

Load Forecasting in a Competitive Environment

Georg Shultz, Chief, Energy Forecasting Branch, RUS

Load Forecasting – What’s New A Discussion of the New RUS Load Forecasting Regulation

Remarks by Georg Shultz, Chief, Energy Forecasting Branch, Electric Staff Division, Electric Program, Rural Utilities Service at the RUS 2000 Electric Engineering Seminar on March 14, 2000.

The 2 topics for discussion are the ‘new’ RUS regulation on load forecasting and my thoughts on the impact of ‘competition’ on load forecasting.

The New Load Forecasting Regulation

RUS has developed and proposed a new load forecasting regulation to reduce the reporting burden for load forecasts required to be submitted to RUS consistent with the Agency’s need for information. We anticipate the publication of a final rule sometimes this spring. While RUS is reducing the reporting burden, the load forecasts are still an integral part of electric utility planning and are probably even more important than in the past.

To develop the regulation needed to accomplish this reduction RUS set up a working group with representatives from each major functional unit in the electric program. The regional offices, the Power Supply Division, the Electric Staff Division and the field staff were all represented. Jim Ruspi, the director of the Southern Regional Division chaired the group. As is the usual case with developing a load forecast, even this small group had conflicting opinions and ideas as to how to best accomplish the goal.

A major stumbling block in meeting the new goal was criteria for approval of a borrower’s Power Requirements Study in the existing regulation as stated below:

- 1) “The borrower used valid and verifiable analytical techniques and models.”
and
- 2) “The borrower adopted methods and procedures in general use by the electric utility industry to develop its load forecast.”

To meet these 2 criteria it was necessary to develop a PRS with a significant level of support and documentation. Our challenge was to meet the government policy mandate to reduce reporting burden while keeping an acceptable level of information to support the credit decisions made by the commensurate with the Agency’s credit exposure, the business risk of our borrowers and overall utility practice.

The approach finally adopted by the Agency stands on several principles. The first was to expand the overall approval criteria to increase flexibility by allowing subjective forecasting approaches. The second was increase the thresholds for loans that do not require a formal load forecast. The third was to expand the Agency’s administrative discretion with regard to load forecast approval extensions and waivers. The fourth was to reduce certain prescriptive requirements regarding scenario analysis and consumer surveys. The final principle was to unequivocally place the responsibility for the development of the forecast on the General Manager.

Another important change, but not fundamental to our goals, is dropping the use of the term “ power requirements study” in favor of the term “load forecast.”

Principle 1 - Expand the overall approval criteria to increase flexibility

Central to this change is the establishment of two types of load forecasts acceptable to RUS. One forecast is that outlined in the current regulation. For our discussion we will call this forecast a “basic level forecast”. It is still the cornerstone of RUS policy with regard to load forecasting. We will call the second forecast a “minimum level forecast.” It is a subset of the basic level forecast. So we must spend a few minutes considering the basic level forecast.

The proposed regulation states:

§ 1710.208 RUS criteria for approval of all load forecasts by power supply borrowers and by distribution borrowers required to maintain an approved load forecast on an ongoing basis.

All load forecasts submitted by power supply borrowers and by distribution borrowers required to maintain an approved load forecast must satisfy the following criteria:

- (a) The borrower objectively analyzed all known relevant factors that influence the consumption of electricity and the known number of customers served at the time the study was developed;
- (b) The borrower considered and identified all loads on its system of RE Act beneficiaries and non-RE Act beneficiaries;
- (c) The borrower developed an adequate supporting database and analyzed a reasonable range of relevant assumptions and alternative futures;
- (d) The borrower adopted methods and procedures in general use by the electric utility industry to develop its load forecast;
- (e) The borrower used valid and verifiable analytical techniques and models;
- (f) The borrower provided RUS with adequate documentation and assistance to allow for a thorough and independent review; and
- (g) In the case of a power supply borrower required to maintain an approved load forecast on an ongoing basis, the borrower adequately coordinated the preparation of the load forecast work plan and load forecast with its member systems.

The above approval criteria (formally adopted by the Agency with the 1992 promulgation of 7CFR1710 Subpart E – Power Requirements Studies) essentially defines a “basic level load forecast.” I again want to draw your attention to criterion (d) and criterion (e). A basic level forecast was often referred to a “full blown PRS.” The phrase is somewhat incongruous in that the basic level PRS represented the minimum acceptable load forecast. However, it is inescapable that to meet these criteria is was necessary to develop a comprehensive historical database, estimate mathematical models using the historical data, and to develop a comprehensive projected database to load the models to estimate projections. Model estimation using ordinary least square regression and econometric theory were acceptable to RUS. While these tasks are not trivial, it is possible to develop an acceptable load forecast with an unsophisticated personal computer with a spreadsheet application for database development and ordinary least squares regression capability, and a basic understanding of economic theory. Better computers and software are continually becoming available. Indeed RUS approved forecasts developed using just Excel as recently as last year.

Now let's consider the minimum level forecast.

§ 1710.207 RUS criteria for approval of load forecasts by distribution borrowers not required to maintain an approved load forecast on an ongoing basis.

Load forecasts submitted by distribution borrowers that are unaffiliated with a power supply borrower, or by distribution borrowers that are members of a power supply borrower that has a total utility plant less than \$500 million and that is not itself a member of another power supply borrower with a total utility plant of \$500 million or more must satisfy the following minimum criteria:

- (a) The borrower considered all known relevant factors that influence the consumption of electricity and the known number of consumers served at the time the study was developed;
- (b) The borrower considered and identified all loads on its system of RE Act beneficiaries and non-RE Act beneficiaries;
- (c) The borrower developed an adequate supporting data base and considered a range of relevant assumptions; and
- (d) The borrower provided RUS with adequate documentation and assistance to allow for a thorough and independent review.

The above approval criteria essentially defines the minimum level load forecast. Gone is the need the need to develop mathematical models and to develop comprehensive databases to satisfy the criteria. To illustrate the difference the between a basic level forecast and a minimum level forecast lets look the following "side by side."

**LOAD FORECAST REGULATION
APPROVAL CRITERIA SIDE BY SIDE**

ITEM	MINIMUM LEVEL	BASIC LEVEL
1	(a) The borrower considered all known relevant factors that influence the consumption of electricity and the known number of consumers served at the time the study was developed;	(a) The borrower objectively analyzed all known relevant factors that influence the consumption of electricity and the known number of customers served at the time the study was developed;
2	(b) The borrower considered and identified all loads on its system of RE Act beneficiaries and non-RE Act beneficiaries;	(b) The borrower considered and identified all loads on its system of RE Act beneficiaries and non-RE Act beneficiaries;
3	(c) The borrower developed an adequate supporting database and considered a range of relevant assumptions; and	(c) The borrower developed an adequate supporting database and analyzed a reasonable range of relevant assumptions and alternative futures ; and
4		(d) The borrower adopted methods and procedures in general use by the electric utility industry to develop its load forecast;
5		(e) The borrower used valid and verifiable analytical techniques and models;
6	(d) The borrower provided RUS with adequate documentation and assistance to allow for a thorough and independent review.	(f) The borrower provided RUS with adequate documentation and assistance to allow for a thorough and independent review, and;
7		(g) In the case of a power supply borrower required to maintain an approved load forecast on an ongoing basis, the borrower adequately coordinated the preparation of the load forecast work plan and load forecast with its member systems.

Item 1

The only difference in actual text between the minimum and basic criteria in item 1 is the word “objectively.” But this is a very important distinction. This means that a subjective analysis may be used as the basis for a minimum level load forecast. In other words a judgmental forecast without the benefit of developing mathematical models or other industry accepted approach.

Item 2

There is no text difference for Item 2

Item 3

Here again the difference allows for the development of a subjective forecast. The difference between the words “considered’ and ‘analyzed’ is most telling.

Per Webster

consider (verb)- to think about seriously.

analyze (verb) – to separate into elemental parts or basic principles so as to determine the nature of the whole.

To analyze it was usual for utilities to use either an econometric or end-use approach coupled with judgment. To consider requires only judgment. A minimum level forecast, that is a subjective or judgmental forecast, does not require any sort of explicit mathematical modeling. But to consider and understand your loads and develop a useful forecast a comprehensive historical database is still necessary. Data is so important to the development of any forecast that it is included in the new regulation as part of all load forecasts.

In God we trust, everyone else must use data.

Another important distinction is the need to develop alternative futures for a basic level load forecast that is not needed in the minimum level forecast.

Item 4 and Item 5

There are no parallels between the minimum and basic level forecasts for these items.

Item 6

No difference

Item 7

While this appears to be a difference. In actuality it is not. A minimum level study is not an option for a power supply borrower.

Principle 2 – Increased thresholds

(Please note that we have moved back to the principle discussion.) I am only going to discuss major threshold changes.

The first threshold change is the definition of a large borrower. The regulation provides for any borrower, power supply or distribution, with more that \$500 million in total utility plant (TUP) as large. These borrowers and the members of these borrowers are required by the regulation to maintain an up-to-date and valid load forecast at all times. These large borrowers will see little change from the previous regulation.

The second change increases the eligibility criteria for borrowers to opt NOT to prepare a formal load forecast. A small power supply borrower is required to submit a basic level load forecast for any request of RUS in the amount of \$50 million or larger. This was increased from \$25 million. A 'small' distribution borrower is required to submit at least a minimum level load forecast for any request of RUS greater than \$3 million. Also distribution borrowers not affiliated with a large power supply borrower and with more that \$60 million in TUP can request up to 5% of TUP without a load forecast. This

change makes it possible for larger borrowers to exercise the no formal load forecast option. But we must all remember that a load forecast is always implicit with every decision made by an electric utility.

Principle 3 – Expanded administrative discretion

The expanded administrative discretion manifests itself in the discretion given RUS to consider extending time frames regarding the routine development of load forecasts for large power supply borrowers and their members. The new regulation allows for Extensions up to 24 months. The old regulation allowed for 12 months.

Principle 4 – Reduce prescriptive requirements

Although the existing regulation had few prescriptive requirements defining how to prepare the actual forecast, reduction to an absolute minimum was our goal. The most significant reduction in prescriptive requirements is the elimination of the requirement to develop scenario analysis as part of a basic level forecast. While never defining the type of customer survey required the Agency opted to extend the interval between conducting customer surveys from 3 to 5 years. Obviously there is a significant reduction in overall requirements between a basic level forecast and a minimum level forecast.

Principle 5 - Accountability

What the Agency is most interested in while reviewing the actual forecast is that your cooperative did an objective and reasonable analysis and accepts accountability for the forecast.

In the past, accountability was addressed primarily through a board resolution approving the forecast. What is new in the new regulation is that in addition to the board resolution, a letter to the board from the borrower's general manager recommending approval of the load forecast is required. This letter explicitly places the responsibility for the development and results of the forecast directly on the shoulders of the general

manager. With this one change the Agency clearly emphasizes the importance of the load forecast while introducing increased flexibility and reduced requirements in other parts of the regulation.

In spite of the changes occurring in the industry the Agency recognized that most industry accepted techniques to develop load forecasts are not suitable for small rural electric borrowers. From the credit side of the ledger the Agency also felt that the level of effort required to develop or review a comprehensive load forecast was not warranted for small loans. For these borrowers and small loans a formal submittal of any load forecast to RUS is not required.

If your cooperative is a member of a large generation and transmission cooperative it will still be necessary to develop on a routine basis a comprehensive load forecast. A large system is defined as one with over \$500 million in total utility plant. But even here we reduced requirements and added flexibility.

We expect the new regulation to be published in the Federal Register and become effective this spring.

We all realize that most forecasts and plans never come to a precise fruition. Those that do are often the result of luck more than will. But it is in the process of anticipating the future, studying our opportunities; developing and implementing plans to meet our goals that we are prepared to adapt and adjust to what the future actually brings to us instead of simply letting the wind carry us to wherever.

Keep in mind that RUS will continue to accept valid load forecasts required by and developed for other parties. Also all utility decisions require a load forecast of one sort or another. For borrowers not required to submit a 'formal' load forecast to RUS in support of their loan requests, it is still necessary to support their forecast in other loan support documents such as the financial forecast and construction work plans.

This discussion was not intended to answer all questions for all borrowers. But to make you aware that a change is taking place, the type of changes made and to spur your interest in finding out how the regulation will actually impact your cooperative. If you have questions after reading the regulation ask your cooperative's RUS field representative or give us a call at 202 720 1920 or email me at gshultz@rus.usda.gov.

A brief comment on competition and load forecasting.

An often asked question since the Energy Policy Act of 1992 is what is the impact of 'competition' on load forecasting for rural cooperatives.

To begin let me ask you a rhetorical question.

What has changed on the customer side of the meter since the passing of the Energy Policy Act?

NOT A THING.

Customers still want the same things from their energy suppliers?

Reliability

Low cost

Convenience

Safety

Customers still use energy for the same things.

Lighting

Convenience items

Entertainment

Food Storage

Information handling

Space cooling

Space heating

Water heating

Items 1-6 are what I refer to as high quality heat uses. Appliances that use electricity normally provide these services. Items 7 and 8 are services that can be provided by appliances that use low quality heat. Appliances that use any number of fuels can provide these services, fuels such as propane, fuel oil, wood, and natural gas. Most of which can readily be delivered to rural electric customers. Real competition for electricity occurs at the margin. Competition is especially important to rural electric cooperatives since 70% of their total sales are to residential customers where alternative fuels are readily available as a substitute for electricity. Considering that 50% of the residential customer's total energy usage is for low quality heat, alternatives to energy supplied as electricity are already available, if the price is right. Rural electric cooperatives have been living with real competition since their inception.

Residential space heating and water heating are low quality energy uses that can be supplied by just about any other fuel, such as wood, propane, natural gas, fuel oil and coal. In some areas solar collectors are an option. Improved housing envelope efficiency and improved appliance efficiency are also options. Demand side management can also be brought into play. Competition! So what is new?

It is my contention that in the large vast majority of rural electric coop cases the cost of delivered energy to the residential sector by region is already as low as it can go because of competition from alternative fuels, efficiency options and the cooperative policy of designing rates to just cover costs.

Changes caused by restructuring are beyond the scope of my talk, but it is my considered opinion that the cost of wholesale power for any given region will be relatively consistent within for the various different rate classes in the immediate geographical area. The electric production and delivery system is still in place and cannot ignore the laws of physics. Customers energy needs are well established and respond pursuant to the observed laws of economics. Looking at average revenue requirements and usage patterns for the last 3 years we can get a feel for the prices

and correlated usage levels. At about 9 to 10 cents per kWh usage does drop off sharply. See attachment 1 and 2.

How does the redefining of competition for energy to include choosing electricity suppliers effect electricity usage by residential consumers who have little market power? Keep this thought, the overall costs and therefore the price to the rural residential sector may rise as the lower cost electricity is aggressively sought by and contracted to large commercial and industrial customers, but regionally it will rise or fall together.

BIOGRAPHICAL SKETCH

GEORG SHULTZ

Mr. Shultz is currently the Branch Chief for the Energy Forecasting Branch, Electric Staff Division. He is a graduate of the University of Maryland with a Bachelor of Science Degree in Electrical Engineering

Load Forecasting

**Was Power Requirements
Study**

1

Today's discussion topics

- **New forecasting regulation**
- **Competition and forecasting**

2

Guiding Mandate

from management

- **Reduce reporting burden**
- **Retain vital information**
- **Forecasts are integral to business planning**

3

Project Team

- James Ruspi, Southern Regional Division
- Brian Jenkins, Northern Regional Division
- Ed Stapanon, Northern Regional Division
- Wei Moy, Power Supply Division
- Georg Shultz, Electric Staff Division
- Paul Kris, Southern Regional Division

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Stumbling Blocks

from existing regulation

- **Borrower use valid and verifiable analytical methods**
- **Borrower use methods in general use by the electric industry**

5

Challenge

Reduce reporting mandate

Retain acceptable levels of information

6

Guiding Principles

- **Expand overall approval criteria**
- **Increase thresholds**
- **Expand administrative discretion**
- **Reduce prescriptive requirements**
- **Clear and unambiguous accountability**

7

Expand Approval Criteria

- **Subjective versus objective**
- **Considered versus analyzed**

8

Webster

**Considered-to think about
seriously**

**Analyze- to separate into elemental
parts so as to determine the nature
of the whole**

Webster

**Subjective-existing only in the
mind**

**Objective-Based on observable
phenomena**

**In God we trust.
Everyone else must use**

DATA

11

Increased thresholds

■ **Large borrowers with more than \$500 million in TUP continue to have routine reporting requirements**

■ **Up from \$300 million**

12

Increased thresholds

- **Loan amounts for borrowers with routine reporting requirements**
 - **\$50 million for 'small' power supply borrowers**
 - **\$3 million for 'small' distribution borrowers or**
 - **5% of TUP for 'small' distribution borrowers**

13

Expanded discretion

- **Broader general waiver authority**
- **Longer administrative extensions**

14

Reduced prescriptive requirements

- **Scenario analysis**
- **Surveys periods**
- **More options**

15

Accountability

**Memorandum to board from
general manager**

16

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gshultz@rus.usda.gov

sashurst@rus.usda.gov

ctuttle@rus.usda.gov

202 720 1920

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Competition

**■ What has changed on the other side
of the meter?**

■ Nothing

18

The customer wants

- **Reliability**
- **Low cost**
- **Convenience**
- **Safety**

19

The customer uses

- **Lighting**
- **Entertainment**
- **Convenience items**
- **Food storage**
- **Information handling**
- **Space conditioning**
- **Water heating**

20



**Coop's
and
competition
are no strangers**

21



**Competition at the power
supply level will impact rate
classes in a region equally**

22



**Expect to lose electric load
when the residential rates
reach 9 cents per kWh.**

23



**Expect overall residential
rates to increase relative to
large customer rates**

24