FREQUENCY RESPONSE AS A TOOL FOR GRID RELIABILITY - ERCOT DEMAND RESPONSE

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Outline

- I want to briefly discuss ERCOT's demand response programs
  - Load Resources (Formerly referred to as Loads Acting as a Resource (LaaRs))
  - Emergency Interruptible Load Service (EILS)
  - History of deployments

Background on Load Resources (LRs)

- LRs is considered an ancillary service
  - One half of ERCOT's responsive reserves can be comprised of LRs (1150 to 1400 MW)
  - Some LRs have an under-frequency relay that can be automatically interrupted when system frequency drops below 59.7 Hz
  - Other loads must be capable of deploying 95% of its ancillary service obligation within 10 minutes
  - LRs must return 95% of its load to the grid within 3 hours following an event

Failure to Perform

- If a LR fails to meet its obligation on two occasions, that LR will be disqualified for six months
- The LR may reapply but it must submit a corrective action plan and pass a load interruption test
- Administrative penalties may also be assessed by the Commission for the failure to respond

Cost of LRs

- The average cost per MW per hour of responsive reserves ranged between $6.11 to $20.04 during 2010 (with an average of $9.82)
  - This includes payments to generation and load resources providing responsive reserves

EILS

- Following a load curtailment event in April 2006, ERCOT and the Commission determined that a second tier of voluntary load response was necessary to avoid rolling blackouts
- EILS was established in fall 2007
- ERCOT may procure up to 1000 MW
- Loads are paid as bid for each four-month contract period (a capacity payment)
  - The minimum bid is one MW but loads can be aggregated

EILS

- EILS resources must have an interval data recorder (IDR) meter
- EILS resources must be capable of responding to a verbal dispatch from ERCOT within 10 minutes by dropping 100% of contracted load
- EILS resources are required to return to their normal operating levels within 10 hours following an event
- EILS resources are subject to an annual load-shedding test unless the resources have been deployed in the last 12 months

Failure to Perform

- If an EILS resource fails to deploy all of its required load, ERCOT may withhold all or part of the capacity payment and may suspend the resource from participating in the program for six months
- Further, if the portfolio for an EILS resource falls below 95% during a contract period, it is considered to have failed to meet its requirements
- To be reinstated as an EILS resource, the resource must successfully pass a load-shedding test
- The Commission could also assess administrative penalties

Cost of EILS

- The annual cost cap for the program is $50 million
- An average of 367 MW has been procured each contract period for each of the four time blocks during 2010
- The average cost per MW per hour for 2010 was $8.00
- The total 2010 program cost was $21.52 million

Energy Emergency Alert (EEA)

- LRs and EILS are included in ERCOT's EEA Process

Event Level	Triggering Event	System Operations
EEA Level 1	< 2300 MW adjusted reserves	Use capacity available from DC ties: Dispatch uncommitted units
EEA Level 2A -- MEDIUM potential for firm load shed	< 1750 MW adjusted reserves	Deploy interruptible loads (LRs); Begin block-load transfers of load to neighboring grids
EEA Level 2B – HIGH potential for firm load shed	To maintain system frequency at 60 Hz	Deploy Emergency Interruptible Loads (EILS) if available
EEA Level 3	To maintain system frequency at 59.8 Hz	Instruct transmission operators to shed firm load via rotating outages in blocks of 100 MW

History of LR Deployments

- 2007

Date	Time	Duration (min)	Amount of Response (MW)	Type of Deployment	Frequency at time of Deployment	Frequency after Deployment
7/2/2007	19:38	25	1184	Systemwide Manual Deployment (VDI) related to frequency restoration as a result of a potential NERC DCS Event	60.1	60.13
9/5/2007	7:57	92	1206	Systemwide Manual Deployment (VDI) related to frequency restoration as a result of a potential NERC DCS Event	59.74	60.15
12/12/2007	1:56	19	1104	Systemwide Manual Deployment (VDI) related to frequency restoration as a result of a potential NERC DCS Event	59.8	60.15

History of LR Deployments

- 2008

Date	Time	Duration (min)	Amount of Response (MW)	Type of Deployment	Frequency at time of Deployment	Frequency after Deployment
2/26/2008	18:49	79	1211	EECP Step 2, Systemwide Manual Deployment	59.935	60.05
3/16/2008	11:37	4	632	UF Event for Frequency < 59.7 Hz but less than 20 cycles	59.8	60.06
8/11/2008	17:14	41	1179	Systemwide Manual Deployment (VDI) related to frequency restoration as a result of a potential NERC DCS Event	59.82	60.05
12/16/2008	15:49	46	837	Systemwide Manual Deployment (VDI) related to frequency restoration as a result of a potential NERC DCS Event	59.7	60.05

History of LR Deployments

- 2010

Date	Time	Duration (min)	Amount of Response (MW)	Type of Deployment	Frequency at time of Deployment	Frequency after Deployment
1/9/2010	10:32	30	922	Systemwide Manual Deployment (VDI) related to frequency restoration as a result of a potential NERC DCS Event	59.77	60.03
5/15/2010	16:14	36	1112	UF Event for frequency < 59.7 Hz but of uncertain duration	59.685	59.95
6/23/2010	15:20	40	817	UF Event followed by VDI to selected QSEs for frequency restoration as a result of a NERC DCS Event	59.72	60.1
8/20/2010	15:28	12	1329	Systemwide Manual Deployment (VDI) related to frequency restoration as a result of a potential NERC DCS Event	59.75	60.08
11/3/2010	10:21	52	1301	UF Event followed by VDI to QSEs for frequency restoration as a result of a potential NERC DCS Event	59.86	60.14

History of LR Deployments

- 2011

Date	Time	Duration (min)	Amount of Response (MW)	Type of Deployment
2/2/2011	5:26	511 (half) 569 (half)	1150	EEA Step 2A, following loss of 7000 MW of generation

History of EILS Deployments

- EILS was deployed for the first time on February 2, 2011 at 5:47 a.m. in response to the loss of 7000 MW of generation
- EILS providers are also tested at least once a year, if they have not been deployed during an emergency event

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