California Energy Commission
Natural Gas Unit

2007 IEPR
Natural Gas Forecast
Revised Reference Case

by

James Fore

August 16, 2007

Reference Case

- Long term perspective - next 10 years
- Based on annual average conditions
- Focus on infrastructure and resource adequacy
- Includes sensitivity analysis

Source: California Energy Commission Staff, 2007

Revisions to June 2007 Preliminary Natural Gas Forecast

1. North American LNG regasification capacity was limited to 14 Bcf per day.

2. Increased the finding and development costs for new natural gas reserves added to more accurately reflect current and future costs.

3. Pipeline flows from Baja Mexico into San Diego (Otay Mesa) were restricted to match the current physical capability of the SDG&E system.

4. Natural gas demand for Alberta oil sands development was increased.

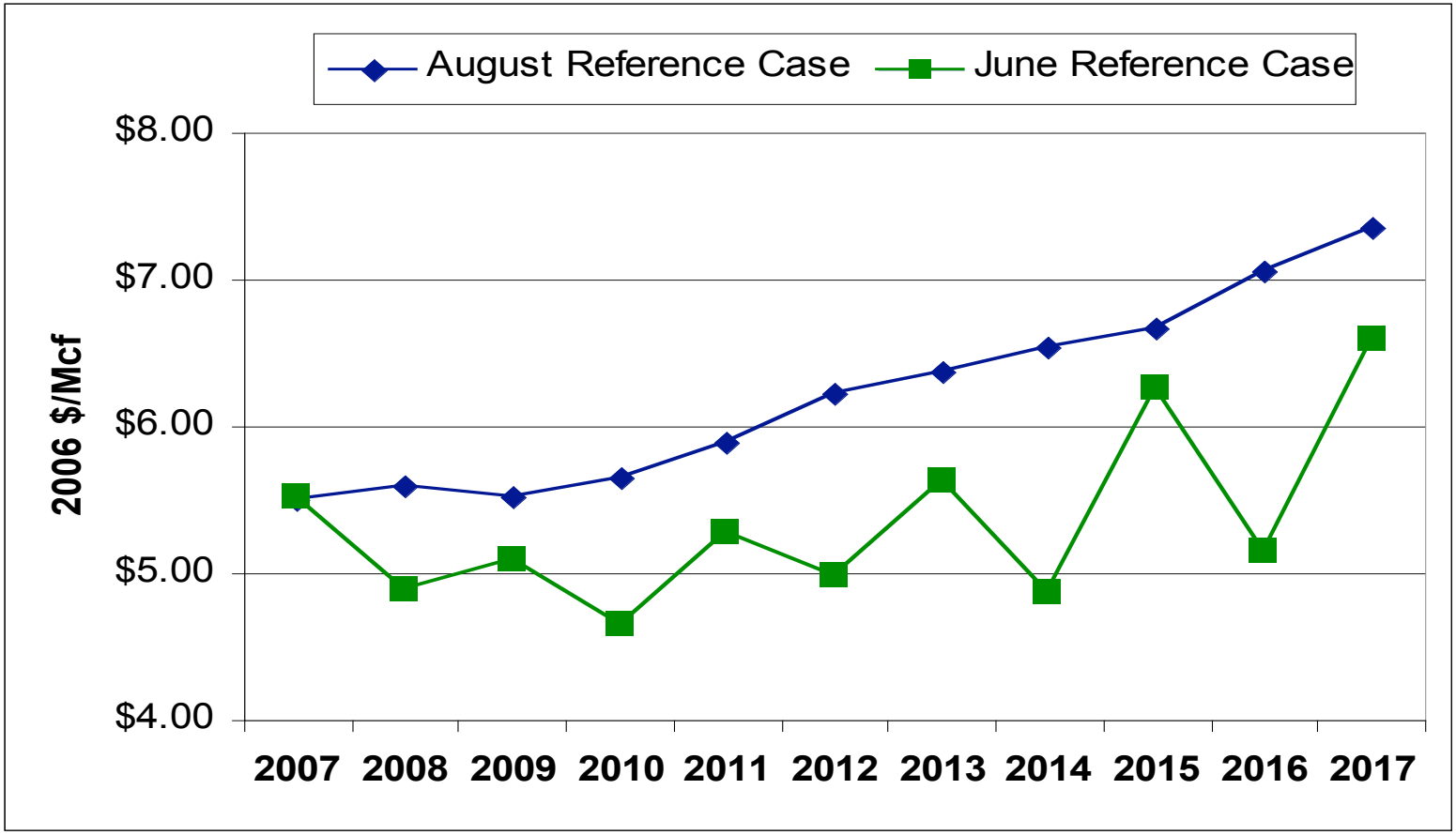
5. The quantity of natural gas produced indigenously, within California was reduced to reflect current production capability.

6. Power generation demand projections for the Western Electricity Coordinating Council (WECC) were updated with the current analysis provided by the Commission's Electricity Analysis Office (EAO) staff.

7. Residential, commercial, industrial, and enhanced oil recovery natural gas demand projections were updated with the latest natural gas forecast by the Commission's Demand Analysis Office (DAO) staff.

Source: California Energy Commission Staff, 2007

Henry Hub Price (2006 $/Mcf)



Source: California Energy Commission Staff, 2007

Natural Gas Demand Parameters

Residential	Commercial	Industrial
Natural Gas Price	Natural Gas Price	Natural Gas Price
		Crude Oil Price
Gross Domestic Product	Gross Domestic Product	
		Industrial Production Index
Heating Degree Days	Heating Degree Days	
Population	Population	

Source: California Energy Commission Staff, 2007

Revised Natural Gas Forecast

Residential – Price Elastic

Commercial – Price Elastic

Industrial - Chemical – Price Elastic

- Non-Chemical – PriceElastic

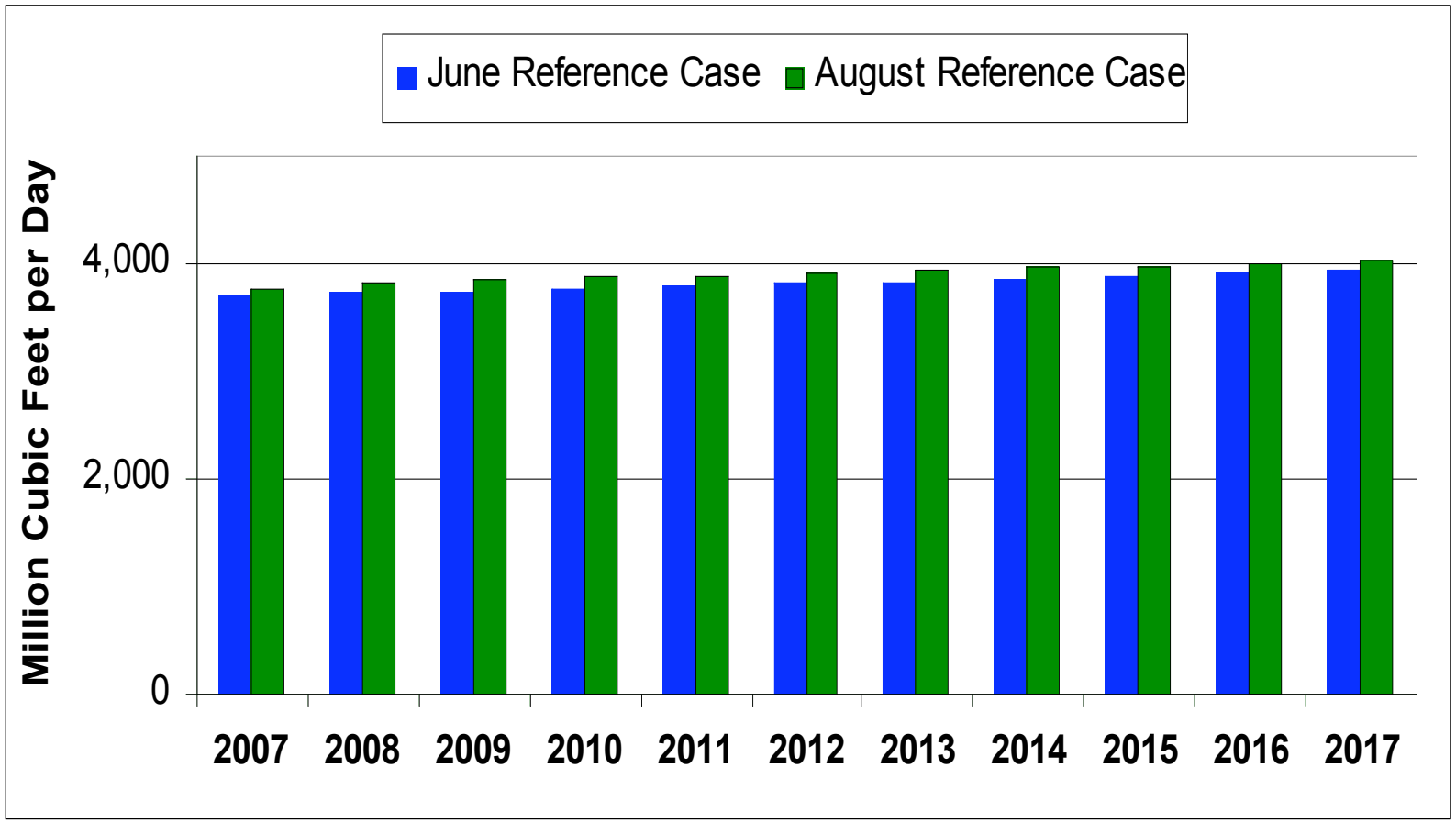
Natural Gas Fuel Electric Generation – Inelastic

Oil Sands – Inelastic

California Demand - Inelastic

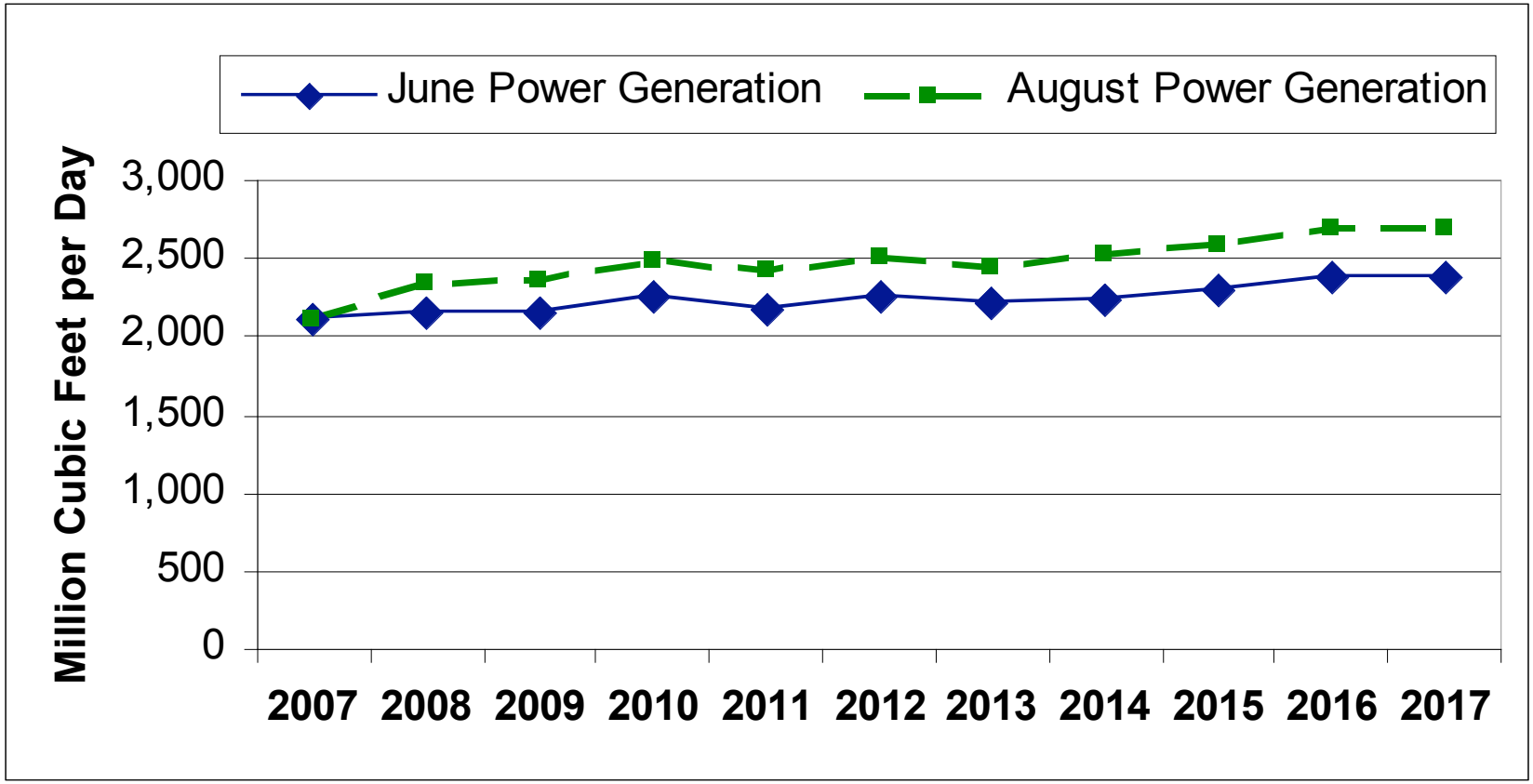
Source: California Energy Commission Staff, 2007

California Revised Natural Gas Demand Residential, Commercial, and Industrial



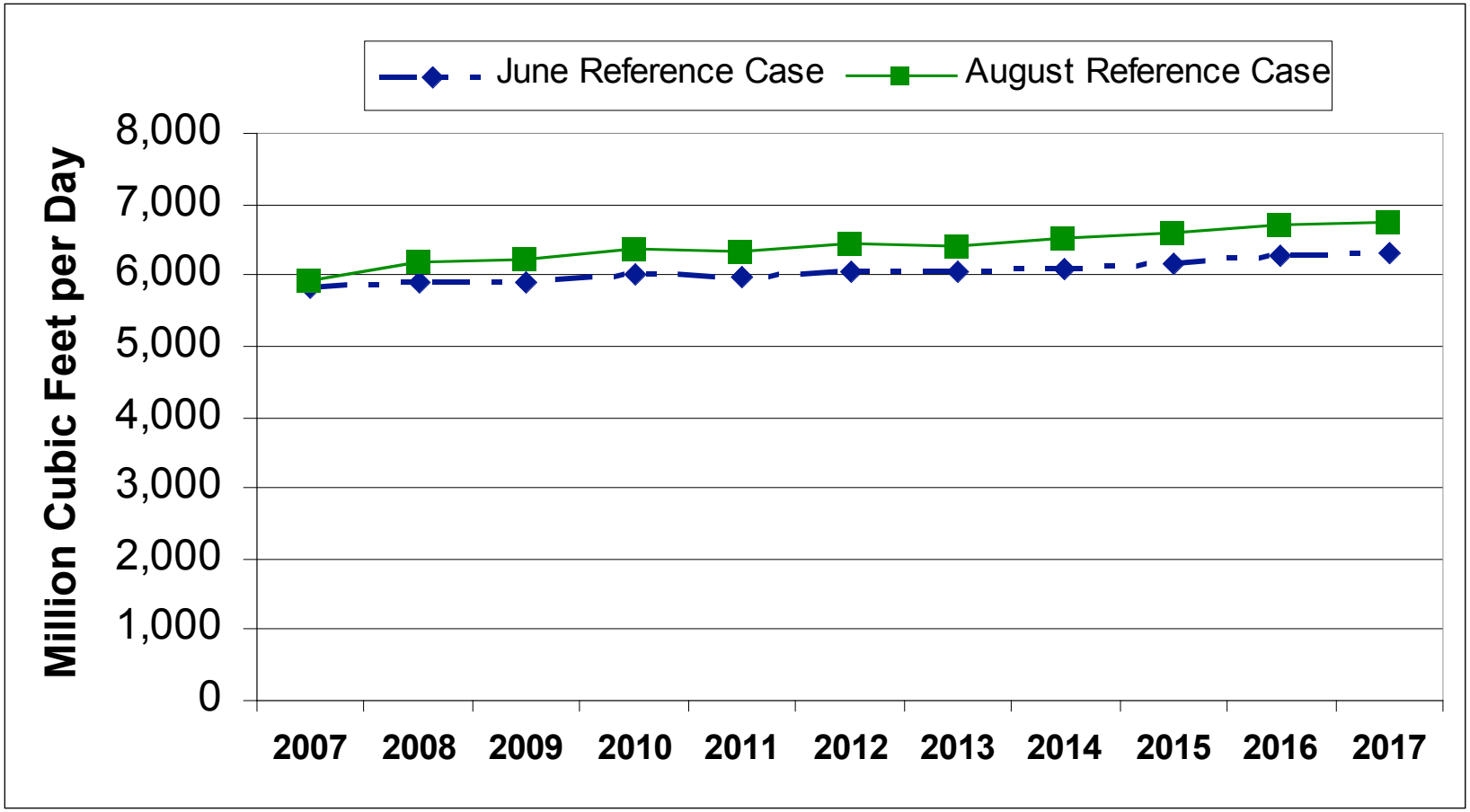
Source: California Energy Commission Staff, 2007

Revised California Natural Gas Demand Power Generation



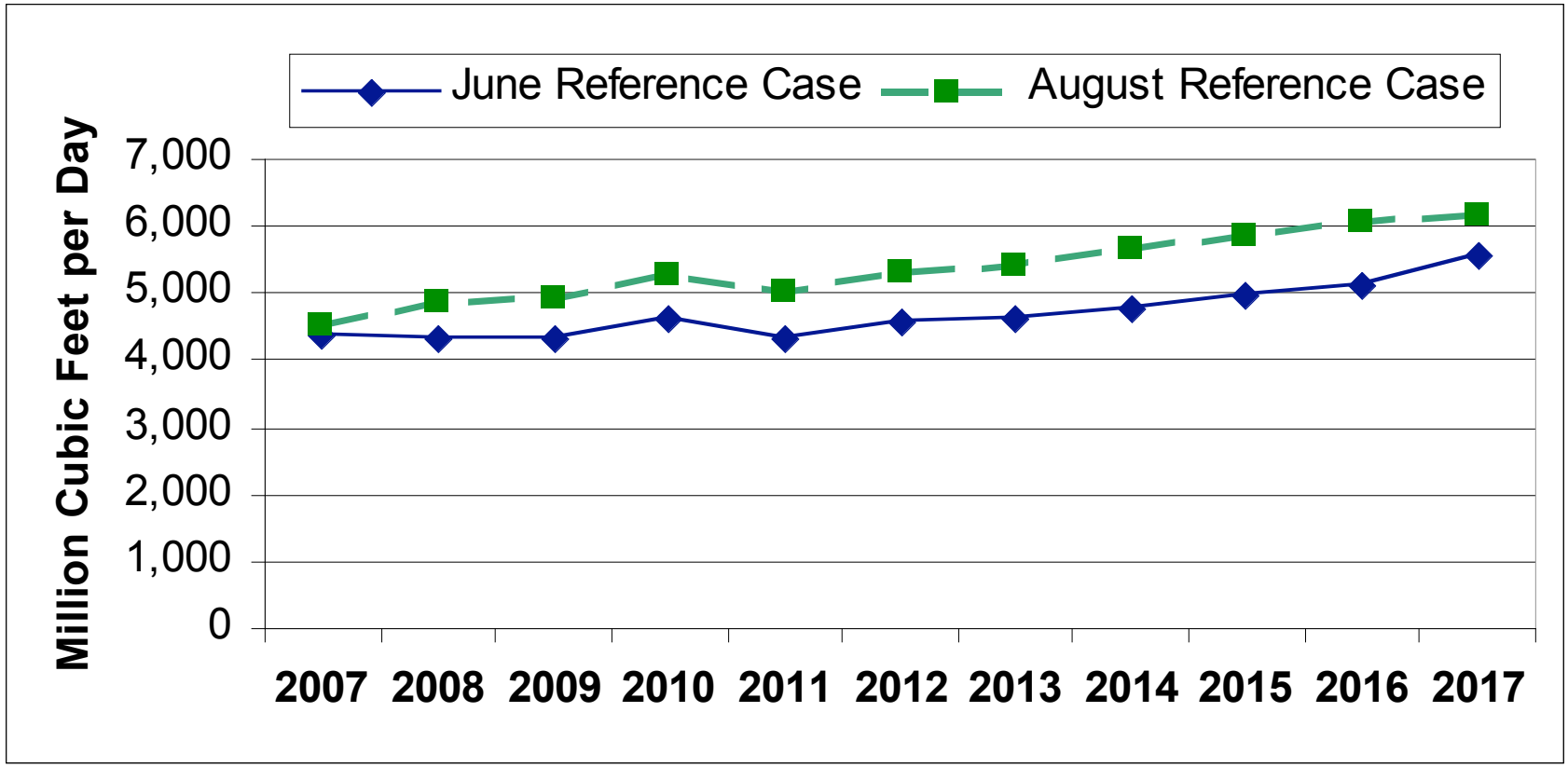
Source: California Energy Commission Staff, 2007

Revised California Total Natural Gas Demand



Source: California Energy Commission Staff, 2007

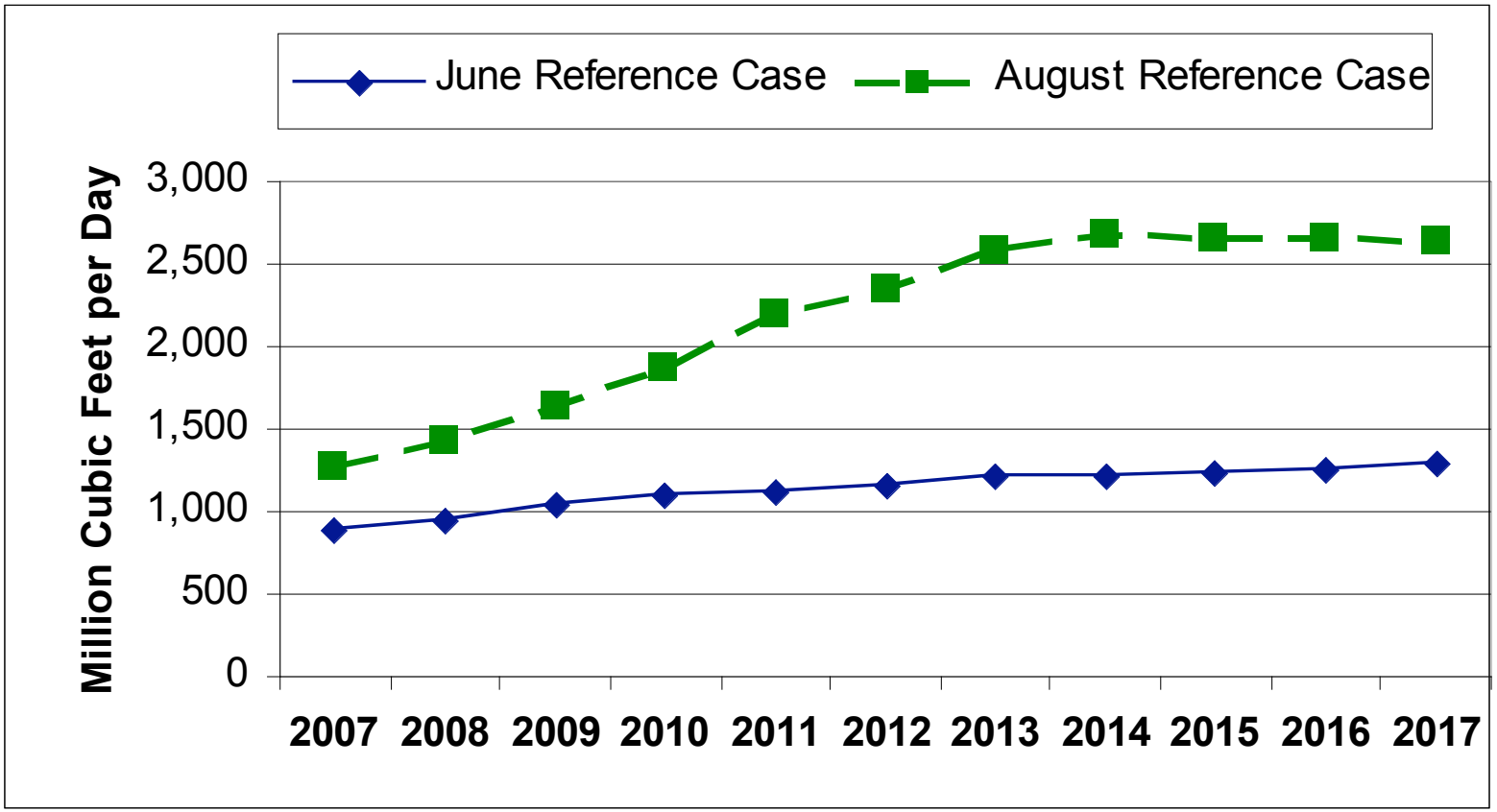
Western Canada and United States Revised Power Generation Natural Gas Demand



Excludes California Power Generation Natural Gas Demand

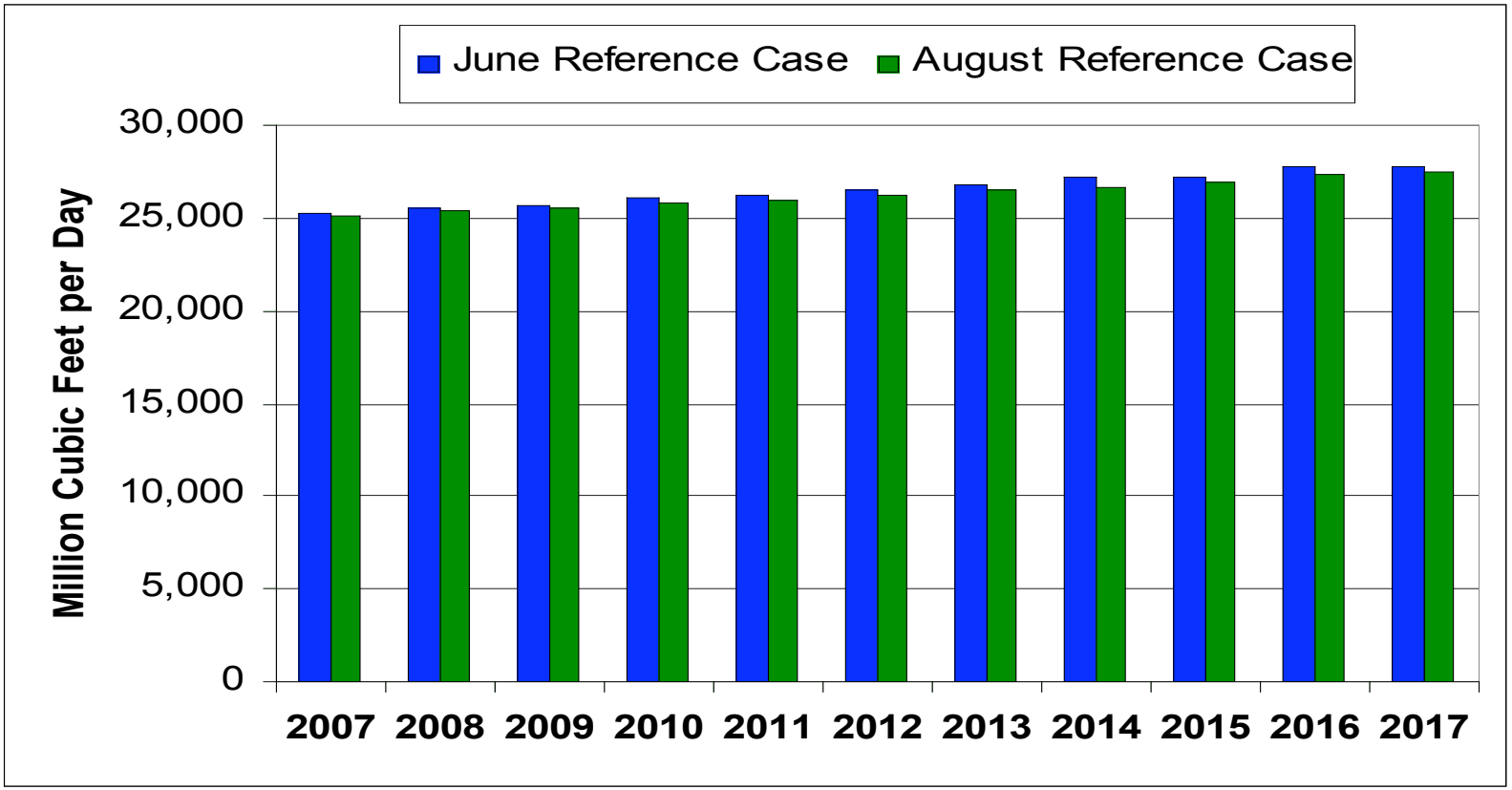
Source: California Energy Commission Staff, 2007

Revised Alberta Oil Sands Natural Gas Demand



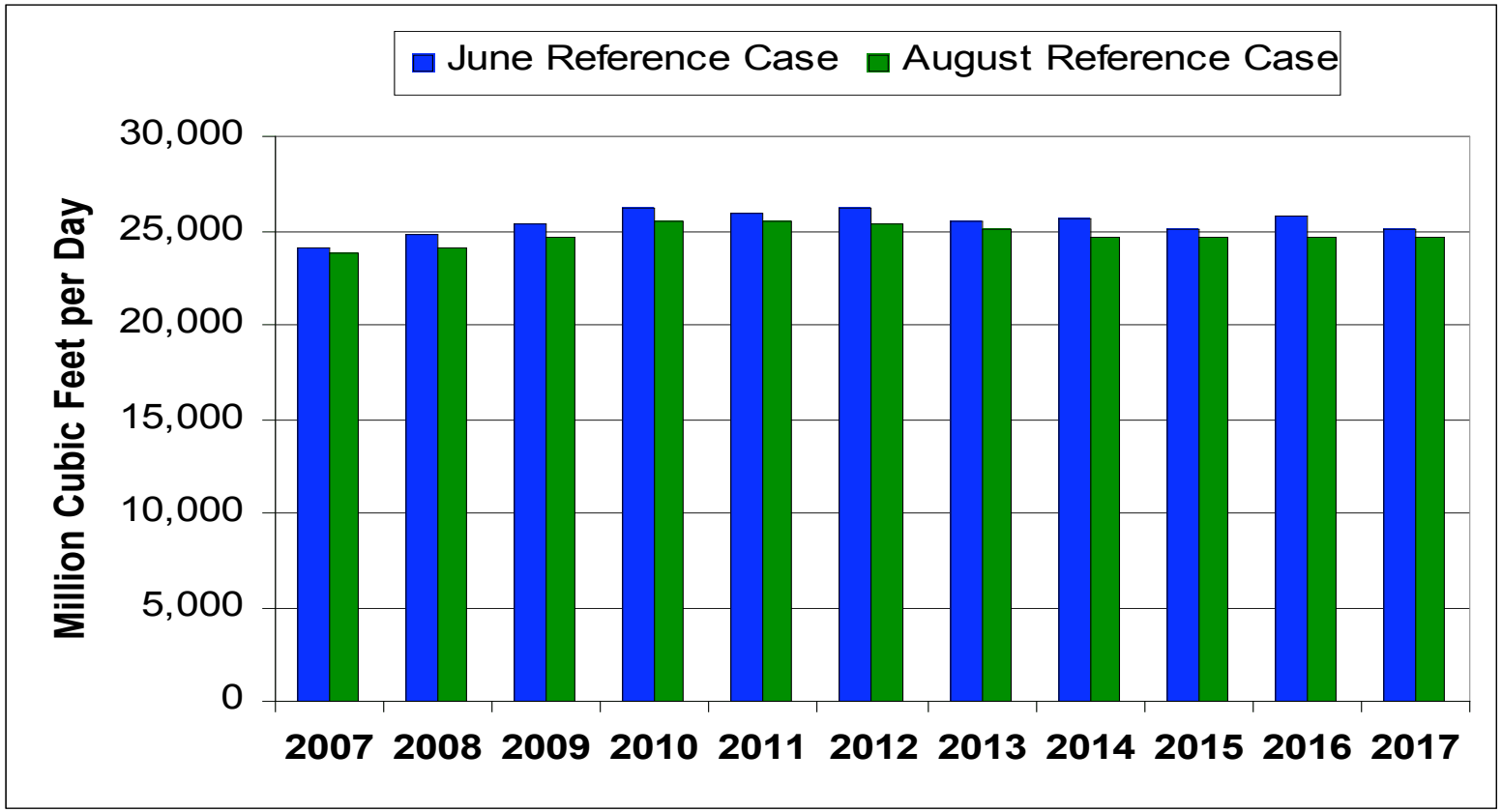
Source: California Energy Commission Staff, 2007

North America Residential and Commercial Natural Gas Demand



Excludes California

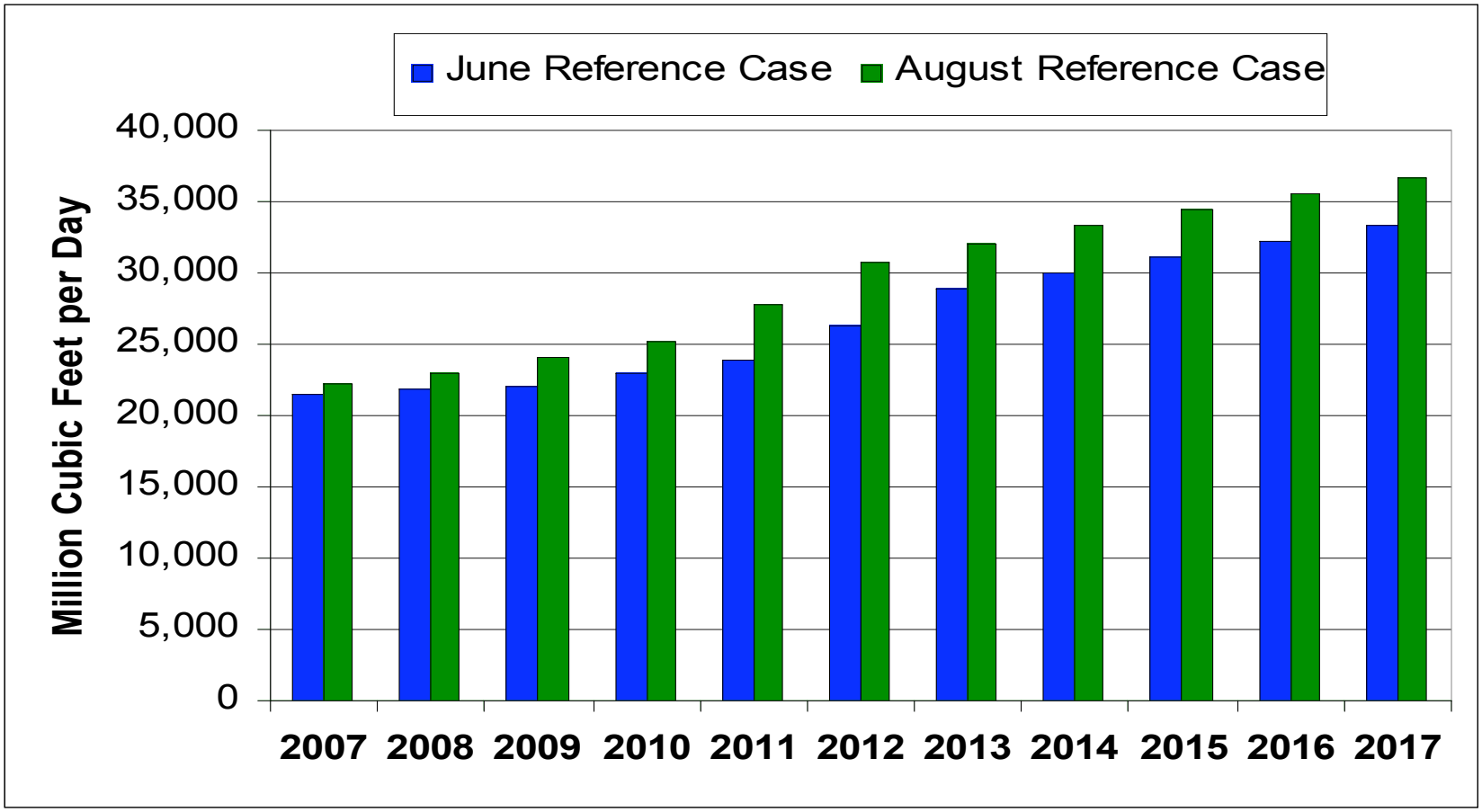
North America Industrial Natural Gas Demand



Excludes California

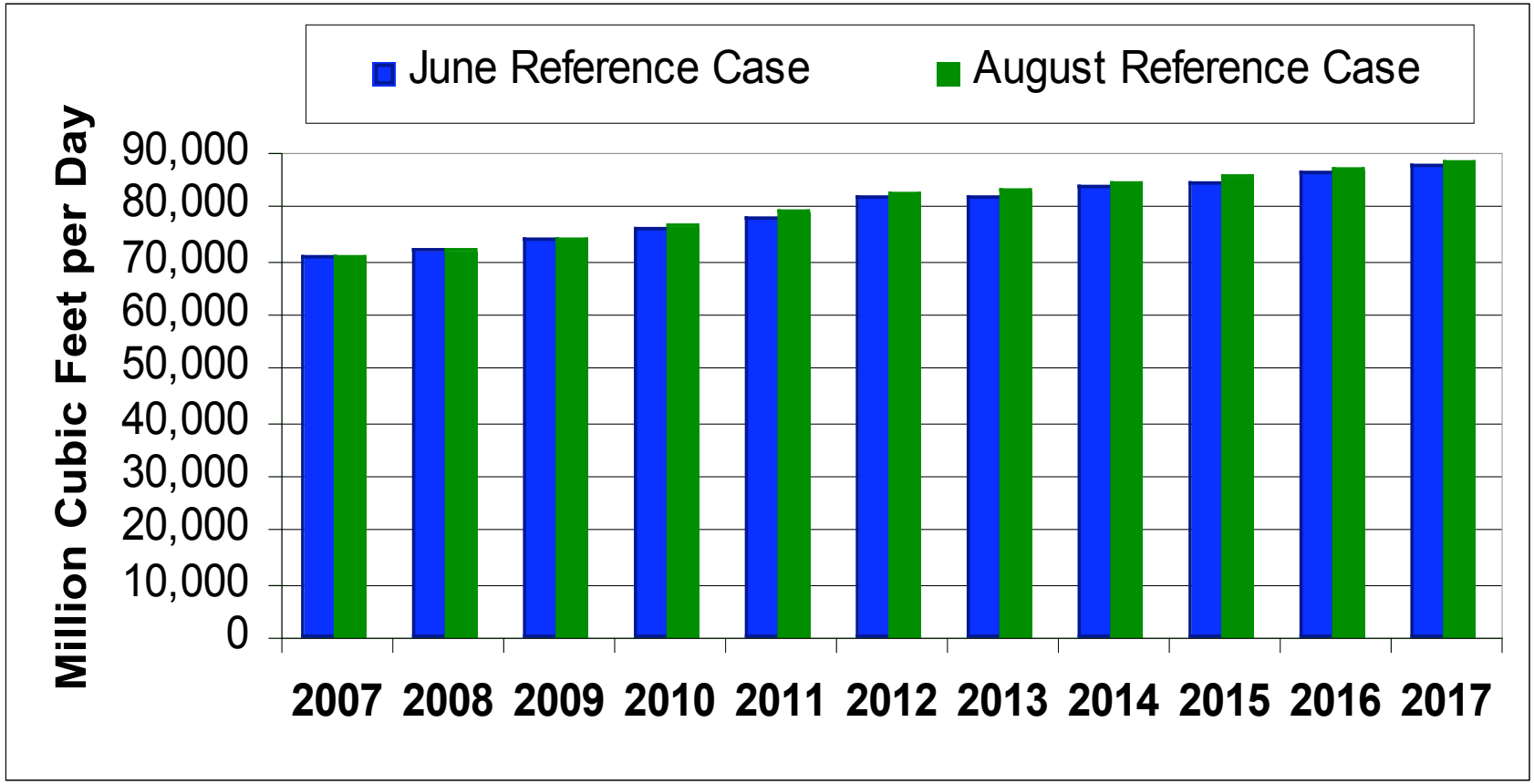
Source: California Energy Commission Staff, 2007

North America Inelastic Natural Gas Demand



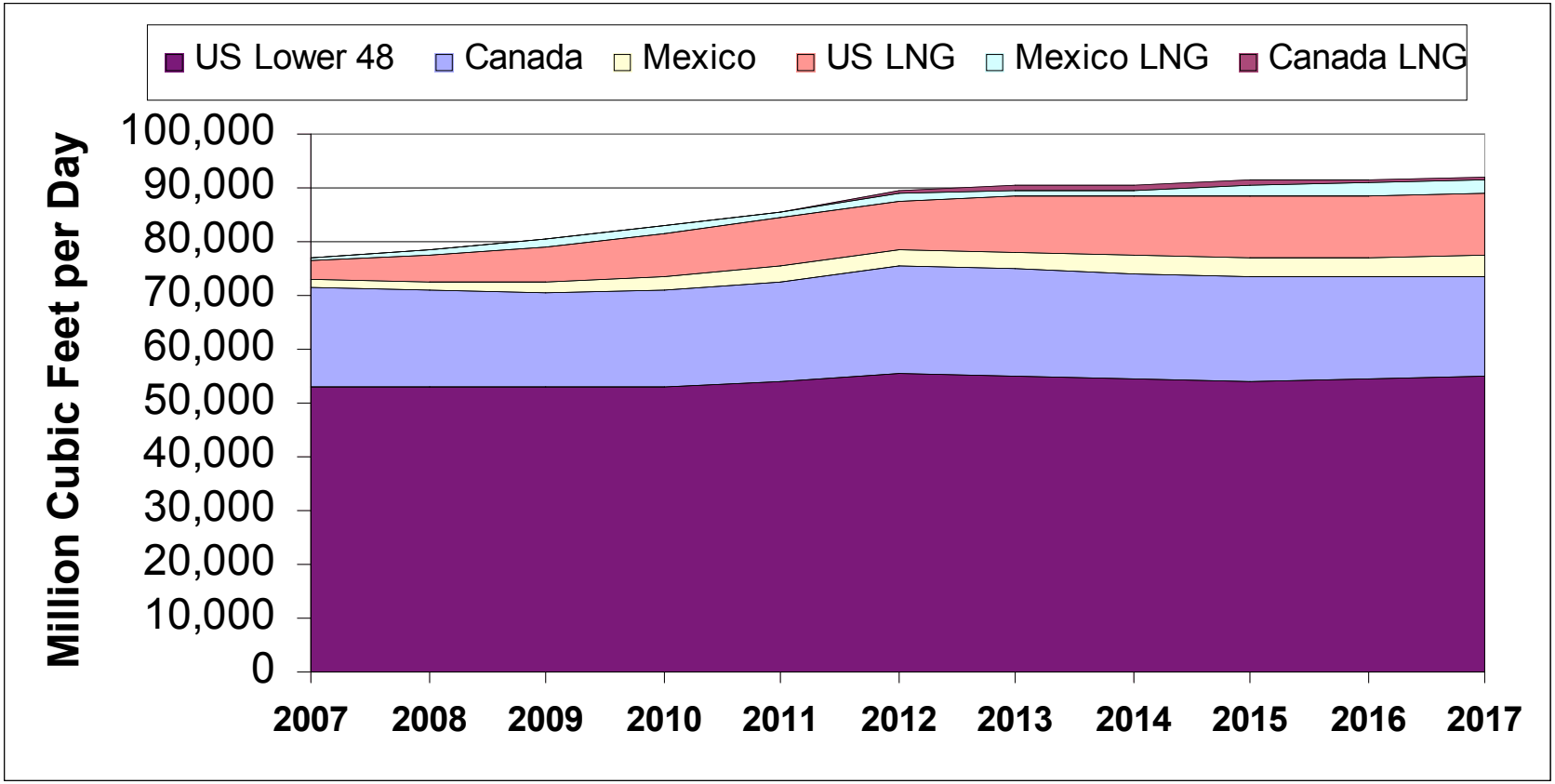
Source: California Energy Commission Staff, 2007

North America Natural Gas Demand Change



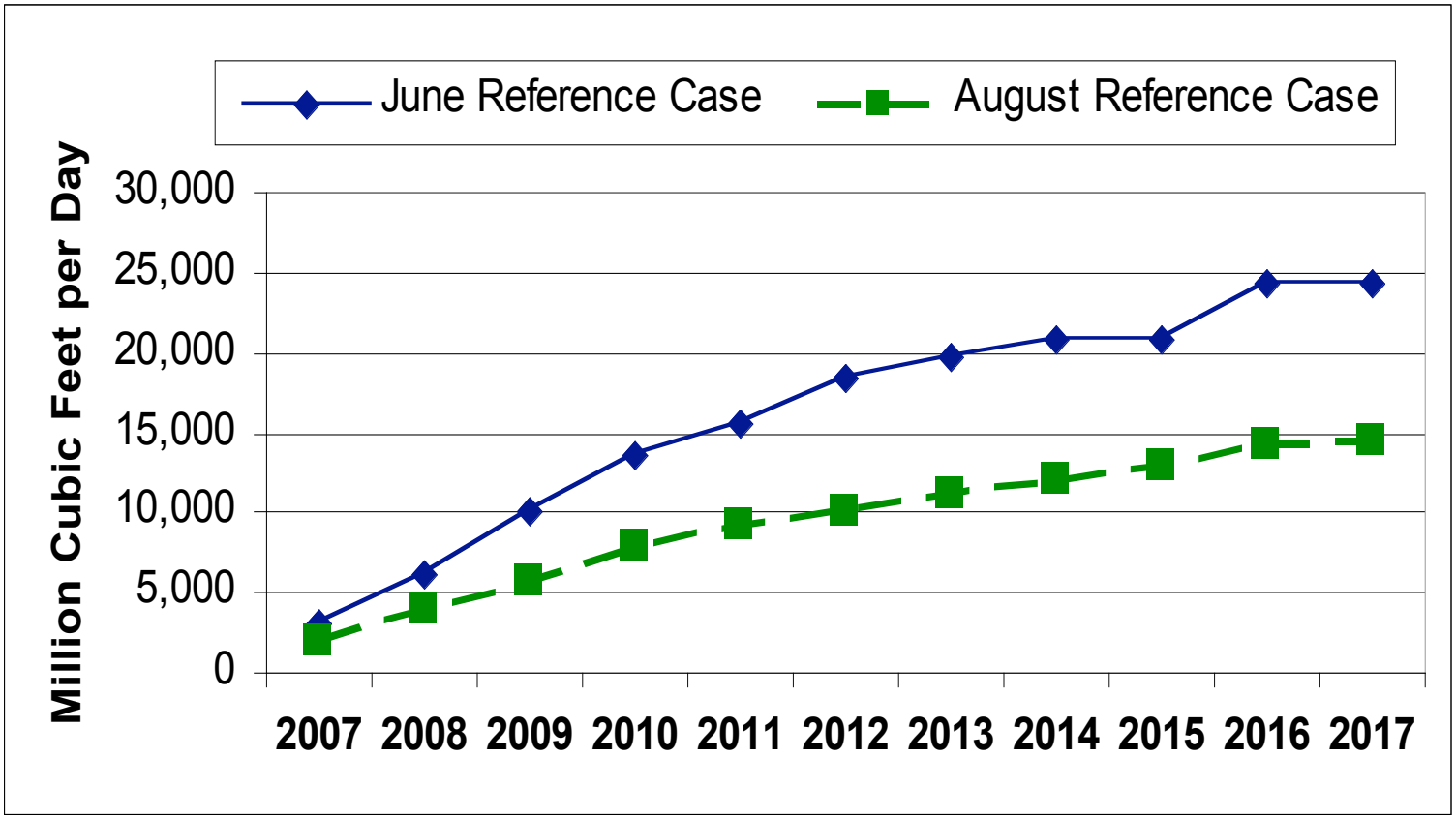
Source: California Energy Commission Staff, 2007

North America's Natural Gas Supply



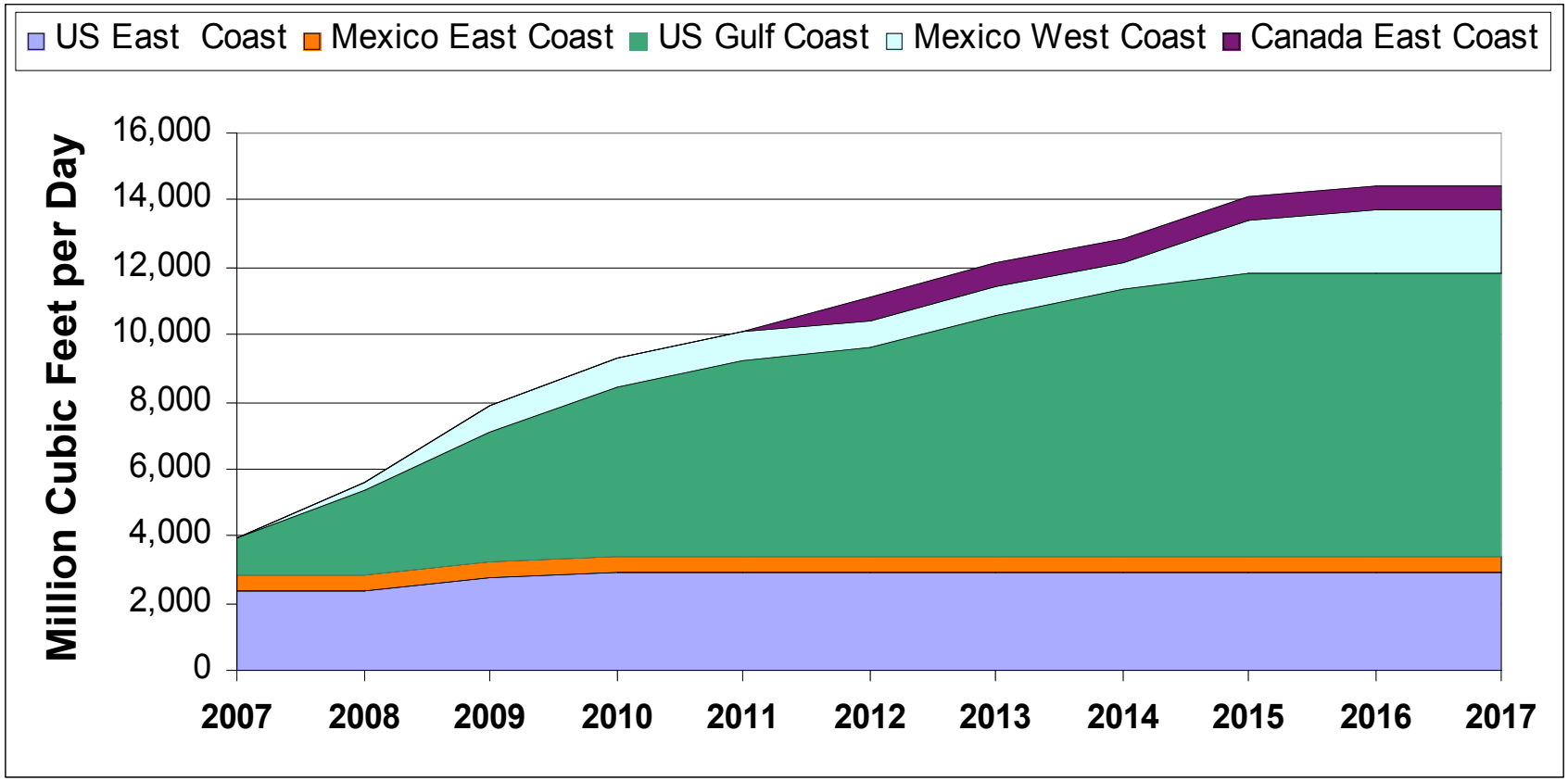
Source: California Energy Commission Staff, 2007

North America Total LNG Imports



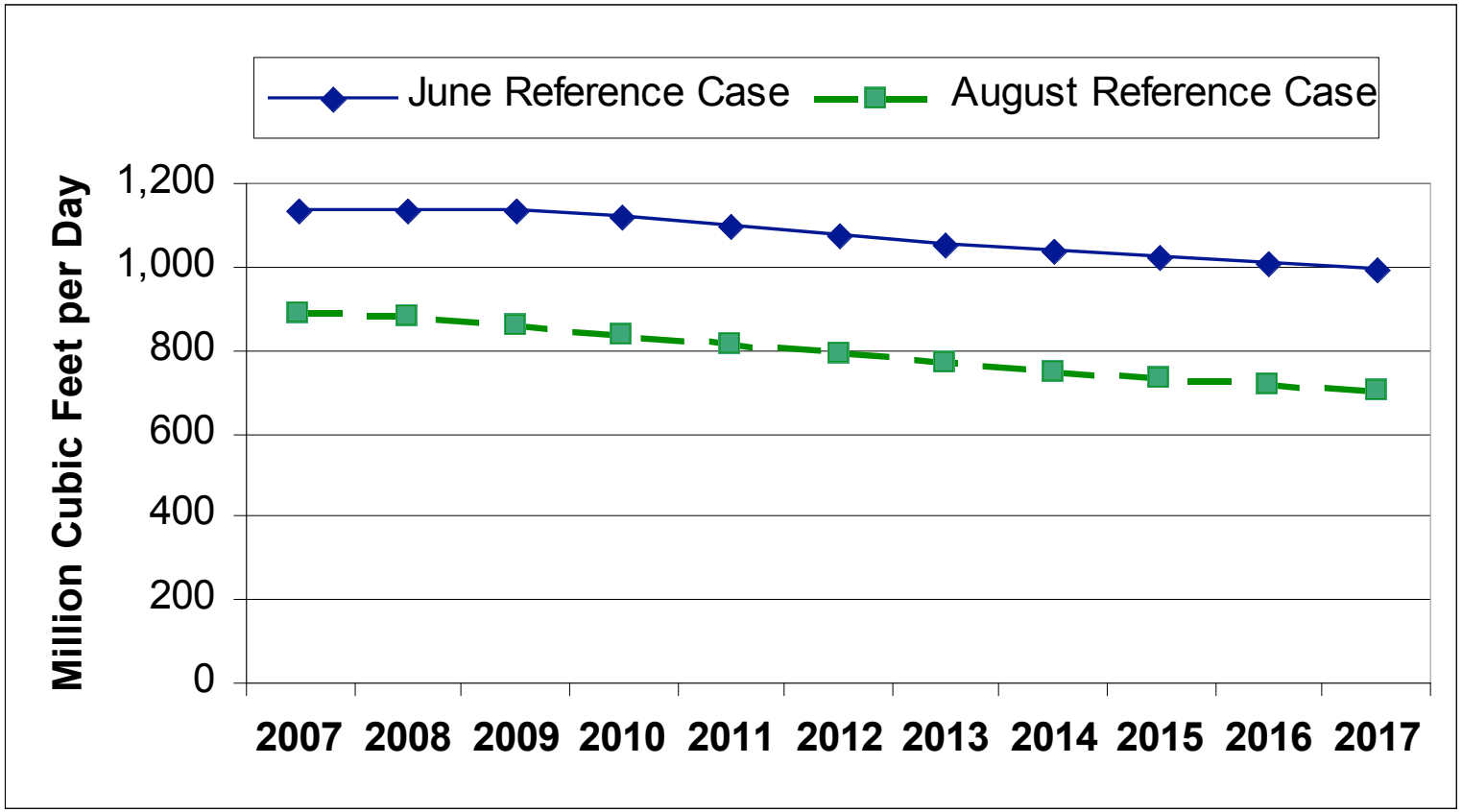
Source: California Energy Commission Staff, 2007

North America's LNG Imports



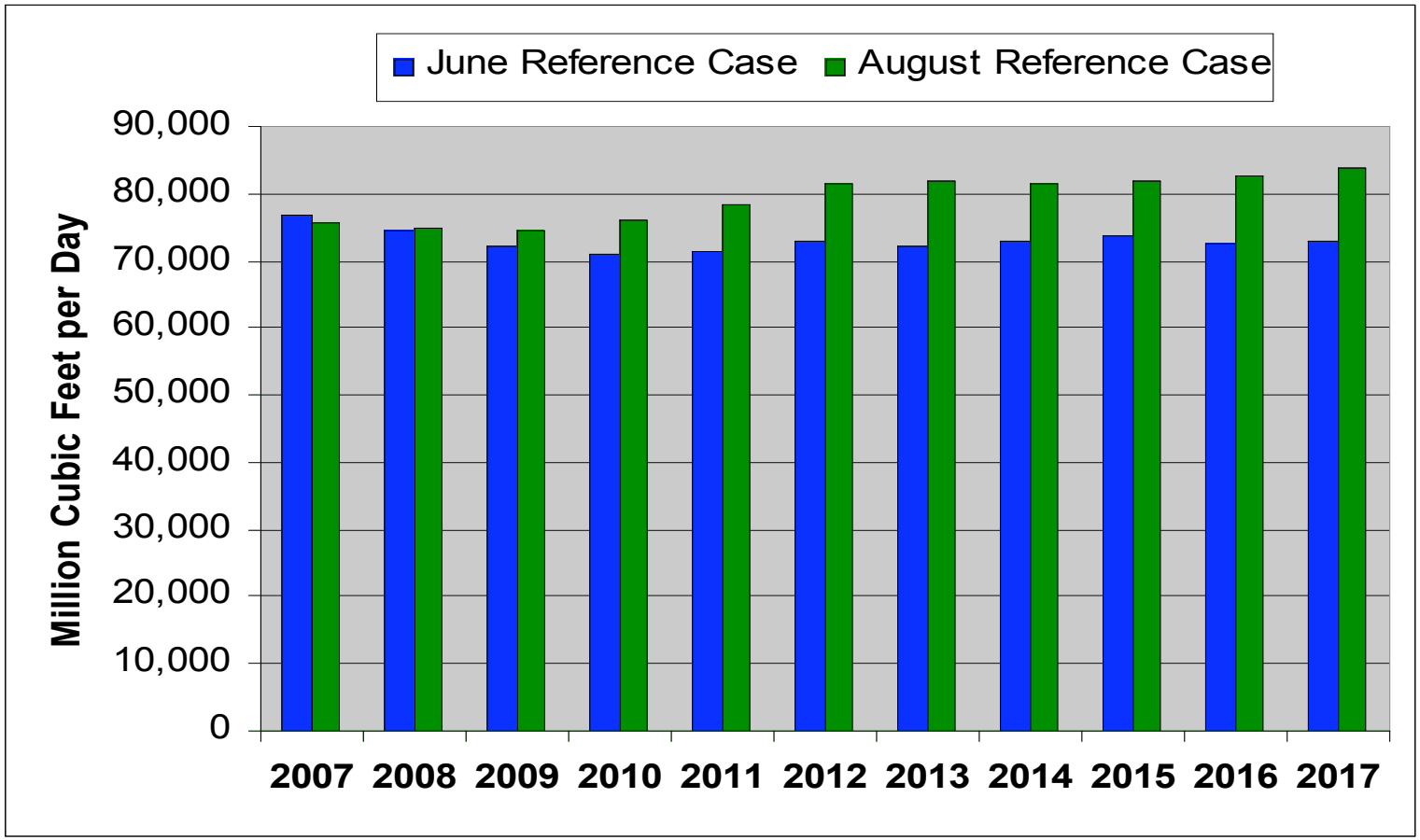
Source: California Energy Commission Staff, 2007

California Natural Gas Production



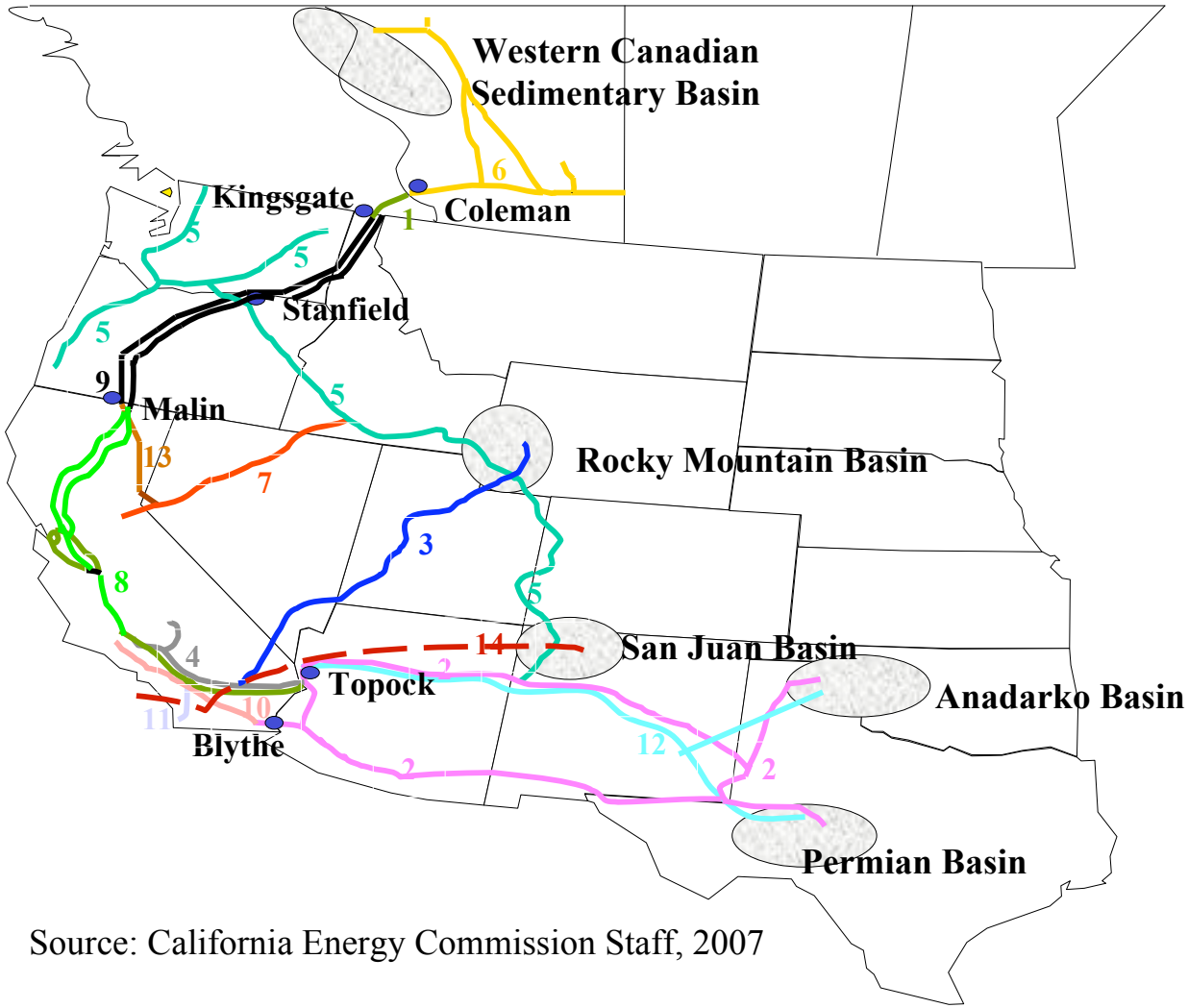
Source: California Energy Commission Staff, 2007

North America Natural Gas Production



Source: California Energy Commission Staff, 2007

Interstate Pipeline Serving Western United States and Canada



1	ANG
2	El Paso
3	Kern River
4	Mojave
5	Northwest
6	NOVA
7	Paiute
8	PG&E
9	PG&E GT- NW
10	SoCalGas
11	SDG&E
12	Transwestern
13	Tuscarora
14	Southern Trails

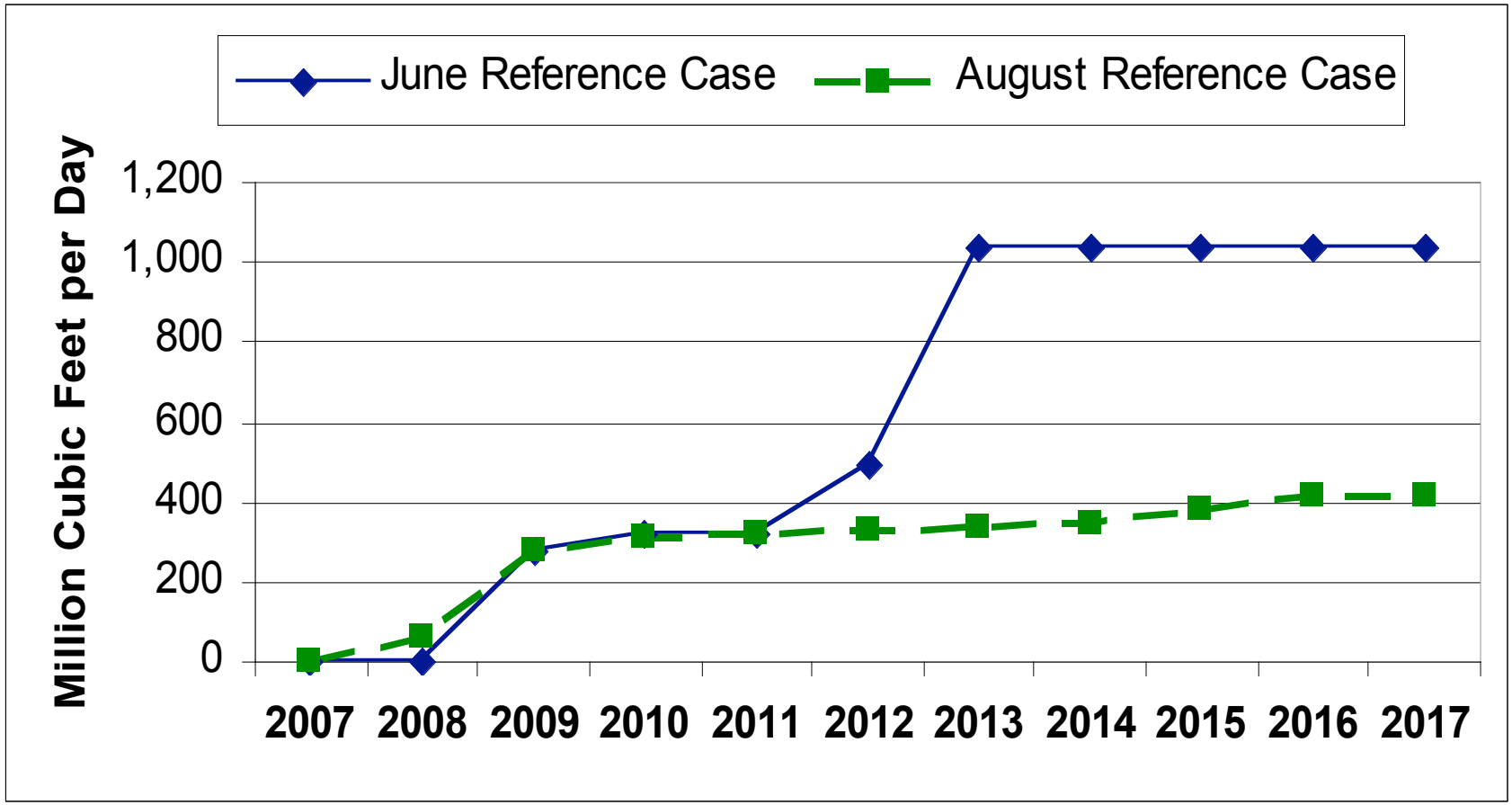
Source: California Energy Commission Staff, 2007

Infrastructure Changes

- Baja LNG Start Up 2008 at 1 Bcf/D
- Limited Pipeline Expansion into San Diego – 400 MMcfpD
- North Baja Pipeline Reversed – 2008
- Rockies Express – Start Up 2009 at 1Bcf/D
- Baja LNG Expands – 2015 by 1.5 Bcf/D
- North Baja Pipeline Expands - 2015
- California Line 300 Expands 2016 480MMcf/D

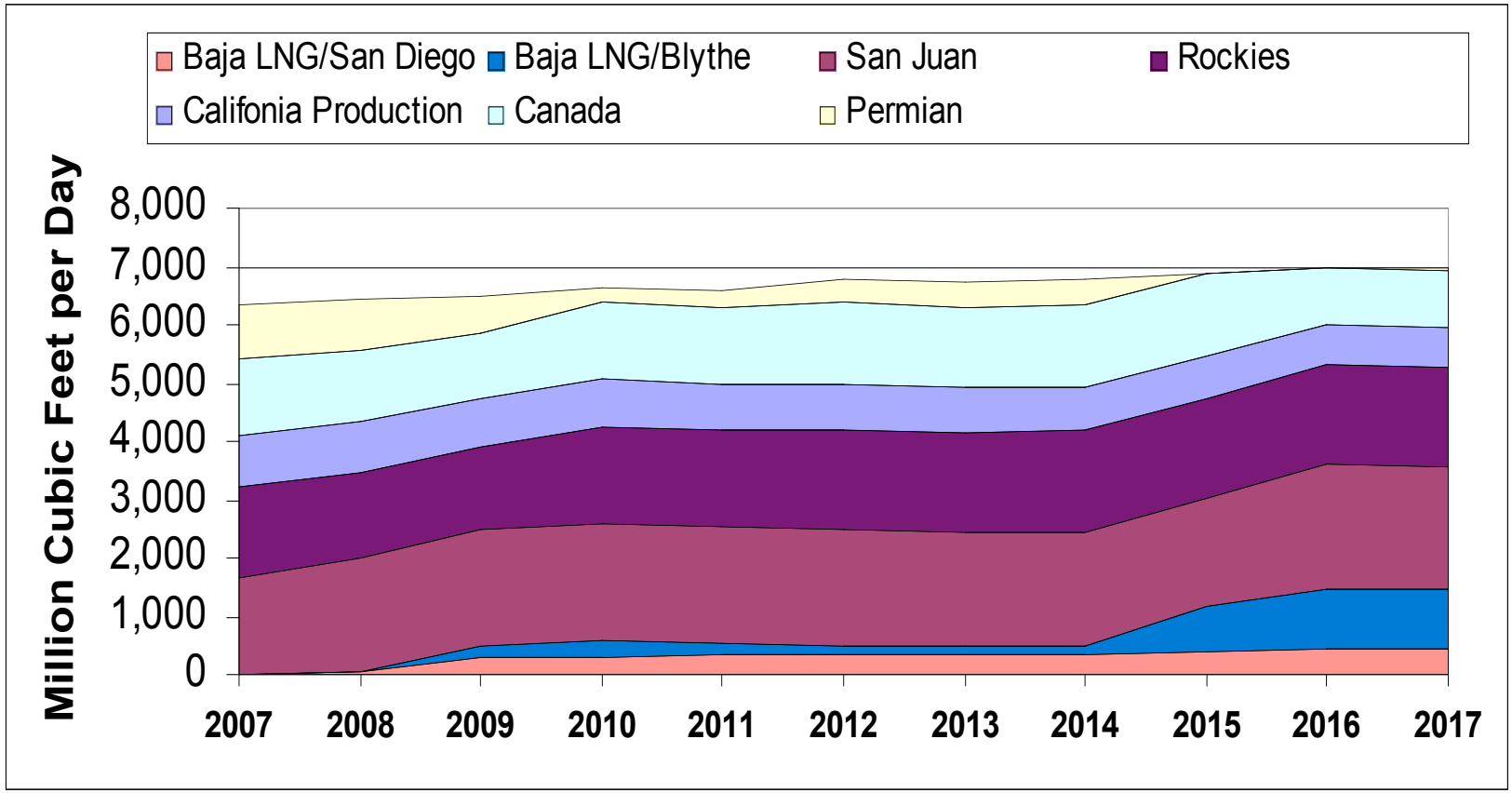
Source: California Energy Commission Staff, 2007

Baja Mexico Natural Gas Flows (LNG) at Otay Mesa



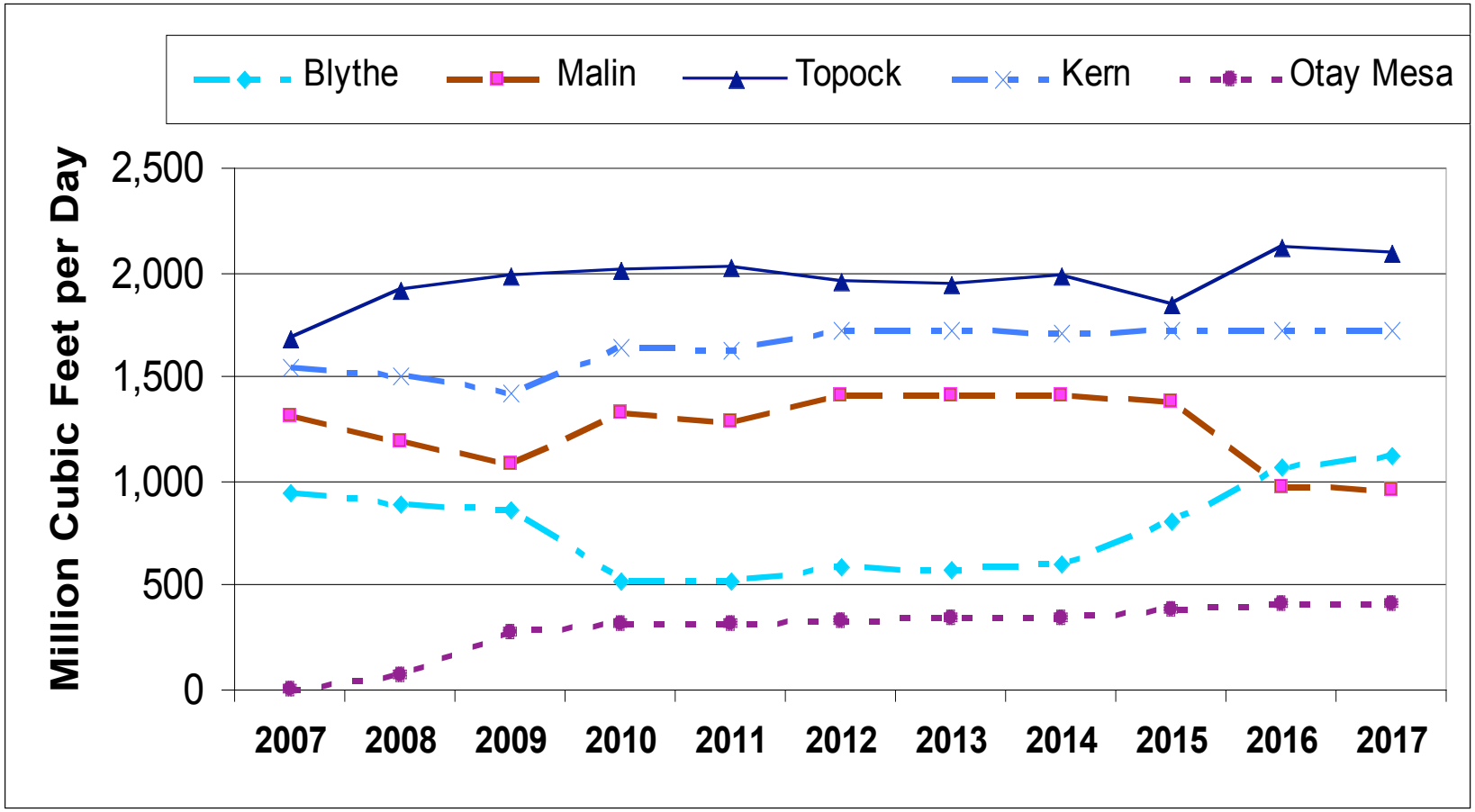
Source: California Energy Commission Staff, 2007

California Natural Gas Supply



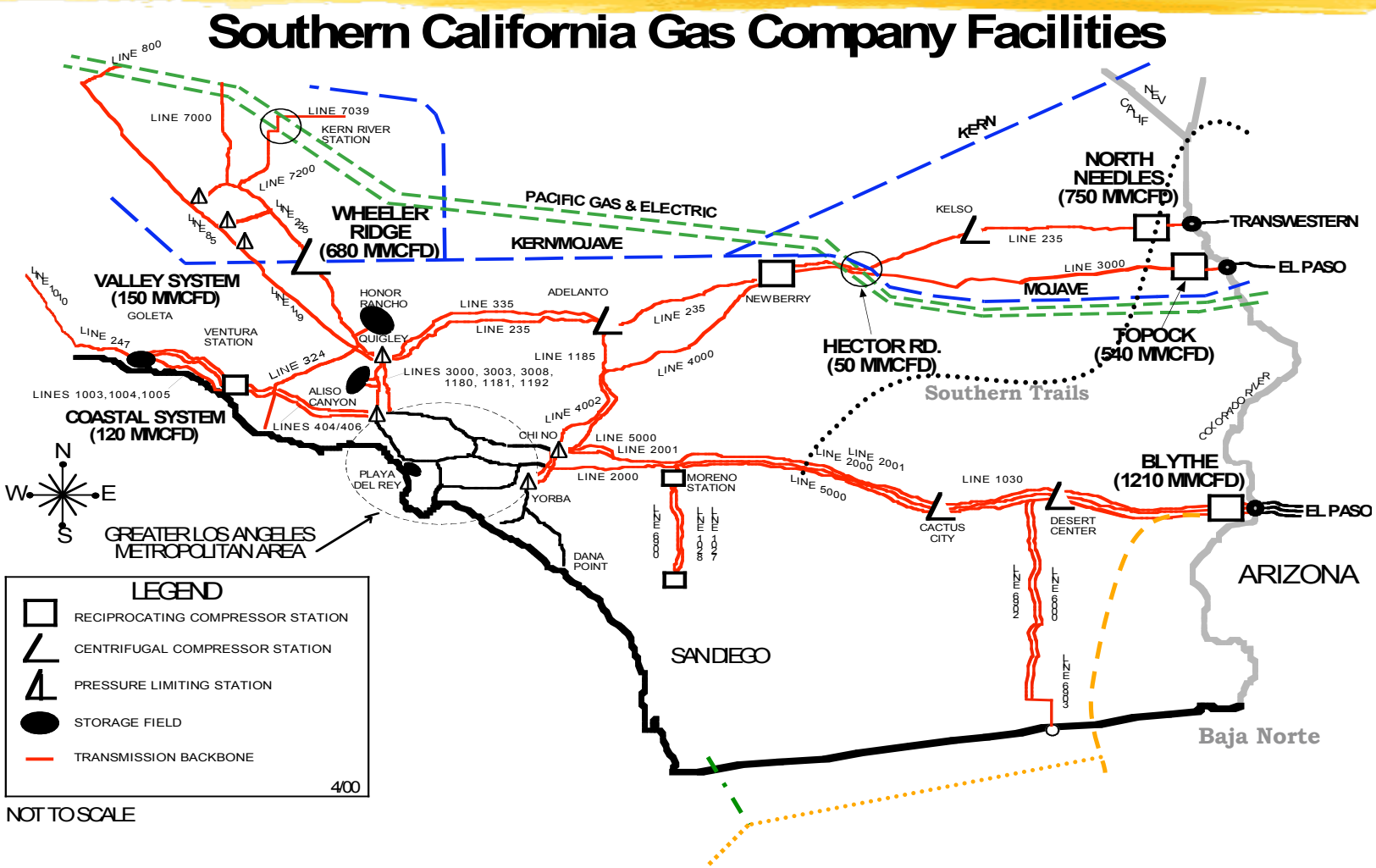
Source: California Energy Commission Staff, 2007

Gas Flows Into California



Source: California Energy Commission Staff, 2007

Southern California Natural Gas Pipeline System

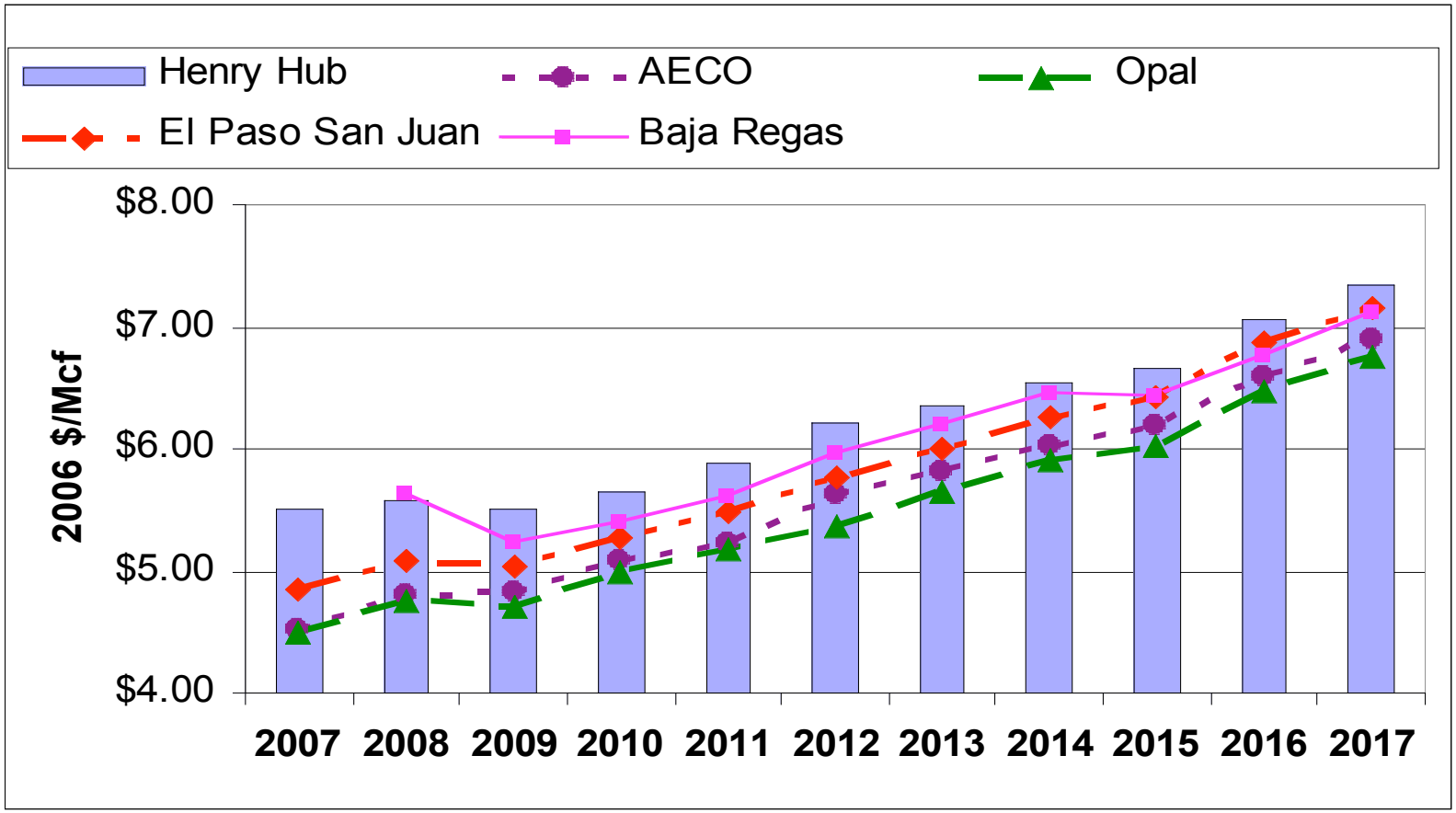


Source: Southern California Gas

California Natural Gas Pipeline System

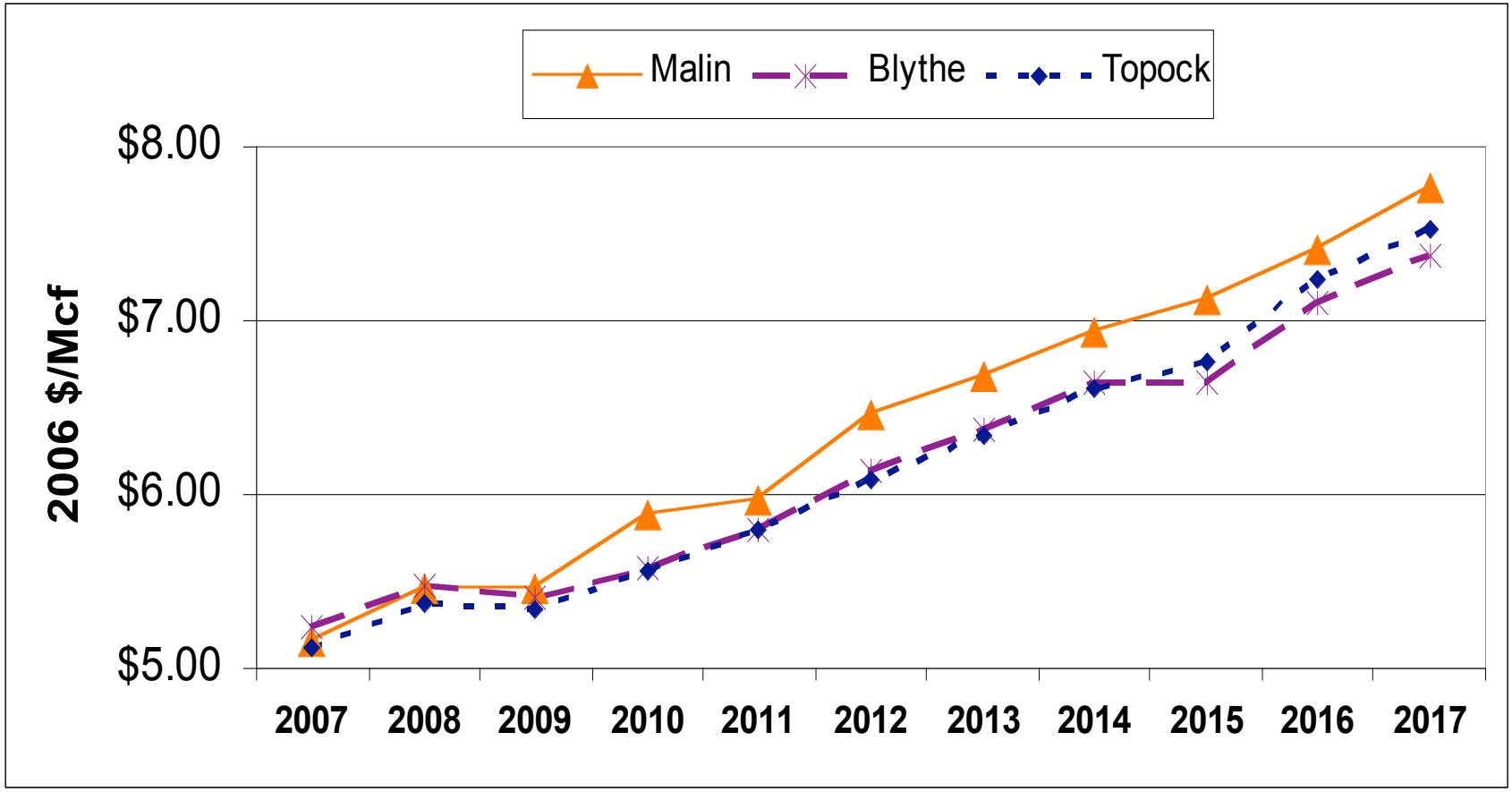
Source: Pacific Gas and Electric

Natural Gas Field Price



Source: California Energy Commission Staff, 2007

California Border Price



Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment: Sensitivities

- **Sensitivity #1: Dry Hydro conditions**
  - **Raised for power generation natural gas demand by 12 – 14% in the WECC.**

- **Sensitivity #2: Add 1 Bcf/d regasification terminal in Southern California**
  - **Begins operation in 2011;**
  - **Used a 75% utilization factor;**
  - **No expansion allowed.**

Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment: Sensitivities

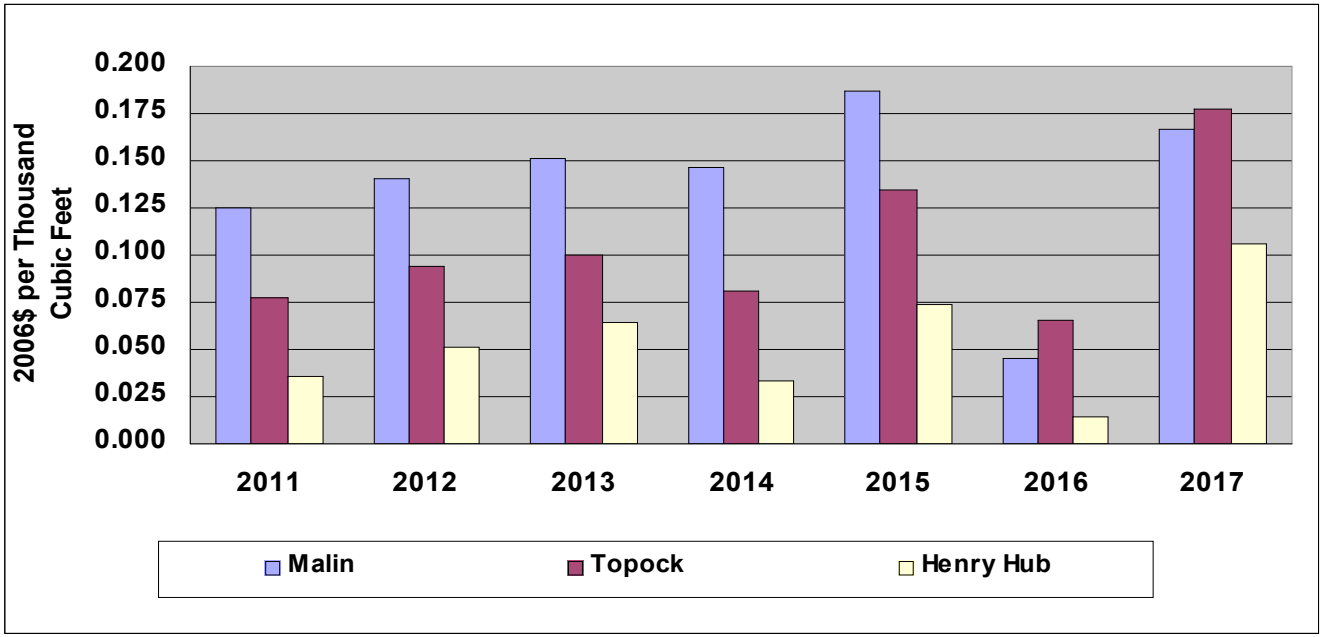
- **Sensitivity #3: Add 1 Bcf/d regasification terminal in Southern California**
  - **Begins operation in 2011;**
  - **Used a 75% utilization factor;**
  - **Add an expansion of 1 Bcf/d in 2015.**

- **Sensitivity #4: Add 1 Bcf/d regasification terminal in Southern California**
  - **Begins operation in 2011;**
  - **Used a 75% utilization factor;**
  - **Add another 1 Bcf/d terminal in 2015 in the Pacific Northwest.**

Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment: Sensitivity #1: Dry Hydro

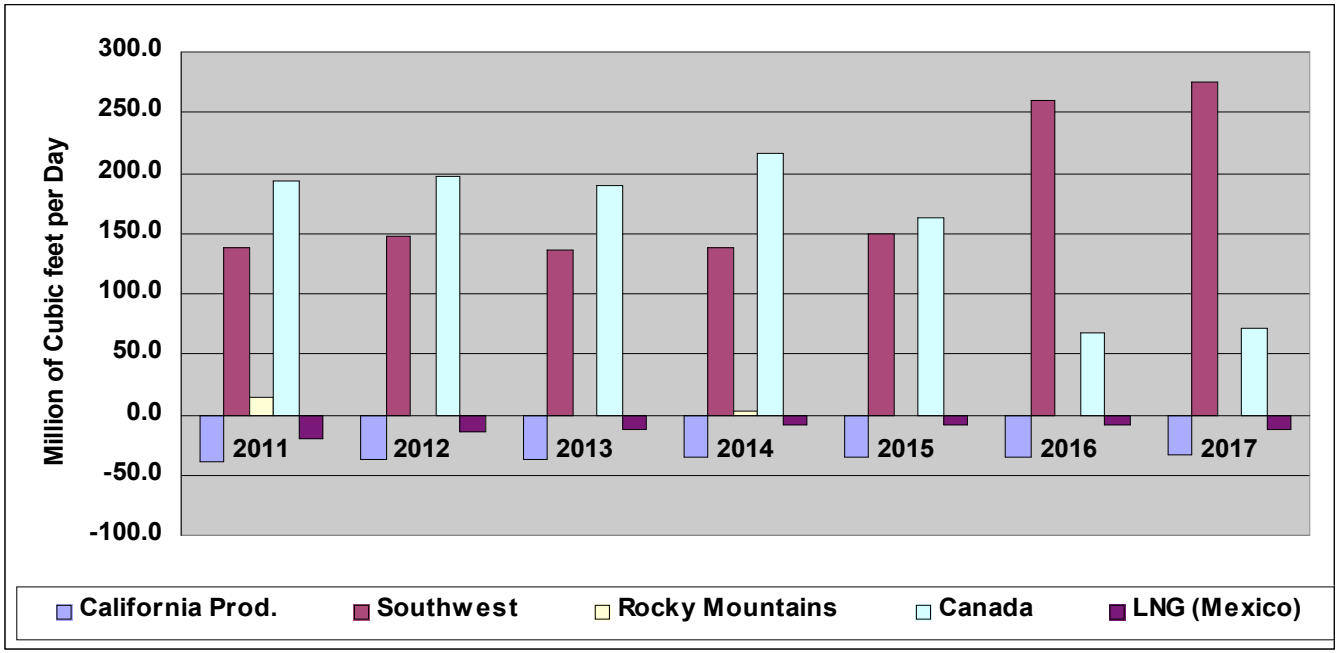
Prices Differences From Revised Reference Case



Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment: Sensitivity #1: Dry Hydro

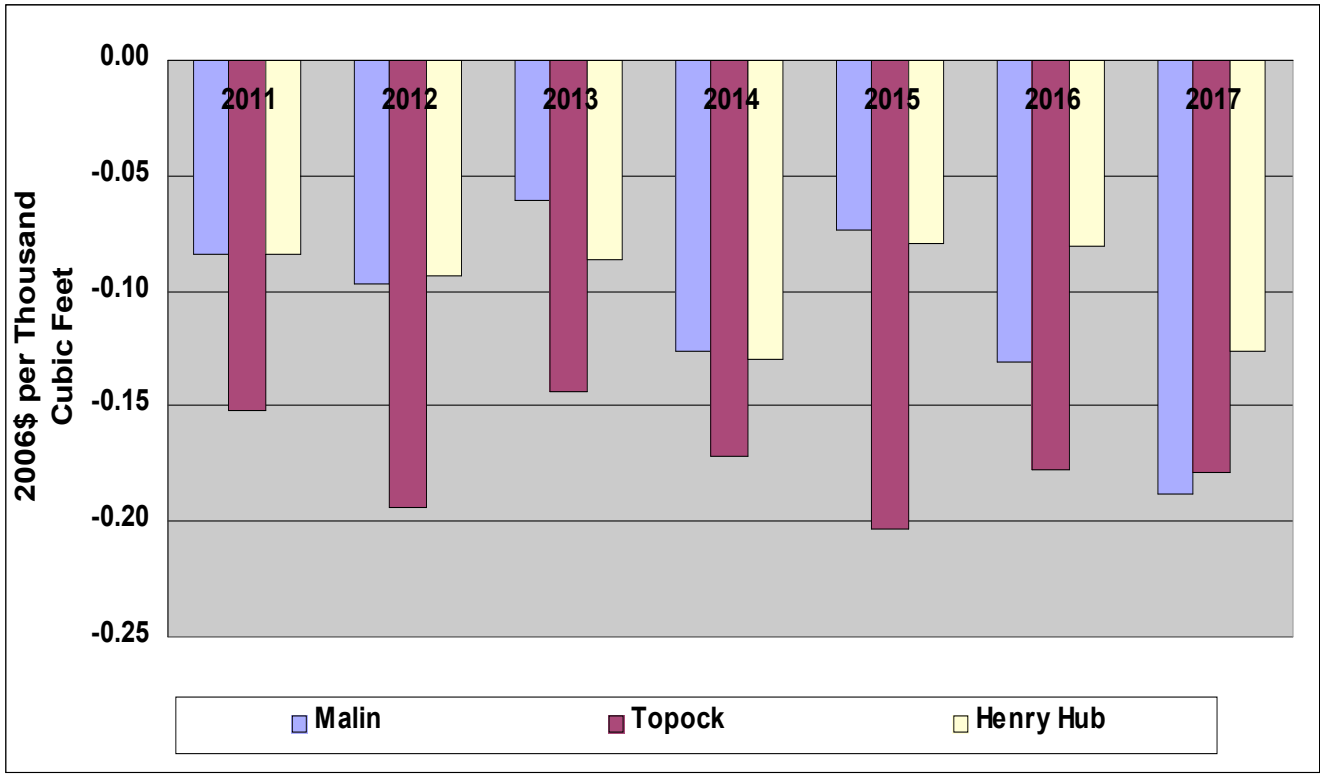
Flow Differences From Revised Reference Case



Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment:
Sensitivity #2: LNG in S. California (no expansion)

Prices Differences From Revised Reference Case



Source: California Energy Commission Staff, 2007

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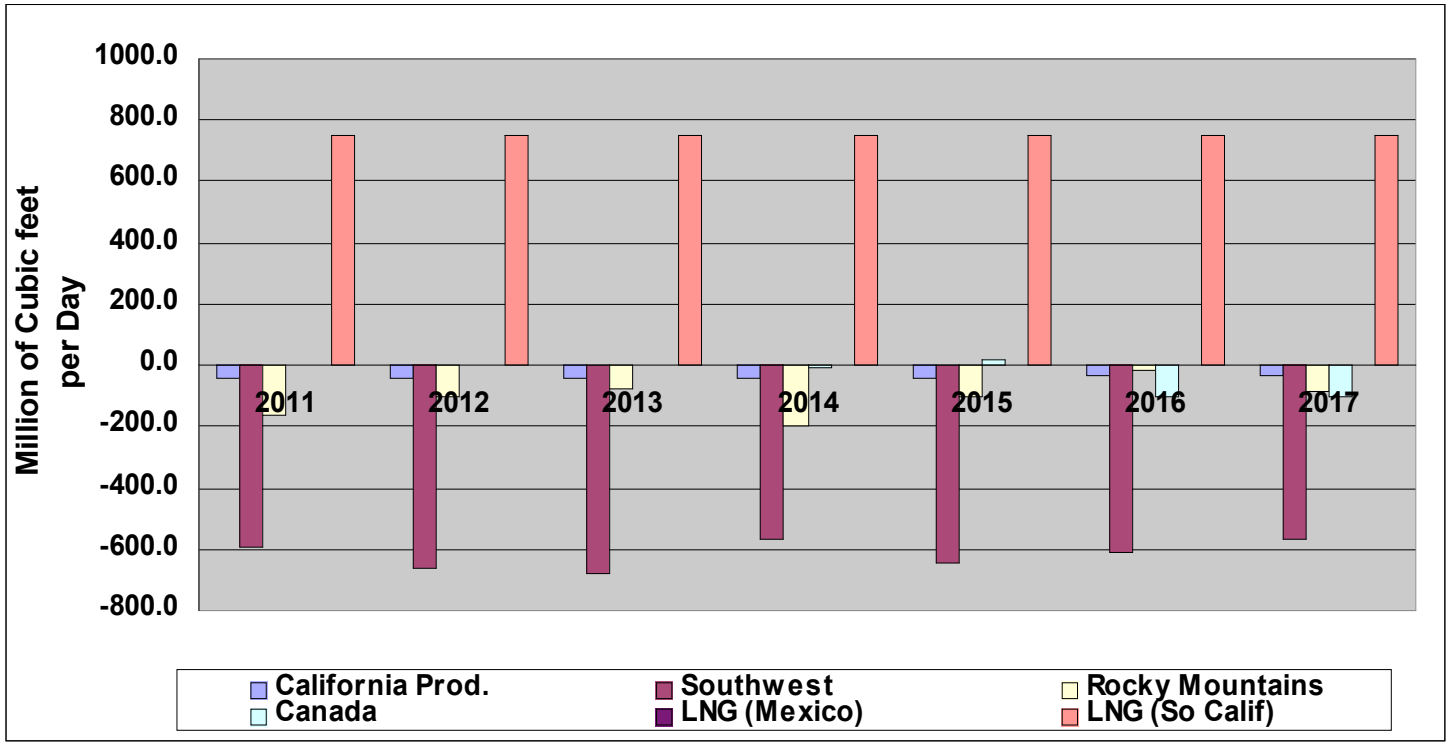
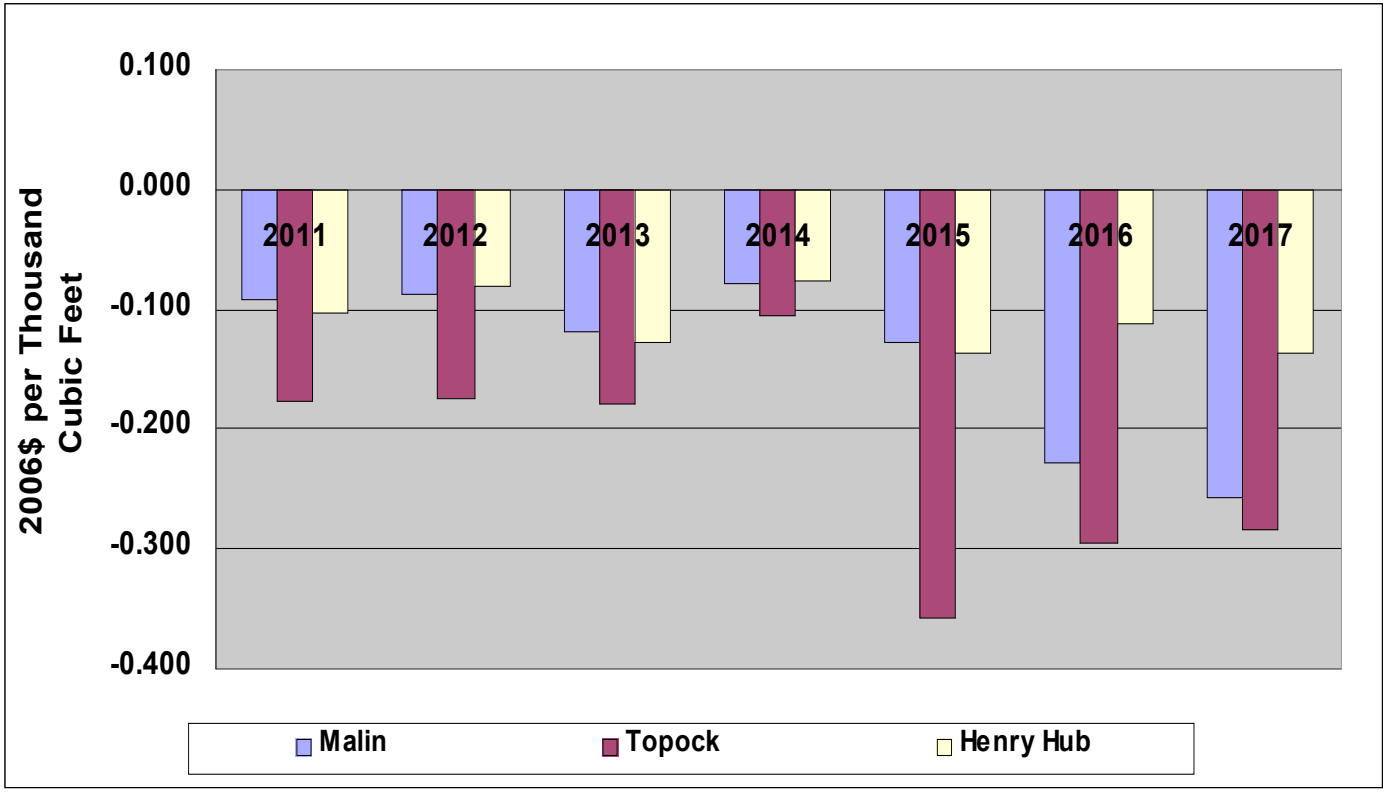


Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment:
Sensitivity #3: LNG in S. California (1 Bcf/d expansion)

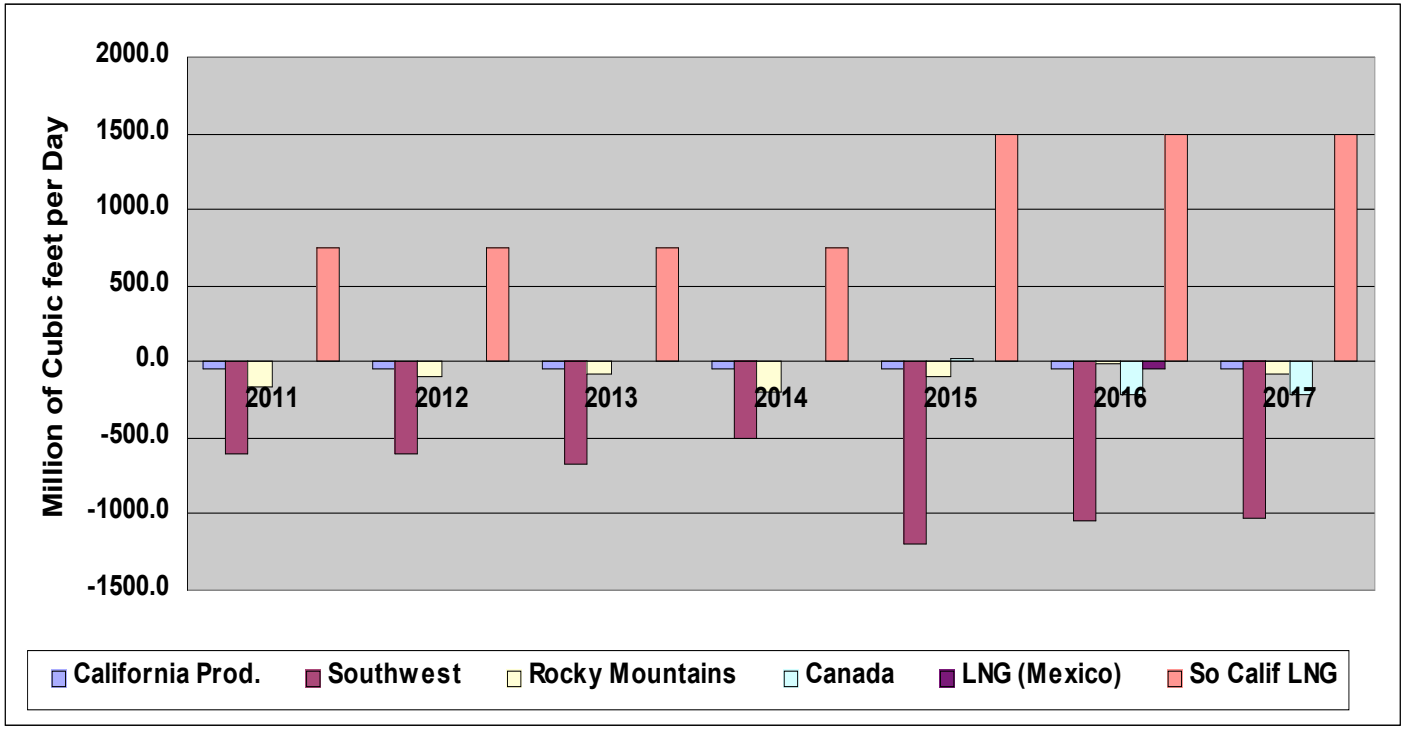
Prices Differences From Revised Reference Case



Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment:
Sensitivity #3: LNG in S. California (1 Bcf/d expansion)

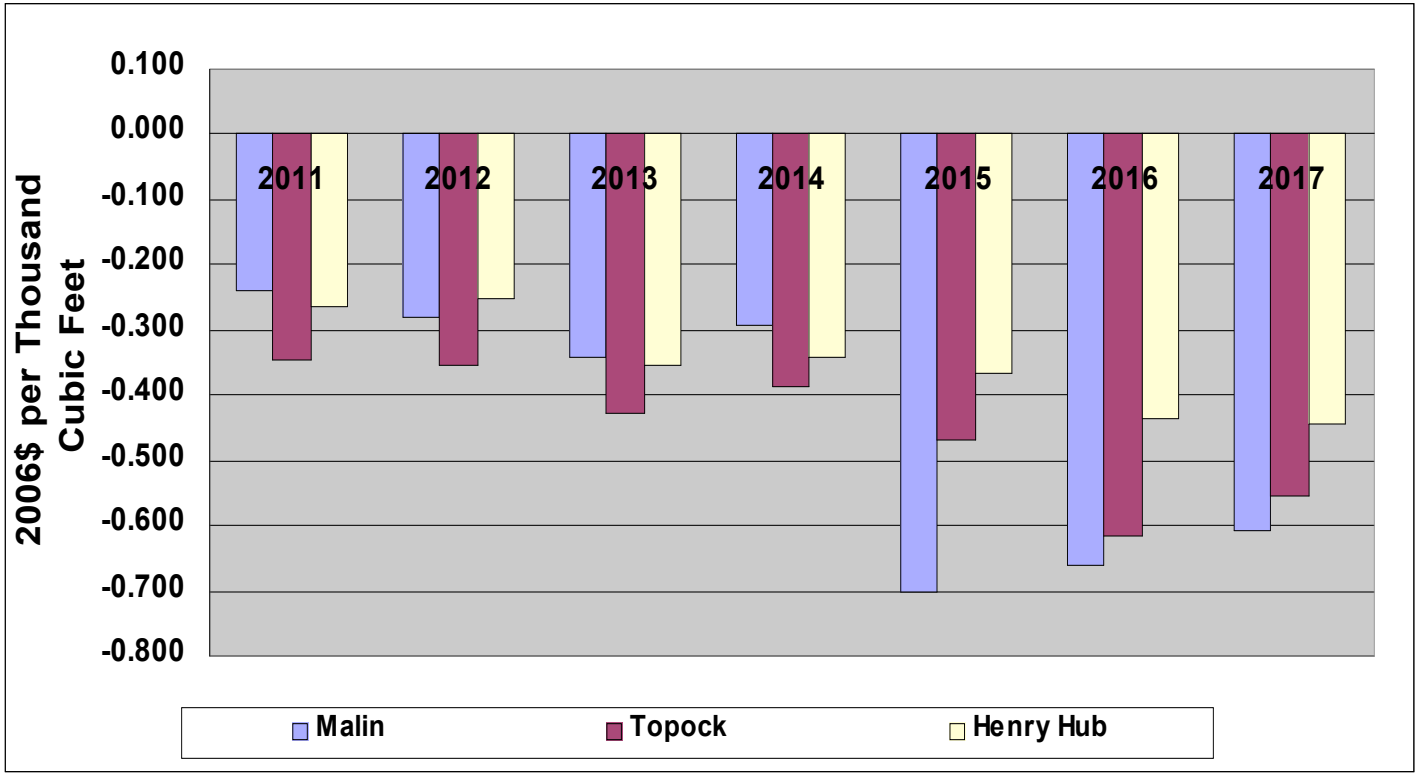
Flow Differences From Revised Reference Case



Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment:
Sensitivity #4: LNG in S. California (with 1 Bcf/d terminal in the Pacific Northwest)

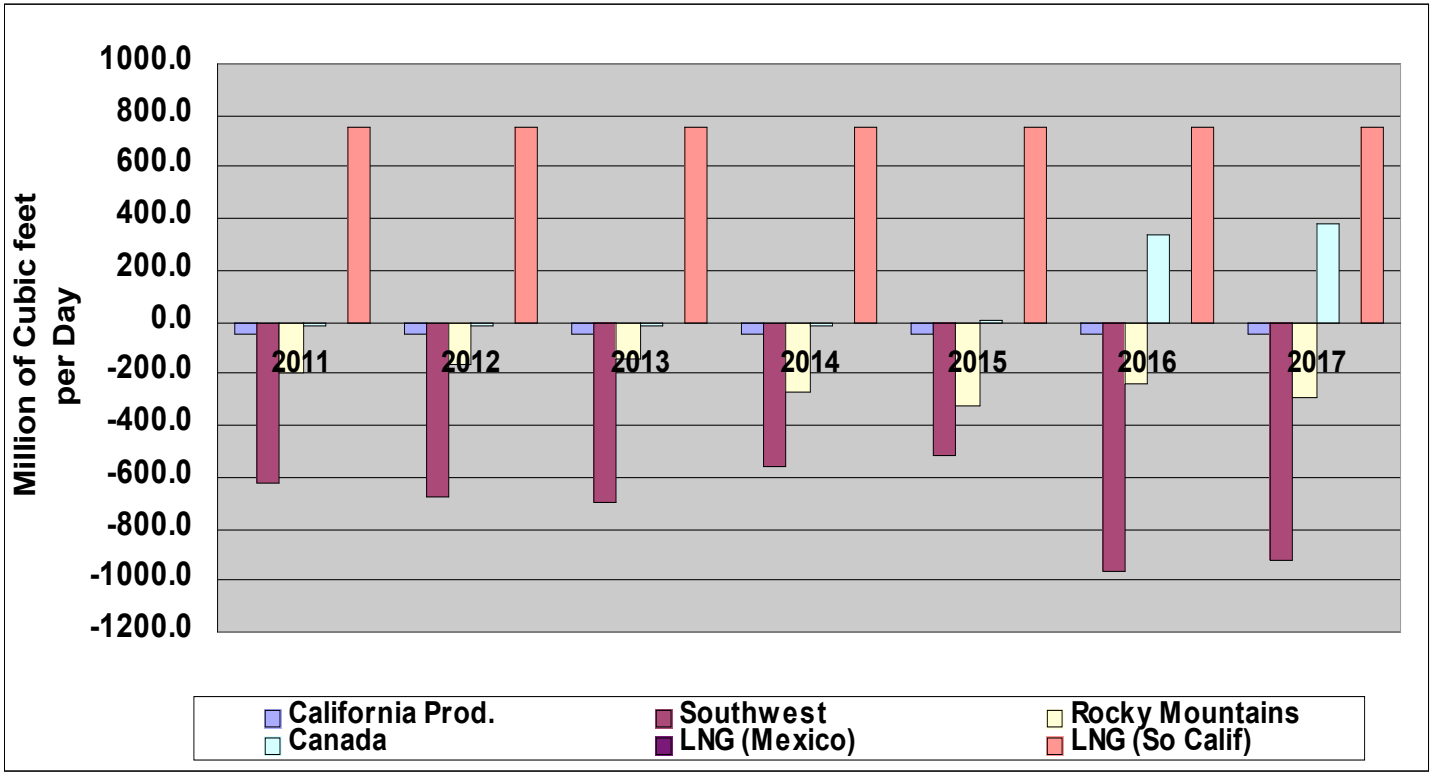
Prices Differences From Revised Reference Case



Source: California Energy Commission Staff, 2007

Natural Gas Market Assessment:
Sensitivity #4: LNG in S. California (with 1 Bcf/d terminal in the Pacific Northwest)

Flow Differences From Revised Reference Case



Source: California Energy Commission Staff, 2007

Questions?