

## **ATC 2020 FUTURES DESCRIPTIONS**

### **Robust Economy**

High energy and peak-demand rates of growth characterize this future because the economy recovers and expands vigorously due to increased capital investment, employment and consumer spending.

Higher energy consumption means that no additional small coal plants in Wisconsin are retired or converted to natural gas. Generator additions are needed within ATC based on MISO's Reference Plan, and they include coal, natural gas, and wind facilities.

A vigorous Wisconsin economy allows the state to increase its renewable portfolio standard to 20% through a combination of internal and external resources. Higher demand for energy also results in higher costs for both natural gas and coal. The level of environmental regulation does not increase, and there is no carbon regulation or additional regulation of other emissions.

Regionally, Minnesota, Iowa, and Illinois also meet their 2020 renewable portfolio standards using wind power from these states and the Dakotas. The transmission overlay is the 765 kV Overlay developed in MISO's Regional Generator Outlet Study (RGOS) for 15 GW of wind, which was one of the levels specified by the Upper Midwest Transmission Development Initiative (UMTDI). The regional generation expansion plan is the MISO Reference Plan.

### **Green Economy**

In this future the economy experiences increased investment and growth due to policy initiatives like enhanced Renewable Portfolio Standards; a shift away from fossil fuels due to carbon regulation; Smart Grid with improved real-time demand response by customers; additional off-peak demand due to factors like off-peak charging of electric and plug-in hybrid vehicles; and increased energy-efficiency measures like improved building standards.

Energy and peak-demand grow within ATC and MISO because of increased economic activity in the new green manufacturing and construction sectors, aided by federal and state incentive programs. However, demand growth increases less than energy growth, due to the peak-shifting effects of demand-response programs, and increased off-peak usage due to lower electric rates during these hours and new factors like off-peak charging of electric and plug-in hybrid vehicles.

Stricter regulation of carbon and other emissions increases the cost of operating and retro-fitting smaller, older coal plants. These developments cause more of these units within ATC to be retired for economic reasons. The increased need for energy in the green economy is met by considerable additional wind power inside and outside ATC, allowing Wisconsin to reach 25% renewable energy usage by 2020.

Carbon regulation increases production costs for coal-fired generation and encourages greater use of natural gas as well as wind power. The additional wind power also results in more frequent dispatch of fast-start combustion turbines to compensate for the intermittency of the wind resource. These factors raise natural-gas prices higher than projected levels. Coal prices, on the other hand, are as projected because existing baseload plants continue to be needed to meet increased energy growth.

The level of environmental regulation is higher because of the policy shift away from generating facilities producing high emissions.

Regionally, all MISO states with a 2020 Renewable Portfolio Standard are meeting these requirements using wind power from the highest-capacity factor wind zones. Increased reliance on gas-fired and wind-powered resources means that it is appropriate to use the 345 kV Transmission Overlay (for 25 GW of wind) and the MISO Gas-Only generation expansion plan.

### **Slow Growth**

Energy and peak demand grow at a slow rate in this future due to a sluggish economy inside and outside ATC.

Lower demand and the high cost of retrofitting to meet environmental regulations causes some smaller, older coal-fired units within ATC to be retired for economic reasons. Beyond the currently planned ATC wind facilities, there are virtually no new generator additions within ATC.

An enhanced renewable portfolio standard does not become law in Wisconsin, and the percentage of energy from renewables remains at the level required by current law (10%)

The combination of lower energy demand and no carbon regulation results in lower costs for natural gas. For the same reasons, coal plants serve proportionately more of the need, resulting in continuing demand for coal, and the cost of coal increases as projected.

Regional wind development is at a lower level as renewable portfolio standards in other states also remain at current levels. The required transmission overlay is the most limited scenario (“Overlay Light”), and the MISO Reference case is the regional generation expansion plan.

## **Regional Wind**

In this future the potential of the Upper Midwest to produce and transfer its full potential of wind energy is realized.

ATC and regional energy and peak-demand growth are at higher levels.

Because of the additional wind resources and some level of carbon regulation, substantial retirements of older, smaller Wisconsin coal plants occur. Mid-levels of additional wind are needed in Wisconsin, though regional wind development outpaces Wisconsin wind development. The enhanced Wisconsin renewable portfolio standard of 20% is met.

An additional 600 MW of combustion-turbine capacity is needed in Wisconsin to meet the higher peak-demand growth rate. Steady demand for natural gas results in projected cost levels. Less coal-fired generation is needed because of the additional wind power, reducing the demand and cost for coal.

Additional environmental regulations are promulgated in the form of some carbon regulation and additional limits on other emissions.

Regionally, the highest capacity-factor wind zones are developed. The 765 kV Overlay for 25 GW of wind is thus needed. The MISO Reference case provides the non-wind generation expansion plan.

## **Limited Investment**

The main driver of this future is reduced capital investment in new energy infrastructure, especially new baseload generation. There is less need for such investment because energy and peak-demand growth is modest within ATC and MISO due to an economy that is not growing at a robust rate.

In this future credit markets do not provide easy access to investment capital, thus increasing the cost and transaction time for major projects. Regulatory proceedings for new, large generating facilities and major transmission facilities are also lengthy and uncertain due to public opposition, concern for rate impacts, and new environmental requirements.

Hence, there are limited generator additions within ATC, including new wind farms. The Wisconsin RPS remains as is, and there is no federal RPS. Gas prices are higher because of increased reliance on lower-capital-cost gas-fired units for new generation. Coal prices are also higher than projected because new supplies of coal are limited due to the investment climate. Finally, new environmental regulations do not increase production costs for or cause high retirement levels of existing coal units.

Regional wind development is at a relatively low level because the Minnesota and Iowa renewable portfolio standards also remain as is and are met from wind development in those states and the Dakotas. The transmission expansion case is the most limited scenario (“Overlay Light”), and the regional generation expansion plan is the MISO Gas Only case.

### **Carbon-Constrained Future**

The basic premise of this future is that carbon emissions must be reduced due to federal regulation, either a cap-and-trade system specifying increasingly stringent emissions levels or a direct tax on carbon emissions.

In this future energy and peak-demand growth inside and outside ATC are restricted to low levels because demand reduction and energy efficiency are effective means of reducing carbon emissions. Expanded funding for programs like Focus on Energy and increased incentives for green building and energy-efficient appliances reduce peak demand and energy consumption below projected levels.

The pace of retirement of smaller, older coal plants within ATC increases to its highest feasible level. Generator additions within ATC are mainly additional wind facilities. The percentage of ATC energy derived from renewable resources is at its highest plausible level, since the Wisconsin renewable portfolio standard is increased and new renewable generation within ATC is another means of reducing carbon emissions.

Natural gas prices are as projected because increasing demand for natural gas is offset by the fact that natural-gas fired generation also produces carbon emissions. Coal prices are lower than forecast because the demand for coal decreases as a result of carbon regulation.

The level of carbon regulation is as projected because direct regulation of carbon emissions is still needed but is not the exclusive means of constraining carbon output.

Regional renewable portfolio standards continue in effect as a contributor to carbon reduction, but are not at the highest plausible levels. Mid-levels of additional wind power are developed in Minnesota, Iowa, Illinois, and the Dakotas.

In this future, due to the relative prevalence of gas and wind generation, the transmission overlay is the 345 kV Overlay for 15 GW of wind, and the regional generation-expansion plan is the MISO Gas-Only plan.