# ATC Energy Collaborative - Michigan Progress Update

ATC Network Customer Meeting

November 20, 2008

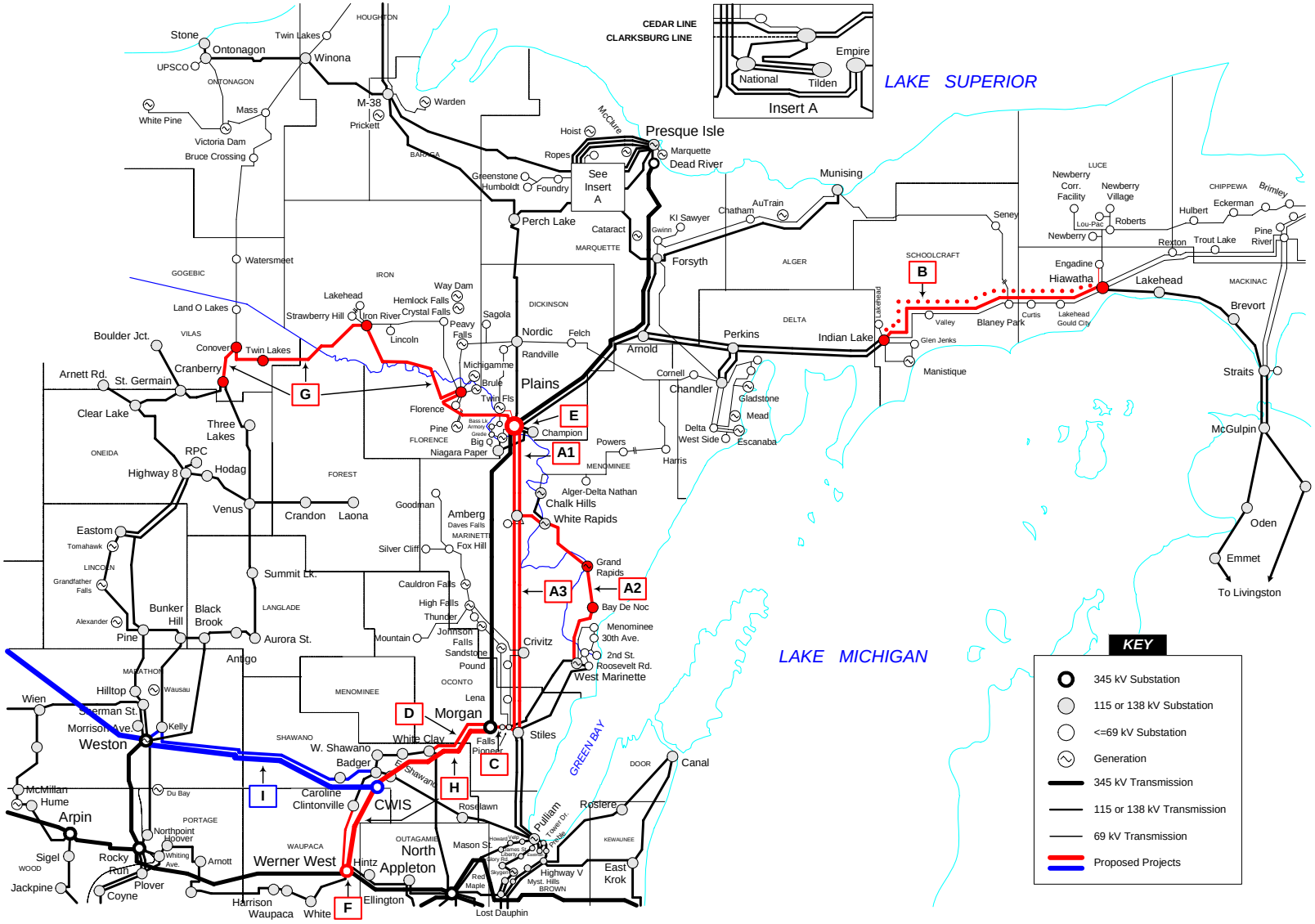
# Agenda

- Collaborative Objectives, Deliverables, Approach
- Background and Progress to Date
  - Upper Peninsula Situation Review
  - Strategic Flexibility Introduction
    - Concepts
    - ATC Corporate Futures
- Preliminary Futures for the UP Analysis
  - Draft micro drivers and micro driver bounds
  - Identify behavior of micro drivers within ATC futures
  - Stakeholder Feedback Process
- Overall Timeline
- Next Steps

# ATC Energy Collaborative - Michigan Objective, Deliverables and Approach

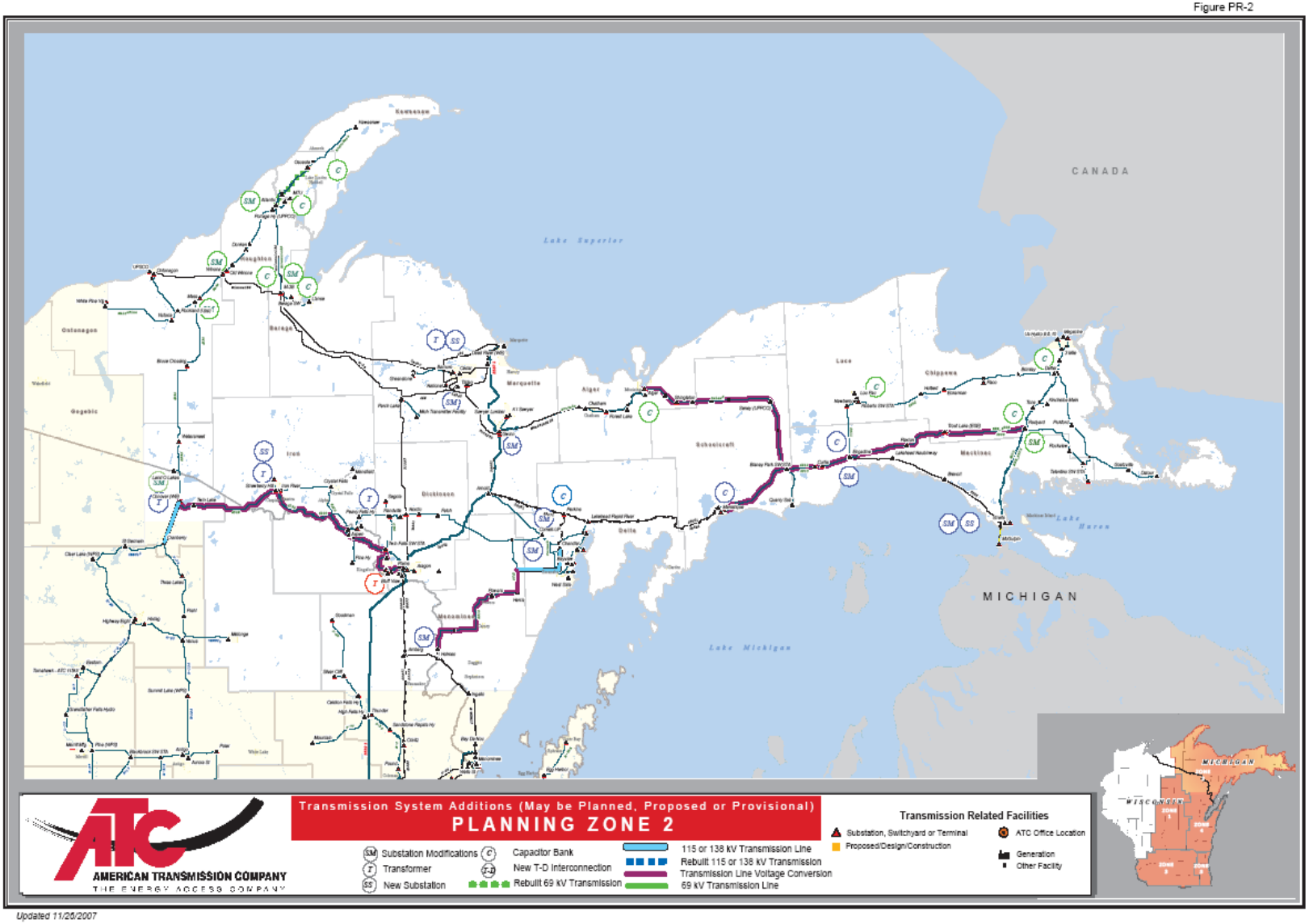
- Objective
  - To evaluate needs of Upper Peninsula using strategic flexibility approach and considering:
    - "Plausible Futures" in the Upper Peninsula
    - Range of alternative options available
    - Risks associated with options
- Deliverables
  - Plan for Upper Peninsula that meets the intermediate and long term needs of the area with an understanding of the range of plausible futures and risk created by those futures
- Approach
  - Work closely with stakeholders to customize ATC corporate futures for UP, brainstorm alternatives, evaluate alternatives with reliability and economic models as appropriate, make recommendations for overall solutions

# Upper Peninsula Situation Review
# Existing Projects



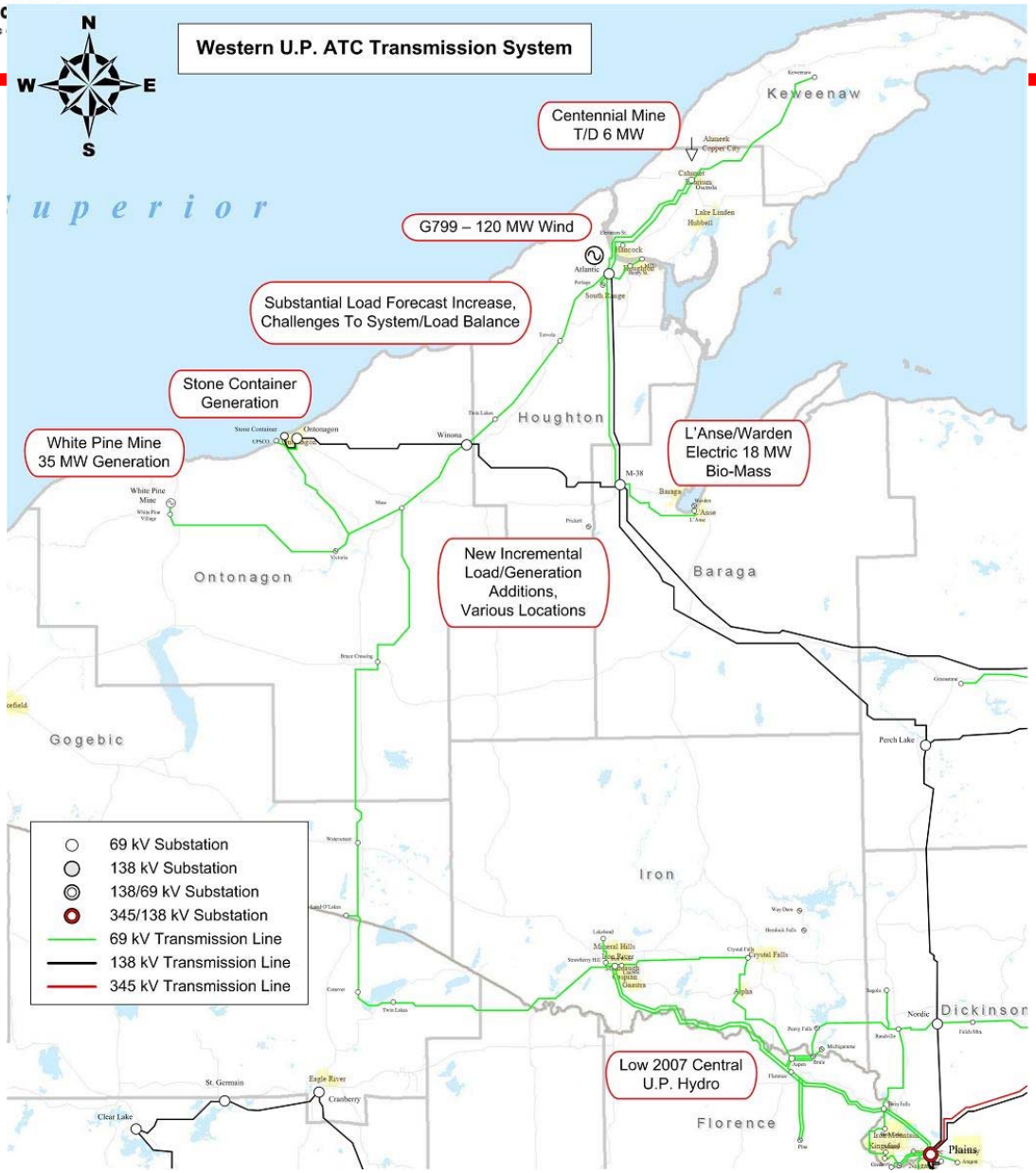
# Upper Peninsula Situation Review
# Existing Projects (cont)

Figure PR-2

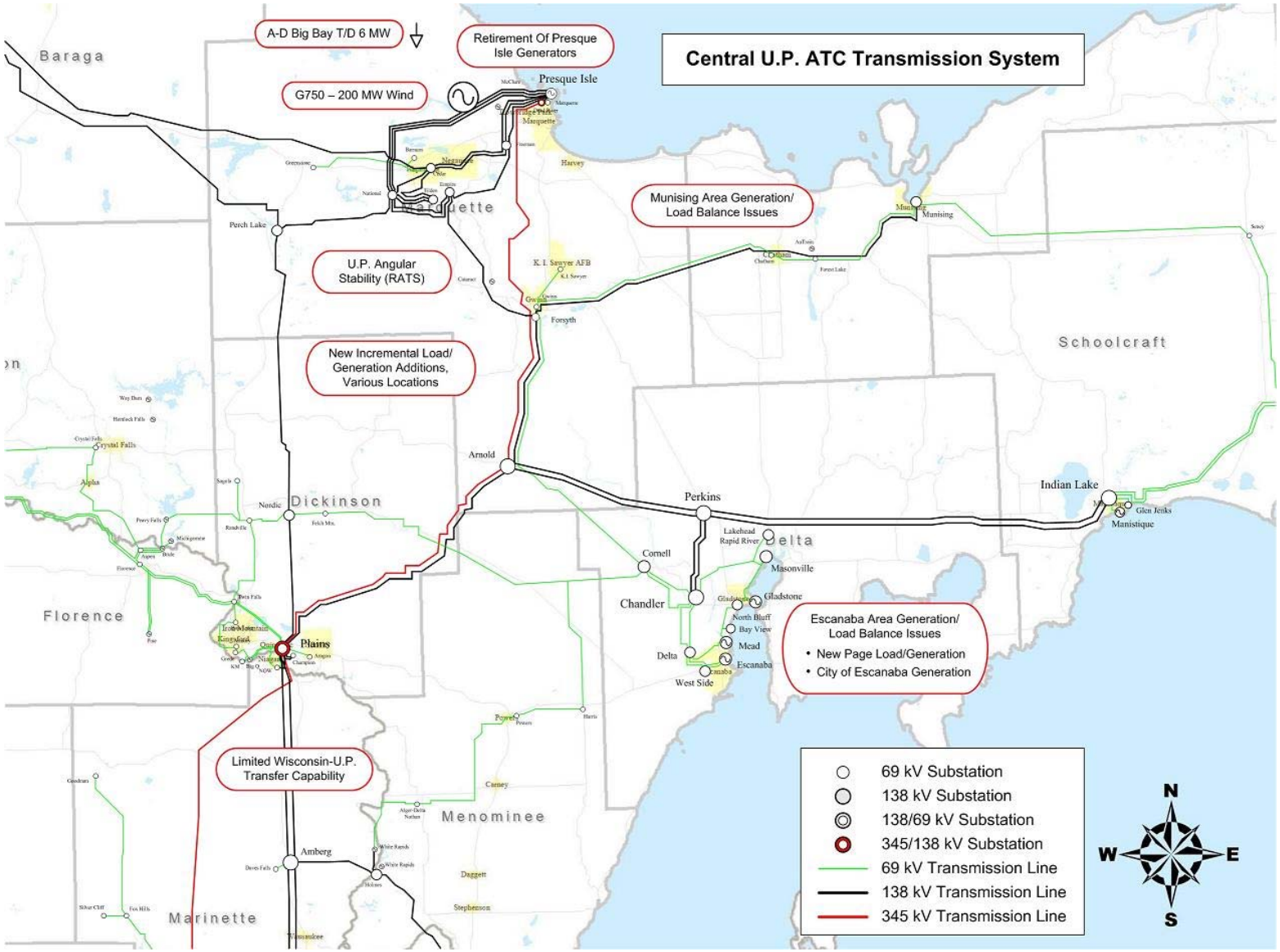



Updated 11/26/2007

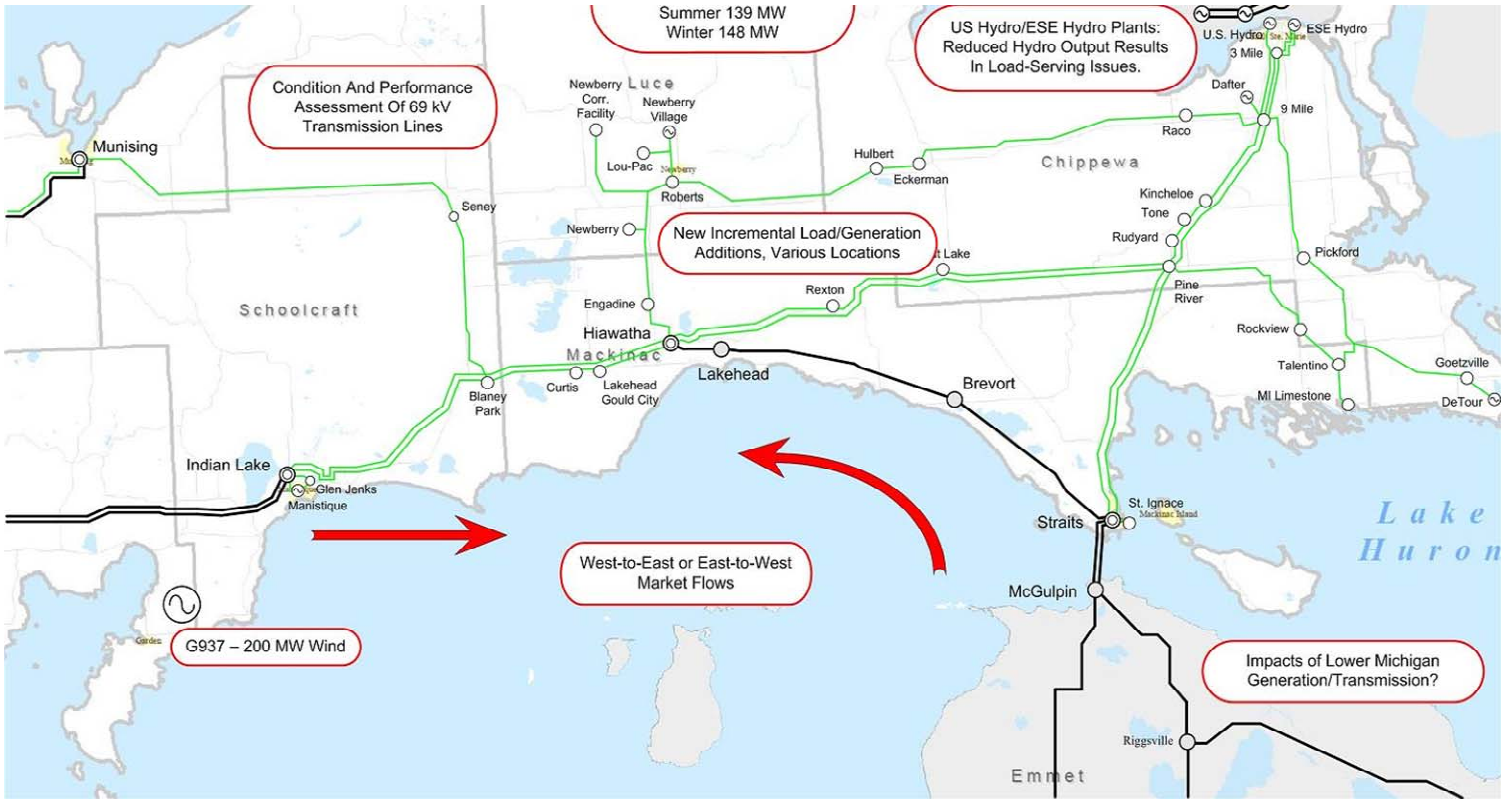
# Upper Peninsula Situation Review
# Western UP



# Upper Peninsula Situation Review
# Central UP

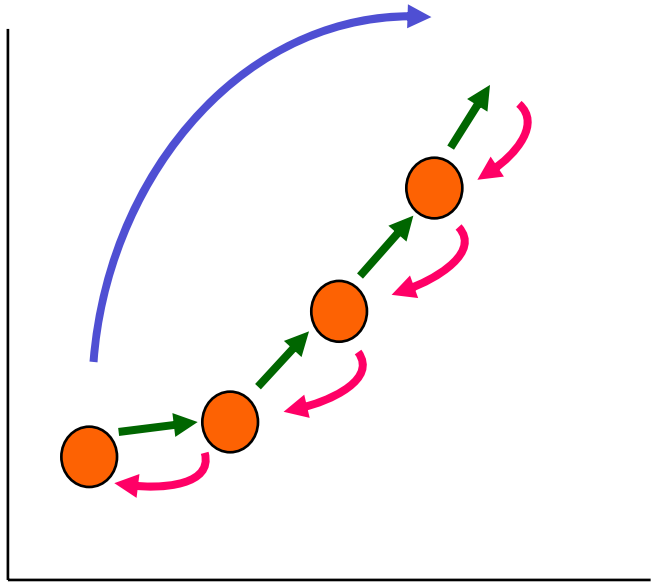


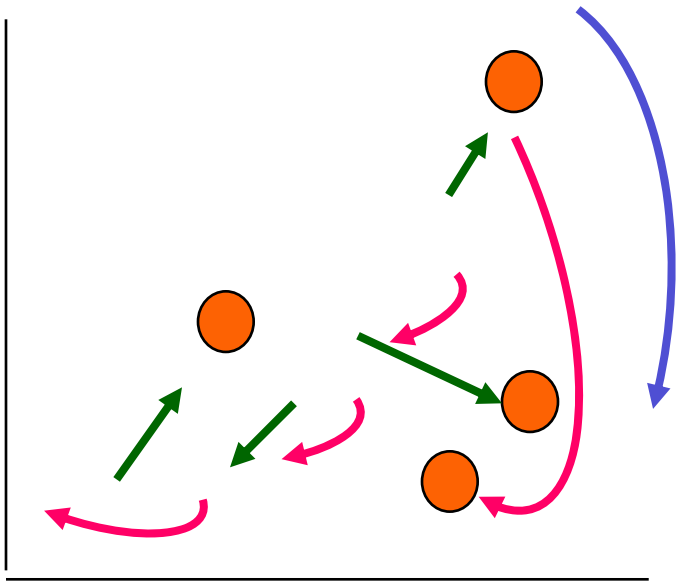
# Upper Peninsula Situation Review
# Eastern UP

# Why Strategic Flexibility?

## Traditional Planning Process





***Traditional strategic planning depends on linkages between actions and outcomes***

***Unexpected events undermine the best strategic plan by corrupting assumed connections***

# The Problem with Prediction-Based Strategy

- Traditional strategic planning requires accurate predictions of the future, but these predictions can be unreliable
  - So you'd like to remain flexible BUT
- Utilities are large complex businesses
  - Need to make complex decisions
  - Need to make large capital investments over long periods of time

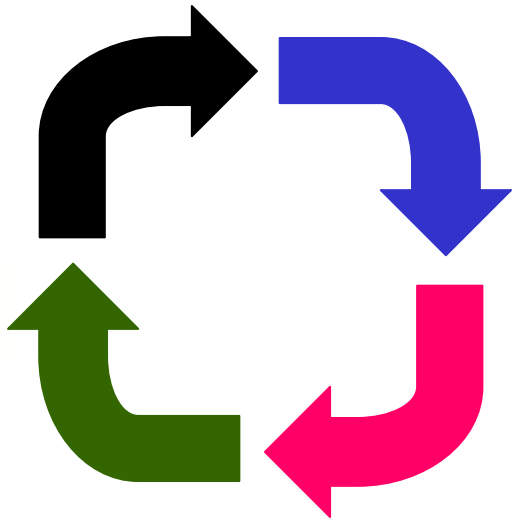
# The Strategic Flexibility framework

## Anticipate

- Identify drivers of change
- Define the range of possible futures
- "Scenario building"

## Formulate

- Develop an optimal strategy for each scenario
- Compare optimal strategies to define "core" and "contingent" elements



## Operate

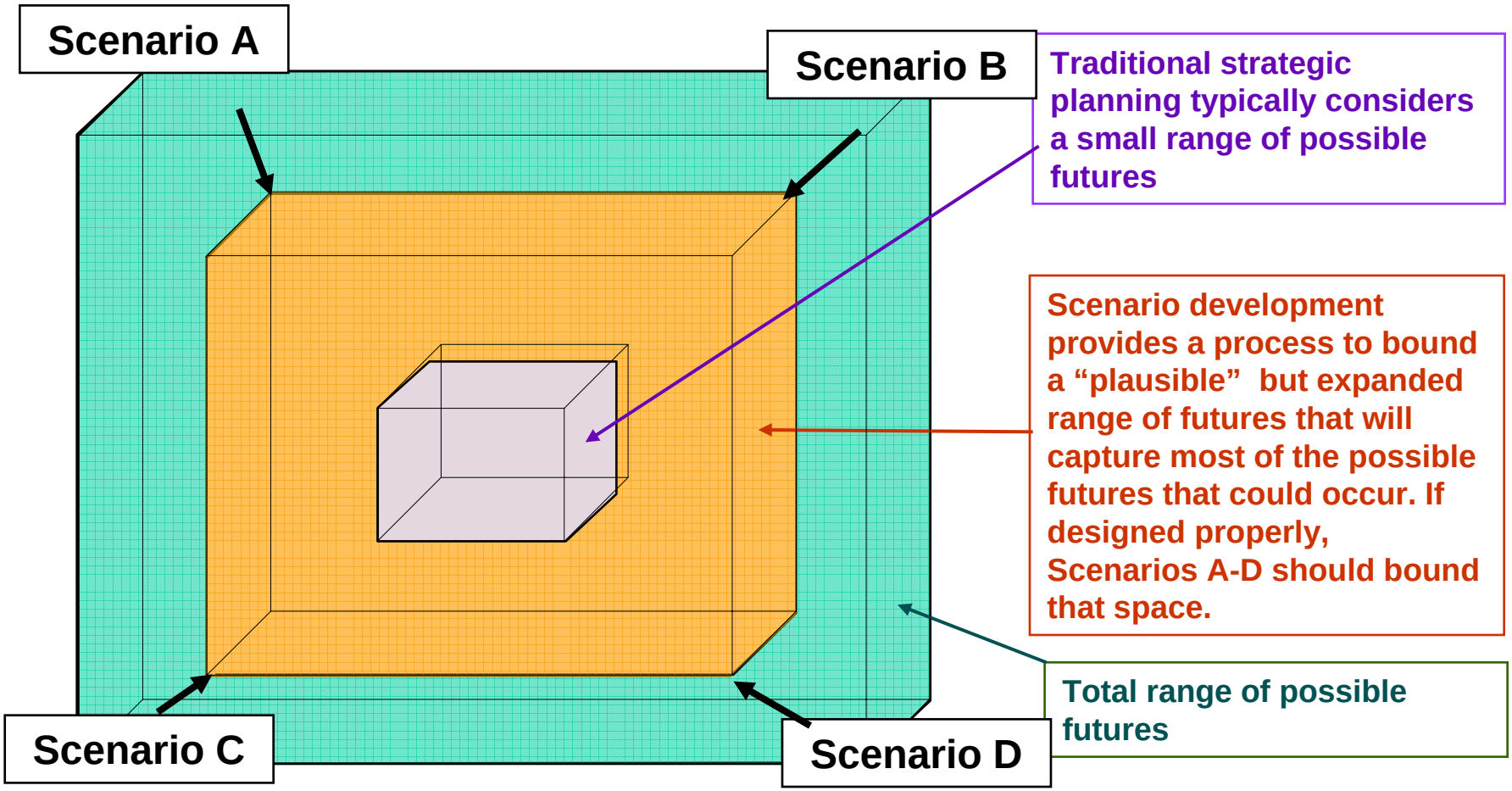
- Implement the core strategy
- Monitor the environment
- Exercise or abandon options as appropriate

## Accumulate

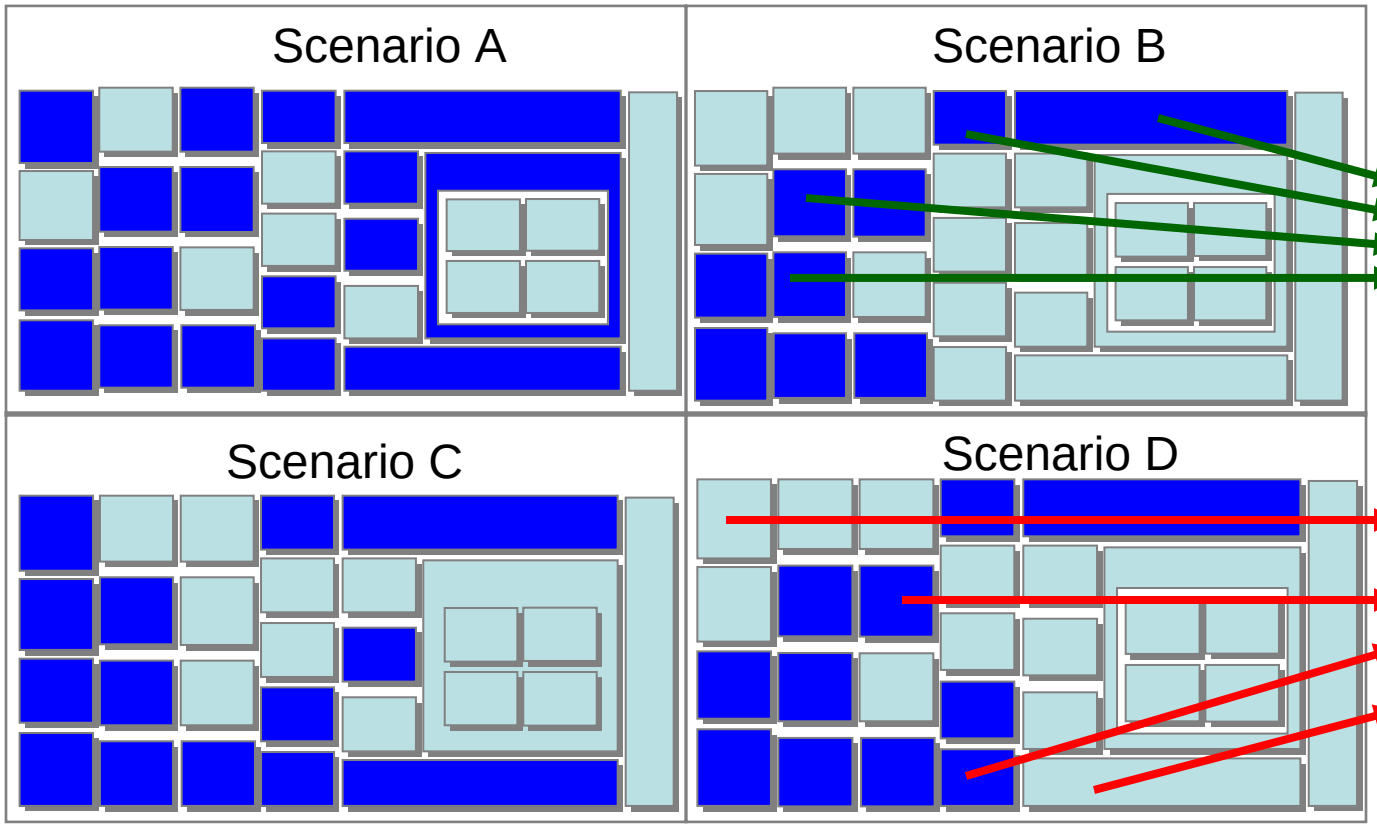
- Acquire those capabilities needed to implement the core strategy
- Take real options on capabilities needed for contingent strategies

***Prepare for a future you cannot predict.***

# Anticipate the Future by Bounding It



# "Core" and "Contingent" Strategic Options




- ***"Core" elements of the plan***
- ***"Contingent" elements of the plan***

Needed project

Unneeded project

***Source: Deloitte Consulting***

# Strategic Analysis Approach
# Strategic Flexibility

1. **Review ATC Corporate Futures**
2. **Customize the futures for UP**
    1. **Brainstorm UP-specific drivers for futures**
    2. **Set bounds for UP-specific drivers**
    3. **Determine behavior of UP-specific drivers in ATC corporate futures**
3. **Identify needs created by each future**
    1. **Reliability analysis**
    2. **Economic benefit/cost analysis if appropriate**
    3. **Review needs with stakeholders; brainstorm solutions**
4. **Evaluate performance of solutions in each future**
5. **Review results with stakeholders**
    1. **Identify solutions that work in all futures – prepare to implement**
    2. **Identify solutions that work in some futures – develop real options that can be exercised if solution is needed**
    3. **Identify solutions that don't work in any future - abandon**
6. **Present recommendations to ATC executives**

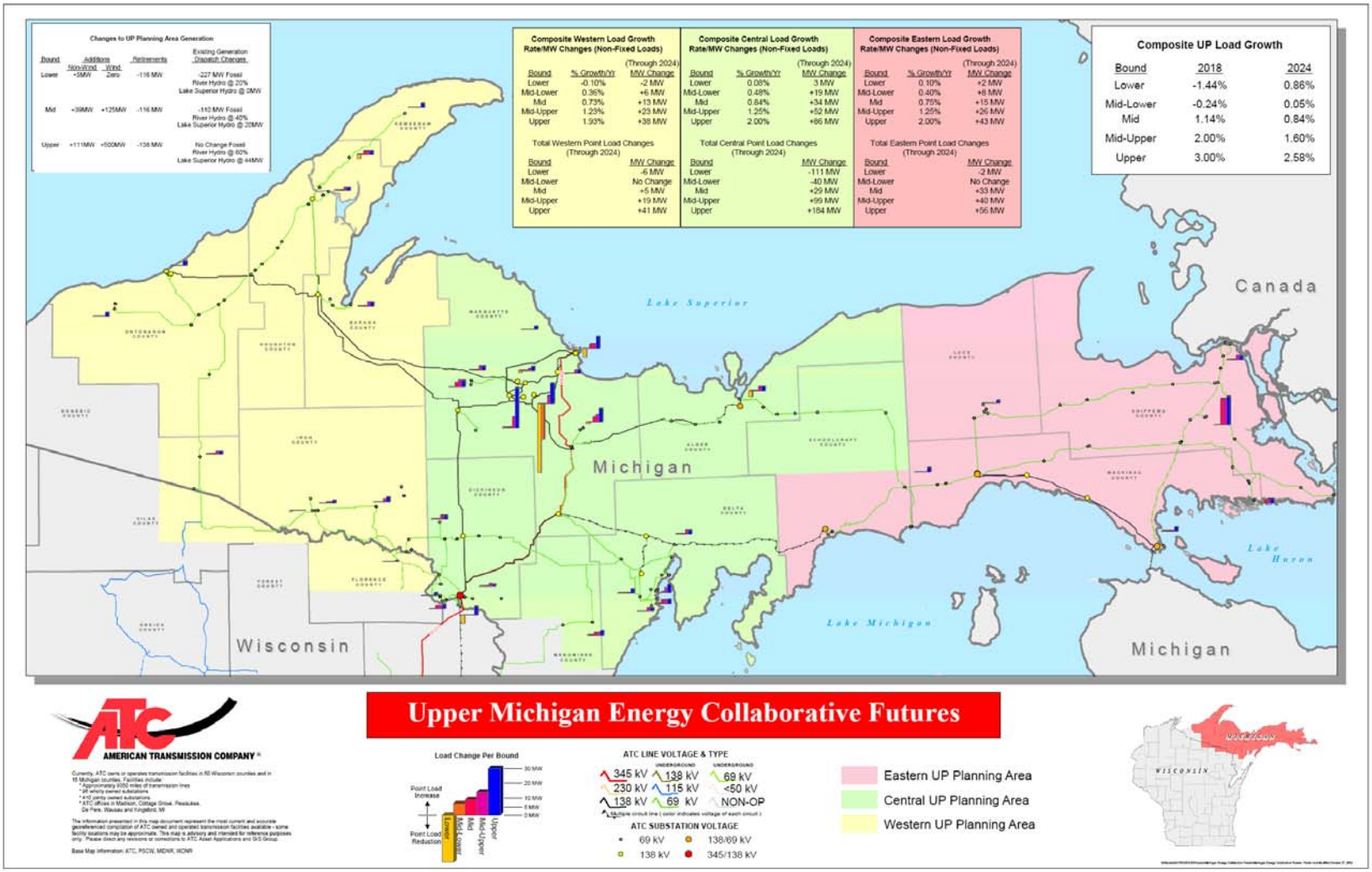
# ATC Initial Stakeholder Process

- May 2008 through October 2008
  - 16 Meetings and Briefings
  - More than 25 Stakeholders involved
- Developed ATC's Matrix of Drivers
  - Discussion of the "Plausible Bounds"
  - Upper, Mid and Lower for Each Driver

# Michigan Micro-Drivers

- Load Assumptions
  - Demand and Energy Growth
  - Point Load Step Changes
- Generation Assumptions
  - Consider all sources
    - IOU/Co-Op/ Municipal Owned
    - End-use customer owned (Behind the meter)
  - Existing Local Generation Availability (Hydro, CTs, diesels)
  - New Additions
  - Retirements

# Preliminary UP Drivers & Futures Geographic View



# Preliminary UP Drivers & Futures Spreadsheet View

**ATC Futures - ATC Energy Collaborative - Michigan**

**October 27, 2008 (Draft for Stakeholder Comment)**

| | Load Assumptions | | | | | | | | | | | | Generation Assumptions | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***UP Micro-Drivers*** | Demand Growth Within UP (Demand MWs) | | | Energy Growth Within UP (Energy MWHrs) | | | Total Point Loads MW added in the UP (2018/2024) | | | Total UP Growth (2018) | Total UP Growth (2024) | Demand Growth Outside UP (MWs) | Existing UP Generation Profile (Changes in Dispatch Characteristics) | | | UP Generation Additions | | | UP Generation retirements | | | Wind Generation | | | New Generation in Northern Lower Michigan |
| **Bounds** | **West** | **Central** | **East** | **West** | **Central** | **East** | **West** | **Central** | **East** | **U.P.** | **U.P.** | | **West** | **Central** | **East** | **West** | **Central** | **East** | **West** | **Central** | **East** | **West** | **Central** | **East** | |
| Lower | -0.10% | 0.08% | 0.10% | -0.10% | 0.08% | 0.10% | (-6 / 0) -6 MW | (-111 / 0) -111 MW | (-2 / 0) -2 MW | -1.44% | -0.86% | 0.5% | Fossil (-69 MW) Hydro 20% of max | Fossil (-151 MW) Hydro 20% of max | 9.4MW Diesel Available Hydro Off Line (0MW) | None | None | 5 MW | None | 116 MW | None | Zero | Zero | Zero | Zero |
| Mid-Lower | 0.36% | 0.48% | 0.40% | 0.36% | 0.48% | 0.40% | No Change | (-40 / 0) -40 MW | No Change | -0.24% | -0.05% | 1.0% | Fossil (-51MW) Hydro 20% of max | Fossil (-134) Hydro 20% of max | | | | | | | | | | | |
| Mid | 0.73% | 0.84% | 0.75% | 0.73% | 0.84% | 0.75% | (+5 / 0) +5 MW | (+29 / 0) +29 MW | (+33 / 0) +33 MW | 1.14% | 0.84% | 1.75% | Fossil (-40MW) Hydro 40% of max | Fossil (-65 MW) Hydro 40% of max. | 11.4MW Diesel Available 20MW Hydro | None | 10MW | 29 MW | None | | None | 25MW | 50MW | 50MW | 100MW |
| Mid-Upper | 1.23% | 1.25% | 1.25% | 1.23% | 1.25% | 1.25% | (+16 / +3) +19 MW | (+79 / +20) +99 MW | (+35 / +5) +40 MW | 2.00% | 1.60% | 2.0% | Fossil all available Hydro 50% of max | Fossil (-40 MW) Hydro 50% of max | 11.4MW Diesel Available 32MW Hydro | | | 93MW | None | | | 50MW | 100MW | 100MW | |
| Upper | 1.93% | 2.00% | 2.00% | 1.93% | 2.00% | 2.00% | (+19 / +22) +41 MW | (+134 /+50) +184 MW | (+46 / +10) +56 MW | 3.00% | 2.58% | 3.0% | Fossil all available Hydro 60% of max | Fossil all available Hydro 60% of max | Diesel 100% Available (16MW) Hydro 100% (44MW) | None | 10MW | 101 MW | None | 138 MW | None | 100MW | 200MW | 200MW | 600MW |
| ***2018 Futures Descriptions*** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Robust Economy | (+1.93%) Upper | (+2.00%) Upper | (+2.00%) Upper | (+1.93%) Upper | (+2.00%) Upper | (+2.00%) Upper | (+19 MW) Upper | (+134 MW) Upper | (+46 MW) Upper | (+3.00%) Upper | | Upper 3% | Fossil all available Upper | Fossil all available Upper | 20MW Hydro Mid | (none) Upper | (+10MW) Upper | (+101 MW) Upper | (none) Lower | (-116 MW) Lower | (none) Lower | (+25 MW) Mid | (+50 MW) Mid | (+50 MW) Mid | Upper 600MW |
| High Retirements | (+0.73%) Mid | (+0.84%) Mid | (+0.75%) Mid | (+0.73%) Mid | (+0.84%) Mid | (+0.75%) Mid | (+5 MW) Mid | (+29 MW) Mid | (+33 MW) Mid | (+1.14%) Mid | | Mid 1.75% | (-69 MW) Lower | Fossil (-151 MW) Lower | 32MW Hydro Mid-Upper | (none) Lower | (none) Lower | (+29 MW) Mid | (none) Lower | (-138 MW) Upper | (none) Lower | (+25 MW) Mid | (+50 MW) Mid | (+50 MW) Mid | Upper 600MW |
| High Environmental | (+0.36%) Mid-Lower | (+0.48%) Mid-Lower | (+0.40%) Mid-Lower | (+0.36%) Mid-Lower | (+0.48%) Mid-Lower | (+0.40%) Mid-Lower | (no change) Mid-Lower | (-40 MW) Mid-Lower | (no change) Mid-Lower | (-0.24%) Mid-Lower | | Mid-Lower 1% | Fossil (-51MW) Mid-Lower | Fossil (-134) Mid-Lower | 20MW Hydro Mid | (none) Lower | (none) Lower | (+5 MW) Lower | (none) Lower | (-116 MW) Lower | (none) Lower | (+50 MW) Mid-Upper | (+100 MW) Mid-Upper | (+100 MW) Mid-Upper | Lower 0 |
| Slow Growth | (-0.10%) Lower | (+0.08%) Lower | (+0.10%) Lower | (-0.10%) Lower | (+0.08%) Lower | (+0.10%) Lower | (-6 MW) Lower | (-111 MW) Lower | (-2 MW) Lower | (-1.44%) Lower | | Lower 0.5% | Fossil (-40MW) Mid | Fossil (-65 MW) Mid | Hydro 100% (44MW) Upper | (none) Mid | (+10MW) Mid | (+5 MW) Lower | (none) Lower | (-116MW) Lower | (none) Lower | (none) Lower | (none) Lower | (none) Lower | Lower 0 |
| DOE 20% Wind | (+1.23%) Mid-Upper | (+1.25%) Mid-Upper | (+1.25%) Mid-Upper | (+1.23%) Mid-Upper | (+1.25%) Mid-Upper | (+1.25%) Mid-Upper | (+16 MW) Mid-Upper | (+79 MW) Mid-Upper | (+35 MW) Mid-Upper | (+2.00%) Mid-Upper | | Mid-Upper 2% | (-69 MW) Lower | Fossil (-151 MW) Lower | 20MW Hydro Mid | (none) Lower | (none) Lower | (+93 MW) Mid-Upper | (none) Lower | (-138 MW) Upper | (none) Lower | (+100 MW) Upper | (+200 MW) Upper | (+200 MW) Upper | Mid 100MW |
| Fuel and Investment Limitations | (+0.73%) Mid | (+0.84%) Mid | (+0.75%) Mid | (+0.73%) Mid | (+0.84%) Mid | (+0.75%) Mid | (no change) Mid-Lower | (no change) Mid-Lower | (no change) Mid-Lower | (0.48%) Mid-Lower | | Mid-Lower 1.3% | Fossil (-40MW) Mid | Fossil (-65 MW) Mid | Hydro Off Line (0MW) Lower | (none) Mid | (+10MW) Mid | (+5 MW) Lower | (none) Lower | (-116 MW) Lower | (none) Lower | (none) Lower | (none) Lower | (none) Lower | Lower 0 |
| ***2024 Futures Descriptions*** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Robust Economy | (+1.93%) Upper | (+2.00%) Upper | (+2.00%) Upper | (+1.93%) Upper | (+2.00%) Upper | (+2.00%) Upper | (+41 MW) Upper | (+184 MW) Upper | (+56 MW) Upper | | (+2.58%) Upper | Upper 3% | Fossil all available Upper | Fossil all available Upper | 20MW Hydro Mid | (none) Upper | (+10MW) Upper | (+101 MW) Upper | (none) Lower | (-116 MW) Lower | (none) Lower | (+25 MW) Mid | (+50 MW) Mid | (+50 MW) Mid | Upper 600MW |
| High Retirements | (+0.73%) Mid | (+0.84%) Mid | (+0.75%) Mid | (+0.73%) Mid | (+0.84%) Mid | (+0.75%) Mid | (+5 MW) Mid | (+29 MW) Mid | (+33 MW) Mid | | (+0.84%) Mid | Mid 1.75% | (-69 MW) Lower | Fossil (-151 MW) Lower | 32MW Hydro Mid-Upper | (none) Lower | (none) Lower | (+29 MW) Mid | (none) Lower | (-138 MW) Upper | (none) Lower | (+25 MW) Mid | (+50 MW) Mid | (+50 MW) Mid | Upper 600MW |
| High Environmental | (+0.36%) Mid-Lower | (+0.48%) Mid-Lower | (+0.40%) Mid-Lower | (+0.36%) Mid-Lower | (+0.48%) Mid-Lower | (+0.40%) Mid-Lower | (no change) Mid-Lower | (-40 MW) Mid-Lower | (no change) Mid-Lower | | (-0.05%) Mid-Lower | Mid-Low 1% | Fossil (-51MW) Mid-Lower | Fossil (-134) Mid-Lower | 20MW Hydro Mid | (none) Lower | (none) Lower | (+5 MW) Lower | (none) Lower | (-116 MW) Lower | (none) Lower | (+50 MW) Mid-Upper | (+100 MW) Mid-Upper | (+100 MW) Mid-Upper | Lower 0 |
| Slow Growth | (-0.10%) Lower | (+0.08%) Lower | (+0.10%) Lower | (-0.10%) Lower | (+0.08%) Lower | (+0.10%) Lower | (-6 MW) Lower | (-111 MW) Lower | (-2 MW) Lower | | (-0.86%) Lower | Lower 0.5% | Fossil (-40MW) Mid | Fossil (-65 MW) Mid | Hydro 100% (44MW) Upper | (none) Mid | (+10MW) Mid | (+5 MW) Lower | (none) Lower | (-116MW) Lower | (none) Lower | (none) Lower | (none) Lower | (none) Lower | Lower 0 |
| DOE 20% Wind | (+1.23%) Mid-Upper | (+1.25%) Mid-Upper | (+1.25%) Mid-Upper | (+1.23%) Mid-Upper | (+1.25%) Mid-Upper | (+1.25%) Mid-Upper | (+19 MW) Mid-Upper | (+99 MW) Mid-Upper | (+40 MW) Mid-Upper | | (+1.60%) Mid-Upper | Mid-Upper 2% | (-69 MW) Lower | Fossil (-151 MW) Lower | 20MW Hydro Mid | (none) Lower | (none) Lower | (+93 MW) Mid-Upper | (none) Lower | (-138 MW) Upper | (none) Lower | (+100 MW) Upper | (+200 MW) Upper | (+200 MW) Upper | Mid 100MW |
| Fuel and Investment Limitations | (+0.73%) Mid | (+0.84%) Mid | (+0.75%) Mid | (+0.73%) Mid | (+0.84%) Mid | (+0.75%) Mid | (no change) Mid-Lower | (no change) Mid-Lower | (no change) Mid-Lower | | (0.45%) Mid-Lower | Mid-Lower 1.3% | Fossil (-40MW) Mid | Fossil (-65 MW) Mid | Hydro Off Line (0MW) Lower | (none) Mid | (+10MW) Mid | (+5 MW) Lower | (none) Lower | (-116 MW) Lower | (none) Lower | (none) Lower | (none) Lower | (none) Lower | Lower 0 |

# 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 |

- 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

| | |
|---|---|
| Natural Gas Prices | Lower (-40%) |
| Coal Prices | Mid |

- 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 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 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 |

- 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

| | |
|---|---|
| **Natural Gas Prices** | Mid-Upper (+25%) |
| **Coal Prices** | Mid |

- 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)

# Next Stakeholder Feedback Opportunity

- Review the ATC Preliminary Drivers Matrix
  - Link to OASIS posting http://oasis.midwestiso.org/documents/ATC/planning.html
  - To request a call or meeting to discuss the Matrix
    - Brett French
      - Bfrench@atcllc.com
      - (906) 779 7902
- Provide feedback and comments to
  - Ken Copp
    - kcopp@atcllc.com
    - (262) 506 6890
- ATC requests feedback and comments by November 26, 2008

# Overall Timeline

- May/October 08 (Complete)
  - Initial meetings plus follow-up data gathering/ verification meetings
- June/October 08
  - Develop U.P. area futures based on customer and ATC executive feedback
- August/October 08
  - Develop Planning study models for each of these futures for 2009, 2013, 2018, 2023
- October/December 08
  - Complete load flow studies on all the planning models, summarize findings/needs
  - Update executives on needs
- November 08/January 09
  - Brainstorm project alternatives to meet needs with stakeholders
  - Determine sets of project alternatives for each of the futures
  - Update/receive feedback from executives on possible alternatives

# Overall Timeline (cont.)

- December 08/ January 09
  - Analyze, select primary and secondary alternatives for each future
  - Determine if economic analysis of alternatives is needed
  - Review findings of need and proposed alternatives with stakeholders and executives
- February 09
  - Get cost estimates, constructability/ environmental/ other issues
  - Make final recommendations for strategy to ATC executives
  - Share results with stakeholders/customers
- February-April 09
  - Develop PRFs/Scope documents needed for projects

# Next Steps

- Continuing feedback from stakeholders, including state commission staff
- Post results of meetings, allowing for final input from all stakeholders
- Make final decision on futures
- Work with stakeholders to define alternatives
- More fully develop analysis methodology
- We will continue to meet with stakeholders and commission staff throughout the analysis process