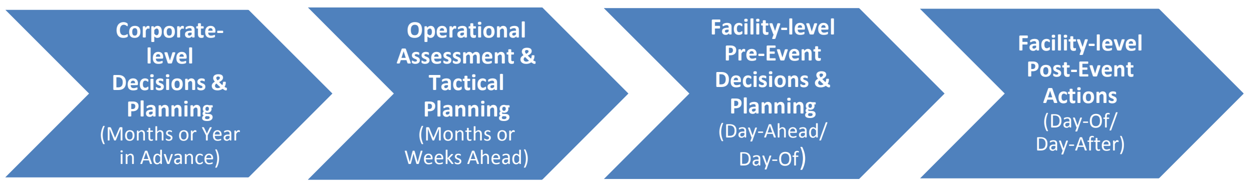
Industrial Demand Response:

Corporate/Facility-level Effort Required for DR Market Participation

Electricity Consumers Resource Council
Washington DC

The participation of industrial loads in demand response (DR) markets requires commitments at both the corporate and facility levels. It is a very time-consuming and complex process, and to the extent adequate compensation is a barrier that prevents DR capable industrial loads from engaging in these markets it is because compensation is not aligned with the real costs and risk associated with demand response. Policy makers that are interested in maximizing industrial load participation in DR markets need to understand the decision-making processes within a company that determine its ultimate willingness to participate.



Corporate Level Decisions & Planning

At the corporate level, senior management must authorize any recommendation to shift or curtail production in response to electricity prices in the energy or ancillary services markets. This process must begin months or a year (often tied to the budget cycle) in advance. The approval is contingent on many factors. First an evaluation of the risk is performed. This includes commitments to customers and the degree of flexibility in each DR capable facility's production schedule, its ability to increase inventories and alter logistics systems such as materials deliveries and the routing of product shipments. The potential cost is estimated. This includes:

- Direct cost of the disruption to the production process and the potential for lost sale
- Premium operational costs such as cost of degraded production efficiency, cost of additional non-productive time/lost production and energy consumption associated with stop/restart actions and process stabilization
- Cost of potential need to shift production to other facilities
- Additional wear-and-tear on process equipment and lost equipment life due to thermal, electrical, chemical and/or mechanical shocks associated with load curtailment events
- Cost of market participation such as RTO membership requirements, LSE certification, and legal costs incurred to secure State PUC approval
- Labor considerations such as work rule changes and overtime budget planning
- Cost of dedicated phone "hot line" and additional metering or relays

The result of the risk evaluation and cost analysis will be used to determine the acceptable of the DR nomination parameters of each DR capable facility. Some production processes or facilities can curtail on shorter notice or sustain a curtailment for a longer period of time. Others can withstand more frequent curtailments but for shorter durations. There are critical tradeoffs between these parameters that must be carefully weighed against the requirements of the core business and the net earnings of a load curtailment.

Parameters of Demand Response Nomination

- Load available for curtailment (MW)
- Start time of curtailment
- Duration of curtailment (hrs)
- Frequency of curtailment (events/year)
- Self-schedule versus call option
- Minimum notice time before event (for call options)
- Buy-through option (hours before event)

An important decision relates to the option to self-schedule demand response in which the customer decides when to enter the market, versus the commitment to a form of call option in which the RTO system operator alerts the customer of a pending curtailment. In addition, the company may negotiate a bilateral agreement with a third-party to administer its DR capability.

An important feature of a call option that will encourage participation is the ability to "buy-through" an event if, for example, the event is called at a critical time during a facility's production cycle or there is an overriding need to fulfill a commitment to a customer of the core business. An example of a buy-through option is for the RTO system operator to give the customer one hour from the time the operator gives two-hour notice of a pending call to curtail, to buy-through the event. This would be in the form of a payment to the RTO to compensate for its need to procure resources within the shorter time window. The level of the payment can be negotiated in advance.

Facility Level Decisions & Planning

At the facility level, pre-event decisions and actions depend on whether the load self-schedules its available curtailment or is subject to a call for a pre-specified curtailment. The level of inventories and the need to reschedule deliveries of raw materials or product shipments is assessed in both cases if a buy-through option is available for the call. For self-scheduled curtailments, the facility estimates the potential net event earnings before any offer to curtail is made.

Corporate-Level Decisions & Planning Requirements for Demand Response Participation

Risk Evaluation

- Annual
- Seasonal
- Weekly
- Daily
- Hourly

Production schedule flexibility, logistical resources and ability to increase inventories

Life Cycle Analysis of Equipment Costs

Estimate lost equipment life due to thermal, electrical, chemical and/or mechanical shocks associated with load curtailment events

Determine acceptable values of the DR nomination parameters

Market Participation

- ISO/RTO membership
- LSE certification
- State PUC approval
- Other

Labor Considerations

- Work rule changes (e.g., shift changes)
- Overtime budget planning

Additional Resources

- Dedicated phone "hot line"
- Advanced metering , controls, relays, etc.

After the event, the production process has to be restored and stabilized. For some period of time the process will be less efficient than normal operations depending on the duration and magnitude of the event.

Facility-Level Decisions & Actions Associated with Demand Response Participation

Pre-Event Decisions & Actions

(Day-Ahead & Day-Of)

Pre-event decisions and actions depend on whether the load self-schedules its available curtailment or is subject to a "call" for a pre-specified curtailment.

Risk Evaluation

- Place in production cycle
- Level of inventories
- Need to reschedule deliveries and shipments

Benefit/Cost Analysis

- Estimate potential net event earnings vs. premium operational/logistical costs

Contingency Management

- Ability to buy-through event

Make Event Nomination

(if applicable)

Confirmation to RTO/Utility Control Center

Post-Event Actions

(Day-Of & Day-After)

After the event the production process needs to be restored and stabilized. For some period of time the process will be less efficient than normal operation depending on the duration and magnitude of the event.

Production Restoration

- Shift labor resources
- Restabilize processes
- Damage assessment

Compensation

- Settlement with RTO/utility
- Settlement with other parties

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