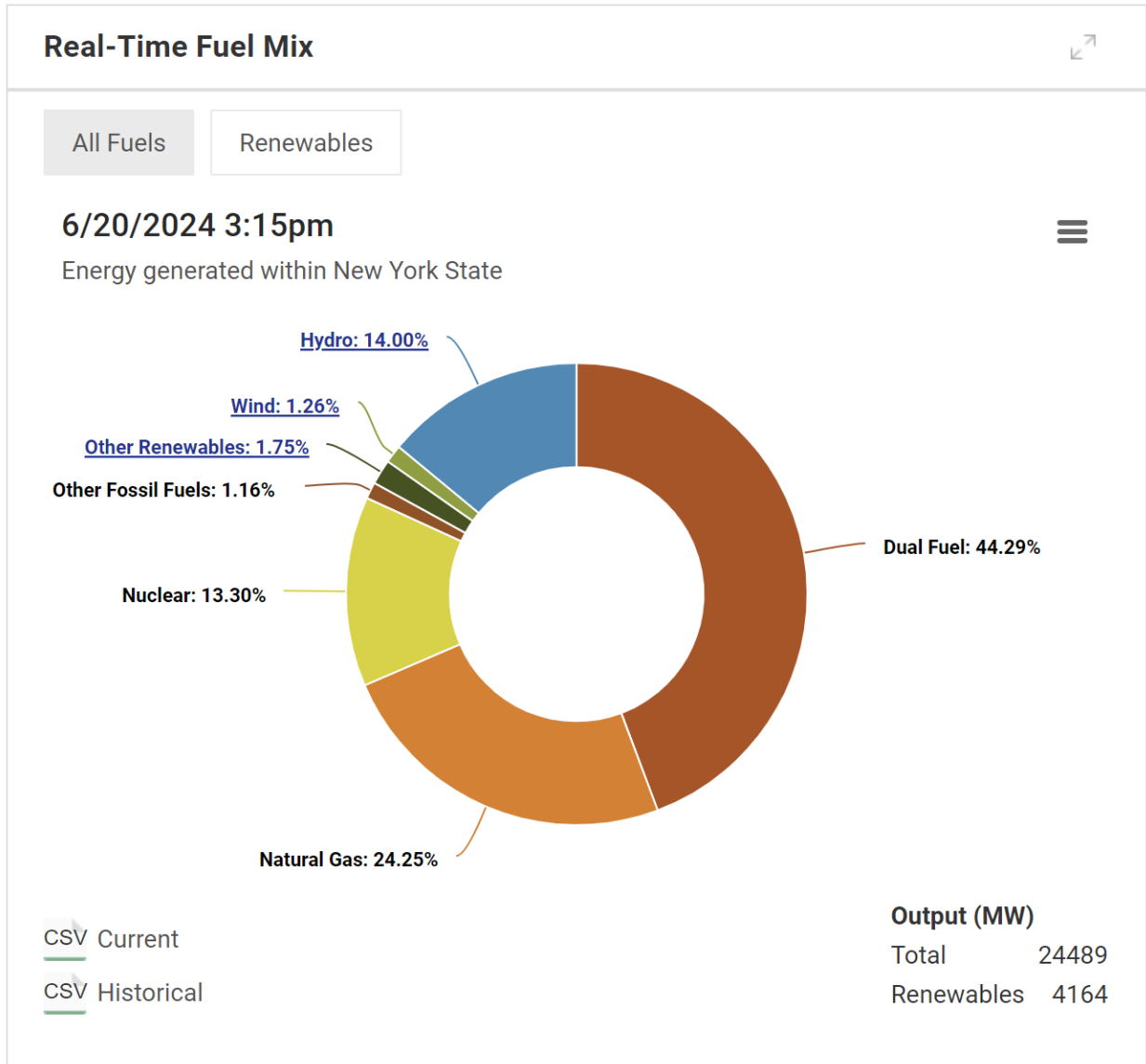


NYISO Data for June 2024 Heat Wave

This data summary documents New York Independent System Operator (NYISO) load data from the [Real-Time Dashboard](#) for the period 17-20 June 2024. Data available on the Dashboard includes Day Ahead Market Zonal LBMP, Interregional Data, Interface Data, Load vs LBMP, Daily Fuel, Interface Flow, and Zonal Data but the data used were limited to Real-Time Fuel Mix and Load.

The Real-Time Fuel Mix panel includes links to current and historical five-minute generation (MW) for energy generated in New York State. In the following daily summaries, I have processed that data to calculate hourly averages. The generator types include “Hydro” that includes pumped storage hydro; “Wind”, mostly land-based wind; “Other Renewables” that covers solar energy, energy storage resources, methane, refuse, or wood; “Other Fossil Fuels” is oil; “Nuclear”; “Natural Gas”; and “Dual Fuel” which are units that burn both natural gas and oil. To provide electricity when natural gas is diverted to home heating many NY generators can also burn oil.



To provide estimates of the observed and forecast load I took screenshots that displayed the current and yesterday's data. I have not figured out how to access historical hourly data, but this gives an idea of the loads.

I process the 5-minute data provided by NYISO in a spreadsheet because I no longer have access to a programming language and am too old to learn a new one that is available. The tradeoff is that the spreadsheet approach requires manual steps to get the hourly values and I have to do each day in a new spreadsheet.

The summaries provided below include daily statistics and graphs of fuel mix types over the whole period. There also is a summary of each day with hourly values listed.

Episode Daily Summary

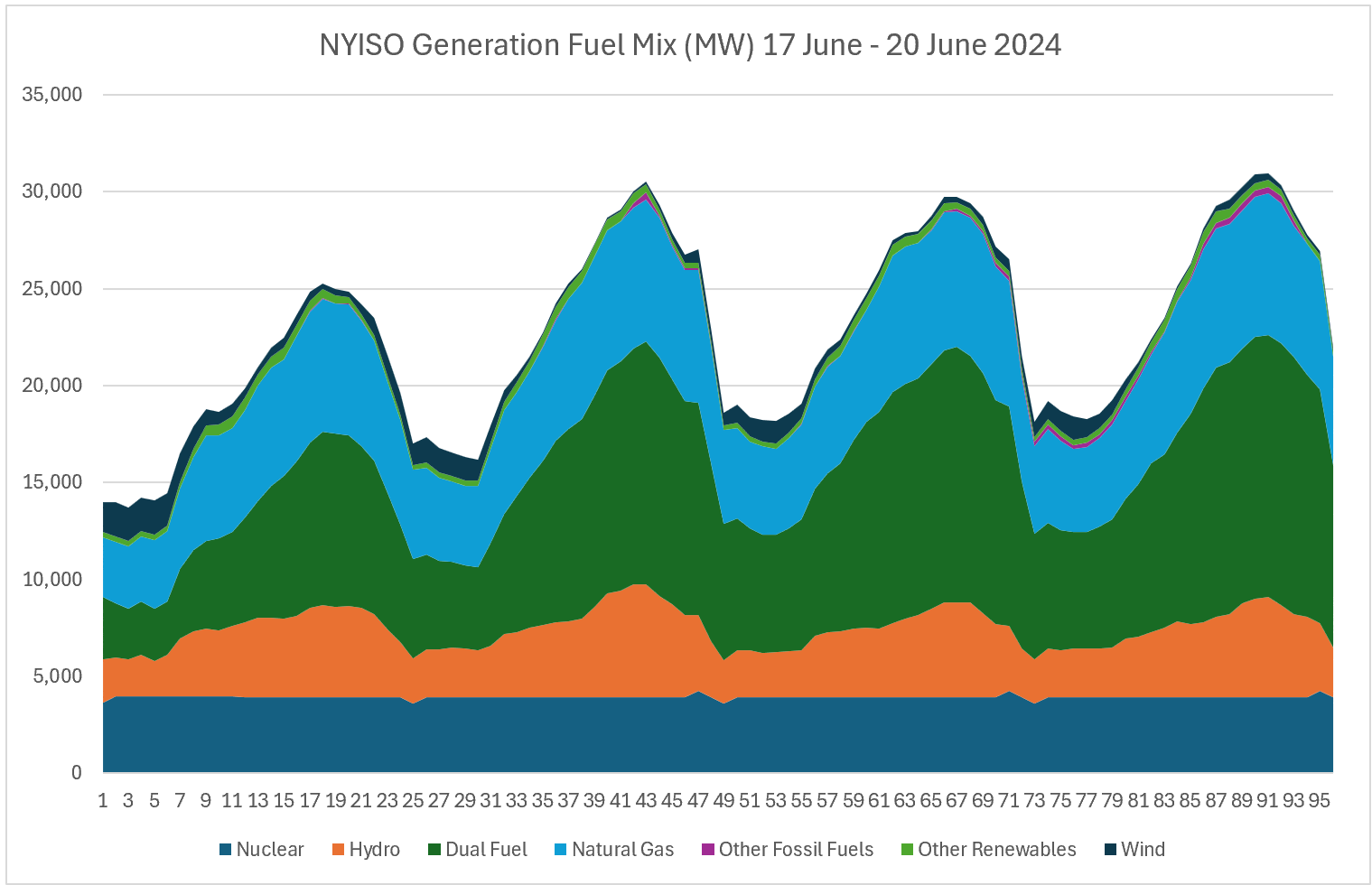
17 June - 20 June 2024 NYISO Fuel-Mix Generation (MW) Daily Summary

| Daily Average Generation (MW) | | | | | |
|-------------------------------|---------------|---------------|---------------|---------------|---------------|
| Date | 6/17/2024 | 6/18/2024 | 6/19/2024 | 6/20/2024 | Episode |
| Nuclear | 3,934 | 3,928 | 3,917 | 3,915 | 3,923 |
| Hydro | 3,472 | 3,810 | 3,442 | 3,540 | 3,566 |
| Dual Fuel | 5,702 | 8,578 | 9,707 | 9,839 | 8,457 |
| Natural Gas | 5,244 | 5,939 | 5,905 | 6,008 | 5,774 |
| Other Fossil Fuels | 6 | 44 | 49 | 202 | 75 |
| Other Renewables | 419 | 411 | 393 | 395 | 404 |
| Wind | 932 | 527 | 518 | 450 | 607 |
| Total | 19,710 | 23,237 | 23,932 | 24,350 | 22,807 |

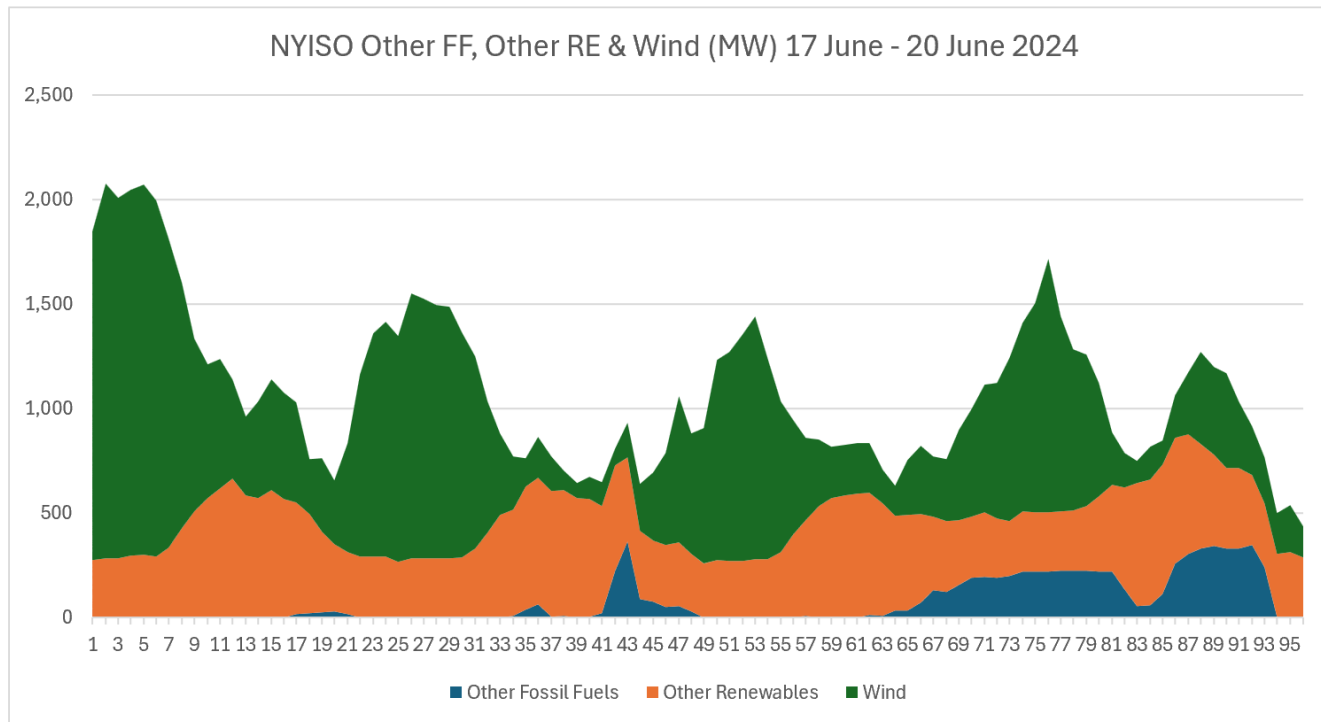
| Hourly Maximum Generation (MW) | | | | | |
|--------------------------------|---------------|---------------|---------------|---------------|---------------|
| Date | 6/17/2024 | 6/18/2024 | 6/19/2024 | 6/20/2024 | Episode |
| Nuclear | 3,965 | 4,237 | 4,241 | 4,240 | 4,170 |
| Hydro | 4,726 | 5,843 | 4,923 | 5,179 | 5,168 |
| Dual Fuel | 8,977 | 12,516 | 13,195 | 13,520 | 12,052 |
| Natural Gas | 6,852 | 7,317 | 7,160 | 7,295 | 7,156 |
| Other Fossil Fuels | 30 | 365 | 197 | 349 | 235 |
| Other Renewables | 667 | 605 | 592 | 615 | 620 |
| Wind | 1,789 | 1,268 | 1,158 | 1,209 | 1,356 |
| Total | 25,245 | 30,525 | 29,753 | 30,936 | 29,115 |

| Daily Total Generation (MW) | | | | | |
|-----------------------------|----------------|----------------|----------------|----------------|------------------|
| Date | 6/17/2024 | 6/18/2024 | 6/19/2024 | 6/20/2024 | Episode |
| Nuclear | 94,408 | 94,260 | 94,013 | 93,958 | 376,639 |
| Hydro | 83,338 | 91,437 | 82,613 | 84,971 | 342,359 |
| Dual Fuel | 136,847 | 205,877 | 232,978 | 236,130 | 811,832 |
| Natural Gas | 125,866 | 142,536 | 141,727 | 144,200 | 554,330 |
| Other Fossil Fuels | 138 | 1,065 | 1,176 | 4,854 | 7,233 |
| Other Renewables | 10,065 | 9,860 | 9,422 | 9,477 | 38,824 |
| Wind | 22,373 | 12,655 | 12,434 | 10,804 | 58,266 |
| Total | 473,033 | 557,691 | 574,364 | 584,395 | 2,189,483 |

The NYISO Summer 2024 Reliability Outlook expects 34,913 MW of resources available to meet 31,541 MW of forecasted demand under normal conditions. During this period, the maximum hourly generation was 30,525 MW at hour 18 on June 18.



This graph shows the hourly fuel type generation throughout the period. NYISO does not track behind-the-meter solar that reduces the load that NYISO must provide. Note that nuclear is constant throughout the day and hydro, dual-fuel, and natural gas increases to match the load peak. The remaining three categories are of particular interest. The following graph only includes these three categories because they are small relative to the other fuel types.



In the “Other Renewables” categories the next table lists the following capabilities at the end of 2023: utility-scale solar energy 254 MW, energy storage resources 20 MW, methane 104 MW, refuse 239 MW, and wood 56 MW for a total of 653 MW. The graph suggests that solar was providing its peak load during each day. The methane, refuse, and wood generators are dispatched so that they reduce load at night to a little under 300 MW.

One of the notable features during this period was that the wind resource consistently was lowest during the daily peak load.

The category “Other Fossil Fuels” provides generation for units that are exclusively oil-firing. In New York there are two types of these units – residual oil-fired steam boilers and simple-cycle peaking turbines. All the oil-fired boilers must remain at minimum loads higher than the lowest hourly values listed above to be able to ramp up for the diurnal peak. Therefore, the generation came from simple-cycle peaking turbines.

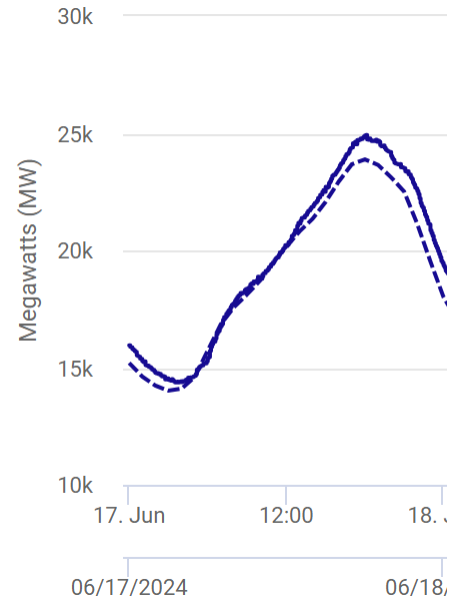
2024 NYISO Goldbook Tables III - 2a NYISO Market Generators and Table III - 2b Non-Market Generators 2023 Capacity, Energy, and Capacity Factors

| Primary Fuel Tupe | Secondary Fuel Type | Nameplate (MW) | 2024 CRIS (MW) | | 2023 Net Energy (GWh) | Capacity Factor (%) | | |
|------------------------|------------------------|----------------|----------------|--------|-----------------------|---------------------|--------|--------|
| | | | Summer | Winter | | Nameplate | Summer | Winter |
| Natural Gas | No. 2 Fuel Oil | 10,979 | 9,412 | 11,212 | 35,154 | 36.6% | 42.6% | 35.8% |
| Water | | 6,731 | 5,734 | 5,734 | 27,923 | 47.4% | 55.6% | 55.6% |
| Natural Gas | | 5,343 | 4,824 | 5,275 | 11,589 | 24.8% | 27.4% | 25.1% |
| Natural Gas | No. 6 Fuel Oil | 5,286 | 5,237 | 5,237 | 6,169 | 13.3% | 13.4% | 13.4% |
| Uranium | | 3,537 | 3,381 | 3,381 | 27,522 | 88.8% | 92.9% | 92.9% |
| Wind | | 2,864 | 2,861 | 2,861 | 4,893 | 19.5% | 19.5% | 19.5% |
| Natural Gas | Kerosene | 1,852 | 1,717 | 1,981 | 2,887 | 17.8% | 19.2% | 16.6% |
| Natural Gas | No. 4 Fuel Oil | 1,827 | 1,744 | 1,744 | 792 | 4.9% | 5.2% | 5.2% |
| No. 2 Fuel Oil | | 1,311 | 1,196 | 1,494 | 71 | 0.6% | 0.7% | 0.5% |
| No. 4 Fuel Oil | | 902 | 850 | 850 | 9 | 0.1% | 0.1% | 0.1% |
| No. 6 Fuel Oil | Natural Gas | 902 | 835 | 835 | 25 | 0.3% | 0.3% | 0.3% |
| Natural Gas | Butane | 800 | 791 | 925 | 4,391 | 62.7% | 63.4% | 54.2% |
| Refuse (Solid Waste) | | 313 | 239 | 239 | 1,812 | 66.2% | 86.4% | 86.4% |
| Sunlight | | 279 | 254 | 254 | 230 | 9.4% | 10.3% | 10.3% |
| Methane (Bio Gas) | | 131 | 104 | 104 | 561 | 48.7% | 61.7% | 61.7% |
| Natural Gas | Wood and/or Wood Waste | 113 | 106 | 106 | 143 | 14.5% | 15.4% | 15.4% |
| Battery | | 95 | 20 | 20 | -9 | -1.1% | -5.2% | -5.2% |
| Kerosene | | 77 | 77 | 93 | 0 | 0.1% | 0.1% | 0.0% |
| Wood and/or Wood Waste | | 56 | 0 | 0 | 0 | 0.0% | | |
| Fly Wheel | | 20 | 0 | 0 | -7 | -3.9% | | |
| Total | | 43,417 | 39,383 | 42,345 | 124,153 | 32.6% | 36.0% | 33.5% |

June 17, 2024

The peak forecast total load (dashed line) was less than the observed load (solid line). Wind resources were strong until 0700 but tailed off during the day. Note that the wind was lowest when the load peaked at 1700.

NYISO Total Load Forecast vs. Observed



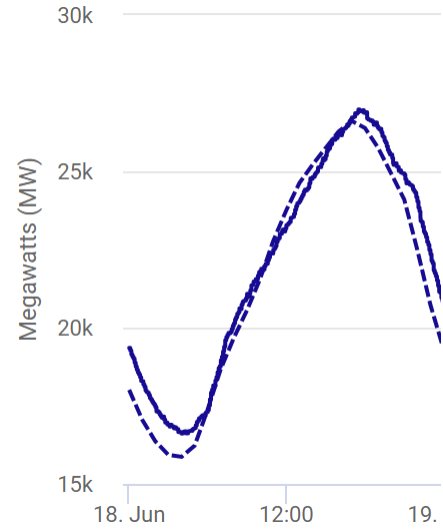
NYISO Fuel Mix (MWh) for 6/17/2024

| Hour | Nuclear | Hydro | Dual Fuel | Natural Gas | Other Fossil Fuels | Other Renewables | Wind | Total |
|------|---------|--------|-----------|-------------|--------------------|------------------|--------|---------|
| 0 | 3,953 | 2,464 | 3,713 | 3,478 | 1 | 298 | 1,670 | 15,576 |
| 1 | 3,954 | 2,038 | 2,757 | 3,177 | 1 | 284 | 1,789 | 14,001 |
| 2 | 3,955 | 1,904 | 2,619 | 3,208 | 1 | 284 | 1,723 | 13,693 |
| 3 | 3,959 | 2,139 | 2,760 | 3,336 | 1 | 296 | 1,750 | 14,239 |
| 4 | 3,961 | 1,826 | 2,717 | 3,519 | 1 | 300 | 1,771 | 14,095 |
| 5 | 3,965 | 2,147 | 2,772 | 3,592 | 1 | 294 | 1,699 | 14,470 |
| 6 | 3,965 | 2,977 | 3,590 | 4,140 | 1 | 333 | 1,481 | 16,486 |
| 7 | 3,964 | 3,348 | 4,197 | 4,793 | 1 | 425 | 1,176 | 17,904 |
| 8 | 3,965 | 3,508 | 4,531 | 5,443 | 1 | 509 | 824 | 18,781 |
| 9 | 3,959 | 3,405 | 4,774 | 5,291 | 1 | 573 | 638 | 18,641 |
| 10 | 3,954 | 3,644 | 4,840 | 5,374 | 1 | 620 | 618 | 19,051 |
| 11 | 3,943 | 3,862 | 5,368 | 5,551 | 1 | 667 | 474 | 19,866 |
| 12 | 3,937 | 4,097 | 5,998 | 5,947 | 1 | 582 | 377 | 20,940 |
| 13 | 3,934 | 4,075 | 6,836 | 6,074 | 6 | 567 | 463 | 21,954 |
| 14 | 3,933 | 4,061 | 7,345 | 6,002 | 1 | 610 | 529 | 22,481 |
| 15 | 3,935 | 4,189 | 7,970 | 6,472 | 1 | 567 | 507 | 23,642 |
| 16 | 3,934 | 4,587 | 8,530 | 6,773 | 17 | 534 | 479 | 24,853 |
| 17 | 3,933 | 4,726 | 8,977 | 6,852 | 23 | 474 | 260 | 25,245 |
| 18 | 3,935 | 4,635 | 8,943 | 6,711 | 27 | 386 | 351 | 24,987 |
| 19 | 3,940 | 4,703 | 8,770 | 6,791 | 30 | 321 | 307 | 24,862 |
| 20 | 3,940 | 4,613 | 8,324 | 6,487 | 19 | 293 | 521 | 24,196 |
| 21 | 3,939 | 4,289 | 7,911 | 6,179 | 2 | 293 | 871 | 23,484 |
| 22 | 3,940 | 3,493 | 7,026 | 5,717 | 1 | 290 | 1,069 | 21,536 |
| 23 | 3,940 | 2,828 | 6,044 | 5,398 | 1 | 290 | 1,124 | 19,624 |
| Day | 94,736 | 83,558 | 137,311 | 126,305 | 138 | 10,090 | 22,469 | 474,605 |
| Max | 3,965 | 4,726 | 8,977 | 6,852 | 30 | 667 | 1,789 | 25,245 |
| Min | 3,933 | 1,826 | 2,619 | 3,177 | 1 | 284 | 260 | 13,693 |
| Avg. | 3,947 | 3,482 | 5,721 | 5,263 | 6 | 420 | 936 | 19,775 |

June 18, 2024

The peak forecast total load (dashed line) was less than the observed load (solid line). Wind resources had a similar pattern to the previous day. Note that the wind output was relatively low during the afternoon load peak. Also notable is that the peaking turbines in the “other fossil fuels” category totaled 1,065 MWh

NYISO Total Load Forecast vs. Observed



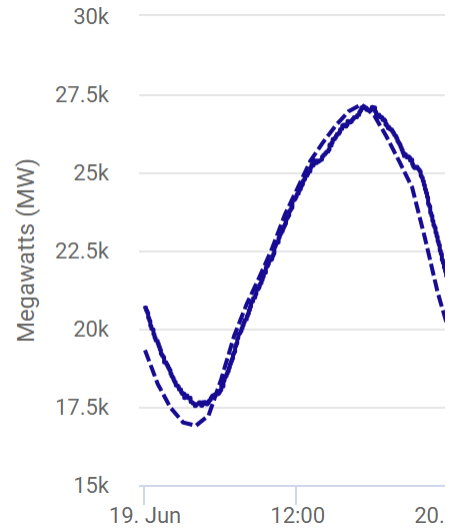
NYISO Fuel Mix (MWh) for 6/18/2024

| Hour | Nuclear | Hydro | Dual Fuel | Natural Gas | Other Fossil Fuels | Other Renewables | Wind | Total |
|------|---------|--------|-----------|-------------|--------------------|------------------|--------|---------|
| 0 | 3,610 | 2,333 | 5,130 | 4,575 | 1 | 268 | 1,080 | 16,995 |
| 1 | 3,937 | 2,453 | 4,890 | 4,494 | 1 | 283 | 1,268 | 17,326 |
| 2 | 3,939 | 2,441 | 4,593 | 4,272 | 1 | 285 | 1,239 | 16,771 |
| 3 | 3,940 | 2,553 | 4,421 | 4,123 | 1 | 285 | 1,210 | 16,532 |
| 4 | 3,938 | 2,483 | 4,320 | 4,099 | 1 | 282 | 1,203 | 16,326 |
| 5 | 3,938 | 2,430 | 4,256 | 4,203 | 1 | 288 | 1,076 | 16,191 |
| 6 | 3,937 | 2,663 | 5,285 | 4,831 | 1 | 331 | 920 | 17,968 |
| 7 | 3,935 | 3,262 | 6,202 | 5,351 | 1 | 405 | 629 | 19,784 |
| 8 | 3,932 | 3,344 | 7,058 | 5,333 | 1 | 491 | 391 | 20,550 |
| 9 | 3,930 | 3,574 | 7,744 | 5,473 | 10 | 505 | 254 | 21,491 |
| 10 | 3,925 | 3,749 | 8,476 | 5,851 | 39 | 587 | 138 | 22,765 |
| 11 | 3,925 | 3,864 | 9,375 | 6,205 | 64 | 605 | 196 | 24,233 |
| 12 | 3,928 | 3,925 | 9,910 | 6,711 | 6 | 599 | 168 | 25,247 |
| 13 | 3,931 | 4,062 | 10,259 | 7,061 | 11 | 600 | 92 | 26,015 |
| 14 | 3,928 | 4,667 | 10,907 | 7,176 | 1 | 570 | 73 | 27,321 |
| 15 | 3,927 | 5,358 | 11,499 | 7,202 | 6 | 563 | 103 | 28,658 |
| 16 | 3,927 | 5,493 | 11,831 | 7,199 | 22 | 512 | 112 | 29,096 |
| 17 | 3,925 | 5,800 | 12,193 | 7,271 | 226 | 502 | 83 | 30,001 |
| 18 | 3,919 | 5,843 | 12,516 | 7,317 | 365 | 402 | 164 | 30,525 |
| 19 | 3,914 | 5,211 | 12,313 | 7,232 | 89 | 327 | 222 | 29,309 |
| 20 | 3,916 | 4,822 | 11,568 | 6,873 | 75 | 296 | 323 | 27,873 |
| 21 | 3,916 | 4,259 | 11,044 | 6,758 | 53 | 296 | 438 | 26,763 |
| 22 | 4,237 | 3,929 | 10,938 | 6,870 | 58 | 301 | 702 | 27,035 |
| 23 | 3,910 | 2,921 | 9,150 | 6,058 | 30 | 277 | 572 | 22,918 |
| Day | 94,260 | 91,437 | 205,877 | 142,536 | 1,065 | 9,860 | 12,655 | 557,691 |
| Max | 4,237 | 5,843 | 12,516 | 7,317 | 365 | 605 | 1,268 | 30,525 |
| Min | 3,610 | 2,333 | 4,256 | 4,099 | 1 | 268 | 73 | 16,191 |
| Avg. | 3,928 | 3,810 | 8,578 | 5,939 | 44 | 411 | 527 | 23,237 |

June 19, 2024

The forecast total load (dashed line) matched the observed load (solid line) much better on this day. Wind resources picked up during the early morning hours when not needed but tailed off again when they were needed. The peaking turbines provided 1,176 MWh on this day.

NYISO Total Load Forecast vs. Observed



NYISO Fuel Mix (MWh) for 6/19/2024

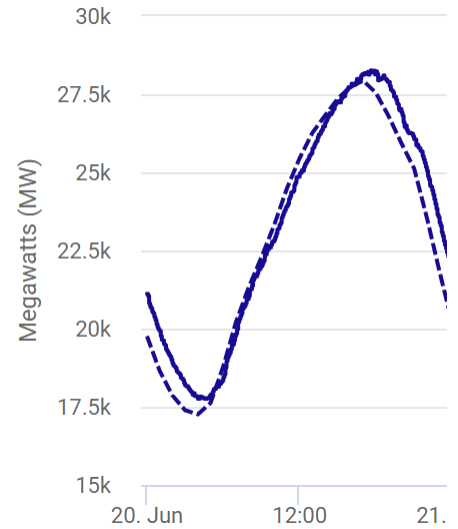
| Hour | Nuclear | Hydro | Dual Fuel | Natural Gas | Other Fossil Fuels | Other Renewables | Wind | Total |
|------|---------|-------|-----------|-------------|--------------------|------------------|-------|--------|
| 0 | 3,588 | 2,253 | 7,024 | 4,834 | 1 | 259 | 647 | 18,606 |
| 1 | 3,916 | 2,418 | 6,815 | 4,656 | 1 | 276 | 955 | 19,037 |
| 2 | 3,919 | 2,413 | 6,281 | 4,503 | 1 | 270 | 1,002 | 18,388 |
| 3 | 3,922 | 2,308 | 6,092 | 4,535 | 1 | 271 | 1,083 | 18,212 |
| 4 | 3,924 | 2,339 | 6,056 | 4,430 | 1 | 279 | 1,158 | 18,187 |
| 5 | 3,927 | 2,364 | 6,341 | 4,656 | 1 | 280 | 962 | 18,530 |
| 6 | 3,928 | 2,419 | 6,750 | 4,918 | 1 | 314 | 720 | 19,049 |
| 7 | 3,927 | 3,142 | 7,604 | 5,269 | 1 | 397 | 548 | 20,888 |
| 8 | 3,920 | 3,364 | 8,197 | 5,511 | 8 | 458 | 393 | 21,851 |
| 9 | 3,920 | 3,424 | 8,634 | 5,537 | 1 | 531 | 317 | 22,364 |
| 10 | 3,910 | 3,549 | 9,739 | 5,614 | 0 | 573 | 244 | 23,630 |
| 11 | 3,909 | 3,587 | 10,644 | 5,782 | 1 | 584 | 244 | 24,751 |
| 12 | 3,910 | 3,570 | 11,187 | 6,438 | 2 | 592 | 243 | 25,942 |
| 13 | 3,912 | 3,834 | 11,924 | 7,011 | 11 | 587 | 237 | 27,515 |
| 14 | 3,916 | 4,070 | 12,094 | 7,074 | 7 | 539 | 162 | 27,862 |
| 15 | 3,918 | 4,245 | 12,192 | 6,985 | 33 | 454 | 143 | 27,970 |
| 16 | 3,915 | 4,561 | 12,654 | 6,880 | 35 | 457 | 263 | 28,765 |
| 17 | 3,915 | 4,923 | 12,971 | 7,121 | 74 | 421 | 329 | 29,753 |
| 18 | 3,917 | 4,876 | 13,195 | 6,990 | 132 | 353 | 286 | 29,749 |
| 19 | 3,916 | 4,905 | 12,726 | 7,095 | 125 | 337 | 297 | 29,400 |
| 20 | 3,913 | 4,366 | 12,376 | 7,160 | 157 | 310 | 432 | 28,714 |
| 21 | 3,914 | 3,777 | 11,553 | 6,905 | 193 | 289 | 516 | 27,147 |
| 22 | 4,241 | 3,380 | 11,316 | 6,483 | 197 | 310 | 607 | 26,532 |
| 23 | 3,918 | 2,525 | 8,614 | 5,343 | 192 | 284 | 648 | 21,523 |

| | | | | | | | | |
|------|--------|--------|---------|---------|-------|-------|--------|---------|
| Day | 94,013 | 82,613 | 232,978 | 141,727 | 1,176 | 9,422 | 12,434 | 574,364 |
| Max | 4,241 | 4,923 | 13,195 | 7,160 | 197 | 592 | 1,158 | 29,753 |
| Min | 3,588 | 2,253 | 6,056 | 4,430 | 0 | 259 | 143 | 18,187 |
| Avg. | 3,917 | 3,442 | 9,707 | 5,905 | 49 | 393 | 518 | 23,932 |

June 20, 2024

The peak forecast total load (dashed line) was less than the observed load (solid line) and was a little earlier. Wind resources showed the same diurnal pattern suggesting that there is some reason that winds pick up at night within high pressure systems. Most notable is that the peaking turbines provided 4,854 MWh of energy on this day.

NYISO Total Load Forecast vs. Observed



NYISO Fuel Mix (MWh) for 6/20/2024

| Hour | Nuclear | Hydro | Dual Fuel | Natural Gas | Other Fossil Fuels | Other Renewables | Wind | Total |
|------|---------|-------|-----------|-------------|--------------------|------------------|-------|--------|
| 0 | 3,594 | 2,280 | 6,492 | 4,521 | 200 | 264 | 776 | 18,128 |
| 1 | 3,920 | 2,524 | 6,486 | 4,842 | 223 | 285 | 902 | 19,183 |
| 2 | 3,924 | 2,430 | 6,188 | 4,627 | 223 | 284 | 998 | 18,673 |
| 3 | 3,925 | 2,494 | 6,013 | 4,284 | 223 | 283 | 1,209 | 18,431 |
| 4 | 3,925 | 2,493 | 6,018 | 4,394 | 224 | 286 | 929 | 18,269 |
| 5 | 3,922 | 2,505 | 6,285 | 4,566 | 224 | 290 | 769 | 18,560 |
| 6 | 3,921 | 2,578 | 6,624 | 4,864 | 223 | 309 | 725 | 19,245 |
| 7 | 3,917 | 3,020 | 7,226 | 5,056 | 221 | 362 | 540 | 20,341 |
| 8 | 3,915 | 3,144 | 7,878 | 5,362 | 220 | 415 | 252 | 21,186 |
| 9 | 3,911 | 3,380 | 8,711 | 5,586 | 135 | 487 | 167 | 22,377 |
| 10 | 3,907 | 3,594 | 8,953 | 6,296 | 57 | 586 | 109 | 23,501 |
| 11 | 3,911 | 3,924 | 9,757 | 6,725 | 61 | 599 | 159 | 25,136 |
| 12 | 3,914 | 3,795 | 10,842 | 6,895 | 117 | 615 | 117 | 26,295 |
| 13 | 3,914 | 3,888 | 12,033 | 7,205 | 260 | 598 | 205 | 28,104 |
| 14 | 3,912 | 4,162 | 12,855 | 7,162 | 306 | 572 | 294 | 29,262 |
| 15 | 3,909 | 4,308 | 12,977 | 7,116 | 330 | 501 | 439 | 29,581 |
| 16 | 3,909 | 4,851 | 13,123 | 7,167 | 345 | 434 | 422 | 30,251 |
| 17 | 3,908 | 5,115 | 13,465 | 7,246 | 329 | 389 | 452 | 30,903 |
| 18 | 3,910 | 5,179 | 13,520 | 7,295 | 331 | 386 | 316 | 30,936 |
| 19 | 3,913 | 4,753 | 13,500 | 7,244 | 349 | 333 | 236 | 30,326 |
| 20 | 3,910 | 4,284 | 13,280 | 6,784 | 242 | 306 | 221 | 29,027 |
| 21 | 3,912 | 4,156 | 12,494 | 6,725 | 6 | 300 | 194 | 27,787 |
| 22 | 4,240 | 3,524 | 12,041 | 6,617 | 6 | 307 | 224 | 26,958 |
| 23 | 3,917 | 2,592 | 9,370 | 5,619 | 1 | 287 | 148 | 21,934 |

| | | | | | | | | |
|------|--------|--------|---------|---------|-------|-------|--------|---------|
| Day | 93,958 | 84,971 | 236,130 | 144,200 | 4,854 | 9,477 | 10,804 | 584,395 |
| Max | 4,240 | 5,179 | 13,520 | 7,295 | 349 | 615 | 1,209 | 30,936 |
| Min | 3,594 | 2,280 | 6,013 | 4,284 | 1 | 264 | 109 | 18,128 |
| Avg. | 3,915 | 3,540 | 9,839 | 6,008 | 202 | 395 | 450 | 24,350 |