

How do you know if you're a good candidate?

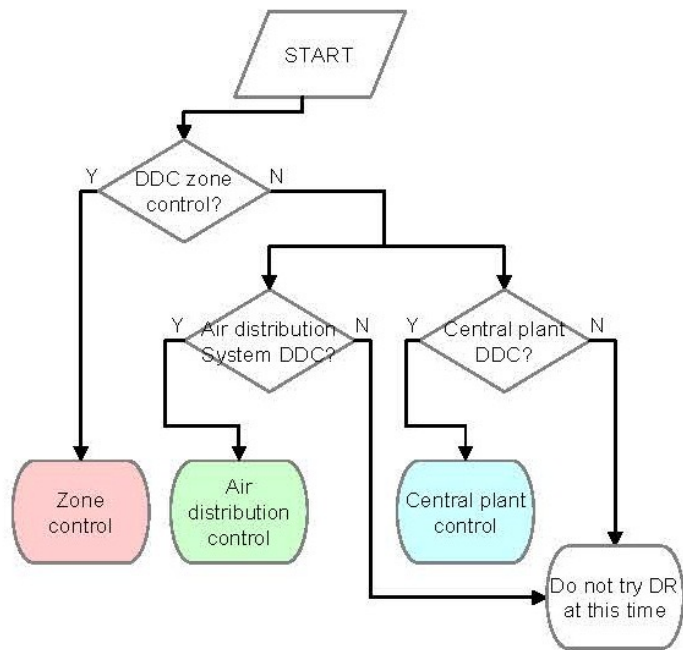
- Conduct an audit:
 - examine energy loads
 - determine whether your facility's peak demand coincides with the utility's
 - Is your business flexible?

Is DR a good option?

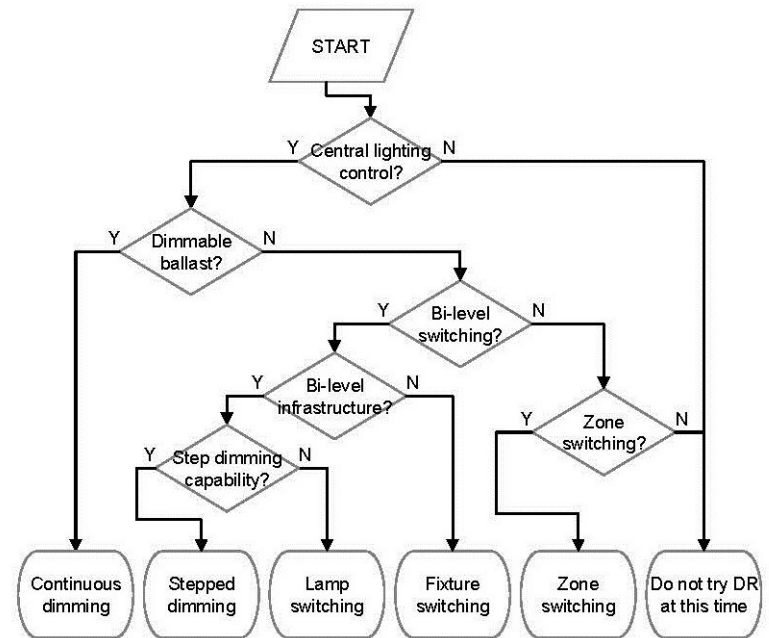
- Sample question set to determine if you are a good candidate?
 - Is your electrical peak demand within the range specified by Utility/
 - Do you have large loads that can be curtailed?
 - Do you have non-essential loads (fountains, lights in unoccupied areas, etc.)?
 - Can you change lighting levels or temperature settings without disrupting business?
 - Do you have a building automation system (BAS) that controls significant portions of lighting, HVAC, or process equipment?
- If you answer yes to some of the questions, DR may be a good revenue generating opportunity

C. Implementation Issues

DR HVAC Decision Tree



DR Lighting Decision Tree



DR Strategy Development and Commissioning

- Step 1: Initial site inspection
 - At the beginning of the DR strategy planning, the coordinator collects all the necessary information on the site process to minimize redundancy. The necessary data include building type, building floor area, HVAC and lighting system profiles, EMCS profiles, and historical electricity demand data.

- Step 2: DR strategy sequence of operation
 - In coordination with the coordinator, facility managers, controls contractors, and other key personnel, DR strategies are planned with respect to system applicability, impact to occupants, desired demand savings, and other relevant factors.
 - Each planned DR strategy needs to be written as a detailed control sequence of operation so that controls contractors can understand exactly what they need to do with EMCS programming and additional hardware installation if necessary.

- Step 3: Demand Savings potential estimation
 - The coordinator makes a preliminary estimate of demand saving potential to estimate the benefits of participating in the DR program and to justify the project cost. While estimation of demand savings from lighting DR strategies can be relatively simple, demand savings from HVAC DR strategies are complicated by various factors. Development of a simplified simulation tool for demand savings estimation from different DR strategies is desired.

- **Step 4: Performance monitoring plan**
 - Along with the DR strategy sequence of operation, EMCS data collection should be also planned in advance by the facility management team. EMCS trend data are helpful to evaluate the success of DR strategies. Adjacent table lists EMCS data points that are recommended for collection for DR strategy diagnosis.

Recommended data collection points		
Whole building	Whole building power demand	
HVAC system	Zone control	Zone temperature Zone setpoint temperatures VAV damper position VAV airflow Reheat valve position
	Air distribution	Supply air temperature Return air temperature Outside air temperature Outside air damper position Fan power Fan status Fan VFD percent Fan airflow Duct static pressure
	Central plant	Chiller power Chiller status Chilled water supply temperature Chilled water return temperature Chilled water flow Cooling tons
Lighting system	Lighting power Light levels	
Other equipment	Power of target equipment Status of target equipment	
Weather	Outside air temperature Outside air humidity	

- Step 5: Proof-of-concept manual test
 - It is recommended that facility management team perform a manual DR strategy demonstration test as a proof-of-concept.
 - The coordinator should supervise the test and analyze the trend data after the test. If the demand savings by the DR strategies are weather dependent, such a test should preferably be conducted on a warm day that can represent a DR event day (at least 85°F or higher).
 - If operational problems or complaints occur even though the sequence of operation is successful, the strategies should be reconsidered.
 - The test results should be compared with the preliminary demand savings potential estimation.
 - If there is difficulty conducting both a demand savings estimation and a manual test, at least one of them should be performed (manual test is preferred).
 - Obstacles to a manual test include seasonal weather conditions, concerns about distracting occupants without a real DR situation, and lack of sophisticated controls to perform a manual test (e.g. hundreds of zone set-points cannot be changed simultaneously without automation).

- Step 6:DR Strategy Proposal
 - Based on the DR strategy sequence of operation developed in the previous step, the controls contractor develops a project proposal for the client.
- Step 7: DR Strategy Installation
 - When the project proposal is accepted by the facility manager, the controls contractor starts the EMCS programming and hardware installation as specified in the proposal.

- Step 8: Post Installation Test
 - When the DR strategy installation is completed, the facility manager tests the strategies to
 - 1) confirm that the strategies work correctly as specified in the sequence of operation, and
 - 2) verify the demand savings potential as estimated in the calculation and pre-installation test.
 - Confirmation of correct operation is more critical, and may be done on a cool day with a shorter duration than actual DR events.
 - EMCS trend data should be collected during the test.
 - After the test, the coordinator should check the EMCS data, especially for the modified parameters, to see if the controls change occurred as planned.
 - If it did not occur, the EMCS programming should be revisited.

- Step 9: M&V for DR Events
 - Measurement and verification efforts should be continued by the coordinator during the actual curtailment as well.
 - If the post-installation test was conducted before the hot summer season, the reduction in service can be larger and the demand savings can be widely different during the real curtailment than in the test.
 - The DR operation should be carefully reviewed especially until the first or second curtailment is completed.
 - The facility manager should calibrate the strategies to maximize demand savings while minimizing impact to occupants.

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