



California ISO
Shaping a Renewed Future

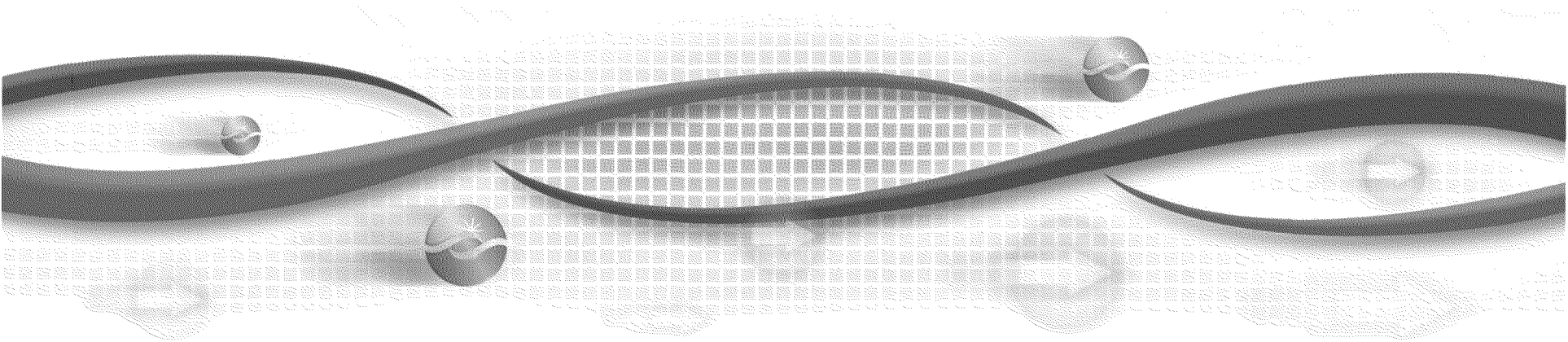
Flexibility characteristics

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CPUC Workshop: Long- Term Procurement Plan

May 3, 2012



What is flexibility?

- Ability of a resource to increase or decrease its production in response to a command.
 - Start-up time: The time it takes a resource go from offline to online
 - Shorter => more flexible
 - Ramp-rate: The rate of change of output
 - Faster => more flexible
 - Minimum load: The lowest operating level at which the resource can respond
 - Lower => more flexible
 - Regulation: Ability to respond to automatic generation control
- Operational constraints that limit flexibility:
 - Fuel / Energy limitations
 - Fuel limitations
 - Environmental limitations
 - Minimum run time
 - Minimum off time

Flexibility characteristics can be compared to flexibility characteristics of generic CCGT or GT.

- **Typical CCGT Characteristic**

- Pmin = 200 MW, Pmax = 500 MW (Pmin=40% of Pmax)
- Ramp-Rate = 7.5 MW/min
- Ability to provide regulation, operating reserves and load following

- **Typical GT Characteristic**

- Pmin = 40 MW, Pmax = 100 MW (Pmin=40% of Pmax)
- Ramp Rate = 12 MW/min
- Ability to provide regulation, operating reserves and load following

Benefits of local resource flexibility

- Local resource flexibility will reduce residual system flexibility needs
 - In 3,331MW (CCGT/GT) to Trajectory High Load scenario, residual system needs reduced to approximately 1,000MW
- Local area flexibility will be able to respond to local constraints
- Local area flexibility could support import capability