

The Forecasting Approach and the Backcasting Approach

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When we have an appointment to meet someone at a station, it is convenient to use an app that provides information on train transfers. By entering the meeting time, the station that you are meeting at, and your current location (nearest station), it will show you the optimal route to the meeting place (“Take the X Line at ○ hour ○ minute, transfer to Z Line at Y Station...”). For example, to make it in time for a meeting at 10:00 a.m., you will have to take a train departing from the nearest station at 9:10 a.m. Taking it further, to take the train at that time, you will have to leave the house at 8:55 a.m. To do that, you must finish eating your breakfast by 8:30 a.m. In that case, you must wake up by 7:30 a.m.... In this way, it is necessary to make a plan beforehand to ensure that you are not late for the meeting.

This approach is also frequently used to predict future energy demand and supply. Known as the “backcasting approach,” it is a method that involves first establishing the future target, then thinking about the measures that should be taken from the current time onward. For example, the Government of Japan has declared its goal of achieving carbon neutrality by 2050. To achieve this, it will set out a plan based on a timeline, such as “achieving 100% adoption of XXX by ○ (year), and realizing the practical application of YYY by △ (year).” It reviews and plans various measures, and if these can be executed as planned, the goal will be achieved. There are infinite patterns for the paths that can be taken toward target achievement, but it will consider the route (roadmap) that is easy to implement, based on conditions such as low cost and ease of gaining consent.

On the other hand, the app that was mentioned at the beginning of this article also provides transfer information to the station that you wish to reach, based on the current time. It tells you that you will arrive at ○ hour ○ minute at the earliest if you were to depart right now. While it shows you the optimal route based on the existing train timetables, the route and arrival time also change correspondingly when the current time changes. Moreover, there are also options such as whether or not you wish to take the Shinkansen bullet trains, and the arrival time may vary greatly depending on which choices you make. This method of predicting the future based on various premises, starting with the present moment as the point of departure, is known as the “forecasting approach.” It is an approach of making highly accurate future predictions on an unknown future, based on highly probable assumptions. In cases where a business plan is formulated with such predicted results as a given, or where an undesirable result has been predicted, it is a useful method for considering preventive

countermeasures.

Generally, forecasting is suited to short-term future predictions, but not to long-term predictions. This is because there is greater uncertainty when it comes to making assumptions, which are necessary for the analysis, for events that will happen 30 years or 50 years into the future. If the assumptions deviate significantly from reality, then the future predictions will also be far off the mark. For this reason, instead of focusing solely on a single assumed value, people often carry out scenario analysis (or sensitivity analysis) that use several assumed values for different scenarios. Even then, we cannot deny that there is a tendency for people to make short-sighted assumptions. From an analyst's point of view, it is considerably difficult to draw up assumptions that deviate significantly from past trends. Therefore, future predictions are limited to the existing scope of social and economic environments, and do not incorporate so-called paradigm shifts.

On the other hand, backcasting is not a method of predicting the future, but merely presents the process for reaching a future goal. If there is a significant gap between the current situation and the goal, the process may deviate significantly from past trends. Even for the same target values, the shorter amount of time it takes to achieve the goal, the greater the degree of deviation. Moreover, advancing unreasonable measures to achieve the goal may give rise to serious side effects in domains that are completely separate from the goal. Norms are typically followed when setting future targets, and there is a tendency to place emphasis on idealistic arguments of "how things ought to be." Over-emphasis on the goal despite a significant gap with reality can make the process toward that goal a "thorny path."

IEEJ's global energy demand and supply forecast, "IEEJ Outlook 2023," will be published on October 19, 2022. It is a future prediction that takes the forecasting approach, and uses scenario analysis to counter the uncertainty of future premises. It is often compared to the World Energy Outlook (WEO) published by the International Energy Agency (IEA), but IEA's forecasts are based on a combination of the forecasting and backcasting approaches. The Stated Policies Scenario (STEPS) set out in the 2021 WEO takes a forecasting approach, while the Sustainable Development Scenarios (SDS) and Net Zero Emissions by 2050 Scenario (NZE) take the backcasting approach.¹ The Announced Pledges Scenario (APS) incorporates both of these approaches.² While these are all examples of future forecasts, it is necessary to take note of the differences in approach in addition to the differences in the premises.

This is not to say that either the forecasting approach or the backcasting approach is better or worse.

¹ Stated Policies Scenario (STEPS): A scenario based on the continued implementation of existing energy and environmental measures. Sustainable Development Scenario (SDS): A scenario in which energy-related SDGs are achieved. Net Zero Emissions by 2050 Scenario (NZE): A scenario in which net zero emissions are achieved by 2050.

² Announced Pledges Scenario (APS): A scenario incorporating the reduction targets of each country. Countries that have declared the goal of achieving carbon neutrality take the backcasting approach, while others take the forecasting approach.

They should be used separately, in accordance with the objective of the analysis. However, the analyst, as well as the parties reading and interpreting the results of the analysis, must have a clear understanding of the differences in the characteristics of each approach. In particular, the normative approach tends to be emphasized when it comes to climate change issues. For this reason, there are many analyses that take the backcasting approach. It is important to strike a balance between the normative nature of the target and the feasibility of the measure (including the timespan leading up to the goal). On the other hand, a forecasting-based outlook may give rise to a large gap with the normative target. This in turn makes it necessary to consider what issues there are and how to overcome them, in order to bridge this gap. Hence, it is important to address climate change issues while using both approaches effectively.

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https://eneken.ieej.or.jp/en/sakiyomi_energy_issues.html