



# CHP Economic Factors: Electric and Natural Gas Market Trends

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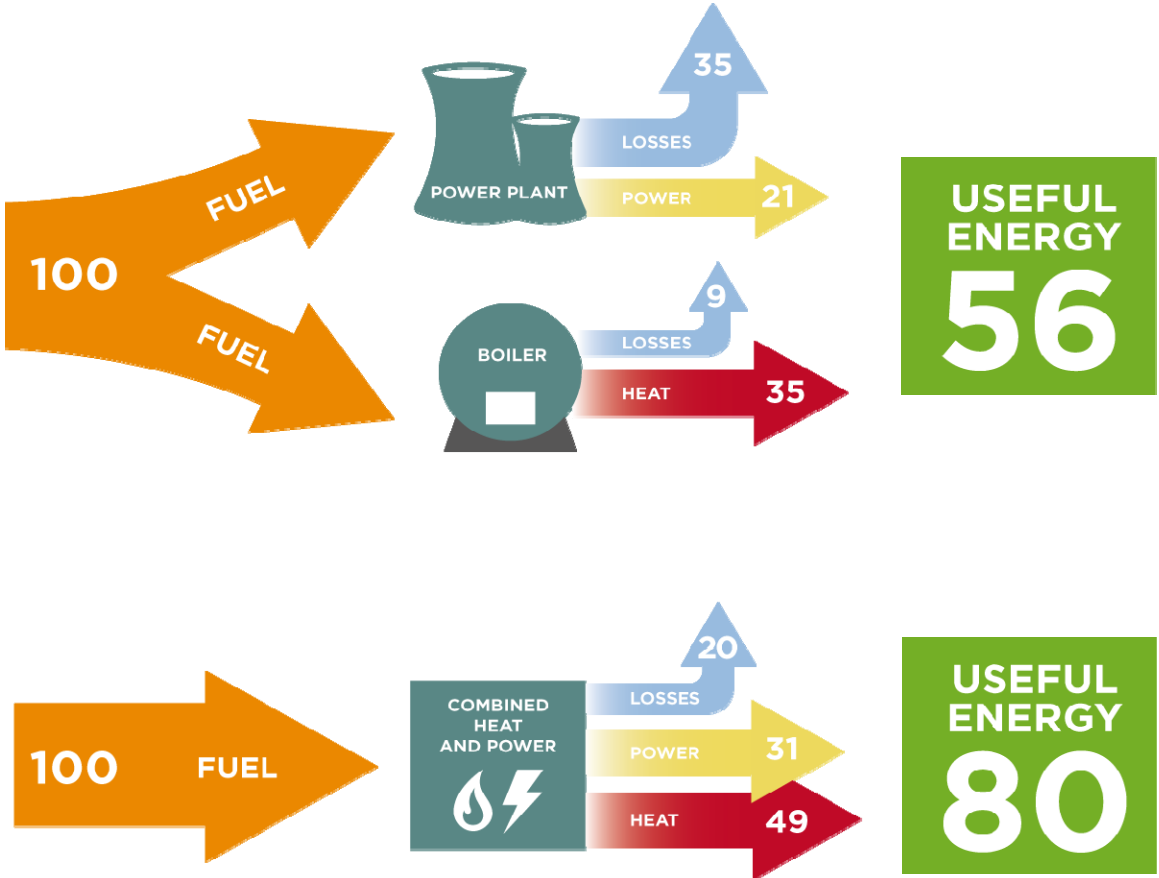
# Discussion Topics

- Overview of Economic Benefits of CHP
  
- Electricity Costs and Trends
  - Generation Services
  - Delivery Services
  
- Natural Gas Supply Costs and Trends

# Introduction to Combined Heat & Power (CHP)

- What is CHP
  - A system that generates electricity and useful thermal energy in a single, integrated system
- Is it new?
  - The concept was first applied in 1882 at Thomas Edison's Pearl Street Station in New York City
  - Efficiency improvements and better technologies are making CHP more attractive
- Maine has a long history with CHP
  - History with pulp and paper facilities

# The CHP Concept



Source: <http://www.renewgreenenergy.co.uk/products/combined-heat-and-power-chp>

# What are the economic benefits of CHP?

## Costs:

New Equipment

*Power Generation*

*Heat Capture*

CHP O&M

CHP Fuel Cost (Natural Gas)

## Benefits:

Electric Bill Savings

*Generation Service*

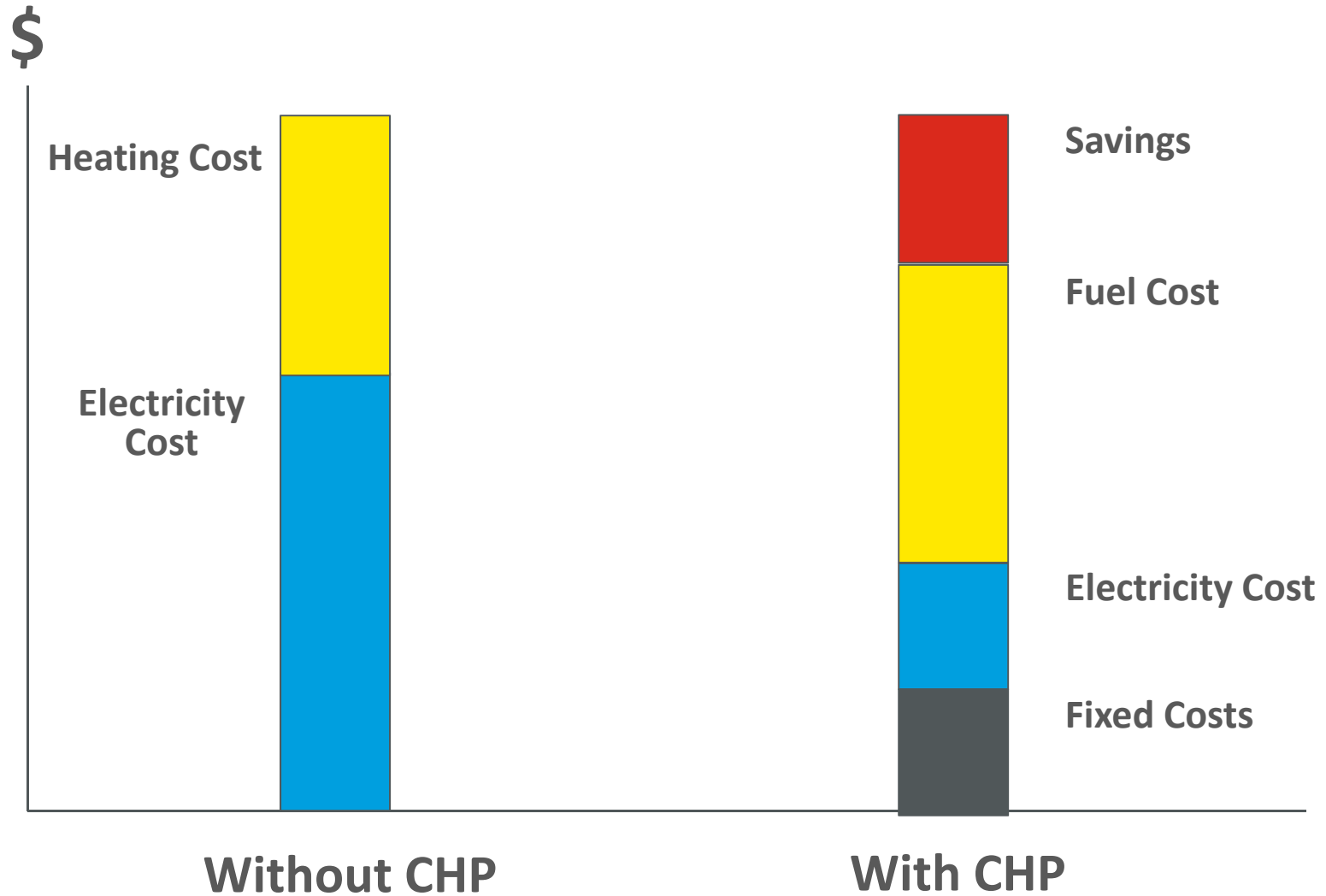
*Utility Charges*

Thermal Fuel Savings

## What are the Considerations:

- The Size of the CHP
- Thermal Requirements
- Fuel Options

# CHP Thermal Efficiencies and Electricity Offset



# Components of Electricity Costs

- Generation Services
  - Power delivered for Customer's Use
  - Source – Competitive Energy Services Provider
  
- Delivery Services
  - Wires, Pole, meters, etc.
  - Source – Regulated Distribution Utilities (CMP, Emera)

# Generation Services

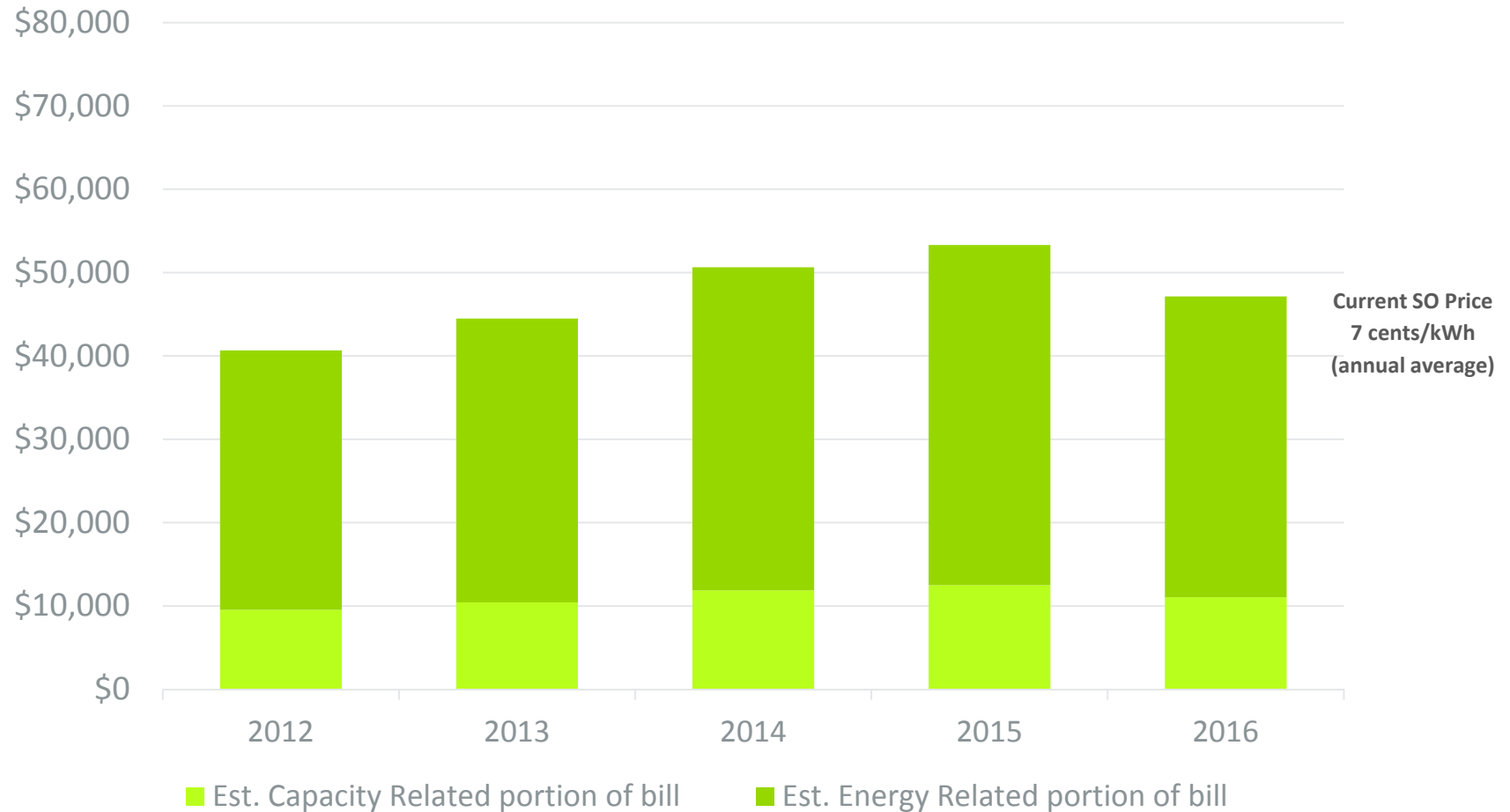
- Energy (kWh) and generation capacity (kW) that the customer consumes
- Can be provided by:
  - Provided by a retail energy supplier of your choosing.
  - Standard Offer Service (*the Competitive supplier is chosen by the Maine Public Utilities Commission*)



# What does a generation service provider have to have?

- ISO New England requires them to have a certain amount of generating capacity to serve its customers
- They also need to have enough energy to serve their customers' needs
- They are responsible for their portion of operating reserves and ancillary services.
- All of this means they have the responsibility to provide you with full requirement service.

# Typical Generation Service Cost – MGS Customer



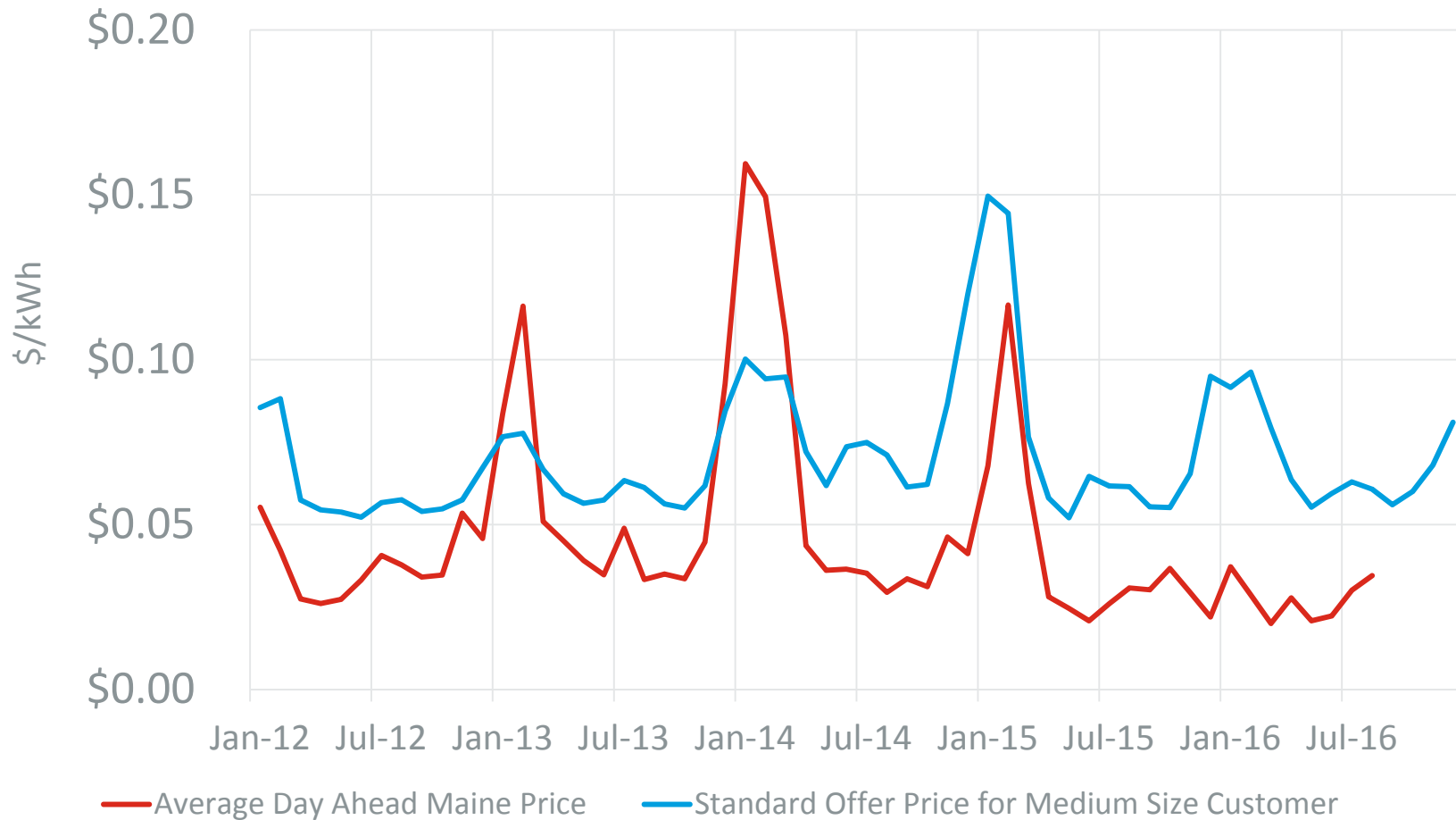
Maine Forward and Day ahead prices from OTC Global Holding 9/19/2016  
 ISO Rates forecasts, Standard offer rates, CMP average medium customer usage and capacity  
 Customer assumption - 211 kW Capacity, 40% Load Factor



# Elements of the Energy portion of Generation Supply

- Supplier prices are based on the generators capabilities and expectations of market prices.
- The market price is set based on dynamics of supply and demand for generation in the region.
- New England obtains much of its supply from Natural Gas fired generation
- Market prices for Electric Energy track Market Prices for Natural Gas (non-firm)

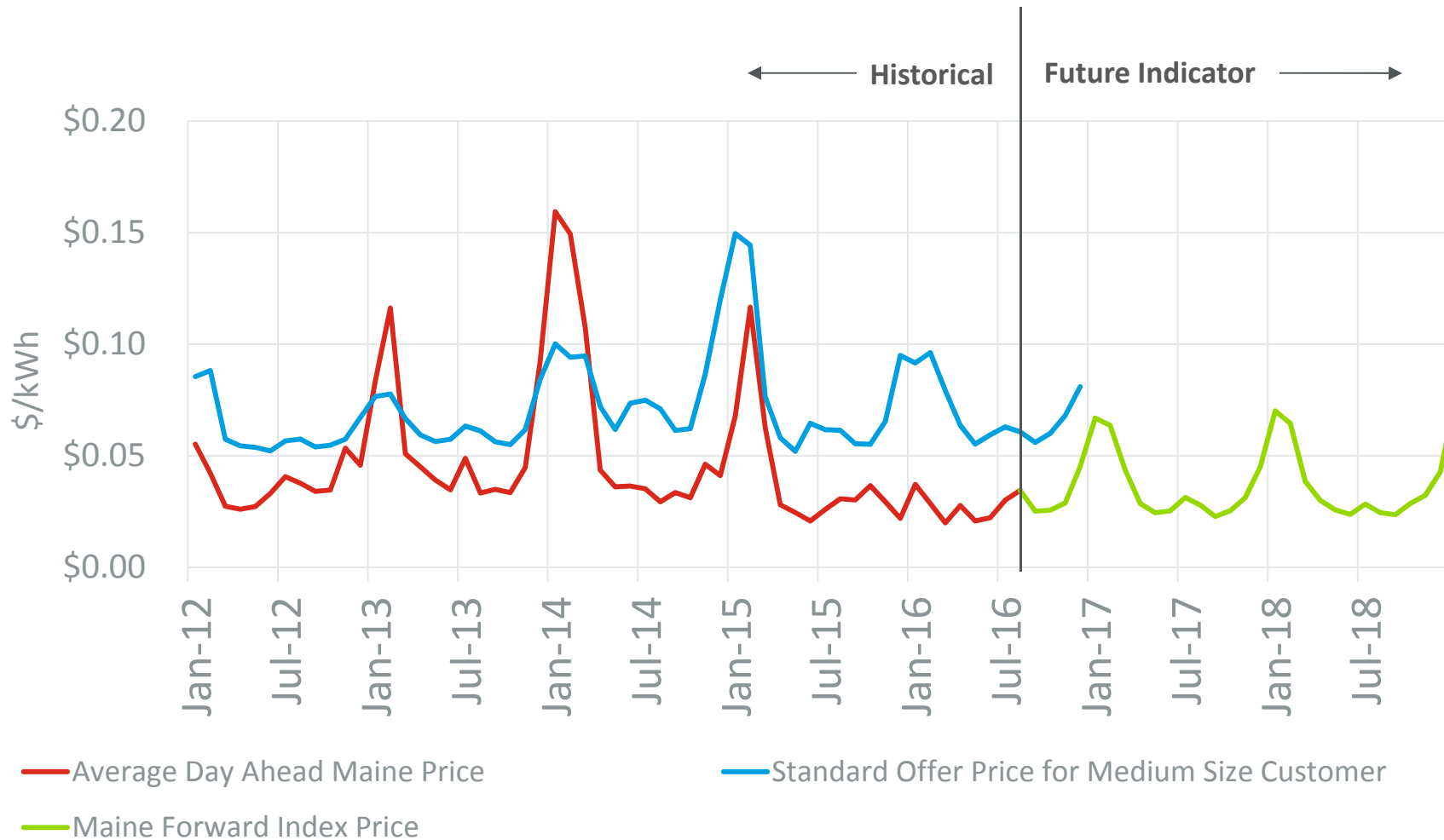
# Trends in Standard Offer Energy Charges



Maine Forward and Day ahead prices from OTC Global Holding 9/19/2016  
 Large customer energy charge from CMP historic RFP rates



# Trends in Standard Offer Energy Charges



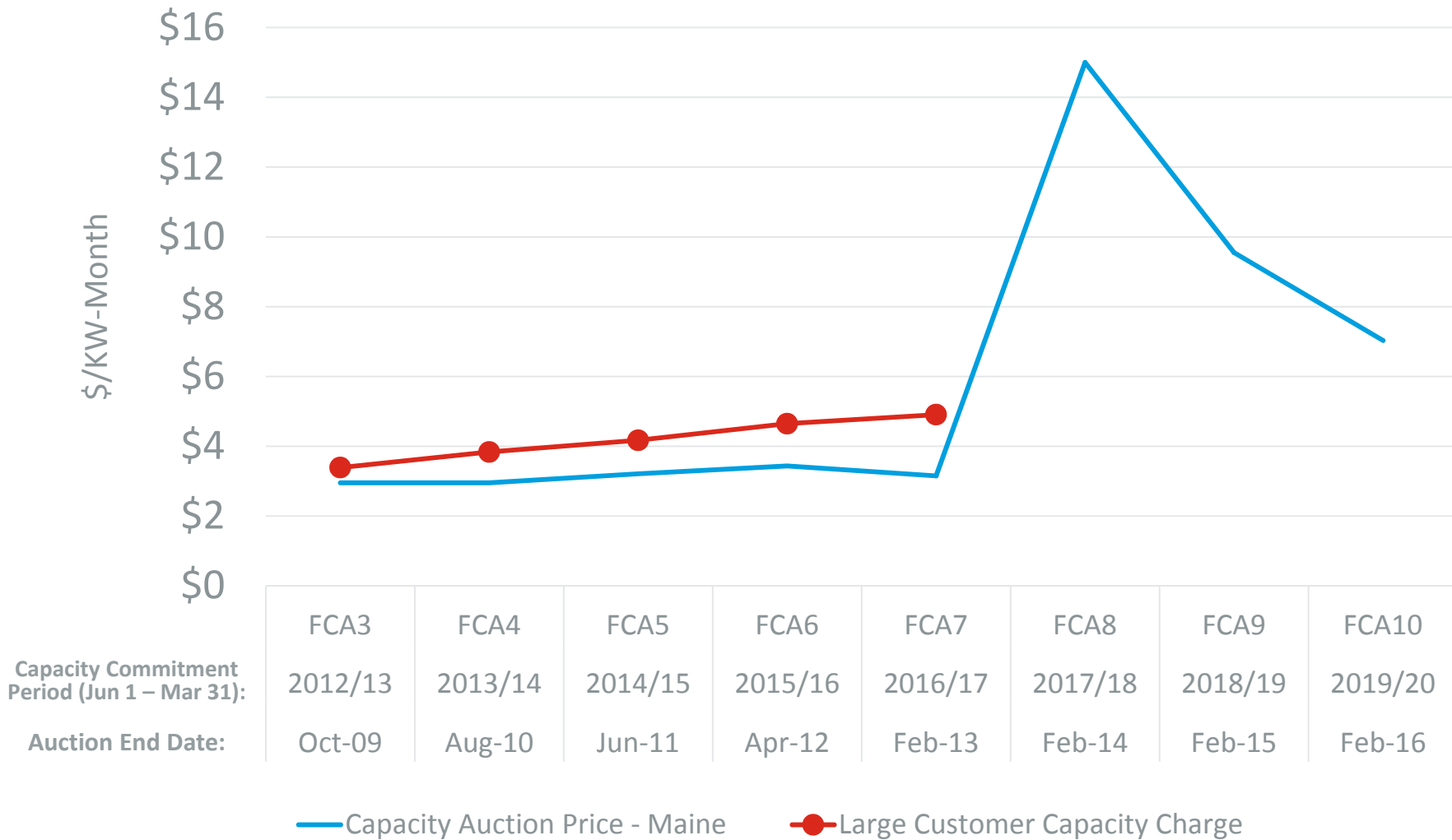
Maine Forward and Day ahead prices from OTC Global Holding 9/19/2016  
 Large customer energy charge from CMP historic RFP rates



# Elements of the Capacity portion of Generation Supply

- “Capacity” is the maximum output of generation or demand resources (kW).
- ISO New England is responsible to assure that there is sufficient Capacity to meet the peak demand in New England.
- New England conducts an annual auction 3 years ahead of time that determines the cost of Capacity (Forward Capacity Auction – FCA).
- Key changes in the FCA rules and retirements are changing the Capacity pricing in the region.

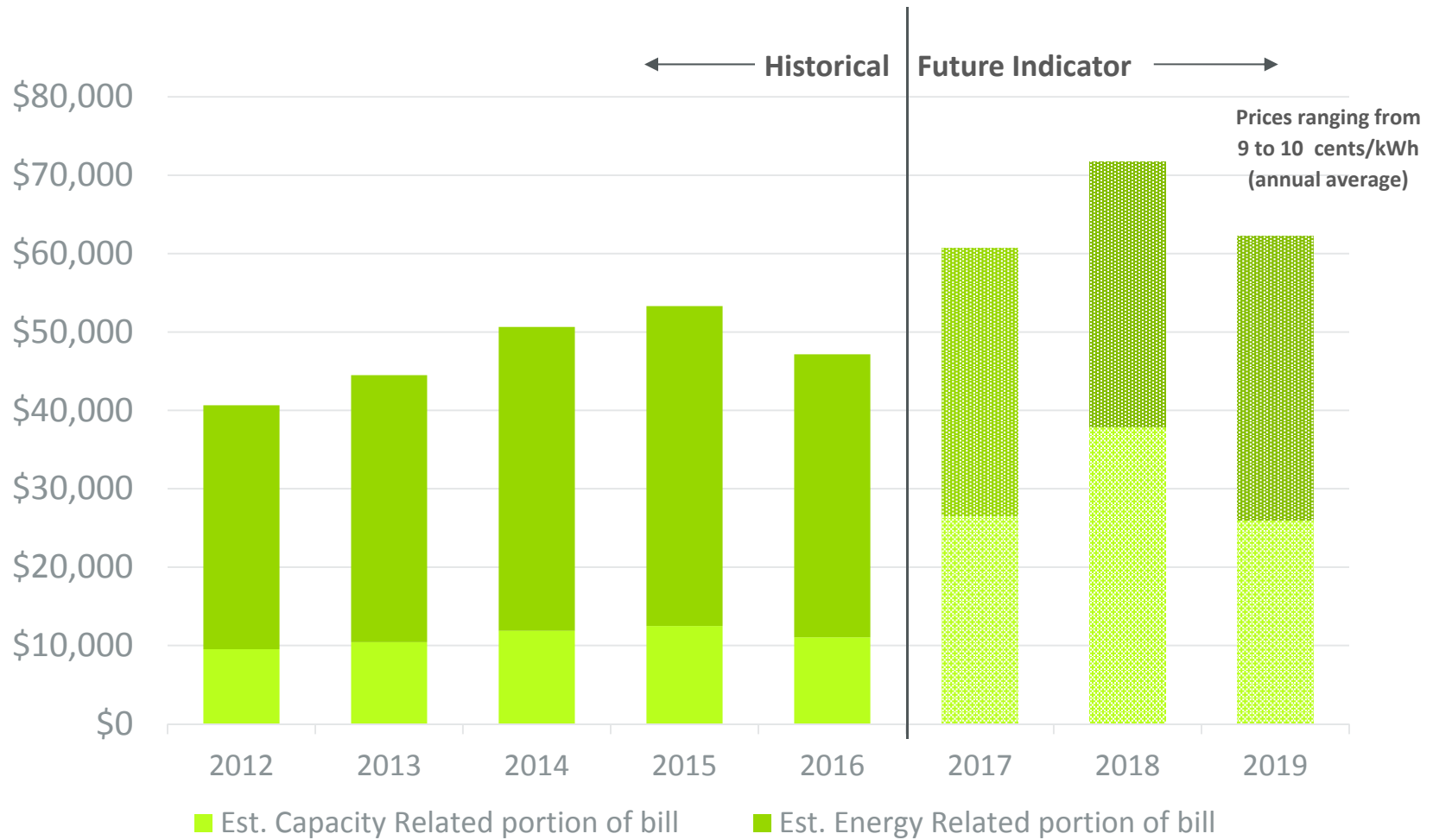
# Trends in Standard Offer Capacity Charges



Capacity commitment auction results from ISO New England  
 Large customer capacity charge from historic SO RFP rates



# Generation Service Cost & Outlook – MGS Customer



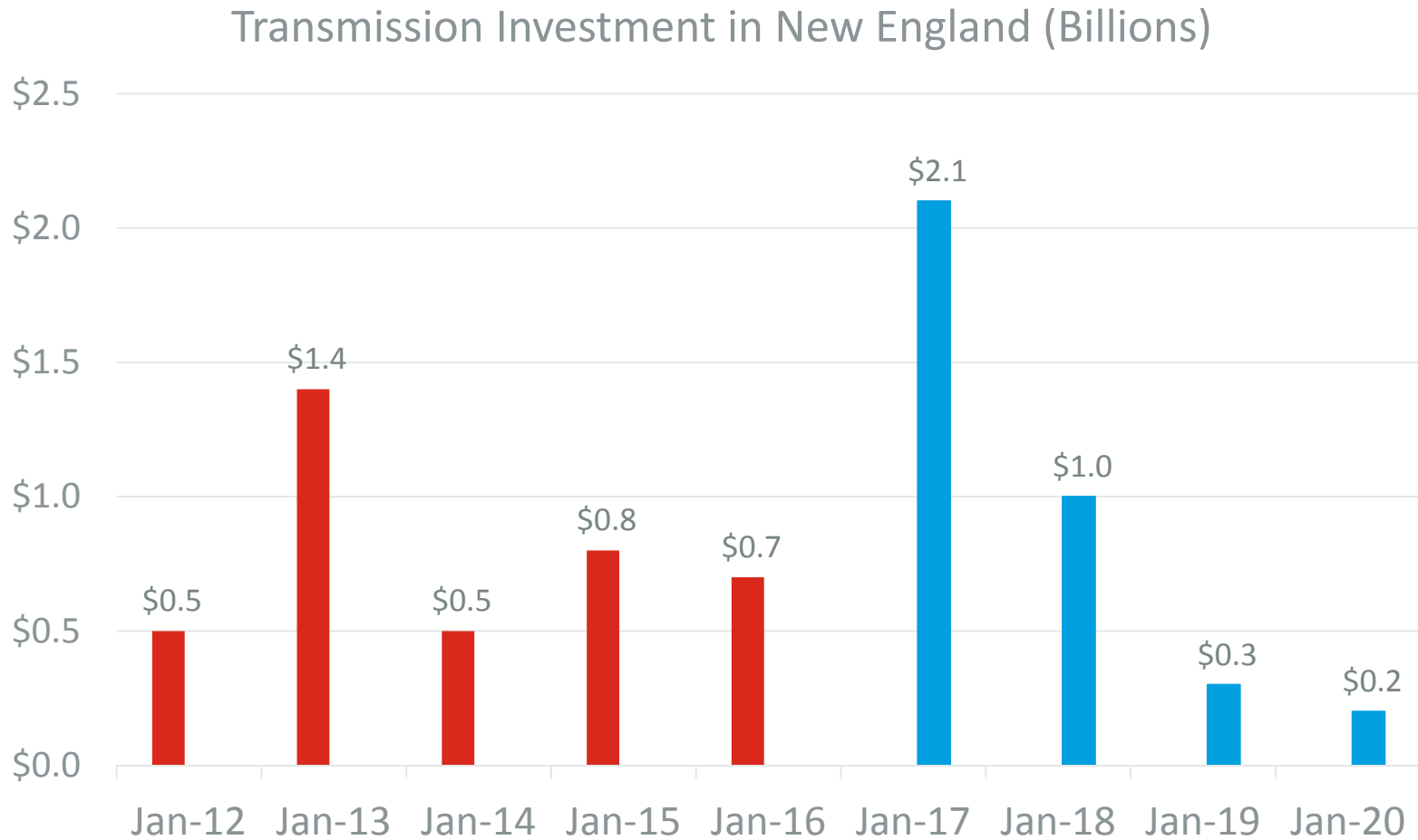
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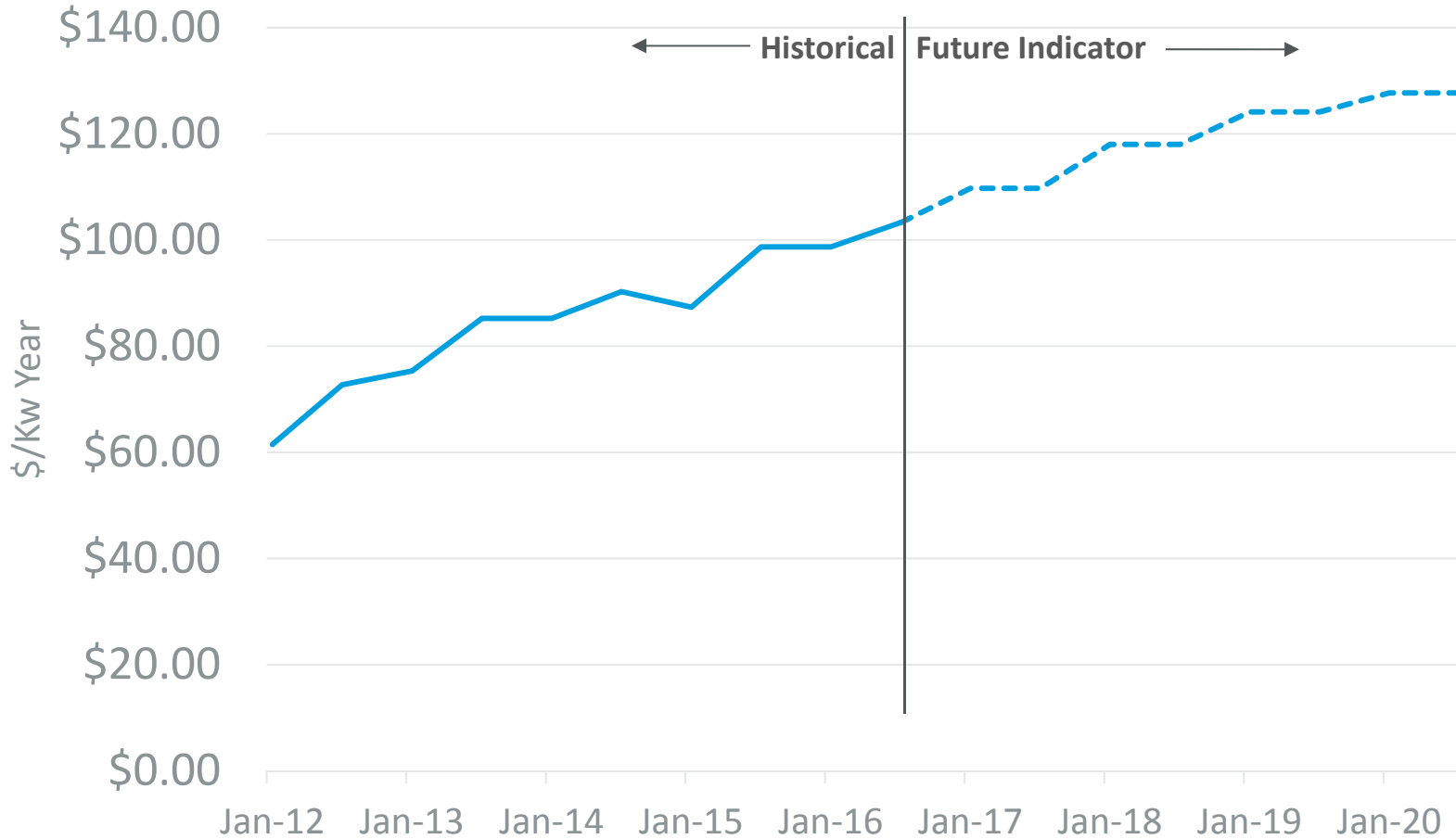
# Delivery Service Rates

- The rates the utility charges to distribute the electricity from the from the generators to end use customers.
- Includes Transmission, Distribution, and associated utility customer services
- These rates can have a combination of capacity (demand) and usage charges (energy), as well as customer charges.
- CHP can alter the energy and demand components of these charges.

# New England Transmission Investment

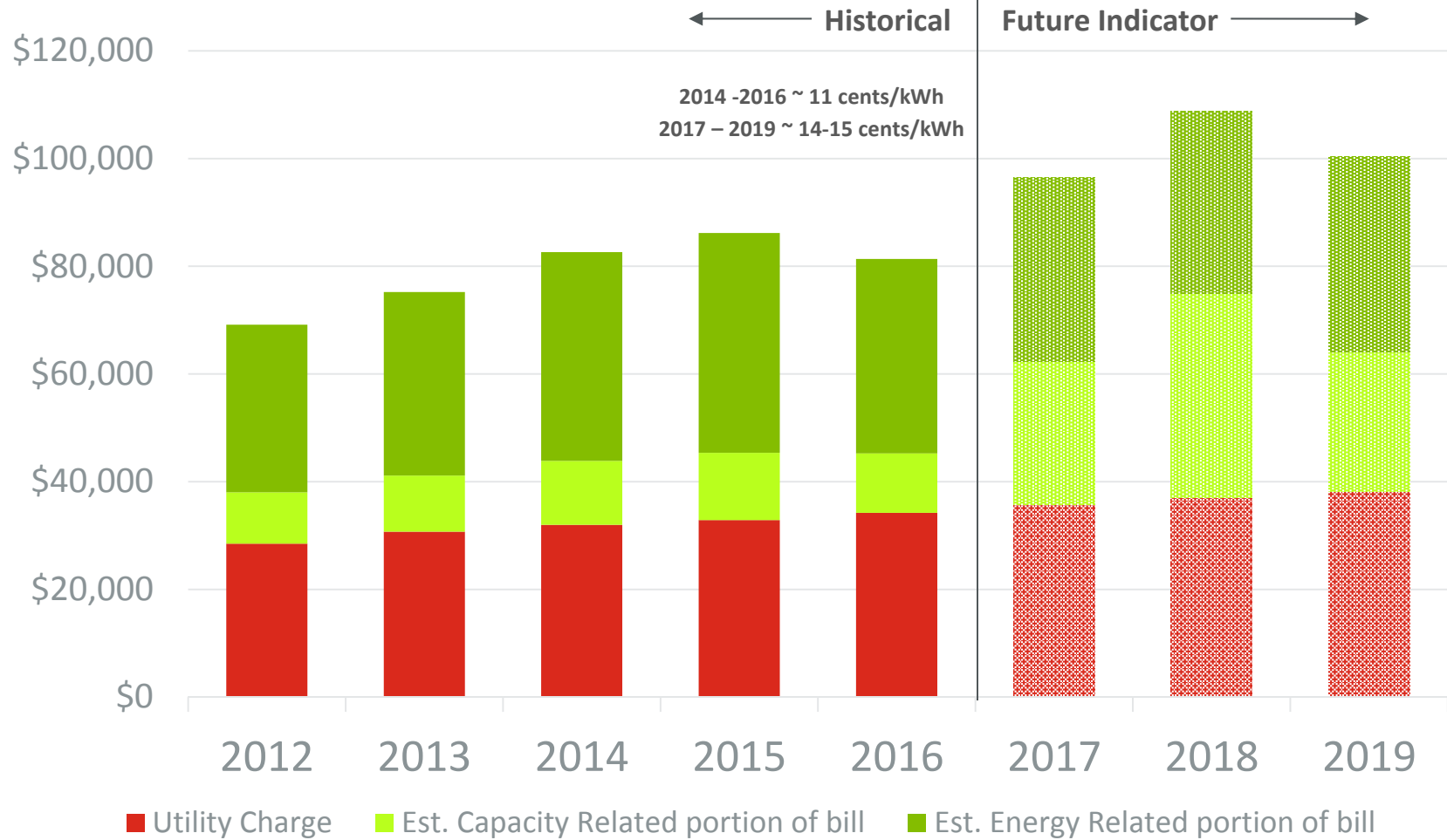


# Transmission Rates Outlook



ISO New England 2016 Reginal Network Service (RNS) rate forecast

# Total Electric Costs & Outlook – MGS Customer



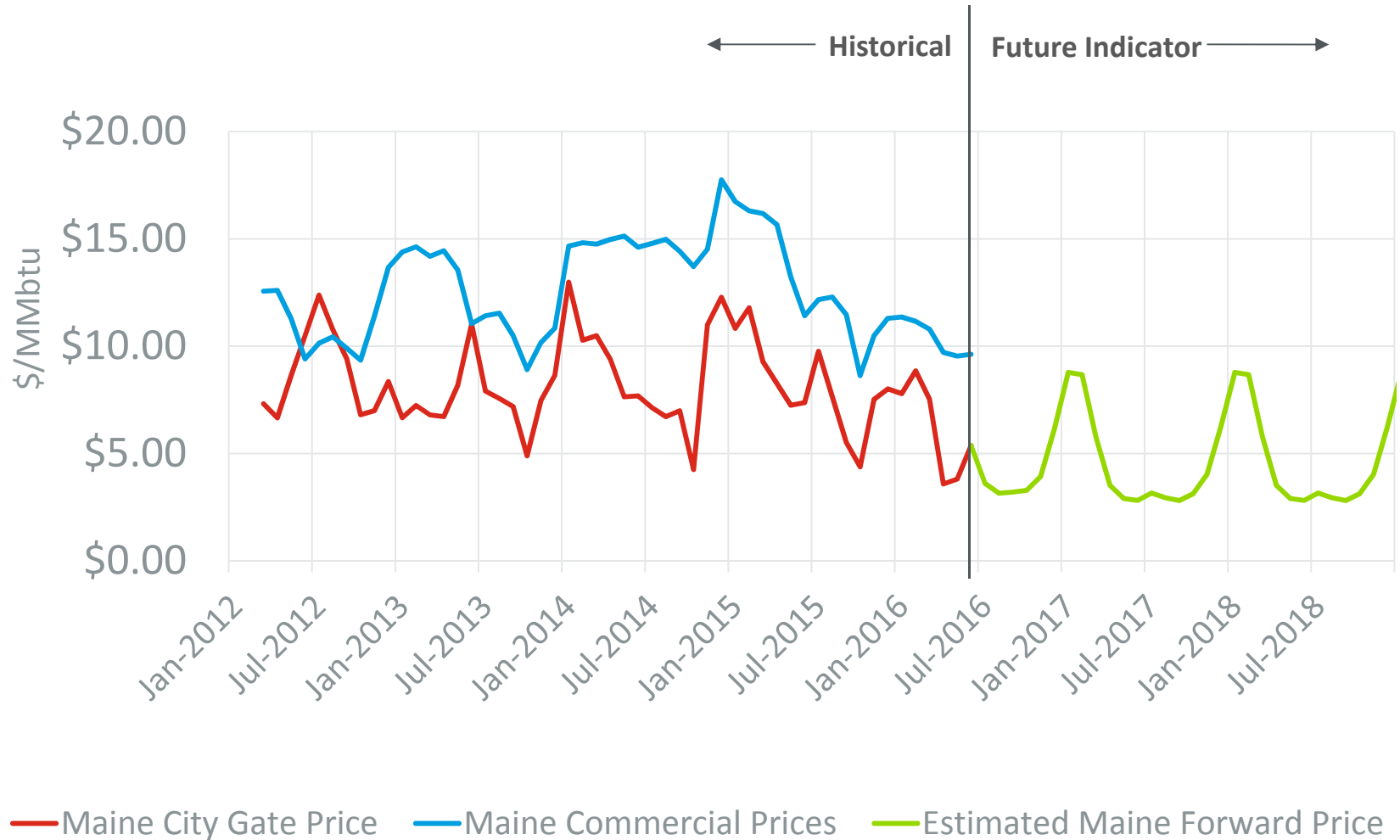
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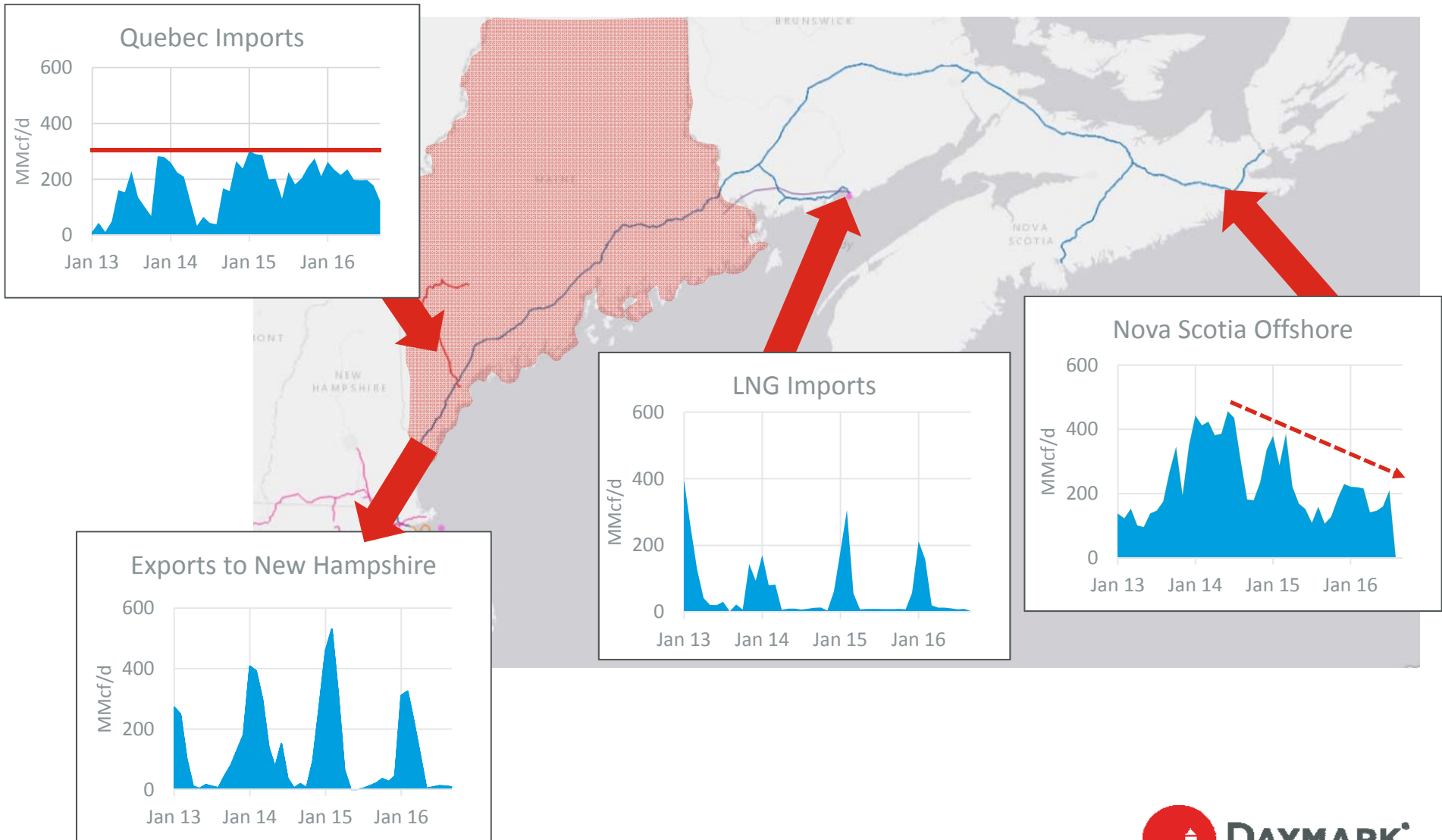
# Natural Gas Supply Costs

- Natural Gas is Likely Fuel supply for CHP
  - Small CHP fuel supply source – gas LDC
- Similarities to Large Gas Generation
  - Most regional generation is also gas-fired
  - Gas-fired Generation sets electric market prices
- Differences
  - Most Large Gas Generation buy wholesale, non-firm
  - Many with oil back-up
  - LDC supplies are typically firm supply

# Trends in Natural Gas Prices



# Gas Supply Source Shift from East to West



# Trends in Maine Natural Gas Supply

- Overall outlook for Gas Supply is good
  - Shale gas supplies in Mid-Atlantic are extensive
  - Market prices have been trending down and outlook is similar
- Challenges are in Delivery
  - The New England system needs to shift to a West to East mode
  - Congestion potential, particularly in winter periods
  - Atlantic Bridge will add capacity from the south in 2017
  - More expansions of the regional system will likely be needed
- Developments in Electric Sector may help
  - Increased dual fuel requirements in generation
  - Increasing Energy Efficiency and Solar developments
  - Push for renewable energy and Canadian Hydro



## Summary

- CHP will help lower both generation and utility charges on a customers bill
- Electricity bills are likely to increase in the coming years due to increasing capacity and transmission charges
- Outlook for natural gas in Maine is promising, with some work needed to assure good access to supplies to the west.

# Thank you

Let's continue the conversation

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