# Future treatment of COVID-19 in electricity demand forecasts

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# Purpose and Agenda

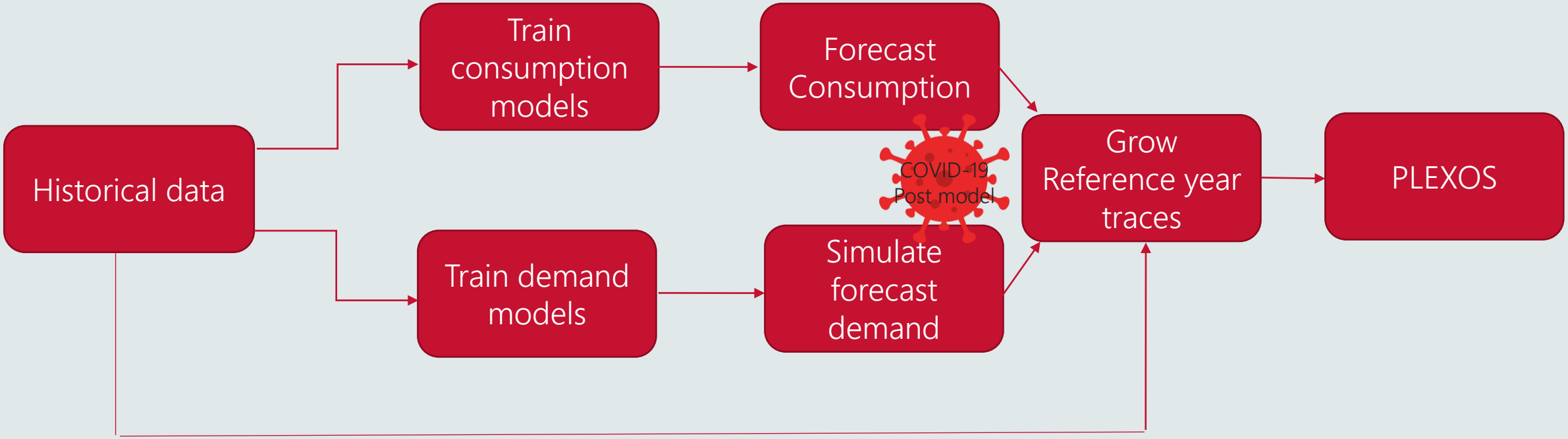
Purpose:

1. Seek feedback on treatment of 2021 reference year traces (July-2020 to June-2021) for market modelling in PLEXOS in the ESOO 2021

Agenda:

- Recap on Energy Demand Forecasting Methodology generic approach to structural breaks
- Recap on ESOO2020 method for forecasting COVID-19
- Discuss use of 2020-21 reference year demand traces COVID-19

# High level demand forecasting flow diagram ESOO 2020

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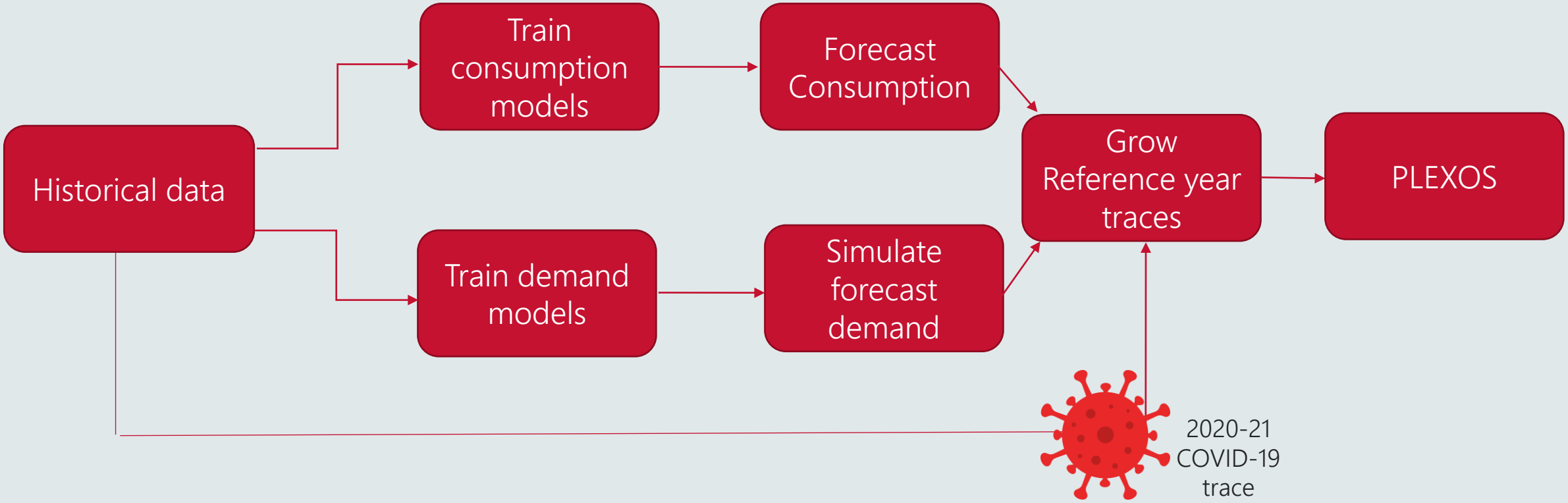
# High level demand forecasting flow diagram for consultation

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# Demand forecasting methodology

The Energy Demand Forecasting Methodology sets out a generic framework for dealing with structural breaks in history:

*"AEMO deals with structural breaks in the maximum/minimum demand forecast models by including a factor variable to account for it when training the models. This allows AEMO to develop and train models with good forecast accuracy in the presence of structural breaks.*

*These structural breaks, in the case of the Global Finance Crisis, may impact annual energy consumption while having only a minor impact on the daily load profile, or, in the case of COVID-19, impact both the long-term consumption and the short-term daily load profile.*

*AEMO accounts for these in its forecasts through both the long-term drivers of demand captured in the annual consumption forecast which drives minimum and maximum demand as well as adjustments to the daily demand profile. The details of how a specific structural break has been modelled will accompany the publication where it is used."*

# How the 2020 ESOO reflected COVID-19 impacts

| | | |
|---|---|---|
| Short to medium term impacts | Lower business consumption from closures of work places. | Profiled max/min offsets |
| | Increase in residential baseload consumption from more people at home (working form home, home schooling or under/unemployed). | |
| | Seasonal increase in residential heating/cooling consumption from more people at home (working form home, home schooling or under/unemployed). | |
| Medium to longer term impacts | Longer term increase in unemployment and consequential slowdown in consumer spending. | LT-indices |
| | Potential for reduced consumption at large industrial loads (early maintenance, part load operation) or closures longer term. | LIL forecast |
| | Reduced spending on capital investments like rooftop PV systems. Potential for reversal, if recovery package include support for PV. | DER forecast |

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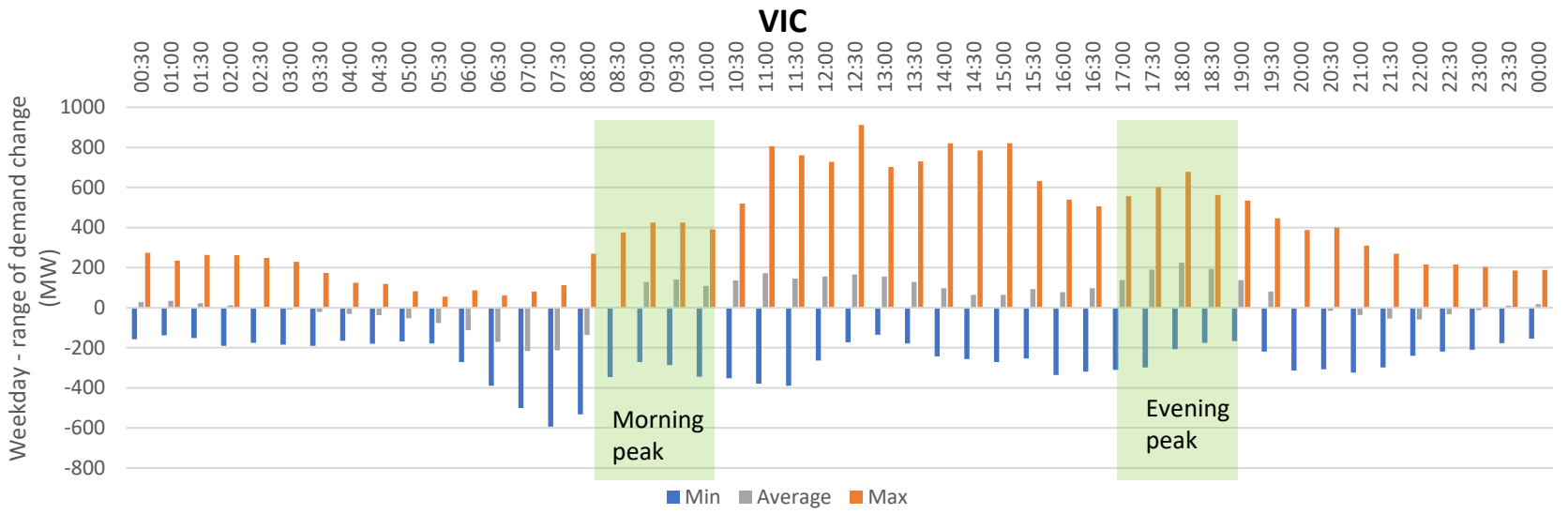
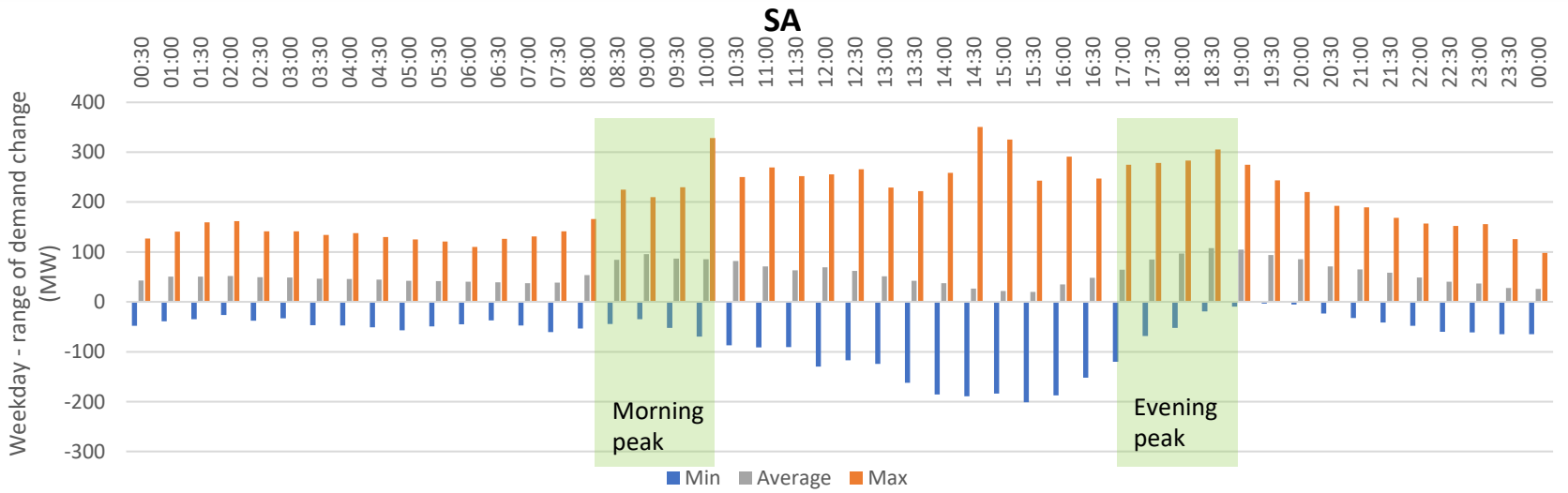
# Estimated impact of COVID-19 on demand across the day



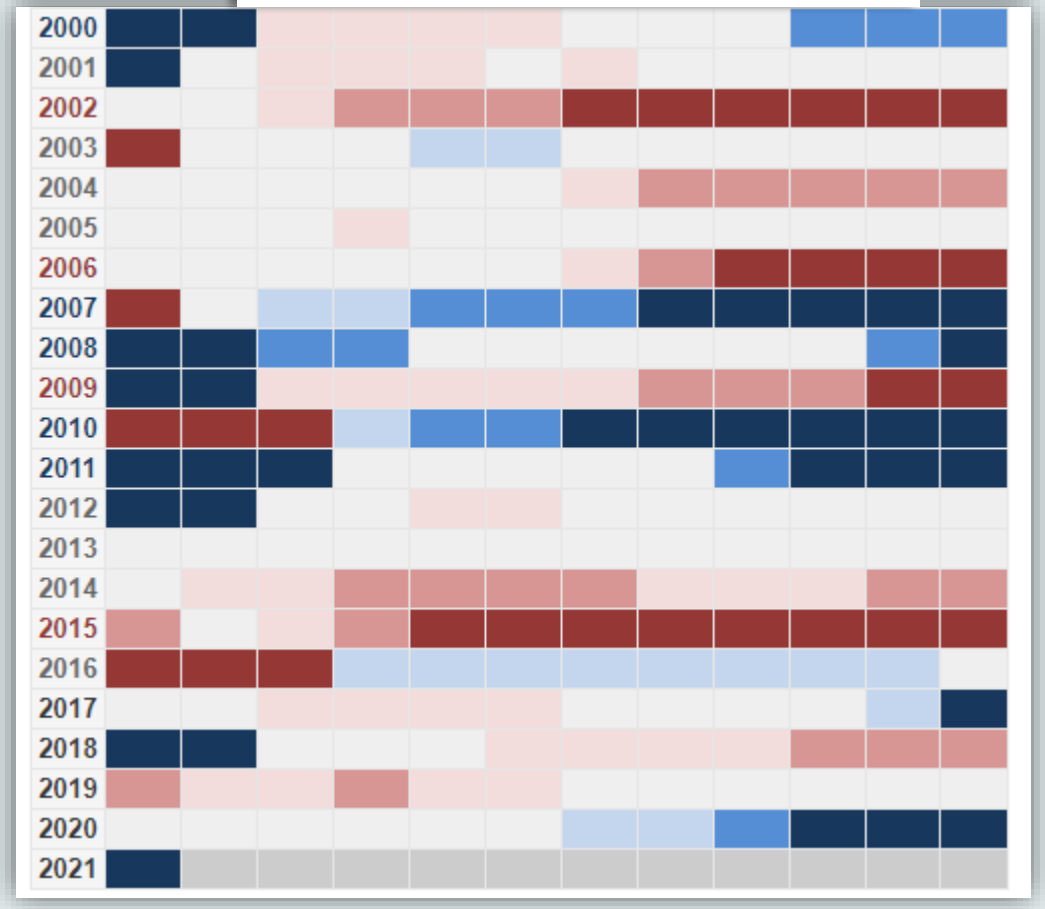

Impacts found by comparing operational demand from a model calibrated to pre-COVID with one calibrated to post-COVID demand.

The chart shows the maximum, minimum and average impact of COVID-19 over winter-2020

# 2020-21 demand traces influenced by COVID-19 and a cold weather year

- 2020-21 demand reflects work-from-home and (at times) impact to some business types, particularly retail and hospitality
  - This may not be representative going forward
- But it was a severe La Nina weather year with one of the coldest winters and summers in recent years.
  - This adds more diversity to weather data used in the ESOO

BoM Monthly ENSO

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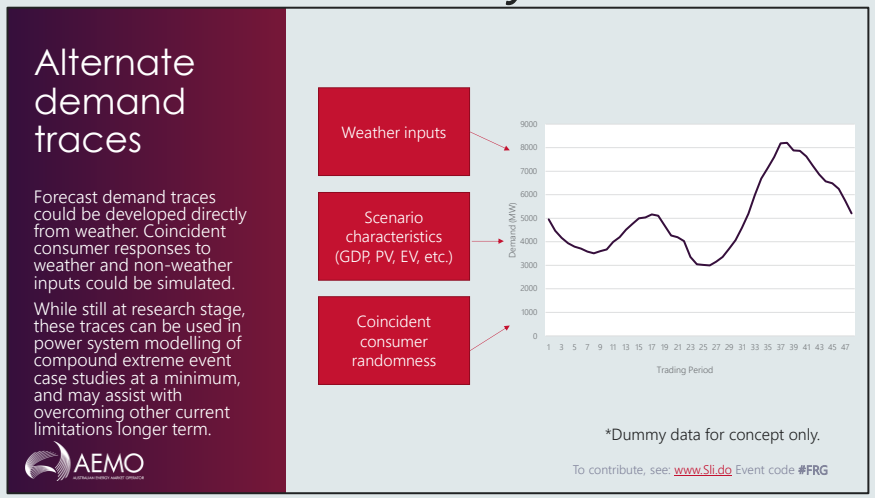
# Exploring modelling options – for discussion

In using 2020-21 as a reference year, how might we attempt scaling daily demand so as to exclude COVID-19 impact?

*Presented July 2020 FRG*




- Challenge: interactions between weather and COVID-19 makes weather correction difficult. For example, working from home impacted weather sensitivity.
- AEMO has made progress on and continues to refine a long-term solution for demand forecasting. The initial model already simulates weather, technology and non-weather driven consumer behaviour that could estimate 2020-21 demand ex COVID-19, although this model is still a prototype.

- What approaches or assumptions can be used with, or in place of the above?

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# Fallback options for treatment of reference year traces

If only existing methodologies and approaches are available to construct the forecast, then the options are:

1. Drop the reference year entirely
2. Retain the 2020-21 reference year, allowing a 'work from home' reference year to make up 1/10 of the demand traces in future reliability forecasts.

# Should we drop the 2020-21 reference year for producing traces because of COVID-19?

## Option 1 – drop 2020-21

Drop unrepresentative demand trace but an important cold (La Nina) year is lost. This may be important when modelling renewable generation.

## Option 2 – retain 2020-21

Expand the range of weather years but use a demand trace that may not be representative of normal demand.

## Option 3 – create a synthetic 2020-21

Use a prototype model to approximate trace based on weather conditions, as if COVID-19 did not occur.

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