



ECONOMICS, TECHNOLOGY, COMPETITION AND RELIABILITY

HARVARD ELECTRICITY POLICY GROUP
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INTRODUCTORY COMMENTS AND OUTLINE

- I. RESOURCE ADEQUACY AND/OR RELIABILITY?
- I. OBVIOUS: THE CONCEPT OF “RELIABILITY” AS WE CURRENTLY UNDERSTAND IT, IS THE RESULT OF, AND IS THEREFORE UNDERPINNED BY, A SPECIFIC INSTITUTIONAL PARADIGM/STRUCTURE WHICH IS, IN ITSELF FUNDAMENTALLY A FUNCTION OF THE AVAILABLE TECHNOLOGY.
- I. LESS OBVIOUS: NEW TECHNOLOGY COUPLED WITH COMPETITION REPRESENT A FUNDAMENTAL, RATHER THAN INCREMENTAL CHANGE.
- I. NOT NECESSARILY OBVIOUS: FAILURE TO UNDERSTAND THE EFFECTS OF COMPETITION ON THE LEGACY INSTITUTIONAL PARADIGM/STRUCTURE WILL BE COSTLY AND ULTIMATELY UNSUCCESSFUL.
- I. SUGGESTIONS FOR THE PATH FORWARD.

RESOURCE ADEQUACY AND “RELIABILITY”

- I. ANY DISCUSSION ON RESOURCE ADEQUACY IS A SUBSET OF THE LARGER DISCUSSION ON RELIABILITY.
 - A. RESOURCE ADEQUACY DOES NOT EXIST AS A TOPIC APART FROM THE BROADER TOPIC OF RELIABILITY.

- II. RESOURCE ADEQUACY CANNOT AND SHOULD NOT BE SEPARATED FROM RELIABILITY.
 - A. DISAGGREGATING INCREASES THE RISK OF POOR/BAD DECISIONS.
 - B. BAD = COSTLY, INEFFECTIVE AND LONG-LIVED.

“RELIABILITY”

I. HOW IS RELIABILITY DEFINED?

A. “CONSISTENTLY GOOD IN QUALITY OR PERFORMANCE.”

I. “GOOD”? “QUALITY”? “PERFORMANCE”?

B. “CAPABLE OF BEING RELIED UPON; DEPENDABLE.”

I. “DEPENDABLE”?

C. DIFFICULT TO BE PRECISE.

I. BUT PRECISION IS REQUIRED BECAUSE THE CONCEPT HAS TO BE OPERATIONALIZED.

D. TO DATE THE INDUSTRY HAS DEFINED RELIABLE THROUGH METRICS AND PROCESS.

I. “1-IN-10”, NUMBER AND LENGTH OF FREQUENCY EXCURSIONS, ETC.

II. 2003 AND 2011?

II. THE CORNERSTONE OF THE RELIABILITY PARADIGM IS THE CONCEPT OF “LOSS OF LOAD”, I.E. LOSS OF LOAD IS A NEGATIVE EVENT.

A. IN WHAT SENSE IS LOSS OF LOAD NEGATIVE?

A. ANY LOSS...IN WHAT SENSE ARE VOLUNTARY (PAID) REDUCTIONS NEGATIVE?

B. MANY SHORT OCCURRENCES (PEAK OR OFFPEAK) OR INFREQUENT LONG OCCURRENCES (PEAK OR OFFPEAK)?

C. OCCURRENCES THAT ARE MORE FREQUENT BUT PREDICTABLE OR LESS FREQUENT BUT RANDOM?

D. DIFFICULT TO OPERATIONALIZE “RELIABILITY” WITHOUT EXPLICIT ANSWERS.

I. WHAT WE HAVE ARE IMPLICIT ANSWERS.

HERITAGE OF THE RELIABILITY PARADIGM

- I. LEGACY: COST EFFECTIVENESS (I.E. DECLINING AVERAGE COST) LED TO LARGE SCALE GENERATION FACILITIES WHICH LED TO UTILITY CONSTRUCT:
 - A. REGULATED MONOPOLIES.
 - B. TRANSMISSION/GENERATION DECISION IS COMMERCIAL/OPERATIONALLY INTERDEPENDENT.
 - C. GRANTING OF FRANCHISES.
 - A. MONOPOLY ACQUIRES FRANCHISE IN RETURN FOR “MEETING/SERVING LOAD.”
 - B. PROVIDER OF LAST RESORT.
 - C. LOAD IS A “GIVEN” AND MUST BE SERVED.
 - D. ASSET VALUES AND USE OF EXISTING TECHNOLOGY REFLECT THIS IMPERATIVE.
- II. UNDER THIS PARADIGM IT IS NATURAL FOR LOSS OF LOAD TO BE A NEGATIVE.
 - A. IMPLICIT PROPERTY RIGHT IS THAT THE CONSUMER HAS THE RIGHT TO BE SERVED 24/7.
 - B. INELASTIC DEMAND.
 - A. NATURAL THAT THERE WAS LIMITED INVESTMENT IN DEMAND REDUCTION OR DEMAND MANAGEMENT.
 - C. INVESTMENT AND OPERATION FOCUSED ON “MAINTAINING RELIABILITY” - SEPARATION OF PHYSICAL/FINANCIAL REGULATION.

TECHNOLOGY AND COMPETITION

- I. DEMAND RESPONSE IS A FUNDAMENTAL DISRUPTIVE TECHNOLOGY.
 - A. FUNDAMENTALLY CHANGES WHAT “MEETING/SERVING LOAD” MEANS AND HOW IT IS OPERATIONALIZED.
 - I. ADDS A COMPLETELY DIFFERENT ELEMENT
 - I. “AT WHAT PRICE” – LINKS PHYSICAL AND FINANCIAL.
 - II. DEFINING RESERVE MARGINS? PLANNING AND OPERATING?
 - I. WHO MAKES THE DECISION? WHO PAYS? STRANDED ASSETS?
 - B. DECENTRALIZED/DISAGGREGATED AS COMPARED TO CENTRALIZED/AGGREGATED...DESPITE EFFORTS, CANNOT BE INCORPORATED.
 - C. THE “LEGACY” REQUIRES THAT DEMAND MANAGEMENT BEHAVE LIKE A THERMAL GENERATOR.
 - I. SIMILAR TO THE RESPONSE TO INTERMITTENT RESOURCES.
 - D. SMART GRID, DISTRIBUTED GENERATION ARE SIMILARLY DISRUPTIVE TECHNOLOGIES.
- II. RENEWABLE ENERGY POLICIES...IF NOT ORTHOGONAL TO THE NEW TECHNOLOGIES, AT LEAST CLOSE TO IT.
 - I. STORAGE.
- III. ALLOWING COMPETITION PUTS “FORCE” BEHIND THE IMPERATIVE OF THE NEW TECHNOLOGIES.
 - A. LOSS OF CAPTIVE CUSTOMERS.

SUGGESTIONS

- I. DIFFICULT...THE WORLD IS CHANGING AND WE DON'T KNOW HOW IT WILL TURN OUT.
 - A. "THE BEST WAY TO PREDICT THE FUTURE IS TO INVENT IT."
 - B. "YOUR THOUGHTS CONSTRUCT PATTERNS LIKE SCAFFOLDING IN YOUR MIND...IN MOST CASES, PEOPLE GET STUCK IN THOSE PATTERNS, JUST LIKE GROOVES IN A RECORD, AND THEY NEVER GET OUT OF THEM."
- II. THE CONCEPT OF RELIABILITY CAN BE THOUGHT OF AS A FORM OF HEDGING OR INSURANCE, I.E. REDUCTION, ELIMINATION OR MITIGATION OF RISK.
 - A. IN THIS CASE, THE RISK OF A FAILURE OF THE ELECTRICITY NETWORK.
- III. THE CURRENT PARADIGM IS BASED ON PRIMARILY "PHYSICAL" HEDGING/INSURANCE, I.E. THE RELIANCE ON PHYSICAL SOLUTIONS.
- IV. THE KEY INGREDIENTS OF THE SOLUTION:
 - A. CORRECT PRICING.
 - B. NO BIAS TOWARD ONE TECHNOLOGY OVER ANOTHER.
 - C. PROBABILISTIC APPROACH.
 - A. SOMETHING EQUIVALENT TO VAR?
 - D. APPROPRIATELY: (1) FLEXIBLE, (2) DIVERSIFIED AND (3) INTEGRATED.