

Grab a clipboard and take this map along on your treasure hunt. Focus on uncovering operational and non-capital opportunities to save. When you find something, make notes about location; tools, materials, or expertise needed; or further research required. Feel free to add to or modify this list to suit your own needs.

Facility Name _____ Date _____ Team _____



Facility Management

- Review the plant's energy tracking system, billing records, or other sources of consumption data. Identify any spikes or unusual changes in energy use over the past year.
- Check the facility's energy action plan and reports from energy audits, assessments, and treasure hunts (if available) to see if earlier identified energy savings measures have been implemented.
- Inspect maintenance plans and records to identify areas to review during the treasure hunt. Routine or preventative maintenance on neglected equipment may yield energy savings.
- Review building management system (BMS) and/or building automation system (BAS) code, if applicable, to ensure that specific commands to reduce unneeded energy consumption (e.g., on/off times) remain active.
- Consider facility maintenance during daylight hours to reduce the need for lighting and HVAC during unoccupied periods.

NOTES:



Dust Collectors

- Verify proper dust collector maintenance schedules are being followed, including:
 - Identify leaks. Track identified leaks to ensure they are sealed.
 - Inspect pulse air jets.
 - Inspect mechanical shakers.
 - Inspect bags.
 - Inspect cartridges.
- Assess, or consider employing, a minimum effective draft by using dampers and/or variable-speed fans to control the draft.
- Consider replacing manual dust collectors with automated dust collectors.
- Check fans. Resize and/or slow down fans that are too big.



- Check the differential pressure across the dust collector (pressure difference between the dirty and clean side of the bags). Maintain pressure between 4 and 5 inches of water.
- Consider using a differential pressure control system on the cleaning system.
- If using a compressed air jet-pulse cleaning system, check that the system is using the minimum effective pressure (usually 60-70 psi).
- Consider using a short pulse to shake extra dust off in the case of compressed air blowdown systems.



Mixing

- Evaluate current mixing time. Consider shortening mixing time based on tracking mix homogeneity by:
 - Analyzing power consumption during mixing to help indicate product homogeneity during batching.
 - Using humidity sensors to help indicate product homogeneity.



Humidity Control Measures

- Consider potential for converting a dry-batch plant into a wet-batch plant.
- Inspect, or consider installing, microwave humidity sensors and automatic water control



Returned Concrete

- Identify opportunities to reduce and eliminate waste of returned concrete, including:
 - Evaluate, or consider modifying, the ordering safety factor and the estimations of the amount of concrete needed at the job site to reduce excess concrete production.
 - Reuse returned concrete on the plant site (e.g., paving the plant driving surfaces or stockpile areas).
 - Consider adding new batch on top of small quantities of fresh returned concrete (less than 5% so as not to affect new batch properties).
 - Consider the stoning out method for retrieving and reusing returned concrete as aggregate.
 - Inspect, or consider installing, a mechanical concrete reclaimer.
 - Consider crushing and recycling concrete, which can be used as aggregate in concrete production, or as road base or fill.

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Cold Weather Concreting

- Check that aggregates are under shelter to avoid moisture increases.
- Check that stockpiles have adequate drainage. Consider creating paved and sloped areas for stockpiles.



Truck Operation and Fleet Management

- Analyze fuel consumption. Verify that information on miles and hours driven, and time spent idling (including batching and traveling off-road) are tracked and analyzed to optimize fuel efficiency.
 - Inspect, or consider installing, diesel flow meters in trucks to provide more precise information on real-time fuel consumption.
- Identify opportunities to reduce idling time, including:
 - Shutting off the engine when washing the truck between loads.
 - Training fleet coordinators on improving truck dispatching.
 - Identifying technologies that reduce idling time, such as a spray nozzle or a wash rack.
 - Wiring radios to the battery to avoid needing the engine on to power the radio.
- Evaluate current routes. Consider a route-planning system (such as GPS) to save fuel by finding shorter distances to desired locations.



Operations and Production Considerations

- Identify opportunities to reduce material costs by substituting with cementitious materials, fly ash, and granulated blast-furnace slag.
- Identify opportunities to control concrete pre-cooling procedures at elevated temperatures:
 - Check if aggregates can be stored in large-capacity stockpiles and in covered and shaded areas.
 - Consider painting the mixing and hauling equipment in light colors.
 - Analyze methods for concrete pre-cooling:
 - Cooling with chilled batch water (either from a natural cold-water source or a chiller).
 - Cooling mixing water with liquid nitrogen.
 - Cooling batch water with a geothermal heat pump.

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- Cooling concrete with ice.
- Evaporative cooling coarse aggregates by wetting stockpiles.
- Cooling concrete with liquid nitrogen.

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9 Compressed Air

- Verify proper maintenance schedules are being followed, including:
 - Check filters are cleaned or replaced.
 - Check motors and compressors are properly lubricated.
 - Inspect fans and pumps where applicable.
 - Inspect drain traps periodically to ensure they are clean and not stuck in the open or closed position.
 - Inspect belts, where applicable.
- Check water cooling systems for water quality (pH and total dissolved solids), flow, operations and temperature.
 - Specify pressure regulators that close when failing.
- Review compressed air applications for excessive pressure, duration, or volume.
- Inspect, or consider installing, ultrasonic acoustic detector to identify leaks and the high-frequency hissing sounds associated with air leaks.
 - Track identified leaks to ensure they are repaired. Develop a leak program to assure leak detection and correction are ongoing.
- Confirm air is completely turned off to equipment no longer active (at solenoid valve).
- Assess, or consider implementing, a control strategy to ensure that only the right amount of compressed air, at the right time, is generated and used in the production system.
 - To determine proper control systems, assess compressed air requirements over time to establish a load profile.
- Evaluate if air pressure can be reduced to the lowest practical set point. Every 2-3 psi decrease in system pressure can reduce energy use of the compressors by 1%.
- Assess if pneumatic controls or tools can be replaced with electric systems.
- Identify opportunities for heat recovery of wasted heat from the compressors.



- Identify opportunities to replace compressors with a variable speed drive (VSD) compressor.
- Evaluate the potential to reduce header pressure during non-production time.
- Evaluate overall preventive and predictive maintenance of system.
- Confirm overall control system operations.
- Confirm operations of cooling towers with variable frequency drives (VFDs) on pumps, two-speed fans, and overall sequence of operations.

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Motors

- Locate and identify all motors. Inventory conditions and specifications of each motor.
- Assess motor needs against actual use to determine if properly sized to meet the needs of its driven equipment. Replace wrong-sized motors with correct size and high-efficiency motors.
- Consider maintenance, repairs and upgrades to the motor systems, including economic costs and benefits using life-cycle costs.
 - If upgrades are pursued, monitor the upgraded system's performance to determine actual cost savings.
 - Consider purchasing energy-efficient motors in order to reduce the motor's life-cycle costs.
- Evaluate overall preventive and predictive maintenance of system.
- Confirm overall control system operations.
- Check shutdown practices for motors and mixers that are not in use to prevent idling. Consider automatic shutdown of motors.



Hot Water and Steam Systems

- Assess boiler processes. Use CO and oxygen readings to optimize the fuel/air mixture for high-flame temperature and lower emissions.
- Verify proper boiler preventive and predictive maintenance schedules are being followed. Ensure all boiler components are optimized.
- Evaluate distribution system insulation. Use appropriate quantities and types of insulation. Inspect and replace damaged insulation.
- Identify leaks. Track identified leaks to ensure they are repaired.





Lighting

- Identify where lights have been left on in unoccupied spaces (e.g., common areas, storage rooms, restrooms, break rooms, outdoor areas).
- Identify and assess opportunities to use automated lighting controls:
 - Occupancy/motion sensors for low-traffic areas.
 - Timers or daylight sensors to dim or turn off exterior and parking lot lights during the day.
 - Dimming controls in locations where there is natural lighting (e.g., near windows).
- Confirm that installed lighting controls are operating as intended.
- Assess need to institute a regular cleaning plan for lamps/fixtures for maximum light output.
- Identify where reflectors can be practically added to existing lighting.
- Assess whether any areas are over-lit, compared to requirements or design levels; consider opportunities for de-lamping.
- Identify and de-energize and/or remove fixtures and ballasts that are not in use.
- Evaluate the opportunity to upgrade to more energy-efficient lighting options:
 - Replace all lights with LEDs.
 - Use LED Exit signs in place of incandescent or CFL models.

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Building Envelope

- Inspect doors and windows to identify gaps or cracks that can be repaired.
 - Note damaged or missing weather stripping.
- Note air leaks that should be sealed with caulking or other sealant.
- Inspect insulation and weather stripping levels and identify inadequacies to be addressed (including loading docks and garage doors).
- Assess opportunity to install vinyl curtains in loading areas, if applicable.
- Note any doors left open to the outside and to any unheated or uncooled areas.
- Assess the opportunity to install solar film or other window coverings on east, west, or south exposures to reduce solar heat gain and heat loss.
- Assess the opportunity to install air lock doors for main entrances, if applicable.
- Assess the opportunity to install a reflective (“cool”) roof covering in warm climates.



Plug Loads

Note: Some elements of this section may be relevant only to larger plants with attached office space. Please use judgement in determining which are applicable.

- Identify any new office equipment that will be needed soon; make plan to ensure they are ENERGY STAR certified where possible.
- Identify any equipment left on overnight (including those left in sleep/idle or screen saver mode).
- Ensure that power management settings are activated on office equipment such as computers, monitors, printers, and copiers.
- Ensure that any large-screen TV monitors are turned off during unoccupied times.
- Use networked printers, rather than personal printers in offices or workstations.
- Identify and discontinue the use of personal heaters and fans in offices or workstations (the use of such personal devices may indicate broader hot/cold issues that should be addressed at the system level).

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- Identify where power strips can be used for easy disconnect from power source. Consider the use of advanced power strips.
- Assess plan for educating staff to unplug rechargeable devices once charged.
- Check if vending machines get turned off or put in sleep mode at the end of the day.
- Consider installing motion/occupancy-based vending machine controls.
- Look for opportunities to replace older vending machines with new ENERGY STAR certified vending machines.

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HVAC

Note: Some elements of this section may be relevant only to larger plants with attached office space. Please use judgement in determining which are applicable.

- Identify and make plans to address instances of simultaneous heating and cooling.
- Ensure that thermostats and outside air temperature sensors are properly calibrated/maintained.
- Ensure that thermostats are set to appropriate temperatures based on season and local weather conditions.
- Confirm proper implementation of a temperature setback policy for heating/cooling when the building is unoccupied (including any special considerations for summer months).
- Perform testing and balancing of air and water systems.
- Ensure that thermostats are properly located to be representative of the room or zone for which the temperature is being controlled.
- Ensure that electronics are located away from thermostats.
- Ensure that space heaters are not being used in offices, break rooms, and other spaces.
- Identify where locking covers for thermostats and ventilation controls can be installed to prevent unauthorized adjustments.
- Ensure free airflow to and from registers.
- Ensure window shades are available to block excess heat gain; make plan to educate staff about when to use them.
- Identify where ceiling fans can be installed to move and de-stratify air layers. Ensure all existing ceiling fans are operating properly.
- Monitor make-up air ventilation; ensure the proper functioning of dampers to achieve outside air requirements.





Treasure Map FOR READY-MIXED CONCRETE PLANTS

- Ensure that HVAC system components are being maintained regularly, including:
 - Replace filters on a regular schedule.
 - Inspect and clean evaporator and condenser coils.
 - Clean fan blades and adjust belts as needed.
 - Inspect water/steam pipes and ducts for leaks and/or inadequate insulation; address as needed.
 - Verify and calibrate operation of variable air volume (VAV) boxes, where applicable.
 - Evaluate furnace/boiler efficiency and clean/tune up as needed (including boiler water treatment and inspection of steam traps, as appropriate).
 - Check chiller and cooling tower components for fouling or corrosion; ensure proper water treatment is in place.
 - Check for unusual noise, vibration and/or decrease in performance of compressors/motors.
- Evaluate how chillers operate during the cold months and determine if chiller or pumps can be shut off.
- Identify and assess opportunities for installing VFDs for fan and pump motors, and VAV boxes in the ductwork – especially where variable loads are being served.
- Identify and assess opportunities for demand-controlled ventilation in areas with variable loads (e.g., meeting room, break room).
- Identify and assess opportunities to use occupancy sensors to control HVAC in offices or meeting rooms.
- Verify proper preventive and predictive maintenance schedules are being followed. Ensure all components are optimized.
- Determine whether economizer modes are being used.
- Confirm non-production modes are used, and schedules are being followed.

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Chillers

- Consider raising chilled water temperature to decrease the required temperature lift.
- Consider reducing condenser water temperature to decrease the required temperature lift.
- Verify proper chiller maintenance schedules are being followed.
 - Keep heat transfer surface clean.
 - Remove trapped air from the condenser.
- Consider replacing chilled water with naturally occurring cooling water when the outside temperature is low.
- Consider replacing absorption chillers with electric drive centrifugal chillers.
- Check water cooling systems for water quality (pH and total dissolved solids), flow, operations and temperature.
- Evaluate if air pressure can be reduced to the lowest practical set point.
- Evaluate overall preventive and predictive maintenance of system.

NOTES:





Treasure Map FOR READY-MIXED CONCRETE PLANTS

ADDITIONAL NOTES:

