Population Growth Strains Power Facility

By DON L. NOEL

Much of Washington State's growth has taken place in the areas Puget Power serves. The state's growth in the 1960s was about twice the national rate of growth—Puget Power's growth was four times the national rate.

We outgrew both the rate of the state and the nation in the early '70s even though the recession slowed all growth.

In the last few years I have seen the economy of the area rebound significantly faster than the nation. Boeing figures prominently in the surge, but you must recognize that the economy is more diversified than it was 10 years or so ago.

Here is a factual example of growth. In the nine county, 4,500 square mile area Puget Power serves, we added more than 21,000 customers in 1976. At about 2.6 persons per household, this amounts to a net addition of 54,800 persons. More than 24,000 customers moved to our area in 1977. At 2.5 persons per household, this is a net addition of 60,000. In 1978, we added more than 29,000 customers for a net addition of 72,500. So, the net addition for the past three years adds up to approximately 186,300 new persons. We didn't go out and recruit the people. They just moved in and said to us, "Hook us up."

I want to call your attention to the effects population growth has on energy supply. I'd also like to point out at this juncture the simple fact that we don't create the energy demand, but we are responsible for providing the energy supply.

I'm afraid that I'll have to give you a little more background now so that you will be in a better position to judge for yourself the effect the energy market has on growth and conversely that growth has on energy.

Looking back to the late '40s, the '50s and the '60s, we recall that this region grew and prospered. Its electrical requirements were met out of our low-cost, abundant, hydroelectric resources—our river systems. As population increased and electric loads grew, dams were built on the region's rivers. No one really paid much attention to all this construction. None of it was stopped for environmental, societal, regulatory, or other such reasons. As a matter of fact, the hydro projects constructed during all this period were looked upon as beneficial. After all, they did provide irrigation, flood control, recreation and abundant electric power to meet growing needs. But as we moved into the late '60s, we literally began to run out of rivers. The energy-producing hydroelectric sites had all been built on. Our resource sponge had been effectively squeezed dry.

As the availability of new hydro facilities came to an end, the utilities in the region began making plans to supplement hydro generation with new thermal plants. A "thermal plant" generates electricity by burning oil, natural gas, coal, or nuclear fuel and produces steam which is run through a turbine generator. Most other parts of the United States have always relied primarily on thermal generation to produce electricity. The Northwest is unique in its hydro resource.

The utilities knew that natural gas and oil were expensive and the supply story was clouded by international politics . . . at any rate, the Federal government said gas and oil should not be burned to make electricity. Our program was, therefore, designed to rely on the use of coal or nuclear-fueled thermal plants and conservation to provide for our future needs. Low-sulfur coal is abundantly available in the Montana-Wyoming area; while nuclear fuel afforded a safe, environmentally superior, low-cost generating source. All of the utilities in the region—public, private, and the Bonneville Power Administration—joined together in what we called the hydro-thermal plan. A program for the planned and coordinated construction of base-load thermal plants to meet future electrical demands of the region was created.

At this point you may be saying, "Listen to him. He's talking about all this new generation when all it really means is that people can buy more electric toothbrushes and hair curlers and other such stuff." But that's not the point. Increased use is not what the program was all about. The real point of the program was, as I've indicated earlier, future growth in this region, growth in population and in the industries, businesses, homes, factories, schools, and farms that have to be added to serve the needs of those new people.

As the hydro-thermal program was developed by the utilities and we went ahead scheduling the new facilities to meet anticipated demands, we ran into an ever-threatening buzz saw: Environmental laws, state siting laws, continuing, almost daily changes in administrative policies, law suits, hearings, delays, and appeals. Our program slowly began to disintegrate into a disaster. Plants scheduled for operation to meet load requirements were delayed—in most instances they haven't even been started yet!

The first glimpses of what we were in for in the future came in 1973 and again in 1976. You remember that in the fall and winter of 1973-74 this region suffered from a drought. Electrical curtailments were instituted and brownout procedures were established, but not activated. And then the rains came and it appeared we were back in business as usual. Another drought occurred in the fall and winter of 1976-77. Similar curtailments were instituted. Ultimately the rains came again, and once more we were back in business as usual.

But were we really? What most people don't realize is that between 1973 and 1976 the region's utilities had brought new thermal generation on line—the Trojan Nuclear Plant, Colstrip 1 and 2 in Montana, and Jim Bridger 2 and 3 in Wyoming—a total of almost 3,000 megawatts (MW) of additional generating capacity. If those new sources of energy hadn't been brought into operation, this region would not have been able to carry its electrical loads when the second drought hit. During the second drought in December of 1976 more than 25 percent of this region's electrical requirements came from thermal generation. The most distressing part of the story, however, is that at least new thermal generation was on line in 1976 to

take care of the growth which had occurred since 1973; but, since that time almost no more new generators had come on line. As a matter of fact, with one exception, every new plant planned for the region under the hydro-thermal program has suffered significant delays. As a result, only one of the thermal plants planned to come into operation through 1980 will be available in that time frame, and furthermore, with two exceptions, none of the plants originally planned to come on line during the period from 1980 to 1989 have even finished the licensing process, much less gotten underway. Our supplies are *not* keeping pace with our growth.

December, 1978, was a cold month. It got particularly cold at the end of the month. From the day after Christmas through New Year's and into the first week in January, the peak loads of our company exceeded any peak loads ever before recorded by simply unbelievable margins. The peak which we experienced on December 31 of 3,130,000 kilowatts was 500,000 kilowatts higher than that which had been estimated. It was equivalent to the peak which we were projecting to occur three years in the future. Energy loads were 30 percent higher than those predicted.

As we moved into the last week in December, we put all of our emergency oil-fired facilities on line. We purchased power from Southern California, and looked in vain for any more supplies. And as the situation continued to deteriorate, we began to see the real possibility of a brownout or system failure. (Incidentally, people frequently criticize us for selling power to California or the Southwest. All through this period the availability of power from those utilities was an absolute lifesaver to this region. California relies on thermally generated power for about 70 percent of its requirements. California's load peaks in the summer, so we are sometimes able to purchase their oil-generated power *if*—and that's a big if—oil is available for them to burn. We do have to return the power to them later.) During the last week in December we were buying 200 MW from B. C. Hydro and the same quantity from Southern California Edison.

Now I told you that we experienced our all-time peak on December 31. Think on that for a minute. That peak was experienced on a Sunday, part of the New Year's holiday. All industries were off; schools were closed. It was a time when the demands on our system would normally be the lowest. It was 18 degrees that night in the Seattle area. Our concern was that if we were experiencing loads of this magnitude during the holiday, what would happen when Tuesday morning came and everybody went back to work? Could we carry that load? We already had notified all of our interruptible customers and were asking for maximum curtailment efforts. We assumed that, if the temperature stayed about the same, our peak could increase by as much as another 300 MW. We knew that our system was straining to carry the load then being experienced, and we foresaw the definite possibility of both individual and system-wide outages.

On Monday afternoon, we alerted all of our crews to be on the job at 6:00 Tuesday morning. We scheduled our customer information centers to open at the same time. We placed operators at every large substation and reviewed the procedure for voltage reduction. In short, we were prepared to cut load and to reduce voltage if necessary to avoid system failures.

Tuesday morning came and temperatures had warmed somewhat. The peak we experienced that day did not exceed the level of the past few days. But we had come whisper-close to our first real electric energy crisis. We had stretched the tightrope about as far as it could go.

Those are the facts. That's the history. The future looks even worse. The electrical resources scheduled for this region will not be adequate to support the electrical loads which are projected. Stated another way, the risk of curtailments, brownouts and blackouts in the next 10 years is significant and grows greater each year as new resources are further delayed.

Now a word about the third resource I mentioned earlier—conservation. Many people ask me, "Why can't we solve this problem by conservation—why can't conservation be a complete substitute for all new generating resources?" The answer is, conservation is a *finite* resource. Conservation practices which reduce our current load will increase the usability of our existing generating resources and, therefore, defer the time new generating resources will be required. And, conservation can reduce the amount of new generation required in the future. But, as long as electric growth and demand continue because of population and other factors, there is simply no way that conservation can eliminate the ultimate necessity of substantial new plant construction.

Think of a room full of people. You can ask everyone to move to the left and thereby add some more people; and maybe you can rearrange the seating so that the space is utilized more efficiently and more people are added; and perhaps you can put everyone on an instant diet and put a few more in. But ultimately, if more people keep coming, you either have to build a bigger room or lock the doors. And it is at the point of locking the doors on energy that I believe one of our decisions lies.

Remember that we are talking about power usage, the average use by our general population, the use by both the "haves" and the "have-nots," from one extreme of the comfortably advantaged to the other extreme of the unfortunately disadvantaged. So when we say to the affluent person, "You've got to cut your energy consumption because the power isn't there," then we are also telling today's have-nots, "You can't ever have, because we aren't making any more." It is one thing to tell you and me that we must restrict our use of hot water, to use our washers and dryers only during non-peak times, and to invest in insulation that will soon pay for itself. It is quite another thing to tell the tenement dweller or the migrant farm worker or the unemployed laborer, "Forget about ever having hot water." But, that is what happens if you ultimately lock those doors on energy.

Some time ago, Dr. Edward Teller, the nuclear scientist, addressed this point pretty clearly in a speech regarding the nuclear moratorium issue in California. Referring to those who felt that no more power is needed, Dr. Teller said:

> "They may not know it, but they are elitists. They talk to the most fortunate Americans, those who cannot imagine what poverty is—those to whom they can say, 'do without'—not those who are already doing without."

I guess I've reached the bottom line. How do I see the energy future? About like this: First, conservation is going to become a way of life. It is necessary. It is here to stay. Plan on it. Practice it.

Second, there is no question in my mind that curtailments, blackouts, allocation of supply and the like will become more frequent in the future, particularly during bad water years.

Third, businesses considering expansion, modifications, construction of new plants, or whatever, must take into account the availability of energy supplies and had better nail that supply down before making construction commitments.

Fourth, energy costs are going up, and that applies to all forms of energy.

And fifth, I believe that as the current energy crisis deepens, and I think it will if we don't do something about it, the economy will be adversely affected, unemployment will increase, and consumer spending will drop. Ultimately, as the effects expand and spread to those least able even now to maintain themselves in our society, fundamental challenges to our system as we know it today could be the result.

I'd like to say I have an instant solution. But I don't. It's going to take a lot of understanding, hard work, and plenty of luck while we're getting back on the track. Maybe we had better order a bunch of black hats because, despite our efforts to advise people in advance of the problem and despite our continuing efforts to provide the power to meet the growth, when the unfortunate day of reckoning comes, we all know who the villain will be. In the meantime, I can only suggest we pray for rain and lots of it.

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