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**TRADE AND INVESTMENT REFORM
SUPPORT PROGRAM IN AZERBAIJAN**

Service Quality Regulation

NARUC/ERRA Regulatory and Tariff Workshop

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Service Quality Regulation

- Price and Quality are complementary features that define value of electric service to a consumer
- SQ regulation increasingly important as utilities get lighter tariff regulation, price caps
- Strong incentives for increased cost efficiencies can lead to quality deterioration
- Regulator should maintain balance between quality demanded and acceptable tariffs
- Optimal Quality : At what point incremental cost of improvements equals the added value to the consumer
- Exclude catastrophic events from SQ regulation.
- Separate emergency regulation

SQ Classifications

- Continuity of supply: service outage frequency, duration
- Technical quality: voltage variations, frequency drops
- Commercial quality: responsiveness to customer care, service complaints, billing errors; meter accuracy, efficiency of network and supply operations
- Safety of public and employees: frequency, severity of incidents, relief efforts
- Criteria within each class: set fewer rather than many, simple and realistic

Value of Quality to Consumers

- Differentiated quality impacts among customer classes
- Business and Industry: loss of production, equipment damage, spoilage, loss of business revenues
- Residential: Want continuity and responsiveness specially during emergencies; minimize annoying voltage variations, flickers. Fair and friendly customer treatment .
- Some consumers may accept planned interruptions
- Sensitivity of new technology to service reliability, low tolerance for voltage fluctuations. Some customers willing to sign 'high-quality' special contracts
- Focus should be to protect residential and small businesses as large customers typically define and mutually agree to SQ in their service contracts

Measurement and Reporting

- Quality parameters must be measurable in order to monitor and regulate
- Clarify the objectives:
 - What is the existing level? Is it too low?
 - Benchmarking one utility against another?
 - To aim for 'best practices'?
 - What is optimal: a point at which cost of the additional quality equals the reduction in customer costs due to better quality

Technical Quality: Definition and Measurements

- - Clearly define voltage quality indicators for measurements.
 - European EN50160/UNIPEDE's
“Measurement Guide for Voltage Characteristics” is a good reference point

Voltage Variations

- Short interruptions: momentary interruptions of 0.1 second to 3 minutes. Considered most important Tech. quality indicator
- Voltage drops close to zero (< 1%). Larger durations(1-3 min.) can be monitored manually or thru SCADA
- These are mostly accidental interruptions
- Indicator used: MAIFI (Momentary Average Interruption Frequency Index)
$$\text{MAIFI} = \sum N_i / N$$
where N_i is No. of interrupted customer in interruption i ; N is total No. of customers
- Affects Manuf. process: e.g immediate discontinuation of operations

Voltage variations...

- **Dips**: voltage may drop bet. 1- 90% of nominal level
 - Severity measured in terms of duration and frequency
 - Dips may cause from 'no damage' to 'severe' similar to momentary interruptions

Flicker: Affects mostly low-voltage customers, lamps luminance, annoyance and perception issue; often caused by customer equipment but network can mitigate

Harmonic distortions: Multiples of 50HZ waves; indicator THD (Total Harmonic Distortion); mostly caused by customer but network operator only person that can coordinate level of HD
- **Supply voltage variations**: Mainly caused by changing load patterns. EU standards: 95% during 10-minute monitoring voltage within +/- 10%.
- Indicator can suggest 'sufficient' or 'insufficient' quality. If sufficient customer probably not willing to pay for improvements
- Norway, Italy, Netherlands have adopted some form of voltage standards
- For developing countries voltage variation less important than continuity of supply

Supply Continuity

- Most important QS parameter with most severe impact for all customers
- Frequency of outages: system-wide, localized, individual premises
- Duration of outages: hours, days
- Response and restoration mechanism
- Measurement Index: System Average Interruption Frequency Index (SAIFI)

Commercial Quality

- Regulators prescribe and monitor utility response mechanism to consumer concerns
- Emergency and outage response ranks #1
- Average response time? call answered in x minutes; service center responsiveness; ease of access
- Records of complaint, resolution, by type: service, billing, others

Regulatory Control Mechanism

- Develop SQ strategy
- Performance Monitoring:
Step1. Prescribe clear, consistent (across utilities and periods) data reporting
Min. standards: set realistic and achievable norms
Is regulator willing to support investments needed with tariff adjustment?
- Step 2. Financial incentives: Do not introduce penalties or incentives too soon
- Monitor and allow system time to adjust. Need transition period
- Need strong utility cooperation - regulator cannot do it alone₁₂

Blending Tech. Commercial and Safety standards

US utilities often adopt blended QS- approach: Example, one Michigan utility has this blend:

1. Downed wire response relieved in < 4 hrs
2. Employee safety severity reduction
3. Repetitive elec. outages < 5 per year
4. Elec. outage restoration < 36 hrs (90% of time)
5. Meter reading read during approved period
6. Base load plant generation availability $> 85\%$
7. Call center answer time 90% < 30 seconds.

Note: Voltage fluctuations, frequency drops not significant occurrences in most US systems

Regional Practices/ERRA survey

While many ERRA member countries have reviewed adoption of SQ standards few have actually adopted them.

Recent ERRA survey (Licensing /Competition committee meeting,Riga, Sept. 2006) shows:

- 1. Who regulates SQ? 15 – Energy Regulator ; 3-others**
- 2. Do you have a continuity of supply standard?
(SAIFI,MAIFE,SAIDI) Yes (EE,HU,LT,MK,RO,TR)
No - Others**
- 3. Who is authorized to set commercial quality 13- regulator; 5- Other institutions**
- 4. Survey Conclusion: EE,HU,LT,TR,MD,RO have detailed SQ in all categories, have registration and audit procedures. Others either in the process or not considering.**

What can Azerbaijan do?

- Develop Strategy: Task Force on QS improvements
- Clarify who is responsible for regulating SQ (TC, MIE, State Energy Control Authority). Typically it is the tariff regulator since two go hand in hand.
- Examine ERRA countries that have adopted some SQ measures
- Address local circumstances
- Increase public awareness and get their input

Phase 1 implementation

- Settle on three or four critical quality parameters in cooperation with Azenergy, and Discos and begin monitoring them. Establish reporting requirements first
- Use Baku and Sumgait distribution systems as models
- Do pilot study of SQ in regions
- Allow transition period before embarking on SQ incentives



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