,850 | 5,607 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,457 | 19,193 | 112,650 | 5,607 |
| Total Requirements | 1,556,314 | 2,173,161 | 2,592,878 | 2,206,061 | 1,837,385 | 1,372,617 | 887,546 | 729,333 | 720,405 | 719,323 | 770,554 | 838,484 | 10,365,799 | 6,038,262 | 16,404,061 | 148,276 |
| RESOURCES | | | | | | | | | | | | | | | | |
| PNGTS | 7,290 | 9,362 | 10,974 | 8,990 | 8,308 | 5,790 | 4,588 | 3,240 | 3,100 | 3,193 | 3,660 | 5,704 | 44,924 | 29,275 | 74,199 | 354 |
| TGP | | | | | | | | | | | | | | | | |
| AES-Londonderry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dawn Supply | 121,106 | 125,143 | 125,143 | 117,069 | 125,143 | 58,255 | 3,392 | 0 | 0 | 0 | 0 | 2,367 | 613,604 | 64,014 | 677,618 | 4,037 |
| Niagara Supply | 93,660 | 93,660 | 65,562 | 79,159 | 66,271 | 41,656 | 0 | 0 | 0 | 0 | 0 | 0 | 398,312 | 41,656 | 439,968 | 3,122 |
| Dracut Baseload | 0 | 768,102 | 768,102 | 718,548 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,254,752 | 0 | 2,254,752 | 24,777 |
| Dracut Swing | 862,026 | 55,382 | 11,140 | 69,222 | 1,145,061 | 921,845 | 520,599 | 387,852 | 377,025 | 376,427 | 436,487 | 824,523 | 2,142,831 | 3,844,758 | 5,987,589 | 11,140 |
| Gulf Supply | 341,982 | 359,103 | 359,476 | 330,738 | 359,476 | 325,705 | 335,033 | 324,864 | 334,390 | 333,813 | 324,707 | 0 | 1,750,775 | 1,978,512 | 3,729,287 | 11,596 |
| Storage | 23,487 | 472,986 | 767,012 | 669,067 | 51,438 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,983,990 | 0 | 1,983,990 | 28,115 |
| Marcellus Shale | 101,073 | 283,543 | 161,328 | 147,927 | 72,959 | 16,516 | 0 | 0 | 0 | 0 | 0 | 0 | 766,830 | 16,516 | 783,346 | 10,000 |
| CityGate Delivery | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DOMAC Liquid | 2,845 | 2,940 | 62,693 | 25,731 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| LNG From Storage | 2,845 | 2,940 | 69,221 | 25,731 | 2,940 | 2,850 | 2,945 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 103,677 | 20,330 | 124,007 | 10,528 |
| Propane Vapor | 0 | 0 | 104,378 | 8,274 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 112,652 | 0 | 112,652 | 35,000 |
| Truck | 0 | 0 | 87,850 | 5,607 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,457 | 19,193 | 112,650 | 5,607 |
| Total Resources | 1,556,314 | 2,173,161 | 2,592,879 | 2,206,063 | 1,837,386 | 1,372,617 | 887,546 | 729,333 | 720,405 | 719,323 | 770,554 | 838,484 | 10,365,803 | 6,038,262 | 16,404,065 | 148,276 |

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2012-13: Resource Mix DSM with Marcellus
(MMBtu)

| REQUIREMENTS | 11/2012 | 12/2012 | 01/2013 | 02/2013 | 03/2013 | 04/2013 | 05/2013 | 06/2013 | 07/2013 | 08/2013 | 09/2013 | 10/2013 | Heating Season (Nov-Mar) | Non-Heating Season (Apr-Oct) | TOTAL | Peak Day |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|---------|---------|-----------------------------|---------------------------------|------------|----------|
| Firm Sendout | 1,511,676 | 2,197,766 | 2,471,373 | 2,115,103 | 1,857,346 | 1,079,007 | 549,705 | 409,649 | 398,878 | 398,471 | 459,496 | 855,868 | 10,153,264 | 4,151,074 | 14,304,338 | 139,900 |
| Refill | | | | | | | | | | | | | | | | |
| Underground Storage | 67,387 | 0 | 0 | 0 | 0 | 313,256 | 335,944 | 324,670 | 335,485 | 333,812 | 323,726 | 1,759 | 67,387 | 1,968,652 | 2,036,039 | 0 |
| LNG | 2,845 | 2,940 | 63,405 | 25,019 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| Propane | 0 | 0 | 93,458 | 0 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,458 | 19,193 | 112,651 | 5,607 |
| Total Requirements | 1,581,908 | 2,200,706 | 2,628,236 | 2,140,122 | 1,863,136 | 1,392,263 | 906,638 | 744,846 | 737,308 | 735,228 | 786,072 | 860,572 | 10,414,108 | 6,162,927 | 16,577,035 | 149,507 |
| RESOURCES | | | | | | | | | | | | | | | | |
| PNGTS | 7,290 | 9,362 | 10,974 | 8,680 | 8,308 | 5,790 | 4,588 | 3,240 | 3,100 | 3,193 | 3,660 | 5,704 | 44,614 | 29,275 | 73,889 | 354 |
| TGP | | | | | | | | | | | | | | | | |
| AES-Londonderry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dawn Supply | 121,106 | 125,143 | 125,143 | 113,032 | 125,143 | 15,032 | 0 | 0 | 0 | 0 | 0 | 3,175 | 609,567 | 18,207 | 627,774 | 4,037 |
| Niagara Supply | 93,660 | 93,995 | 65,562 | 79,716 | 25,769 | 8,027 | 0 | 0 | 0 | 0 | 0 | 0 | 358,702 | 8,027 | 366,729 | 3,122 |
| Dracut Baseload | 0 | 768,102 | 768,103 | 693,770 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,229,975 | 0 | 2,229,975 | 24,777 |
| Dracut Swing | 881,787 | 64,301 | 15,034 | 81,273 | 1,402,164 | 1,018,086 | 542,172 | 403,559 | 392,833 | 392,333 | 452,986 | 844,043 | 2,444,559 | 4,046,012 | 6,490,571 | 12,371 |
| Gulf Supply | 341,799 | 359,476 | 359,476 | 320,628 | 160,869 | 324,852 | 335,944 | 324,670 | 335,485 | 333,812 | 323,726 | 1,759 | 1,542,248 | 1,980,248 | 3,522,496 | 11,596 |
| Storage | 26,425 | 483,834 | 775,209 | 644,716 | 56,525 | 260 | 0 | 0 | 0 | 0 | 0 | 0 | 1,986,709 | 260 | 1,986,969 | 28,115 |
| Marcellus Shale | 104,151 | 290,612 | 169,288 | 148,268 | 75,629 | 17,365 | 0 | 0 | 0 | 0 | 0 | 0 | 787,948 | 17,365 | 805,313 | 10,000 |
| CityGate Delivery | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DOMAC Liquid | 2,845 | 2,940 | 63,405 | 25,019 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| LNG From Storage | 2,845 | 2,940 | 69,933 | 25,019 | 2,940 | 2,850 | 2,945 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 103,677 | 20,330 | 124,007 | 10,528 |
| Propane Vapor | 0 | 0 | 112,651 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 112,651 | 0 | 112,651 | 35,000 |
| Truck | 0 | 0 | 93,458 | 0 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,458 | 19,193 | 112,651 | 5,607 |
| Total Resources | 1,581,908 | 2,200,705 | 2,628,236 | 2,140,121 | 1,863,137 | 1,392,262 | 906,638 | 744,846 | 737,308 | 735,228 | 786,072 | 860,571 | 10,414,107 | 6,162,925 | 16,577,032 | 149,507 |

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2013-14: Resource Mix DSM with Marcellus
(MMBtu)

| REQUIREMENTS | 11/2013 | 12/2013 | 01/2014 | 02/2014 | 03/2014 | 04/2014 | 05/2014 | 06/2014 | 07/2014 | 08/2014 | 09/2014 | 10/2014 | Heating Season (Nov-Mar) | Non-Heating Season (Apr-Oct) | TOTAL | Peak Day |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|---------|---------|--------------------------|------------------------------|------------|----------|
| Firm Sendout | 1,533,087 | 2,222,816 | 2,497,780 | 2,138,340 | 1,880,755 | 1,098,261 | 566,184 | 423,854 | 413,162 | 412,848 | 474,429 | 874,309 | 10,272,778 | 4,263,047 | 14,535,825 | 141,023 |
| Refill | | | | | | | | | | | | | | | | |
| Underground Storage | 69,233 | 0 | 0 | 0 | 0 | 313,781 | 335,944 | 324,333 | 334,354 | 333,883 | 324,218 | 31,636 | 69,233 | 1,998,149 | 2,067,382 | 0 |
| LNG | 2,845 | 2,940 | 67,778 | 20,646 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| Propane | 0 | 0 | 93,458 | 0 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,458 | 19,193 | 112,651 | 5,607 |
| Total Requirements | 1,605,165 | 2,225,756 | 2,659,016 | 2,158,986 | 1,886,545 | 1,412,042 | 923,117 | 758,714 | 750,461 | 749,676 | 801,497 | 908,890 | 10,535,468 | 6,304,397 | 16,839,865 | 150,630 |
| RESOURCES | | | | | | | | | | | | | | | | |
| PNGTS | 7,290 | 9,362 | 10,974 | 8,680 | 8,308 | 5,790 | 4,588 | 3,240 | 3,100 | 3,193 | 3,660 | 5,704 | 44,614 | 29,275 | 73,889 | 354 |
| TGP | | | | | | | | | | | | | | | | |
| AES-Londonderry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dawn Supply | 121,106 | 125,143 | 125,143 | 113,032 | 62,854 | 15,863 | 0 | 0 | 0 | 0 | 0 | 3,910 | 547,278 | 19,773 | 567,051 | 4,037 |
| Niagara Supply | 15,610 | 94,638 | 65,562 | 80,377 | 26,568 | 8,762 | 0 | 0 | 0 | 0 | 0 | 0 | 282,755 | 8,762 | 291,517 | 3,122 |
| Dracut Baseload | 0 | 768,103 | 768,102 | 693,770 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,229,975 | 0 | 2,229,975 | 24,777 |
| Dracut Swing | 1,222,703 | 72,820 | 23,657 | 98,082 | 1,475,490 | 1,034,120 | 558,651 | 417,764 | 407,117 | 406,710 | 467,919 | 861,750 | 2,892,752 | 4,154,031 | 7,046,783 | 13,494 |
| Gulf Supply | 170,713 | 359,476 | 359,476 | 321,978 | 165,380 | 325,377 | 335,944 | 324,333 | 334,354 | 333,883 | 324,218 | 31,636 | 1,377,023 | 2,009,745 | 3,386,768 | 11,596 |
| Storage | 29,101 | 496,978 | 782,656 | 645,762 | 61,920 | 1,143 | 0 | 0 | 0 | 0 | 0 | 0 | 2,016,417 | 1,143 | 2,017,560 | 28,115 |
| Marcellus Shale | 32,951 | 293,356 | 175,253 | 156,012 | 77,294 | 18,137 | 0 | 0 | 0 | 0 | 0 | 0 | 734,866 | 18,137 | 753,003 | 10,000 |
| CityGate Delivery | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DOMAC Liquid | 2,845 | 2,940 | 67,778 | 20,646 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| LNG From Storage | 2,845 | 2,940 | 74,306 | 20,646 | 2,940 | 2,850 | 2,945 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 103,677 | 20,330 | 124,007 | 10,528 |
| Propane Vapor | 0 | 0 | 112,651 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 112,651 | 0 | 112,651 | 35,000 |
| Truck | 0 | 0 | 93,458 | 0 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,458 | 19,193 | 112,651 | 5,607 |
| Total Resources | 1,605,164 | 2,225,756 | 2,659,016 | 2,158,985 | 1,886,544 | 1,412,042 | 923,117 | 758,714 | 750,461 | 749,676 | 801,497 | 908,890 | 10,535,465 | 6,304,397 | 16,839,862 | 150,630 |

COMPARISON OF RESOURCES AND REQUIREMENTS
Base Case Design Year 2014-15: Resource Mix DSM with Marcellus
(MMBtu)

| REQUIREMENTS | 11/2014 | 12/2014 | 01/2015 | 02/2015 | 03/2015 | 04/2015 | 05/2015 | 06/2015 | 07/2015 | 08/2015 | 09/2015 | 10/2015 | Heating Season (Nov-Mar) | Non-Heating Season (Apr-Oct) | TOTAL | Peak Day |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|---------|---------|-----------------------------|---------------------------------|------------|----------|
| Firm Sendout | 1,554,944 | 2,248,875 | 2,525,467 | 2,162,613 | 1,904,867 | 1,117,553 | 582,056 | 437,131 | 426,409 | 426,205 | 488,575 | 892,516 | 10,396,766 | 4,370,445 | 14,767,211 | 142,237 |
| Refill | | | | | | | | | | | | | | | | |
| Underground Storage | 71,182 | 0 | 0 | 0 | 0 | 313,869 | 335,293 | 324,654 | 335,894 | 333,692 | 323,658 | 0 | 71,182 | 1,967,060 | 2,038,242 | 0 |
| LNG | 2,845 | 2,940 | 72,533 | 15,891 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| Propane | 0 | 0 | 93,458 | 0 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,458 | 19,193 | 112,651 | 5,607 |
| Total Requirements | 1,628,971 | 2,251,815 | 2,691,458 | 2,178,504 | 1,910,657 | 1,431,422 | 938,338 | 772,312 | 765,248 | 762,842 | 815,083 | 895,461 | 10,661,405 | 6,380,706 | 17,042,111 | 151,844 |
| RESOURCES | | | | | | | | | | | | | | | | |
| PNGTS | 7,290 | 9,362 | 10,974 | 8,680 | 8,308 | 5,790 | 4,588 | 3,240 | 3,100 | 3,193 | 3,660 | 5,704 | 44,614 | 29,275 | 73,889 | 354 |
| TGP | | | | | | | | | | | | | | | | |
| AES-Londonderry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dawn Supply | 108,292 | 125,143 | 125,143 | 113,032 | 64,000 | 16,940 | 0 | 0 | 0 | 0 | 0 | 4,037 | 535,610 | 20,977 | 556,587 | 4,037 |
| Niagara Supply | 16,388 | 95,282 | 65,562 | 81,228 | 27,398 | 9,742 | 0 | 0 | 0 | 0 | 0 | 627 | 285,858 | 10,369 | 296,227 | 3,122 |
| Dracut Baseload | 0 | 768,103 | 768,103 | 693,769 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,229,975 | 0 | 2,229,975 | 24,778 |
| Dracut Swing | 1,248,795 | 82,307 | 32,830 | 111,712 | 1,485,551 | 1,049,502 | 574,523 | 431,041 | 420,364 | 420,067 | 482,065 | 879,203 | 2,961,195 | 4,256,765 | 7,217,960 | 14,707 |
| Gulf Supply | 175,994 | 359,476 | 359,476 | 323,158 | 170,024 | 325,465 | 335,293 | 324,654 | 335,894 | 333,692 | 323,658 | 0 | 1,388,128 | 1,978,656 | 3,366,784 | 11,596 |
| Storage | 31,921 | 510,755 | 790,318 | 601,470 | 67,820 | 2,071 | 0 | 0 | 0 | 0 | 0 | 0 | 2,002,284 | 2,071 | 2,004,355 | 28,115 |
| Marcellus Shale | 34,601 | 295,508 | 181,350 | 213,671 | 78,826 | 19,062 | 0 | 0 | 0 | 0 | 0 | 0 | 803,956 | 19,062 | 823,018 | 10,000 |
| CityGate Delivery | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DOMAC Liquid | 2,845 | 2,940 | 72,533 | 15,891 | 5,790 | 0 | 9,473 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 99,999 | 24,008 | 124,007 | 4,000 |
| LNG From Storage | 2,845 | 2,940 | 79,061 | 15,891 | 2,940 | 2,850 | 2,945 | 2,850 | 2,945 | 2,945 | 2,850 | 2,945 | 103,677 | 20,330 | 124,007 | 10,528 |
| Propane Vapor | 0 | 0 | 112,651 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 112,651 | 0 | 112,651 | 35,000 |
| Truck | 0 | 0 | 93,458 | 0 | 0 | 0 | 11,516 | 7,677 | 0 | 0 | 0 | 0 | 93,458 | 19,193 | 112,651 | 5,607 |
| Total Resources | 1,628,971 | 2,251,816 | 2,691,459 | 2,178,502 | 1,910,657 | 1,431,422 | 938,338 | 772,312 | 765,248 | 762,842 | 815,083 | 895,461 | 10,661,405 | 6,380,706 | 17,042,111 | 151,844 |