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November 8, 2016

### **MEMORANDUM**

**TO: Power Committee**

**FROM: Tina Jayaweera and Charlie Grist**

**SUBJECT: Stock Turnover Primer**

### **BACKGROUND:**

**Summary** Council staff will provide the Power Committee an overview of how we model stock turnover as part of the load forecast and the conservation potential. This presentation provides an illustration of how we build out the frozen efficiency forecast, and how it relates to conservation.

**Relevance** The frozen efficiency forecast is a key input into the Regional Portfolio Model and serves as a basis for the conservation plan development.

**Workplan:** C. Prepare for the 8<sup>th</sup> Plan

**Background:** During the August 2016 Council meeting, Carrie Cobb from Bonneville Power Administration presented on momentum savings and associated market research. After this presentation, there was a request from Council members to have Staff provide a primer on how energy efficiency is modeled with respect to the demand forecast.

More Info: Carrie Cobb's presentation from the August 2016 meeting can be found here:  
<http://www.nwcouncil.org/media/7150469/5.pdf>

At the December 2016 Council meeting, Massoud Jourabchi will present a primer on the load forecast including on how stock turnover is incorporated. This presentation provides groundwork for that upcoming primer.

# Stock Turnover Primer & the Frozen Efficiency Forecast

Power Committee  
November 15, 2016

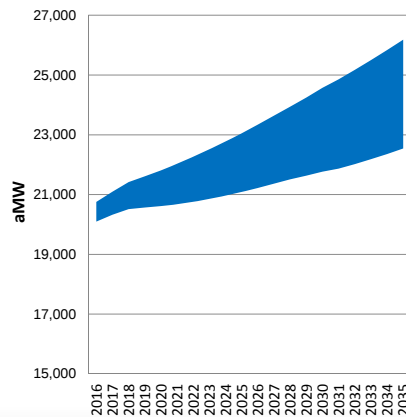


## What does Frozen Efficiency Mean?

- Frozen Efficiency = Current efficiency adjusted for stock turnover and adopted codes and standards
- It does *not* mean the loads are constant
  - New construction builds loads
  - Existing buildings become more efficient due to equipment stock turnover
  - Building shell efficiency doesn't change
- Any additional increases in product/practice efficiency are captured in conservation supply curves
- Remainder of presentation will break this down



## 7<sup>th</sup> Plan Frozen Efficiency Demand Forecast



Projected range of growth in energy demand

- Built up from technology/ end-use & sector per customer
- Assumes frozen efficiency forecast to avoid double counting EE resources

## Key Terms: Stock vs. Flow



### Stock

Defines the loads today.  
What is already out there in buildings?



### Flow

Defines how these loads will change with time.  
What is selling or being built?

## Breaking down the EE Potential/Demand Forecast into Two Buckets

### Lost Opportunity

- Used for equipment that naturally turn over (ex: appliances)

### Retrofit

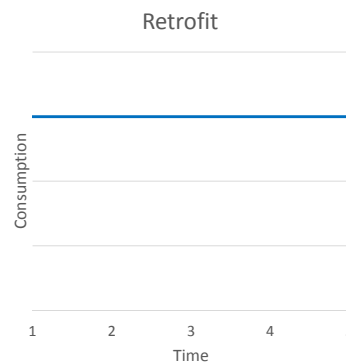
- Used for measures that persist; do not naturally turn-over (ex: insulation)

## Retrofit Upgrades in the Demand Forecast



How are retrofit “upgrades” reflected in the frozen efficiency demand forecast?

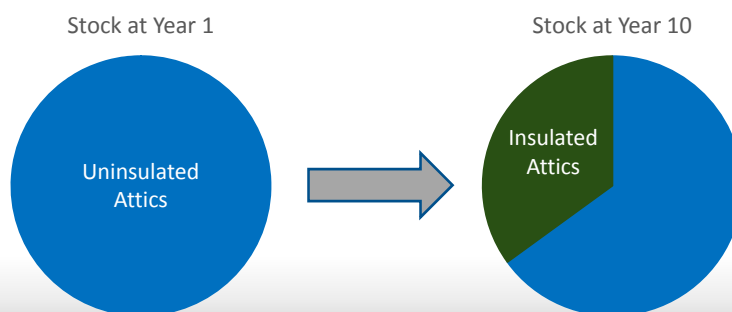
- Existing stock is already built into the demand forecast
- As these upgrades are discretionary and do not naturally turnover, the demand forecast assumes no change in the existing stock



## Savings from Retrofit Measures



- Savings from retrofit measures occur when there is a change in the stock relative to the frozen efficiency demand forecast

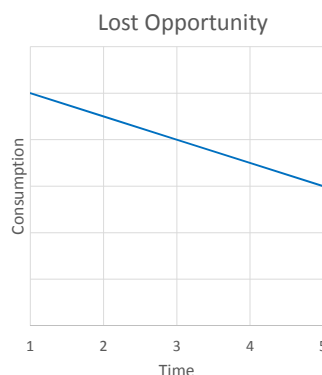


## Product Turnover in the Demand Forecast



How are products that naturally turn over reflected in the frozen efficiency demand forecast?

- Look at current market flow to establish a frozen efficiency baseline
- As products naturally turn over in the demand forecast, it is assumed that they turn over at the efficiency mix of the current market flow
  - Can't turn over to something that isn't available today



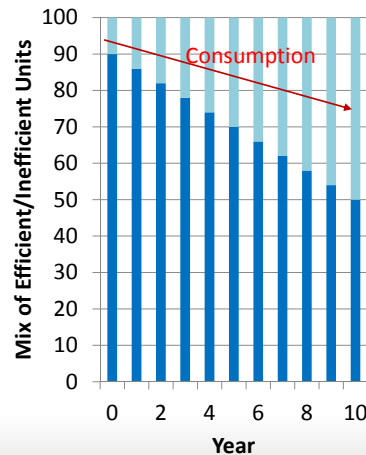
## Efficiency Improvements Assumed in Frozen Efficiency Demand Forecast



- Market of 100 units
  - 90 units are inefficient
  - 10 units are efficient
- Sales data shows that the current flow is:
  - 60% inefficient units
  - 40% efficient units
- Every year 10 units naturally turn over, which frozen efficiency forecast assumes:
  - 60% naturally turn over to inefficient
  - 40% naturally turn over to efficient
- This results in efficiency improvements in the stock over time



This is already accounted for in the demand forecast



## Change in Consumption: Key Drivers



1. Turnover rate, which depends on effective useful life

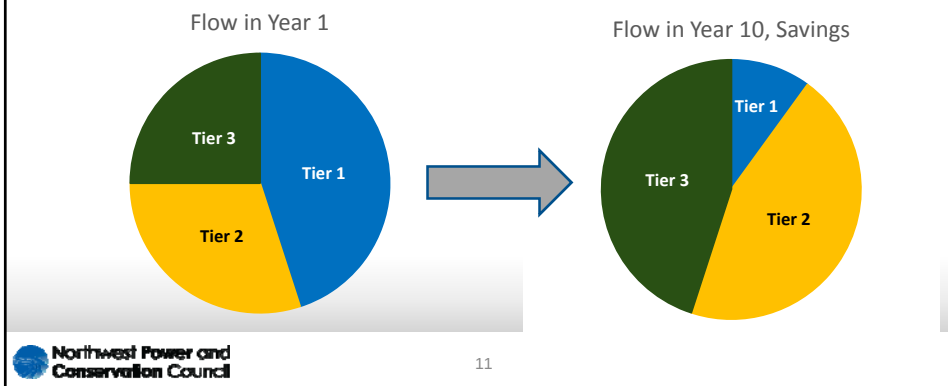
| Equipment          | EUL | Turnover rate     |
|--------------------|-----|-------------------|
| Air conditioners   | 19  | $1/19 = 5\%/yr$   |
| TV                 | 5   | $1/5 = 20\%/yr$   |
| Incandescent bulbs | 1.1 | $1/1.1 = 91\%/yr$ |

2. Relative efficiency between old and new

## Savings from Lost Opportunity Measures



- Savings from lost opportunity measures occur when there is a change in the flow relative to the frozen efficiency demand forecast



Questions?