



# ATC Futures (Text View)

## Robust Economy

Peak Growth Within UP	2%/2% (Upper)
Point Load Growth Within UP	199MW/ 281MW (Upper)
Total Load Growth Within UP	3.0%/2.6% (Upper)
Peak Growth Within ATC	3% (Upper)
Peak Growth Outside ATC	3% (Upper)
Generation Additions Inside UP	Upper
Generation Retirements Inside UP	Lower
Existing Generation Dispatch Changes Inside UP	Upper or Mid
Generation Inside ATC	Upper
Generation Outside ATC	MISO's Reference

- ATC footprint energy and peak demand grow at a fast rate because of a fast growing economy.
- U.P. scalable loads and point loads grow at a similarly fast pace due to a fast growing economy and high commodity prices.
- Percentages to the left show 2018 Growth/2024 Growth
- To help keep up with growing demand, 500 MW of coal-fired units are added within the ATC footprint in 2018 and 2024, respectively. These units could include provisions for carbon sequestration assuming that a \$25/ton CO2 tax makes it cost-effective to do so. Nelson Dewey, a new 280 MW coal-fired generator under PSC review, also helps to meet the higher demand levels. There are no generation retirements within the ATC footprint, other than those that have been announced. The generation expansion plans both inside and outside of ATC come from MISO's Reference Future. However, plant capacities are scaled up on new units to serve the higher peak demand and maintain 15% reserve margins.
- Only generation presently committed to retirement is unavailable in the UP
- Significant generation additions occur in the eastern UP
- Existing generation is available following traditional patterns



# ATC Futures (Text View)

## Robust Economy

RPS %  
Inside ATC

Mid (8% in 2013)

Renewable  
Source for ATC

Mid

General Environ  
Regs

Mid

Renewables  
Inside UP

Mid

Natural Gas  
Prices

Mid-Upper (+25%)

Coal Prices

Upper (20%)

- The percent of energy in ATC from renewables in 2018 and 2024 is 15%, which is higher than required by current Wisconsin Renewable Portfolio Standard (RPS) standards (i.e., 10% by 2015). The Governor's Task Force on Global Warming has suggested that the RPS standard be increased from its current level. A robust economy could help encourage greater investment in renewable resources, even if their direct costs were somewhat higher. A \$25/ton CO2 tax is imposed and mercury costs are 25% higher.
- Modest levels wind generation development occurs in the UP
- Bio Mass fueled generation in the eastern and central UP is part of the non-wind new generation
- The combination of a \$25/ton CO2 tax, 25% higher mercury costs and higher energy requirements results in higher demand and costs for natural gas. There is also upward pressure on coal costs because of high energy requirements.



# ATC Futures (Text View)

## High Retirements

Peak Growth Within UP	0.8%/0.8% (Mid)
Point Load Growth Within UP	67MW/67MW (Mid)
Total Load Growth Within UP	1.1%/0.8% (Mid)
Peak Growth Within ATC	1.5% (Mid)
Peak Growth Outside ATC	1.5% (Mid)
Generation Additions Inside UP	Lower or Mid
Generation Retirements Inside UP	Upper
Existing Generation Dispatch Availability Inside UP	Lower or Mid Upper
Generation Inside ATC	Lower
Generation Outside ATC	MISO's Environmental

- ATC footprint energy and peak demand grow at a modest rate.
- UP scalable loads grow at a modest rate.
- Point load additions are scattered throughout the UP
- The combination of a \$25/ton CO2 tax and 25% higher mercury costs plus the high (and potentially increasing) cost of retrofitting coal-fired plants to meet Federal Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR) regulations cause smaller aging coal-fired units within the ATC footprint to be retired for economic reasons (270 MW in 2013, 880 MW in 2018 and 2024). Nelson Dewey, a new 280 MW coal-fired generator under PSC review, helps to meet internal demand no longer met by retired units. The generation expansion plans both inside and outside of ATC come from MISO's Reference Future.
- There are small generation additions in the eastern UP
- Some additional generation retires within the UP
- Existing generation within the UP is less available for routine dispatch.



# ATC Futures (Text View)

## High Retirements

RPS %  
Inside ATC

Mid (8% in 2013)

Renewable  
Source for ATC

Mid

General Environ  
Regs

Mid

Renewables  
Inside UP

Mid

Natural Gas  
Prices

Mid-Low (-20%)

Coal Prices

Mid

- The percent of energy in ATC from renewables in 2018 and 2024 is 15%, which is higher than required by current Wisconsin RPS standards (i.e., 10% by 2015). Additional wind power could help replace the loss of local, relatively low energy cost generation due to the retirement of smaller and aging coal-fired units, especially if wind-power tax incentives continue. A \$25/ton CO2 tax is imposed and mercury costs are higher.
- Modest wind additions are installed across the UP
- Some Bio Mass based generation is installed in the central and eastern UP
- Additional wind power and higher building standards (requiring better insulation, windows, furnaces, air conditioning, etc.) could also help temper demand for natural gas, somewhat reducing costs from historically high levels. Coal prices – MISO MAIN \$2/MMBTU – delivered in 2010 and 2%/yr (\$2.34 in 2018 and \$2.59 in 2024)



# ATC Futures (Text View)

## High Environmental

Peak Growth Within UP	0.4%/0.4% (Mid-Low)
Point Load Growth Within UP	-40MW/-40MW (Mid-Low)
Total Load Growth Within UP	-0.2%/-0.1% (Mid-Low)
Peak Growth Within ATC	1.0% (Mid-Low)
Peak Growth Outside ATC	1.5% (Mid)
Generation Additions Inside UP	Lower
Generation Retirements Inside UP	Lower
Existing Generation Dispatch Availability Inside UP	Mid-Lower
Generation Inside ATC	Lower
Generation Outside ATC	MISO Environmental

- Load growth within ATC (2013 =1.2%, 2018 and 2024= 1.0%)
- Energy growth within ATC (2013 =1.2%, 2018 and 2024=0.8%)
- Load Growth outside ATC(2013 =1.2%, 2018 and 2024 =1.1%).
- Energy growth outside ATC (2013=1.2%, 2018 and 2024 =1.1%
- Increased conservation programs help reduce ATC footprint energy and peak demand growth rates below the most recent 5-year rate. These rates decline further in 2018 as conservation programs ramp up, particularly in WI. The WI Governor’s Task Force on Global Warming has proposed conservation programs that have a greater impact on energy than peak demand growth. As a result, the reduction in energy growth rate is somewhat greater than the peak demand rate.
- UP scalable loads grow very slowly and UP point loads see a reduction in demand
- Total growth in the UP is negative
- The combination of a \$44/ton CO2 tax and 25% higher mercury costs plus the high (and potentially increasing) cost of retrofitting coal-fired plants to meet CAIR and CAMR regulations cause smaller, aging and less efficient coal-fired units to be retired within the ATC footprint ((270 MW in 2013, 880 MW in 2018 and 2024). The generation expansion plans both inside and outside of ATC come from MISO’s Environmental Future
- Generation inside the UP is less available due to retirements and changes in traditional dispatch



# ATC Futures (Text View) High Environmental

RPS %  
Inside ATC

10% & 20%

Renewable  
Source for ATC

Mid

General Environ  
Regs

Upper

Renewables  
Inside UP

Mid-Upper

Natural Gas  
Prices

Upper (+50%)

Coal Prices

Lower (-10%)

- The percent of energy in ATC from renewables in 2013 is 10%, and 20% in 2018 and 2024, which is higher than required by current Wisconsin RPS standards (10% by 2015). Additional wind power could help replace retired coal fired units, especially if wind-power tax incentives continue or are increased.

- Wind generation expands moderately in the UP with small to moderately large wind farms

- The higher CO2 tax encourages greater use of natural gas and less use of coal, which puts increasing and decreasing pressure on the cost of these fuels, respectively. Additional wind power could result in more frequent dispatch of fast-start natural gas-fired combustion turbines due to the variability of wind. This could also cause some upward pressure on natural gas costs.



# ATC Futures (Text View)

## Slow Growth

Peak Growth Within UP	0%/0% (Lower)
Point Load Growth Within UP	-119MW/-119MW (Low)
Total Load Growth Within UP	-1.4%/-0.9% (Low)
Peak Growth Within ATC	0.5% (Low)
Peak Growth Outside ATC	0.5% (Low)
Generation Additions Inside UP	Mid or Lower
Generation Retirements Inside UP	Lower
Existing Generation Dispatch Availability Inside UP	Mid or Upper
Generation Inside ATC	Mid
Generation Outside ATC	MISO's Reference

- ATC footprint energy and peak demand grow at a slow rate because of a slow growing economy.
- UP scalable loads do not grow and UP point loads see a reduction in demand
- Total growth in the UP is negative
- Lower demand and the high (and potentially increasing) cost of retrofitting coal-fired plants to meet CAIR and CAMR regulations cause some smaller and aging coal-fired units within the ATC footprint to be retired for economic reasons (130 MW in 2013, 440 MW in 2018 and 2024). Nelson Dewey, a new 280 MW coal-fired generator under PSC review, helps to meet internal demand no longer met by retired units. The generation expansion plans both inside and outside of ATC come from MISO's Reference Future. However, plant capacities are scaled down on new units because of lower demand levels and reduced need for reserves.
- There are small generation additions in the central and eastern UP
- Only generation presently committed to retirement is unavailable in the UP
- Existing generation is mostly available following traditional patterns



# ATC Futures (Text View)

## Slow Growth

RPS %  
Inside ATC

Lower

Renewable  
Source for ATC

Mid

General Environ  
Regs

Lower

Renewables  
Inside UP

Lower

Natural Gas  
Prices

Lower (-40%)

Coal Prices

Mid

- The percent of energy in ATC from renewables meets the current Wisconsin RPS standards ( 10% by 2015). 8% of energy from renewables in 2013, 10% in 2018 and 2024.
- Wind generation is slow to develop in the UP
- The combination of no CO2 tax and lower energy requirements results in lower demand and costs for natural gas. Without a CO2 tax, coal-fired plants serve proportionally more of the lower demand levels (than natural gas-fired generators), resulting in enough demand for coal to maintain “mid” level cost projections. Coal prices – MISO MAIN \$2/MMBTU – delivered in 2010 and 2%/yr (\$2.34 in 2018 and \$2.59 in 2024)





# ATC Futures (Text View)

## DOE 20% Wind

Peak Growth Within UP	1.2%/1.2% (Mid-Upper)
Point Load Growth Within UP	130MW/ 158MW (Mid-Upper)
Total Load Growth Within UP	2.0%/1.6% (Mid-Upper)
Peak Growth Within ATC	2.0% (Mid-Upper)
Peak Growth Outside ATC	2.0% (Mid-Upper)
Generation Additions Inside UP	Lower or Mid-Upper
Generation Retirements Inside UP	Upper
Existing Generation Dispatch Availability Inside UP	Lower or Mid
Generation Inside ATC	Upper
Generation Outside ATC	MISO's 20% Wind

- ATC footprint energy and peak demand grow at a somewhat faster rate (0.5% above the 5-year rate) because of a somewhat faster growing economy.
- Scalable and point loads grow fairly quickly in the UP
- The combination of a \$25/ton CO2 tax, 25% higher mercury costs, substantial amounts of power from renewables and high (and potentially increasing) costs for retrofitting coal-fired plants to meet CAIR and CAMR regulations cause smaller, aging coal-fired units within the ATC footprint to be retired for economic reasons (270 MW in 2013, 880 MW in 2018 and 2024). Substantial wind power could help replace the retired smaller and aging coal-fired units. The generation expansion plans both inside and outside of ATC come from MISO's 20% Wind Future.
- Generation additions occur in the eastern UP
- Some additional generation retires within the UP
- Existing generation within the UP is less available for routine dispatch.



# ATC Futures (Text View)

## DOE 20% Wind

RPS %  
Inside ATC

Upper

Renewable  
Source for ATC

Mid

General Environ  
Regs

Mid

Renewables  
Inside UP

Upper

Natural Gas  
Prices

Mid

Coal Prices

Low (-10%)

- The percent of energy in ATC from renewables in 2013 is 20% and is 25% in 2018 and 2024, which is higher than required by current Wisconsin RPS standards (10% by 2015). The percent of energy outside ATC from renewables is 20%. A \$25/ton CO2 tax is imposed and mercury costs are 25% higher.
- Wind generation is quickly develops in the UP using large wind farms
- Additional wind power could result in more frequent dispatch of fast-start natural gas-fired combustion turbines because of the variability of wind. This could provide steady demand for natural gas and result in “mid” level costs. Because of the substantial amounts of energy coming from renewable resources, less low energy-cost generation, primarily coal-fired generation, would be needed, reducing the demand for and cost of coal.



# ATC Futures (Text View)

## Fuel and Investment Limitations

Peak Growth Within UP	0.4%/0.4% (Mid-Low)
Point Load Growth Within UP	0 MW/0 MW (Mid-Low)
Total Load Growth Within UP	0.79%-0.79% (Mid-Low)
Peak Growth Within ATC	1.3% (Mid-Low)
Peak Growth Outside ATC	1.3% (Mid-Low)
Generation Additions Inside UP	Mid or Lower
Generation Retirements Inside UP	Lower
Existing Generation Dispatch Availability Inside UP	Mid or Lower
Generation Inside ATC	Mid
Generation Outside ATC	MISO's Inv. Limitation

- Lengthy regulatory proceedings for approval of new coal-fired generation and transmission delay some generation and transmission siting. There is a 5-year delay for new coal/IGCC permitting. These coal-fired generators are replaced by combustion turbine (CT) and combined cycle (CC) plants located near loads. Greater reliance on natural gas-fired units results in 20% higher costs. Furthermore, there is some disruption in fuel deliveries. Under these conditions, it would not be unusual to have somewhat more conservation with somewhat lower demand and energy growth rates.
- Load in the UP grows at moderate levels
- Point loads in the UP remain constant
- The combination of a \$25/ton CO<sub>2</sub> tax and 25% higher mercury costs plus the high (and potentially increasing) cost of retrofitting coal-fired plants to meet CAIR and CAMR regulations cause some smaller aging coal-fired units within the ATC footprint to be retired for economic reasons (130 MW in 2013, 440 MW in 2018 and 2024). Nelson Dewey, a new 280 MW coal-fired generator under PSC review, helps to meet internal demand no longer met by retired units. The generation expansion plans both inside and outside of ATC come from MISO's Regulatory Limitation Future.
- Some small generation additions are built in the UP
- Only generation presently committed to retirement is retired in the UP
- Existing generation within the UP is less available for routine dispatch.



# ATC Futures (Text View)

## Fuel and Investment Limitations

RPS %  
Inside ATC

Mid (8% in 2013)

Renewable  
Source for ATC

Mid

General Environ  
Regs

Mid

Renewables  
Inside UP

Lower

Natural Gas  
Prices

Mid-Upper (+25%)

Coal Prices

Mid

- The percent of energy in ATC from renewables in 2018 and 2024 is 15%, which is higher than required by current Wisconsin RPS standards (10% by 2015). A \$25/ton CO2 tax is imposed and mercury costs are higher.
- Wind generation does not receive the needed permits for siting and does not develop
- Additional wind power and higher building standards (requiring better insulation, windows, furnaces, air conditioning, etc.) could also help temper demand for natural gas, somewhat reducing costs from historically high levels. Coal prices – MISO MAIN \$2/MMBTU – delivered in 2010 and 2%/yr (\$2.34 in 2018 and \$2.59 in 2024)