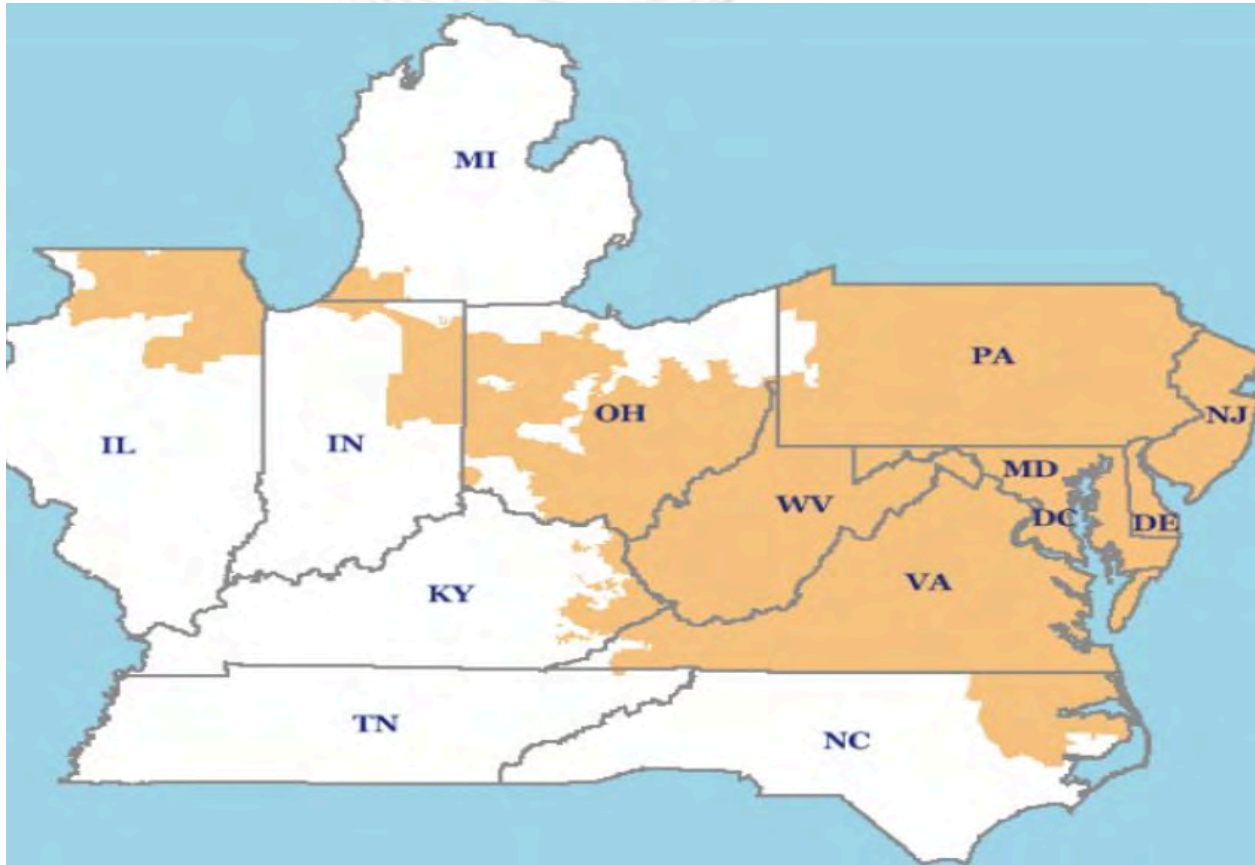




RGGI Educational Briefing

Glen Thomas
October 22, 2019

Before the Senate
Environmental Resources
and Energy Committee



Pennsylvania – Existing Installed Capacity

(MW submitted to PJM, December 31, 2018)

Natural Gas, **15,195 MW**

Waste, **252 MW**

Nuclear, **9,801 MW**

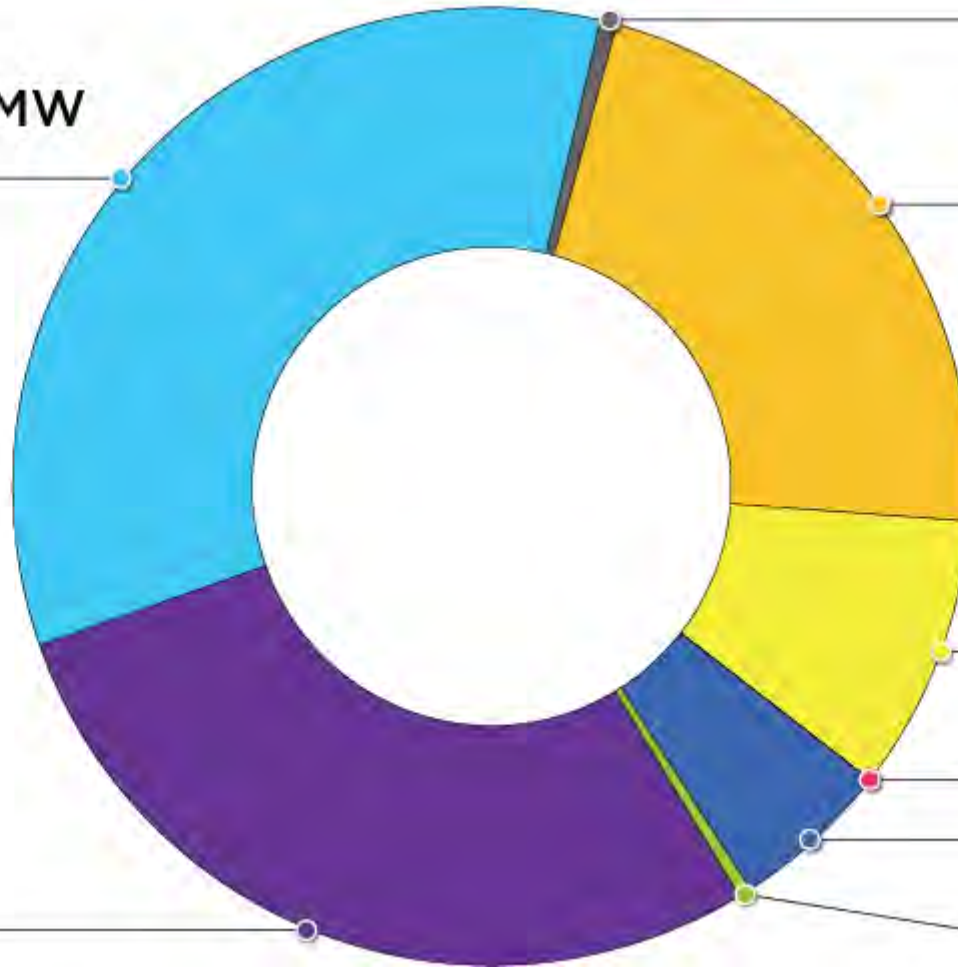
Oil, **4,170 MW**

Solar, **7 MW**

Hydro, **2,413 MW**

Wind, **188 MW**

Coal, **12,634 MW**

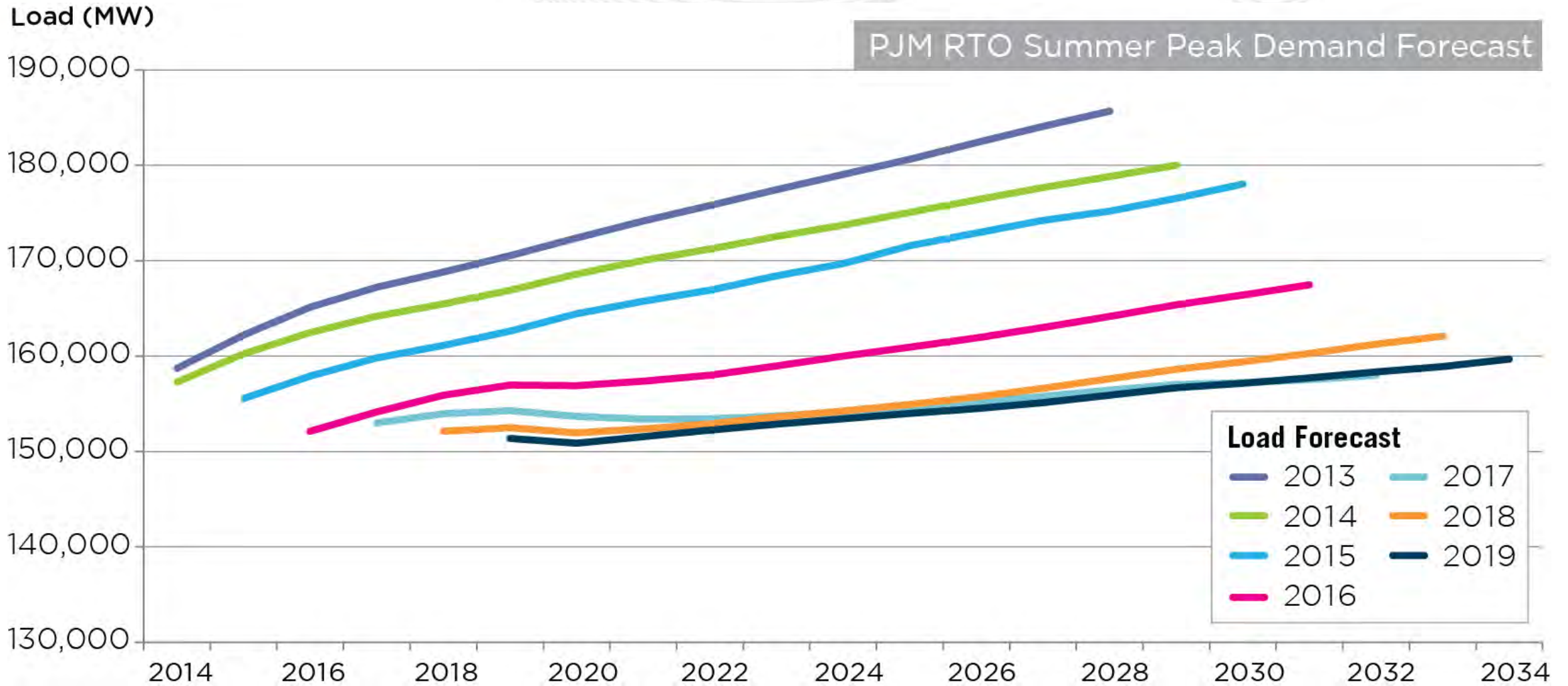


Summary:

Natural gas represents approximately 34.0 percent of the total installed capacity in Pennsylvania while coal represents approximately 28.3 percent.

Overall in PJM, natural gas represents approximately 40.2 percent of installed capacity while coal represents 30.7 percent.

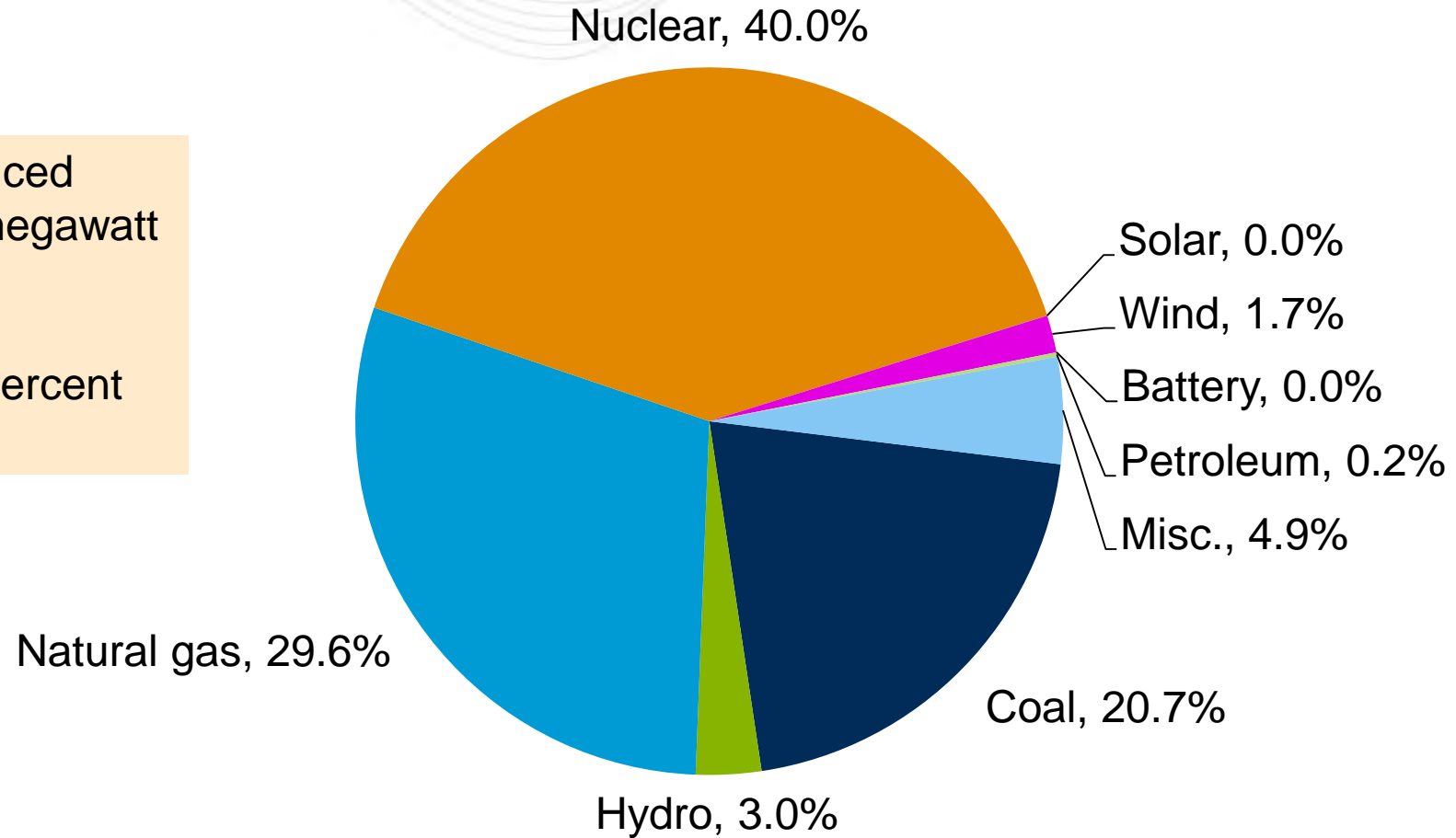
PJM RTO Summer Peak Demand Forecast



Amount of energy produced by Pennsylvania generation in 2018.

Note: Pennsylvania produced more than 202.5 million megawatt hours of energy in 2018.

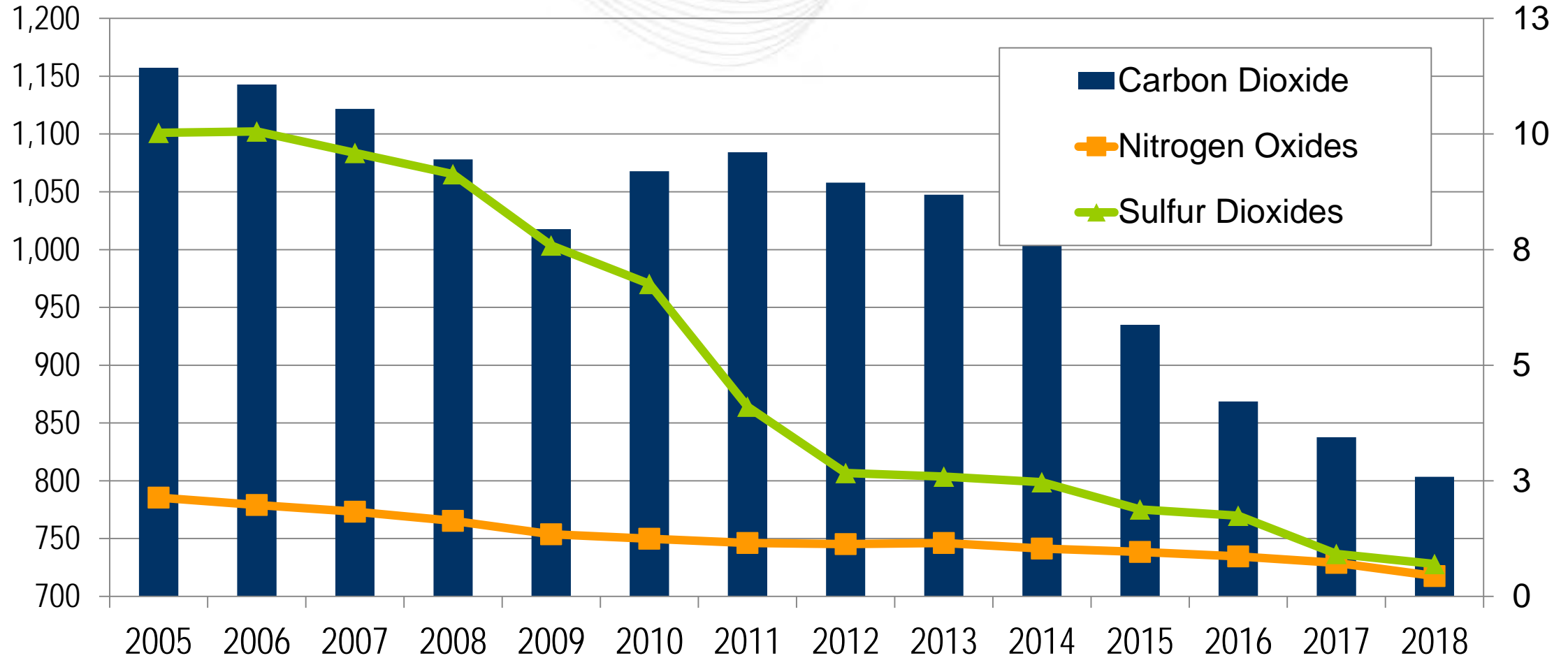
The state exported 24.0 percent of that energy.



CO₂
(lbs/MWh)

Pennsylvania Average Emissions (lbs/MWh)

SO₂ and No_x
(lbs/MWh)



Pennsylvania Carbon Numbers in Perspective

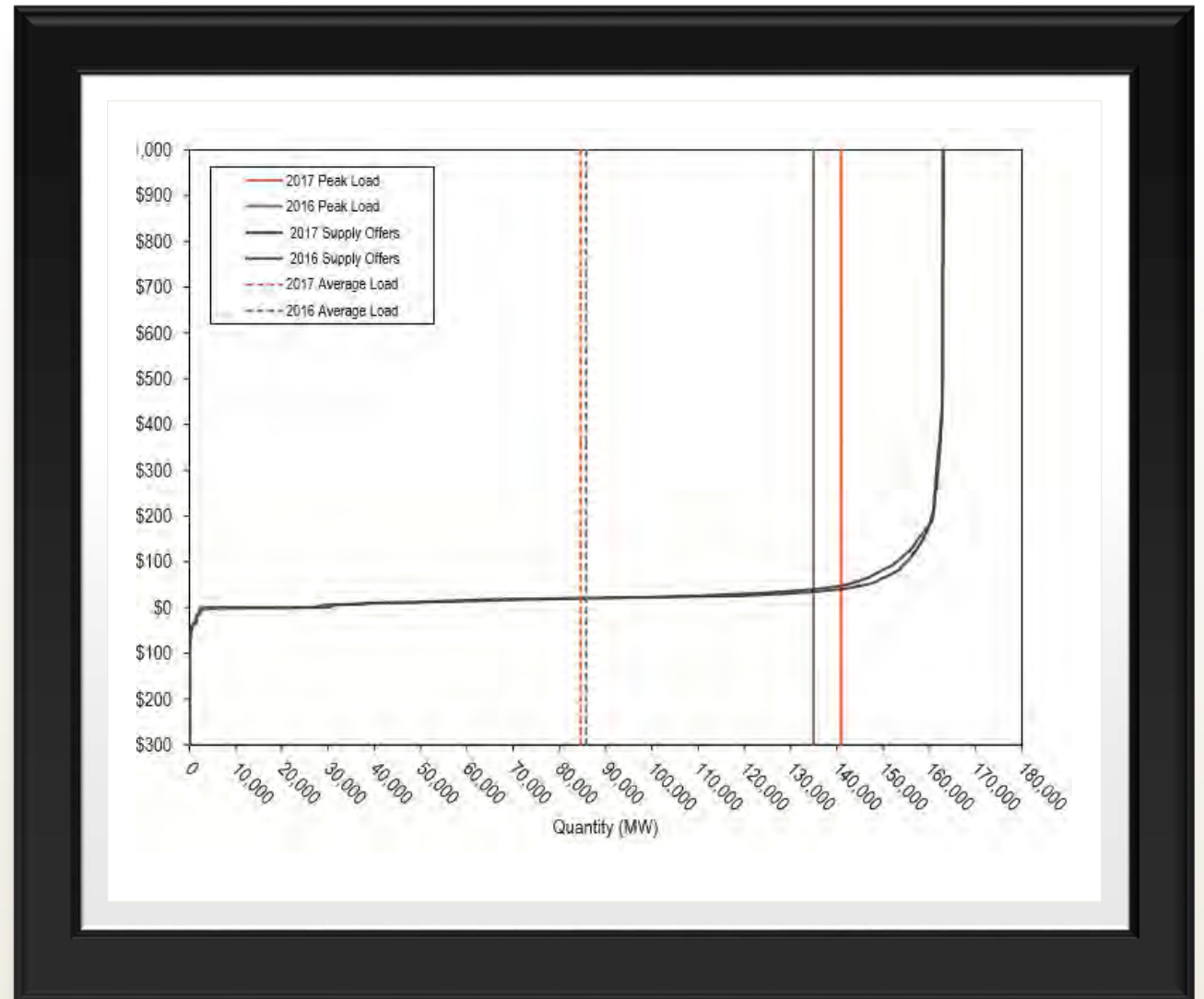
- Total carbon from the power generation sector
 - In 2010, the PA Power Sector emitted 119.6 million metric tons of CO₂.
 - In 2016, the PA Power Sector emitted 82.1 million metric tons of CO₂.
 - Over the same time period, emissions from coal plants dropped from 105.7 to 54.2 while emission from gas plants rose from 13.4 to 27.6.
 - Note that under the Clean Power Plan, Pennsylvania's "goal" was to reach 91 million metric tons of CO₂ emissions by 2030 (a 24% reduction from 2012 levels).

PJM Energy Market

- The PJM Energy Market procures electricity to meet consumers' demands both in real time and in the near term. It includes the sale or purchase of energy in PJM's Real-Time Energy Market (five minutes) and Day-Ahead Market (one day forward).
- Generators submit their bids and PJM selects the lowest cost resources to meet the demand.

PJM SUPPLY STACK – 2016/2017

- Hypercompetitive market yielding very tight margins.
- Significant sensitivities to changes in costs.



Typical Pennsylvania Natural Gas Plant

CURRENT – NO RGGI OR CARBON TAX

- Bids into PJM Energy Market Mostly Based on Fuel Costs.
- Typical bid around \$18/MWH.

WITH RGGI OR CARBON TAX (ASSUMING \$5 PER TON)

- Bids into PJM Energy Market Would Need to Account for Carbon Price.
- Including RGGI price, bid would likely rise to around \$20 MWH.

Typical Pennsylvania Coal Plant

CURRENT – NO RGGI OR CARBON TAX

- Bids into PJM Energy Market Mostly Based on Fuel Costs.
- Typical bid around \$20/MWH.

WITH RGGI OR CARBON TAX (ASSUMING \$5 PER TON)

- Bids into PJM Energy Market Would Need to Account for Carbon Price.
- Including RGGI price, bid would likely rise to around \$26 MWH.