Research and comparison of DEP's 1989 and 2020 IRP filings

Q1. Utilities' ability to follow through on their Short-Term Action Plans;
Please compare the Short-Term Action Plans of the two filings, and please address the following:
a. What is the period of time addressed by the Short Term Action Plan in each filing?
b. How have the Commission rules for the "Short Term Action Plan" requirement changed from 1989 to 2020?
c. Highlight similarities and differences in the Short Term Action Plans of the two filings.
d. Based on how each Plan was written in each filing, provide your opinion on how easy or hard it would have been, or will be, for the Commission to determine how well the company executed the Short Term Action Plan, if were to be evaluated ~5 years after the filing (e.g. 1994 and 2025). In other words, can the Commission (or would have the Commission have been able to) sufficiently evaluate the company's performance to their stated plans?

An IRP is a roadmap to meet forecasted energy demand using both supply and demand side resources to ensure reliable service to customers in the most cost-effective way.
In CP & L's 1989 IRP filing, it is stated that each utility shall prepare an annual short-term action plan which discusses those specific actions currently being taken by the utility to implement its least-cost integrated resource plan. The utility's action plan shall contain a summary of the resource options or programs contained in its current least cost integrated resource plan and for which specific actions must be taken by the utility within the next two to three years. The period specified for the Short term action plan was between 1989 and 1991.
The Duke Energy Progress's 2020 IRP filing states that the Company's Short-Term Action Plan identifies accomplishments in the past year and actions to be taken over the next five years with updates provided every once in two years.

As per Rule R8-59 : Short-Term Action Plan (1989 IRP Filing), the utility's short term action plan containing the summary of resource options, each should include :

1. The objective of the resource option or program;
2. Criteria for measuring progress toward the objective;
3. The implementation schedule of the program-over the next two to to three years
4. Actual progress toward the objective to date.

In the 2020 filing, Rule R8-59 is not available anymore as it is repealed. As per Rule R8-60 (h)(3) : Short Term Action Plan (2020 IRP Filing), Each biennial and update report filed shall be accompanied by a short-term action plan that discusses those specific actions currently being taken by the utility to implement the activities chosen as appropriate per the applicable biennial and update reports.
The Short-Term Action Plan summarizes those actions planned by CP&L over the 1989-1991 period to implement the Integrated Resource Plan.The Short-Term Plan Action in IRP 1989 describes anticipated activities related to the following resources:

1. Conservation and Load Management Programs

2. Purchased Power from Non-Utility Generators
3. Purchased Power from Other Utilities
4. Capacity Addition

The Short Term action plan of 2020 includes accomplishments in the past year with details on the actions for next five years which include continued reliance on ee and dsm resources, continued focus on renewable energy resources, integration of battery storage, ivvc implementation as part of the grid improvement plan, continue to find opportunities to enhance existing clean resources, addition of clean natural gas resources, continue with plan for subsequent license renewal of existing nuclear units, continued transition toward integrated systems and operations planning, continued commitment to meeting the company's carbon plan, wholesale, regulatory, dep request for proposal (rfp) activity, duke energy progress capacity and energy market solicitation, competitive procurement of renewable energy (cpre). With the commission rules requiring more frequent updates to the Short Term action plans compared to 1989, the progress is monitored in a more effective manner with revisions provided once every two years.

There are a lot of similarities between the short term action plans of 1989 IRP filing and that of the 2020 IRP filing. Both the plans highlight those specific actions currently being taken by the utility to implement its least-cost integrated resource plan such as Conservation and Load Management Programs, Purchased Power from Non-Utility Generators, Purchased Power from Other Utilities, and Capacity Addition. In contrast, the Short term action plan filed in IRP 2020 also includes accomplishments in the past year. With increasing emphasis on cleaner energy, the short term action plans now are also in compliance with the Renewable Energy and Energy Efficiency Portfolio Standard (REPS). One other difference observed between the short-term plans is the frequency of updates provided and the period of time addressed in each of the filing. In 1989, the actions were expected to be taken/ goals accomplished in the next 2-3 years, whereas now, it's a forecast for next 5 years with revisions provided to the IRP filing biennially based on the progress.

By the nature of an integrated resource plan, it is a long term-plan. The goal of long-term planning is to ensure that actions performed today have lasting value in the future. For the regulatory commission to evaluate a long-term plan, it would look at what the system should ideally look like in the future in terms of life-cycle cost minimization and strategic alignment with goals of the utility. It would then evaluate the Short-term projects chosen by the utility such that they could gradually transition the system from their current state to the desired future state. Evaluating the short-term action plan filed in the IRP 5 years after its filing would provide the regulatory commission with sufficient data and performance metrics to determine the progress of the utility and quantify the targets set and goals achieved. However, an evaluation of a Short-term Action plan after 5 years of its filing would not be prudent. The goal of short-term planning is to anticipate upcoming system needs so that problems can be avoided. Through a short-term action plan the utility predicts the performance of the existing system after committed system additions and forecasted growth occurs. The regulatory commission evaluates the potential problems that are identified by the utility and cost-effective projects selected by them for implementation. Evaluating the short-term action plan after 2 years would be beneficial, relevant and more effective as it would provide immediate feedback and act as a check on the utility's functioning. It would be an added benefit both to the utility and regulatory commission, if a retrospective review is introduced,which would perform a 5

year review in addition to the continuous and comprehensive evaluation of the utility's short-term action plan.

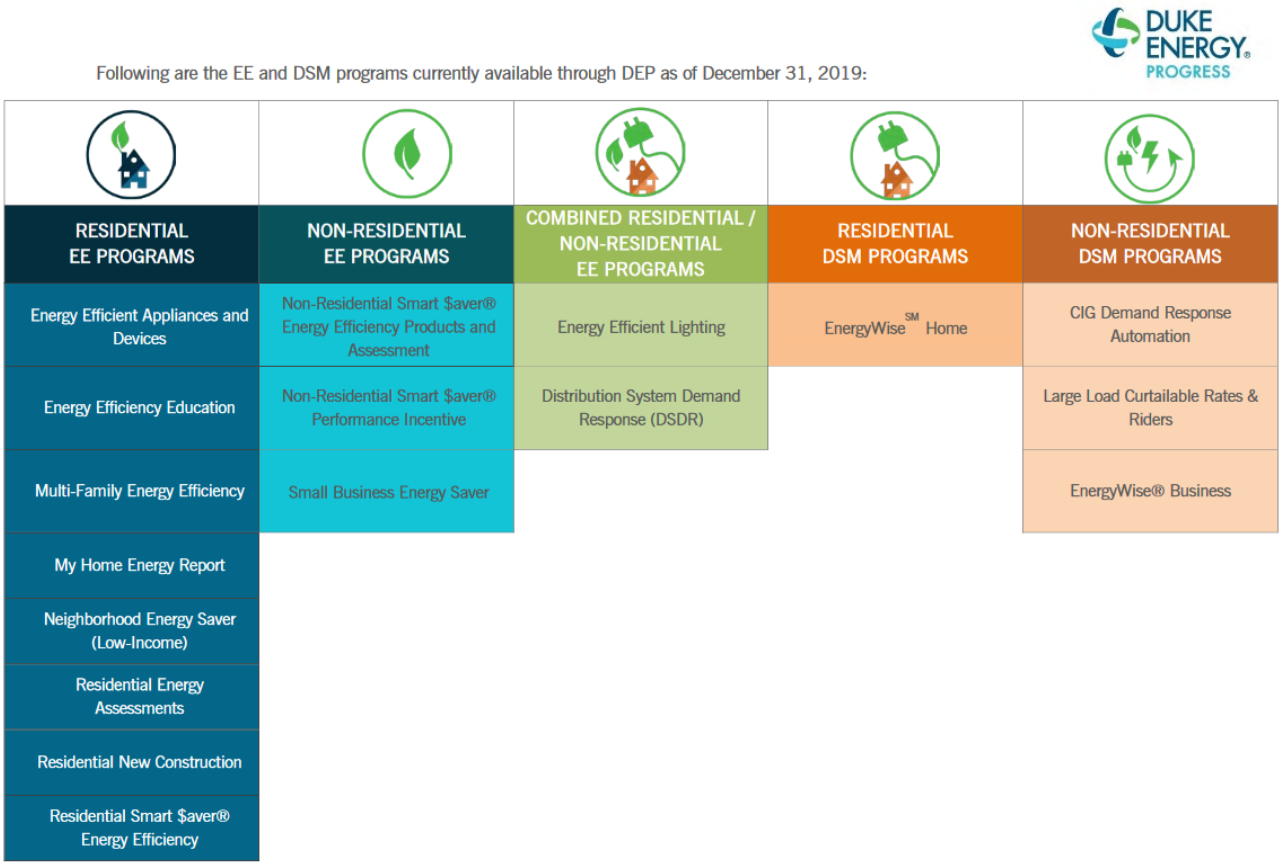
Q2. How has the resource planning equation changed over the years; Highlight company's supply-side and demand-side resource plans in each filing. Please provide a summary of what has most notably changed for each of these from 1989 to 2020, along with any qualitative or quantitative opinions on the quality of the resource plans. Include in your analysis the impacts of various factors which may not have been or be in the company's control. What is your opinion of the quality of their demand-side management plans, and how concrete their DSM plans appear to be?

CP&L's 1989 IRP filing incorporates a diversified mix of conservation and load management, cogeneration and renewable resources, and purchased power; in addition to existing and new generating capacity to meet current and forecast electricity demands. The rise of the OPEC cartel in the 1970s and the resulting worldwide chaos in energy supplies and costs was unanticipated and the company had no control over it. Within the next five years, there was availability of abundant oil and natural gas supplies with a dramatic drop in fossil fuel costs. It was essential that the IRP filing considered the scenario carefully and had better preparedness in terms of supply side and demand side management. A major consideration in CP&L's Resource Plan development is the integration of demand-side resources. Since the increased emphasis on conservation and load management which began in 1981, the Company has made significant progress in implementing its demand-side strategy. By pursuing a diversity of conservation and load management options, the Company ensures not only a balanced mix of demand- and supply-side resources but also that customer preferences for such demand-side options will be met with available programs.The projected impact of the demand-side programs are reflected in the forecasts of energy sales and peak loads; only then are supply-side resources evaluated and included in the Resource Plan to the extent necessary to supply the remaining growth. On the supply side, the company planned a combination of firm purchases from cogenerators and other utilities and new generating capacity to meet the load over the next 10 to 15 years.

As per DEP's 2020 IRP Filing, DEP modeled the adoption rate and program cost associated with DSM based on a combination of both internal company expectations and projections based on information from the 2020 market potential study. Additionally, the Company included the peak shaving capability of DEP's IVVC program which provides a reduction to winter peak demand and overall energy consumption. DEP continues to pursue a long-term, balanced capacity and energy strategy to meet the future electricity needs of its customers. This balanced strategy includes a strong commitment to demand- side management (DSM) and energy efficiency (EE) programs, investments in renewable and emerging energy technologies, and state-of-the art power plants and delivery systems. Below is an image summarising the current energy efficiency and demand side management programs available.

In the 1989 IRP filing, a paradigm shift towards renewable sources of energy for the supply side was seen with PURPA being passed in 1978.The demand side management and load management programs implemented were aggressive and targeted to meet the electricity needs of the growing

economy . Comparing the two resource plans, it is noticed that there is more emphasis on renewable energy, its storage and alternatives in addition to energy efficiency programs in the latest IRP filings. The latest IRP outlines a broad range of scenarios to achieve varying levels of carbon reduction, including pathways to achieve up to 70% CO2 emissions reduction by 2030. The current demand side management and energy efficiency programs are more comprehensive and oriented towards consumers with effective incentive programs and weightage given to clean energy. Both the DSM plans seem well laid out and effective for their respective timeframes and scenarios.



Q3. Changes in the current and forecasted reserve margins discussed in each filing. Please discuss any notable changes to the company's reserve margins between these two filings and discuss any changes to the company's criteria for reserve margin planning. Please also highlight why it is so important for regulators to pay close attention to reserve margins.

The percent reserve margin indicator has been used by utilities for many years and is the traditional reserve capacity evaluation method in the UnitedStates. It is the amount of installed capacity over and above the expected peak load, measured as a percent of the expected peak load. It has the advantages of being easy to understand, reasonable, and easy to calculate. The data needed to calculate the percent reserve is usually readily available. The percent reserve margin indicator also has its disadvantages. As defined, it evaluates the system only at the peak hour of the year. Also, it does not explicitly take into consideration the many other characteristics that determine the reliability of the electricity supply, such as differences in unit sizes, scheduled maintenance, load patterns, and

the availability of generating units. The percent reserve margin indicator is, therefore, unsatisfactory for evaluating capacity options with significantly different characteristics.

As per the 1989 IRP filing, the CP & L standard was molded by analysis of system operating history and management judgement. The 16.7% capacity margin corresponded to a reserve margin of 20% of power resources over peak load which was found appropriate for planning purposes by the North Carolina Utilities Commission (NCUC), in its June 1988 Report on the Long-Range Needs for Expansion of Electricity Generation Facilities for Service in North Carolina. In addition, the South Carolina Public Service Commission found the Company's generation additions plans based on a 20% reserve margin (16.7% capacity margin) to be reasonable.

It is important to realize that reserves can not and do not remain at a constant level because loads are changing and new capacity is being brought in-service. Reserves will be higher immediately following the addition of new generating units and lower just before the installation of a new generating unit. The current Resource Plan relies on smaller increments of capacity that achieve a closer match of supply to demand, minimizing this variation between capacity and load. As per the 2020 IRP filing, DEP has estimated the reserve margin to be at 17%. After accounting for the required reserve margin, approximately 6,200 MW of new resources are projected to be needed over the 15-year planning horizon. While the Company supports the general application of a 17% reserve margin target for each year of the planning period, per the NCUC's guidance, the Company will not employ this target as a "hard and fast" constraint in every plan year. Rather, the Company will consider letting reserves decline below 17% in certain circumstances as long as the risk of a loss of load event is not unreasonably compromised.

Typically, U.S.-based models use the North American Electric Reliability Corporation (NERC)-recommended reserve margin levels. However, historical reserve margins have often exceeded the NERC-recommended levels, suggesting that the use of NERC-recommended levels in planning models may negatively bias projected future capacity investments relative to real-world trends. From an economic perspective, as planning reserve margin increases, the total cost of reserves increases while the costs related to reliability events decline. Similarly, as planning reserve margin decreases, the cost of reserves decreases while the probability of reliability events increases along with an increase in the cost of energy. Thus, there is an economic optimum point where the total system costs (total energy costs plus the cost of unserved energy plus the capacity cost of incremental reserves) are minimized.

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