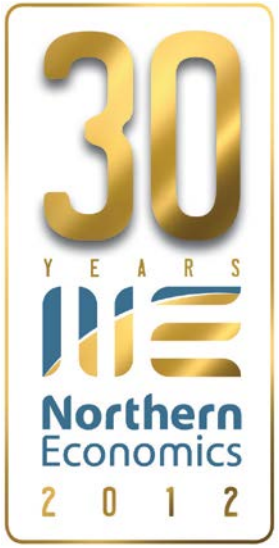
FNSB Gas Distribution System Analysis

Presentation to

FNSB Assembly

Patrick Burden

June 21, 2012



Report Sections

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Points to Remember

- The results presented here are based on a specific set of assumptions
- Sensitivity analysis: price of natural gas delivered to the end user *plus conversion costs* could be $19 to $23/MMBtu; propane could be $24 to $27/MMBtu
- A gas pipeline distribution system for high and medium density areas of the FNSB; propane-based system elsewhere in the Borough
- Pipe system primarily serves residential and commercial users from Chena Ridge to Eielson; excludes FNG and Aurora Energy customers

Project Goals

- To define a supply-neutral optimized plan for the rapid build-out of the FNSB's energy distribution infrastructure, one that delivers propane or natural gas as affordably as possible, to the largest number of borough residents, business and residential properties; and

- To assess the impact of the proposed infrastructure build-out on air quality in the Fairbanks North Star Borough nonattainment area.

Major Findings - 1

- Construction and operation of a piped natural gas distribution system in the high-density and medium-density areas of the FNSB, and a propane distribution system in the low-density areas of the borough, has the potential to reduce fuel costs for space heating of residential and commercial structures by about 60 percent compared to the status quo using fuel oil and wood.
- In 2021 community wide savings are estimated at about $315 million with a non-private distribution entity.

Major Findings - 2

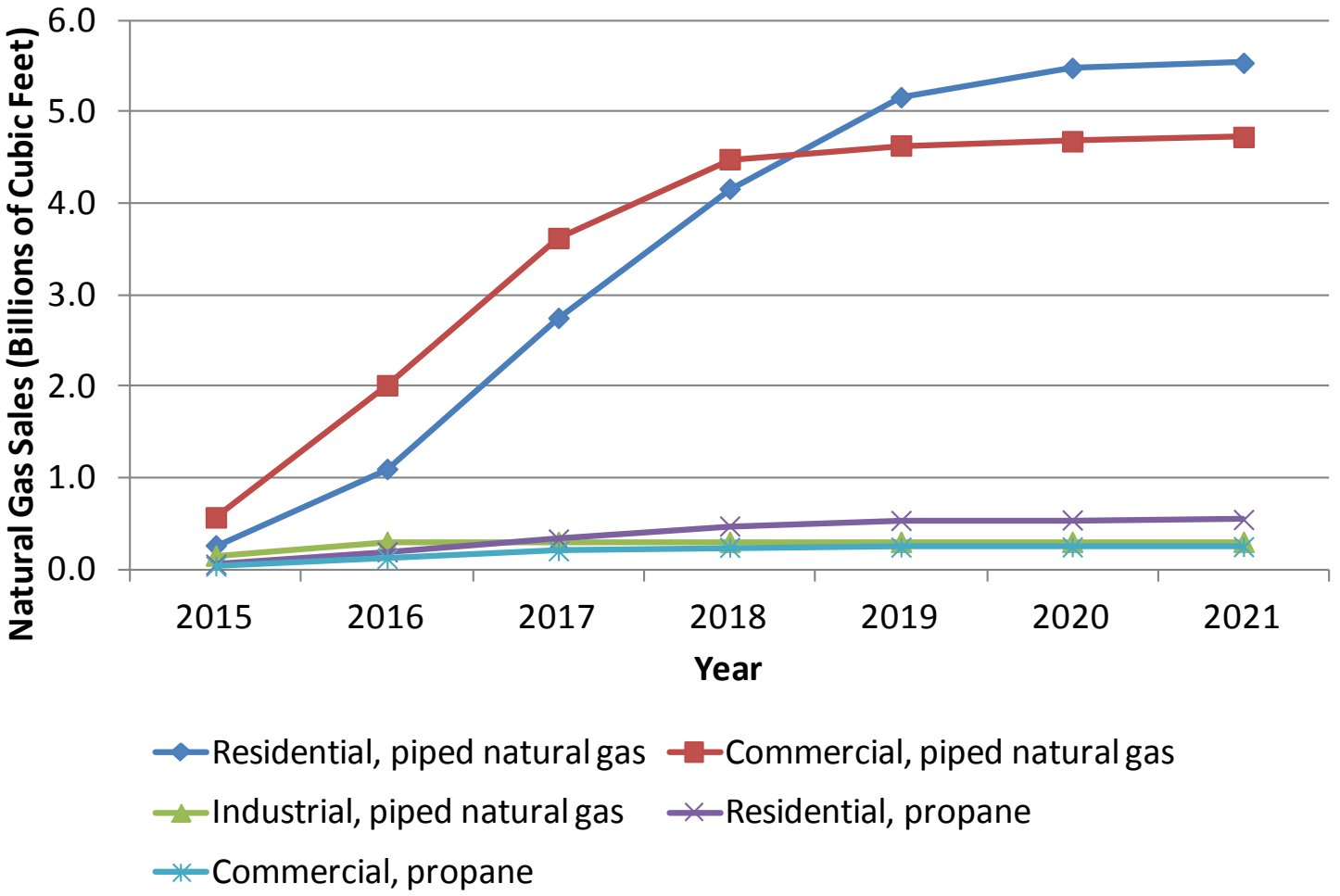
- Converting to natural gas for *space heating* will reduce the overall emissions of $PM_{2.5}$ in the high and medium areas from approximately 2,200 tons per year to less than 200 tons per year.
- The conversion to natural gas will also reduce NO_X and SO_2 emissions, which are precursors to the formation of secondary $PM_{2.5}$ in the atmosphere.
- Combined, these emission reductions will help bring the Fairbanks area into attainment with the ambient $PM_{2.5}$ air quality standard.
- Air quality analysis does not include industrial sector

2012 Market Estimate

Category	Total Estimated Market Potential	Adjusted Market Demand	Potential Market Served by Piped Distribution System
	Bcf/Year		
Residential Sector	6.4	6.1	5.6
Commercial Sector	6.2	5.1	4.9
Industrial Sector	7.9	0.3	0.3
Total	20.5	11.5	10.8

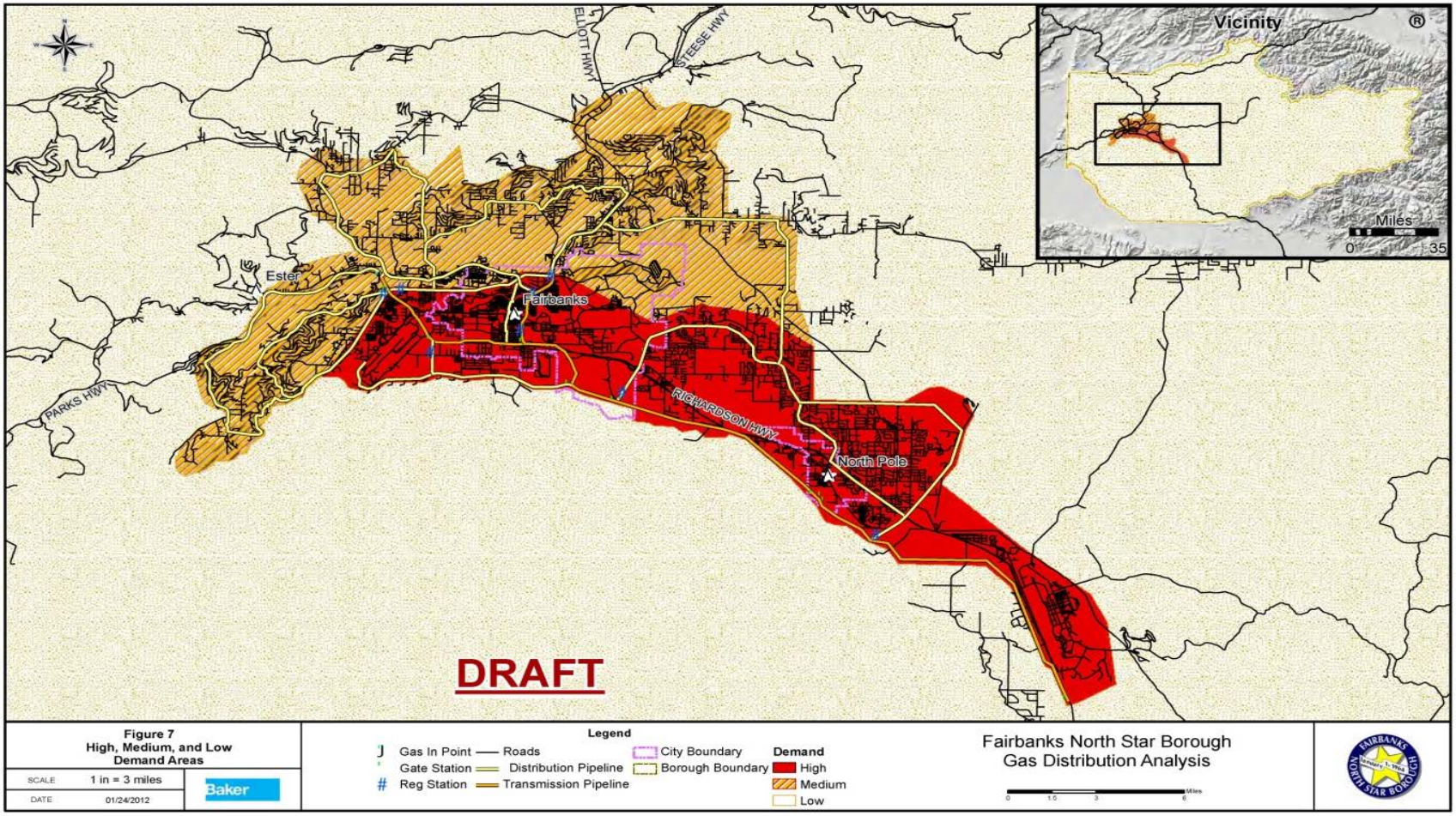
Adjust market potential by removing FNG and Aurora Energy customers, and demand from GVEA and FHR. Also adjust for seasonal cabins in low density area of Borough.

Natural Gas/Propane Sales



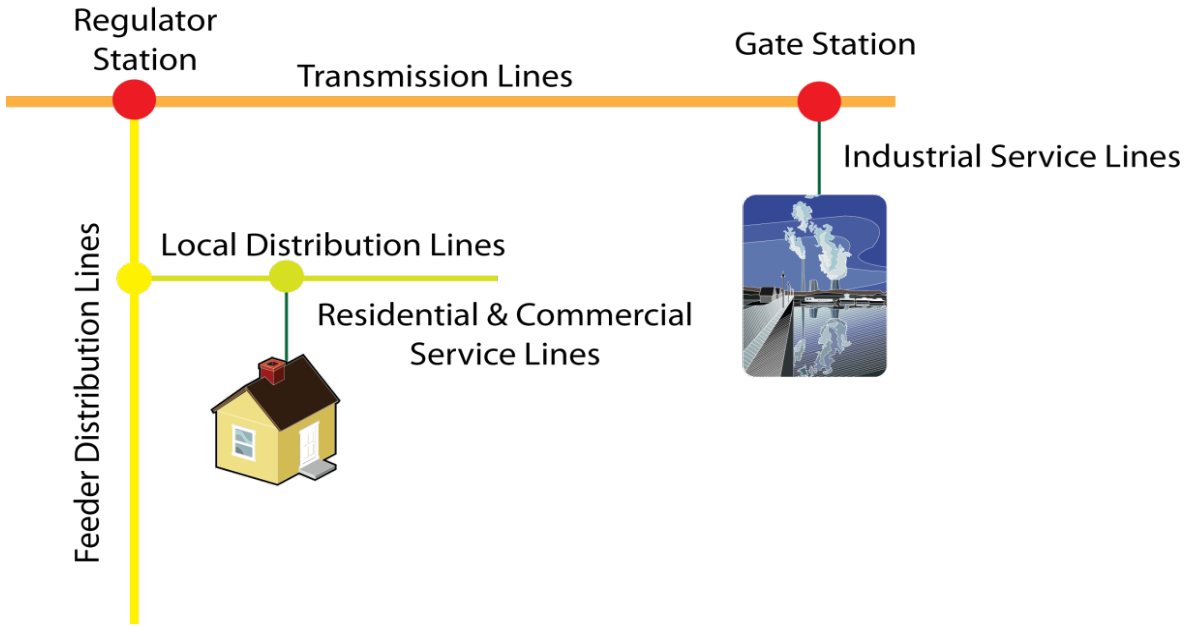
11.4 Bcf per year estimated natural gas and propane sales in 2021

Gas Pipeline Distribution System Conceptual Design



Conceptual Design Includes:

- **Transmission lines** providing natural gas to feeder distribution lines and industrial users
- **Feeder distribution lines** providing natural gas to local distribution lines
- **Local distribution lines** providing natural gas to service lines
- **Service lines** providing natural gas to individual residential and commercial user service connections
- **Pressure regulating stations** which drop the high pressure of the transmission lines to lower service line pressure



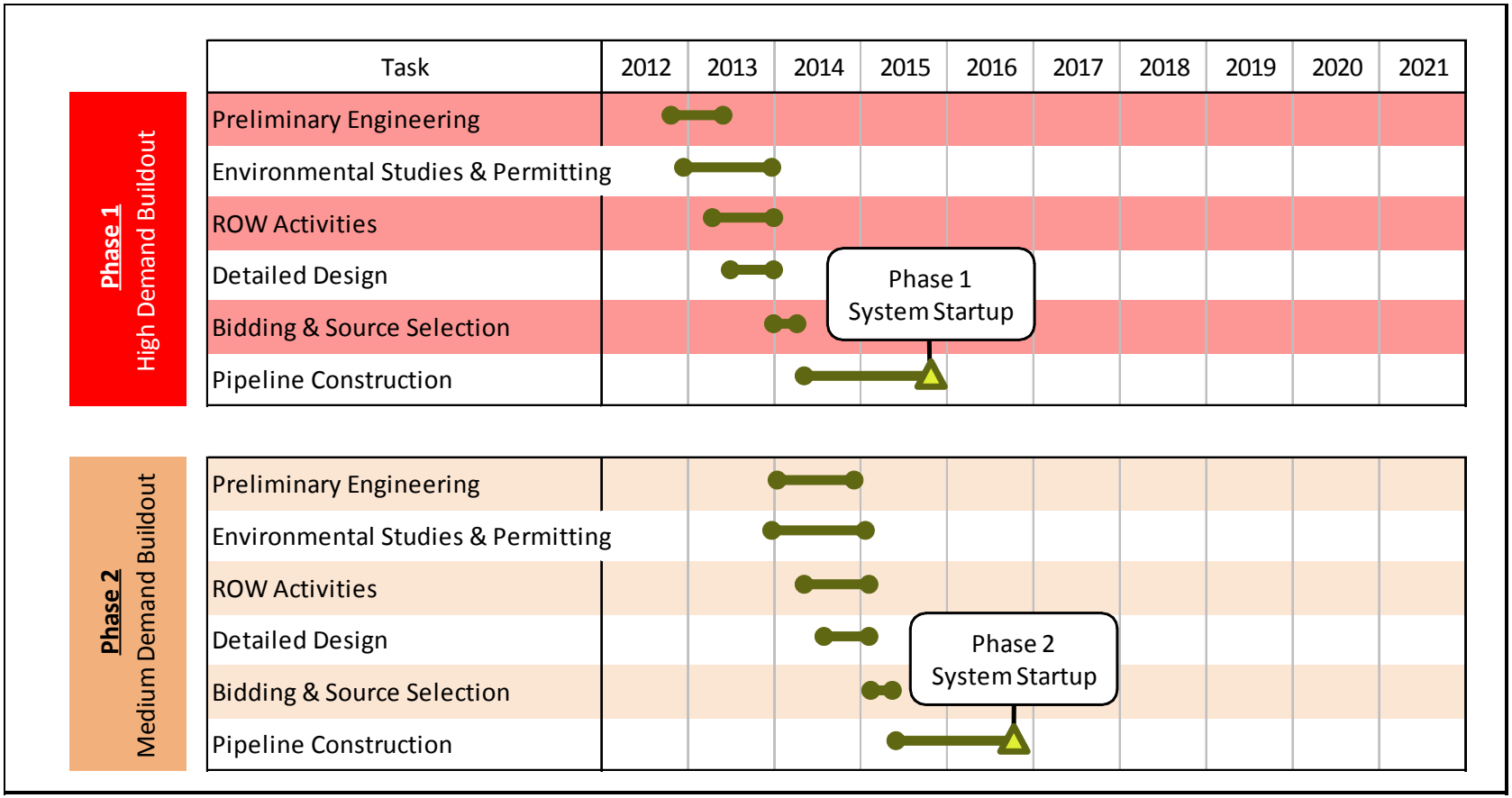
Gas Pipeline Distribution System Cost Estimate

Phase/Item	Low Estimate	High Estimate
1 - High-Demand Area	(in $ millions)	(in $ millions)
Engineering, Permitting & ROW Services	8.1	17.3
Construction	153.5	328.9
Total	161.6	346.2
2 - Medium-Demand Area		
Engineering, Permitting & ROW Services	5.9	12.7
Construction	115.3	247.1
Total	121.2	259.8
Total Phase 1 and Phase 2	**282.8**	**606.0**

Source: Michael Baker Corporation

Note: Base Case estimate for both areas is $404 million.

Conceptual Build Out Schedule



Source: Michael Baker Corporation

Cost of Service for Private Entity

Piped Distribution Area Gas Cost Components	Year 2020
Natural gas price at wellhead ($/MMBtu)	3.91
Other costs to city gate ($/MMBtu)	7.23
Operations & Maintenance cost ($/MMBtu)	0.55
Admin & General Overhead	2.78
Depreciation ($/MMBtu)	0.77
Subtotal	**15.25**
Debt service and return on equity ($/MMBtu)	3.01
Total cost per MMBtu	**18.26**
Total selling value with 20% margin over cost	**21.91**

- Based on ANGDA/ISER reports cost of delivered propane is estimated at about $24.00

Business Structure and SWOT

Organizational Structure	Strengths	Weaknesses	Opportunities	Threats
Private Company	Ability to raise capital for initial distribution system	Highest cost of service option	Potential sales tax income	Stability of future corporation
Non-Profit (Cooperative or Municipal Utility)	Potential for lowest cost of service	May not have bonding capacity to construct the system	May qualify for funding partnership with the State	Potentially least flexible of the business structures
Non-Profits (Local Improvement District)	Access to borough's special assessment bonding capability	Borough assumes the risk of repayment for construction	Borough can benefit from taxes on gas utility	A decline in property values may create difficulty in repaying bonds
State Partnership	Lowest cost of service	Complicated ownership structure	Can leverage state investment and technical support	Uncertain regulatory requirements

On a cost basis alone, the difference between business models is not likely to be the determining factor driving customers to switch over to natural gas. However, based on the analysis, there is a 9% cost of service differential between the private and non-private entities.

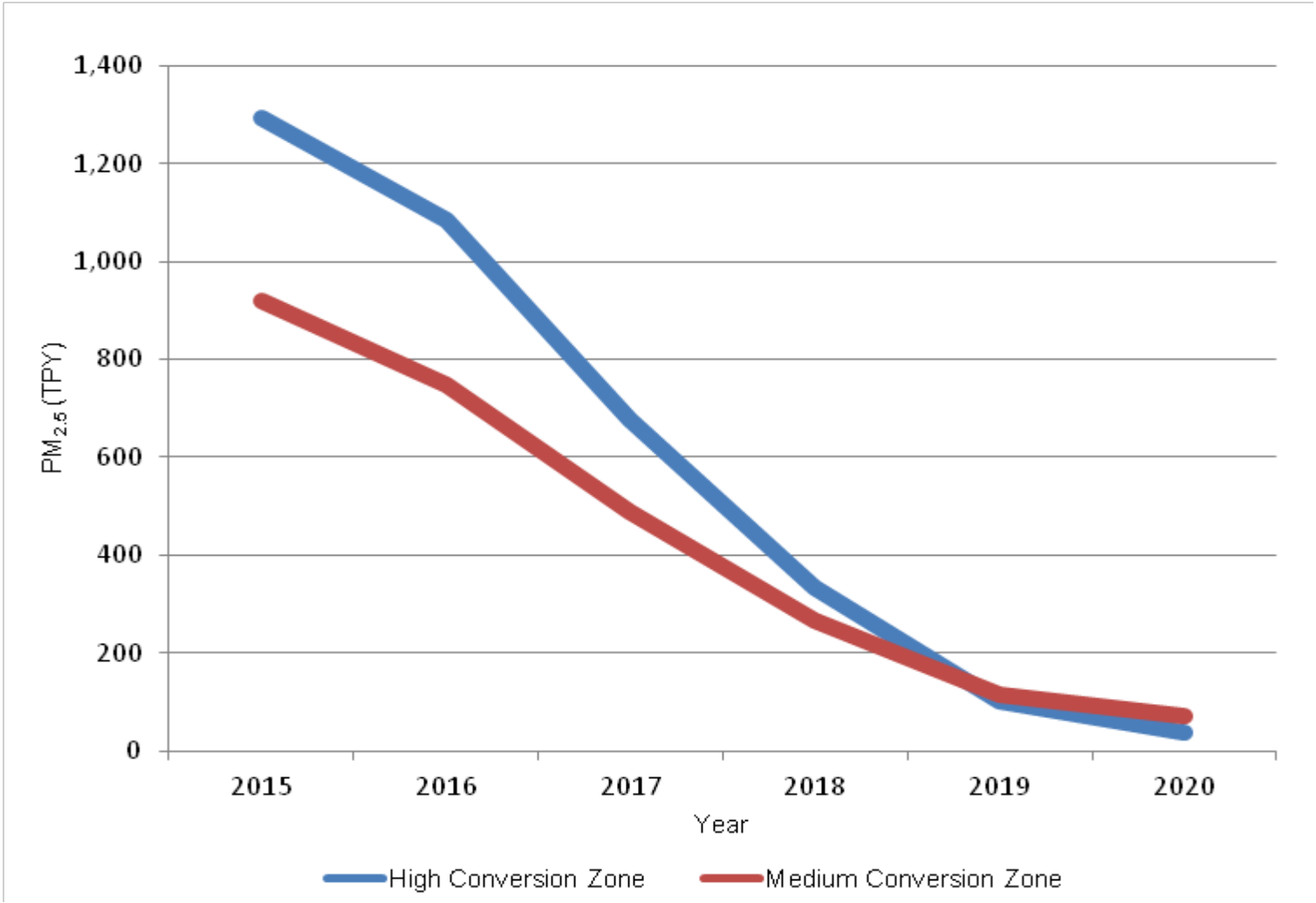
Estimated Impact on Air Quality

Estimates are for High Demand Zone

Category	NO_X	CO	PM_{10}	$PM_{2.5}$	SO_2	VOC
	(%)					
Residential	-58	-96	-96	-96	-97	-97
Commercial	-43	-18	-74	-73	-100	8
Total	-51	-95	-95	-95	-98	-97

Source: SLR International, Corp.

$PM_{2.5}$ Emissions Estimates (Tons per Year)



Potential Savings: Community

	2015	2016	2017	2018	2019	2020	2021
Heating Fuel Price ($/gallon)	$4.82	$4.84	$5.05	$5.22	$5.39	$5.57	$5.75
Delivered Gas Price ($/mcf)	$20.12	$16.67	$16.06	$16.07	$16.29	$16.59	$16.92
	Savings in Millions of $						
Residential	6.3	29.8	66.5	105.8	136.1	149.8	157.3
Commercial	8.8	47.9	97.9	128.5	138.7	145.7	152.9
Industrial	1	3	3.5	3.8	4	4.2	4.4
Total Savings	**16.2**	**80.8**	**167.9**	**238.1**	**278.8**	**299.7**	**314.6**
Savings as a % of Status Quo	4%	19%	38%	51%	58%	60%	60%

Grant as % of CAPEX	Delivered Gas Price, 2015-2021 (Nominal $)						
	2015	2016	2017	2018	2019	2020	2021
10	$20.40	$17.79	$17.16	$17.16	$17.37	$17.66	$17.99
30	$20.26	$17.23	$16.61	$16.62	$16.83	$17.13	$17.46
50	$20.12	$16.67	$16.06	$16.07	$16.29	$16.59	$16.92
70	$19.98	$16.12	$15.50	$15.52	$15.75	$16.06	$16.39
90	$19.84	$15.56	$14.95	$14.98	$15.21	$15.52	$15.86

Potential Savings per Household in 2021

Average Home Heating Requirement:				250	MMBtu/yr
Cost in oil:	$42.25	per MMBtu	($5.75/gal.)	$10,562.50	per year
Cost in gas:	$16.92	per MMBtu	($16.92/mcf)	$4,230.00	per year
Yearly Fuel Cost Savings of Gas over Oil:				**$6,332.50**	**per year**

Estimated Yearly Savings to Homeowner		
Delivered Price of Natural Gas ($/mcf)	Yearly Homeower Cost	Homeowner Savings Over Oil
$16.92	$4,230.00	$6,332.50
$18.00	$4,500.00	$6,062.50
$20.00	$5,000.00	$5,562.50
$22.00	$5,500.00	$5,062.50
$24.00	$6,000.00	$4,562.50

Decision Points

- There will be changes from the model assumptions
  - Management can respond to these changes in many ways
    - Business models/Grants/Bonds/State loans/etc.
  - There are no foreseen absolute go or no-go points or prices
- Wood
  - At 50% grants, gas can displace wood after throughput volumes increase to spread fixed costs across more units; grants to subsidize gas prices for first few years may be more cost-effective than larger grants for capital cost re $PM_{2.5}$
  - Propane is not likely to displace wood in low density areas; residents who primarily heat with wood may not benefit from investment in piped distribution system or propane availability.

Conclusions

- Gas Distribution System meets Project Goals
  - Community-wide savings of 60% of heating fuel costs in 2021
  - $PM_{2.5}$ emissions are reduced from about 2,200 tons per year to less than 200 tons per year; analysis does not include industrial
- Under any reasonable scenario the proposed system would have a positive impact on the community in terms of reducing high energy costs to residents and businesses and improving the quality of life
- As a result, the conversion to natural gas and propane should be pursued