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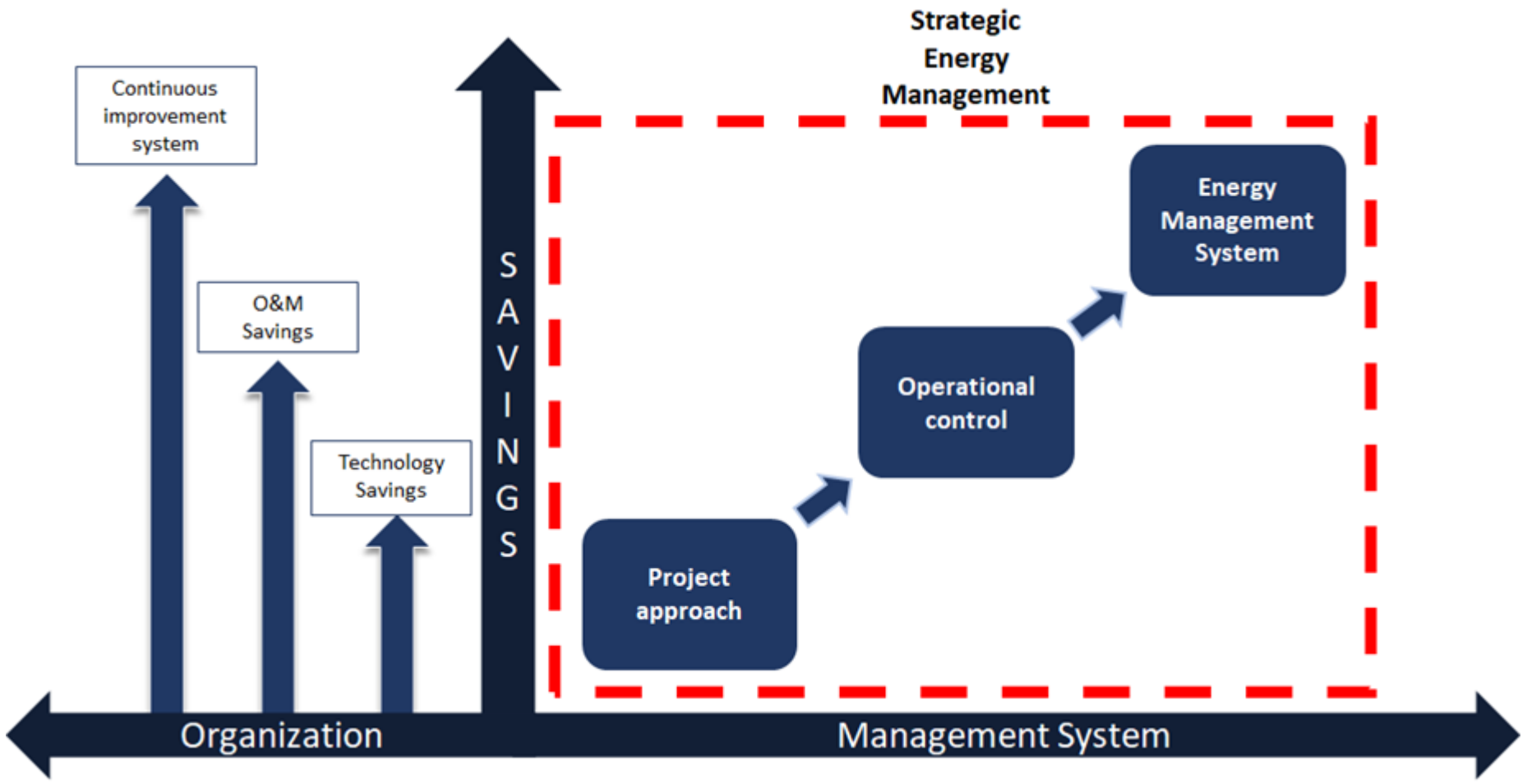
Detroit Diesel Corporation
SEM Program Experiences
November 9, 2022

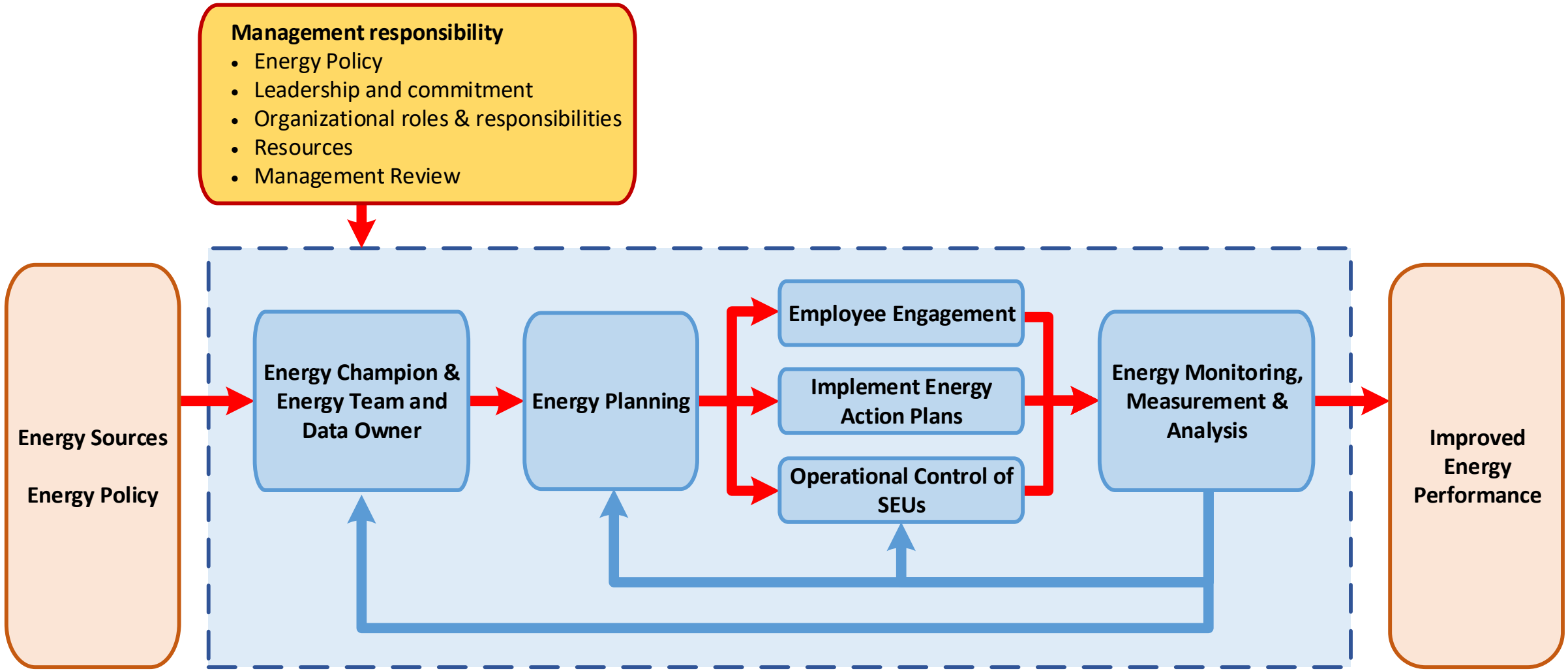
Agenda

1. What is Strategic Energy Management?
2. Detroit Diesel's Campus
3. Campus Control Systems
4. SEM Projects

What is Strategic Energy Management ?



What is Strategic Energy Management ?



Detroit Diesel's first building constructed in 1938

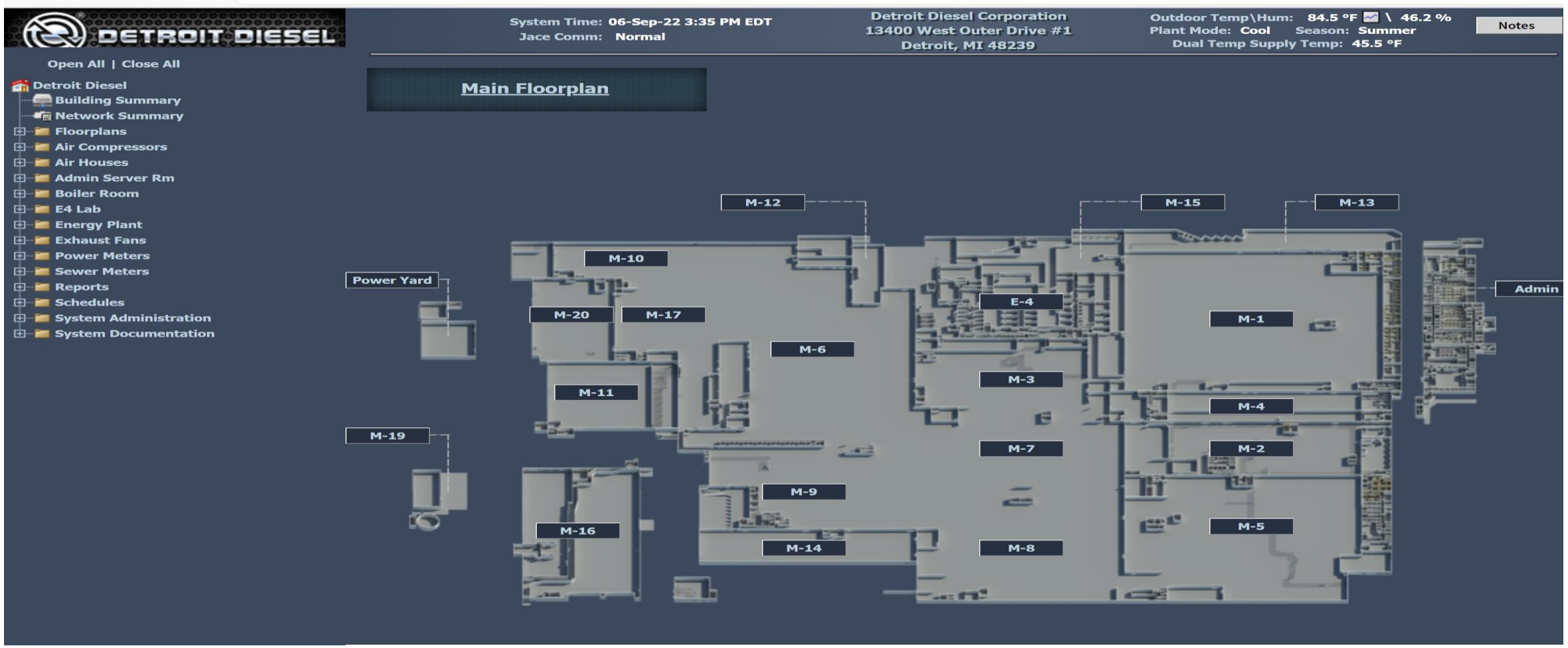
Detroit Diesel currently 3,000,000 sq.ft.
131 acre site

Utilities and Consumption Facts

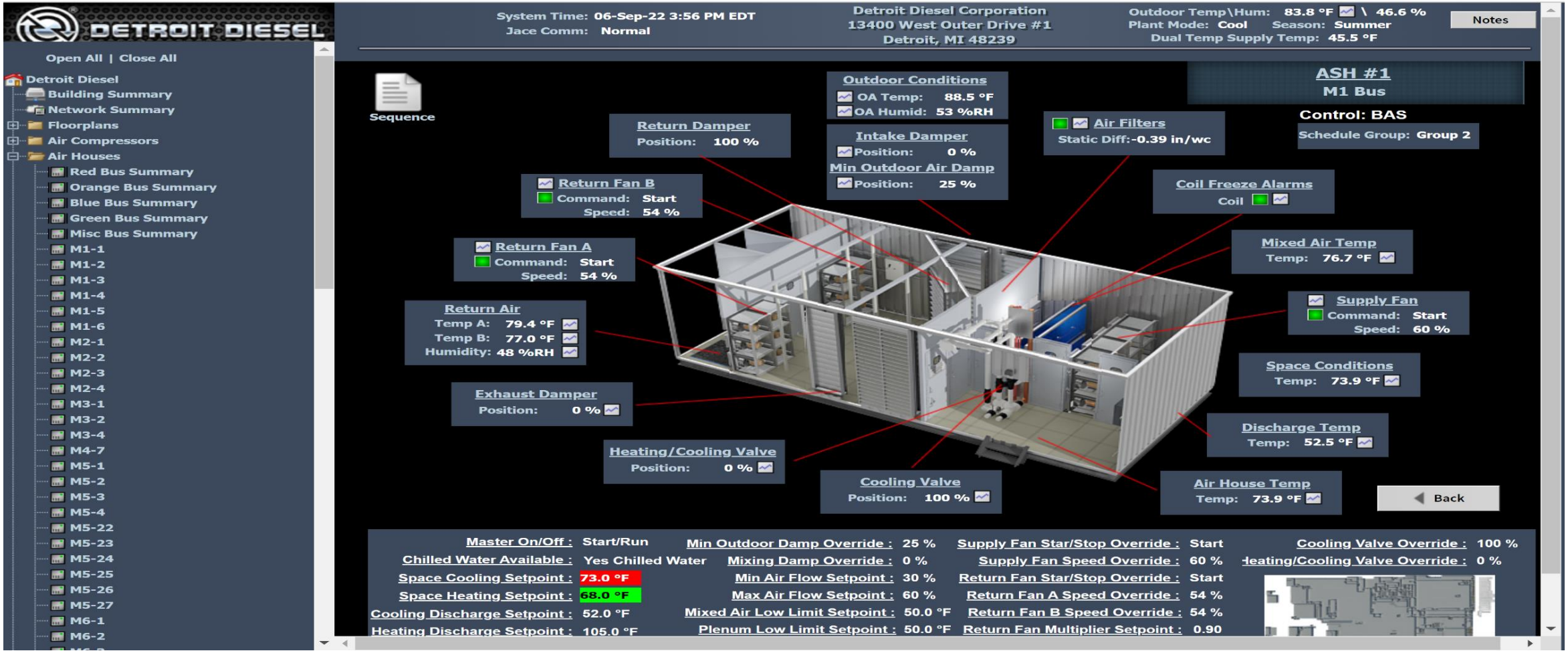
- Total site KWh consumes 110,000 MWh annually
- Monthly electricity costs $600,000
- Total site gas consumption 230,000 MMBtu annually
- Annual gas costs $1,300,000
- Annual utility budget $10,000,000

- Cost drivers for continued reductions in usage

Honeywell Niagara BAS Control and Monitoring Multiple Operational Systems



Air Supply House Controls



Compressor Room Monitoring

De-Rusting Process Conversions

- The previous part cleaning and stripping process utilized year-round High-Pressure steam
- Project scope:
  - Removal of high-pressure steam coils in a 350-gallon chemical de-rust dip tank
  - Replacing the steam coils and the installation of 15 kw electric heating coils,
  - Hot water washer was converted from HP steam to 30kw electric heating coil
- Energy savings:
  - 1000 lb/hr high-pressure steam reduction
- Estimated annual savings: $6,000

Powerhouse Steam Operations

- The high-pressure steam headers were previously set for 95 PSI for all seasons
- Project scope
  - High-pressure steam header set point reductions
  - Summer set points reduced to 75 psi
  - Winter set points were reduced to 90 psi
- Energy savings
  - 20 psi steam pressure reduction in summer
  - 5 psi steam pressure reduction in winter
- **Estimated annual savings: $4,000**

HVAC Operational Improvements

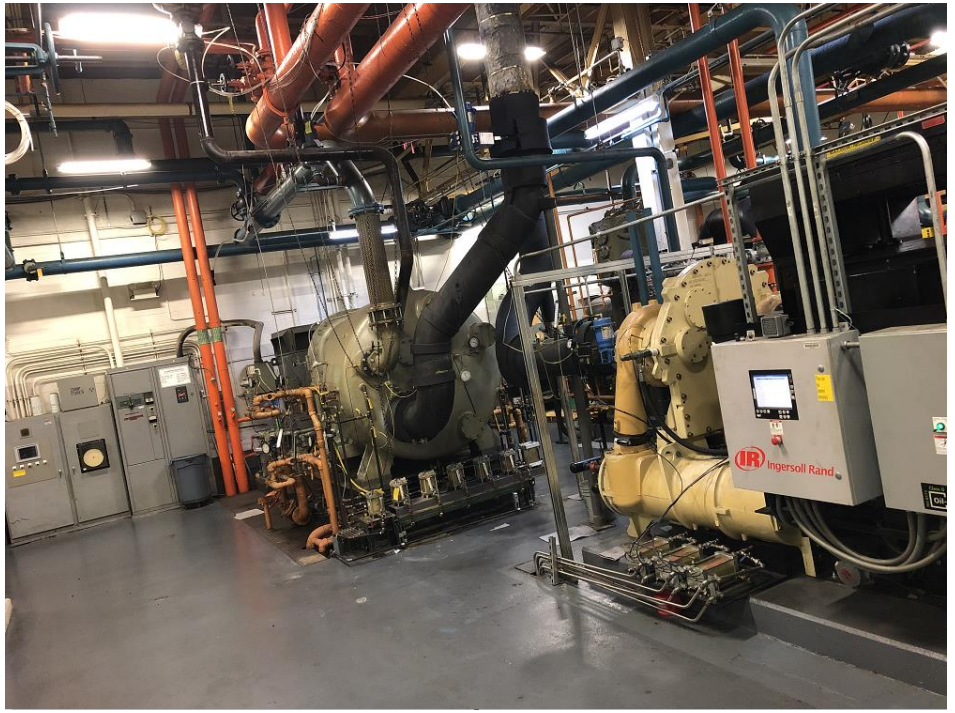
- Prior to SEM engagement, there was no operational control strategy for the facility-wide hvac system
  - Air handling unit set points were set between 65 and 78F and were set to run 24/7
- Project scope
  - Facility-wide operational control strategy established
  - Global winter heating setpoint: 68F
  - Summer cooling setpoint: 75F
  - Thermostat controls locked and only changed upon Energy Team review
  - AHU fans scheduled to reflect production schedules
- Energy savings:
- Reduction in heating and cooling setpoints
- Reduced AHU fan operation
- **Estimated annual savings: $92,000**

Chiller System Improvements

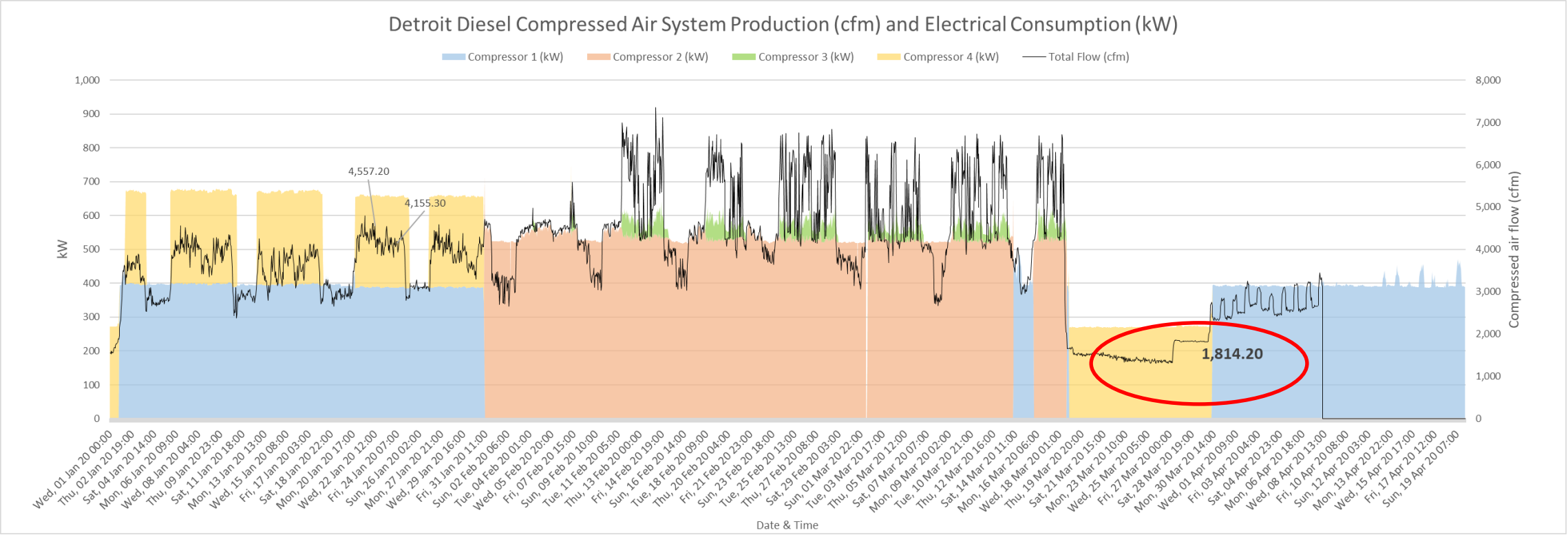
- The Chiller Plant contains 4 chillers with a combined capacity of 4150 Tons Refrigeration
- Maintenance on the chillers was last done over five years ago
- Comfort chiller set points were set at 45F
- Project scope:
- Centrifugal chillers had the condenser and evaporator tubes cleaned, brushed, eddy current tested
- Chilled water set points were increased to 48F
- Energy savings
- Overall chiller system efficiency increased by 23%
- **Estimated annual savings: $51,000**

Compressed Air Operations

- The compressed air system is comprised of 5 compressors a total capacity of 17,000 CFM
- Prior to SEM engagement, the compressed air system was not optimized
- Operating without any preprogramed sequencing and relied on operator input to select compressor function
- Project scope
  - A compressed air leak audit was performed
  - New 400HP variable frequency drive (VFD) screw compressor was installed that can efficiently scale down compressed air generation
  - The compressed air network system pressure was reduced from 95 psi to 90 psi



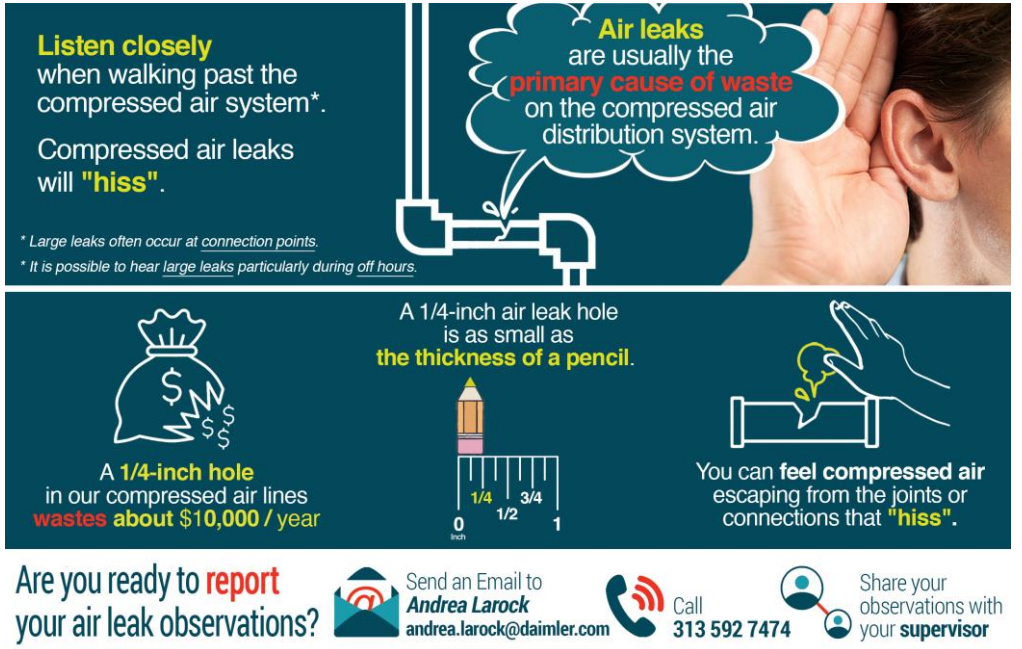
Compressed Air Leaks



- March 2020: Temporary work stoppage at the facility due to COVID
- Compressed air data was analyzed and concluded that the system was feeding 1,814 CFM of compressed air leaks during a period where there was no production taking place
- On an annual basis this leak rate represents **2,600,000 kWh of energy consumed just to feed leaks $164,000!**

Compressed Air: A Success Story

- Conducted 2 compressed air leak audits (2019 and 2022)
- 1,700+ CFM compressed air leaks were identified and repaired
- A SOP was implemented to sequence the compressors based on optimal generation efficiency
- Estimated Annual Savings: $153,000
- The Maintenance Team was further engaged through communication illustrating the value of energy wasted due to air leaks
- Air leak targets have now been established for the compressed air system, and a continuous improvement process is in place to identify, and repair compressed air leaks



Cultural Changes Achieved

- Detroit Diesel's operational management structure has been improved through the new review process by the formal Energy Team
- Framework has been built around energy planning
- Energy Management System has and continues to achieve ISO:50001 certification
- This certification is audited annually, ensuring that Detroit Diesel is well positioned to continue its energy planning efforts in the future
- A "Green corner" has been set up in the facility that highlights energy conservation measures
- Posters around the facility highlight the value of energy wasted

Energy Savings – 2.5 years

Number of Energy Projects Implemented	9
Total Electricity Savings (kWh)	2,806,021
Total Natural Gas Savings (Therms)	203,147
Annual Utility Savings ($)	$296,432
Total SEM Incentives Paid ($)	$245,877
Total Benefit ($)	**$542,309**

Next Steps for Detroit Diesel

- The first 2+ years of SEM primarily focused on the support operations of the facility
  - The next step for Detroit Diesel will be to explore savings opportunities in the production areas of the facility
    - These include Block Machining, Head Machining, Axle Operations, and other production areas
- With energy planning processes firmly ingrained into the culture, the next step of SEM will continue to implement energy saving projects with a strong focus on ENERGY Management INFORMATION SYSTEMS
  - This will not only allow for improved energy information but will also for significant energy savings through improved system control

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