# Inadvertent Interchange Frequency Control Component

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# Real-Time Operations

- Implement Energy Schedules
  - Balanced Energy Schedules
- Control Load - Generation Balance
  - Provide Anticipatory Control
  - Control Interconnection Frequency
- Imbalances result in Inadvertent

# Load-Generation Balance

- **Dependent on a Good Plan**
  - **Adequate Reliability Services**
- **Real-Time Operations**
  - **Frequency Response Balances System**
  - **AGC Restores Scheduled Frequency and Frequency Response Margins**
  - **Operator Dispatched Reserves Restore AGC and Frequency Response Margins**
  - **Operator Dispatched Load Following Restores AGC and Reserve Margins**

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# Balancing Services

- **Balancing Services are required to replace inventory because electricity cannot be stored.**
- **The suite of Balancing Services are response not capacity services.**
- **Since the Frequency Response occurs in seconds, shortening the Market Interval cannot eliminate the need for Balancing Services.**

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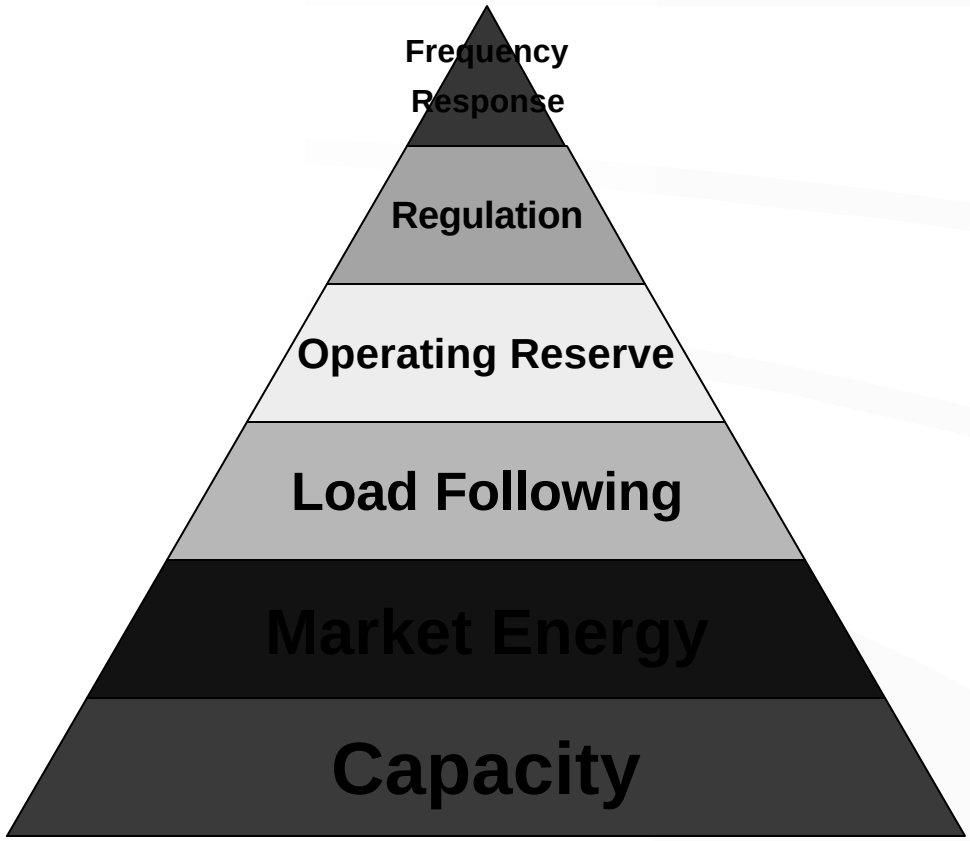
# The Resource Pyramid




**Response Time**

**Seconds**

**A Few to Several Minutes**

**10 to 15 Minutes**

**30 Minutes**

**Market Interval – One Hour**

**Response Not Defined**

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# Unscheduled Energy

- **Should there be a difference between the price of Scheduled Energy and Unscheduled Energy ?**
- **What are the technical differences between Scheduled Energy and Unscheduled Energy ?**

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# California Lesson

- **If rules and price signals conflict, unregulated Market Participants follow price signals, not rules.**

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# Conclusion

1. **Inadvertent Management System should be designed to provide accurate price signals instead of depending on “Command and Control” rules.**

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# How Markets Work

- **Markets do not have an Automatic Balancing Response.**
- **Markets use the Price Elasticity of Supply and Demand to Balance Supply with Demand.**
- **This Balancing Process sets the Market Price.**

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# How Interconnections Work

- **Electric Interconnections require a Real-Time Balancing Response to assure Security and Reliability.**
- **Therefore, the Inadvertent on an Interconnection is Always Balanced.**
- **There is no Balancing Process to use for setting the Market Price.**

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# Conclusion

2. **The concept of a Balancing Market <u>cannot</u> work with Inadvertent information alone !**

**Inadvertent does not provide the information necessary to set a price.**

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# Conclusion

3. **Inadvertent can only be managed effectively when it is managed in conjunction with the process that contributes to Inadvertent, Shared Frequency Control.**

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# Inadvertent Settlement

- **Settlement supporting Reliability includes three components.**
  - **Energy Component represents the value of the Energy.**
  - **Constraint Component represents the value of Transmission & Other Constraints.**
  - **A Frequency Control Component represents the value of the Balancing Services.**

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# Energy & Constraint

- **The Energy Component should be based on the Market Price of Energy. The Market Price of Energy should be derived from an energy market effectively including the Constraint Components.**

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# Frequency Component

- **The Frequency Control Component should provide compensation for the use of Balancing Services provided by others on the interconnection.**

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# Management Desires

- Define “Good” and “Bad” results
- Discourage “Bad” results
- Encourage “Good” results
- Use an understandable process
- Base compensation on service
- Use proportional compensation
- Use a simple process
- Minimize settlement risk

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# Define “Good” and “Bad”

- “Good” opposes frequency error
  - Frequency Low and Inadvertent Out
  - Frequency High and Inadvertent In
- “Bad” contributes to frequency error
  - Frequency Low and Inadvertent In
  - Frequency High and Inadvertent Out

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# Discourage “Bad”

- **Discourage “Bad” Inadvertent by requiring payment of compensation for the Frequency Control Services that have been extracted from the Interconnection.**

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# Encourage “Good”

- **Encourage “Good” Inadvertent by insuring compensation for the Frequency Control Services that have been supplied to the Interconnection.**

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# Understandable Process

- **The process should be easy to understand, use common measurement methods, and determine who has delivered what to whom.**

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# Frequency Control

- Unscheduled energy contributes to frequency control and provides average frequency response.
- Simple statistical methods can measure this frequency response.
- Requiring compensation for average frequency response is the best method to discourage “Bad” and encourage “Good” Inadvertent.

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# Statistical Measurement

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# Proportional Compensation

- **The compensation Discouraging "Bad" Inadvertent and Encouraging "Good" Inadvertent should have a magnitude proportional to the costs incurred and the benefits received from the Inadvertent.**

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# Use a Simple Process

- **Basing the process on a services compensation method creates the simplest process available. The users of the services compensate the providers of the services for the value of the services provided. In this case, the services are Energy and Frequency Control Contribution.**

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# Minimize Settlement Risk

- **The total process should be designed to minimize the Settlement Risk associated with managing the settlement process.**

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# Additional Advantage

- **The FCC method can be integrated into the Reliability Services market as soon as that market is developed. There is no need to reinvent the process when the market is ready to accept the responsibility for frequency control.**

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# Questions

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