

Refueling North America with LNG

Prospectus
Multi-Client Study



ADI Analytics
ENERGY INSIGHT AND CONSULTING

ADI ANALYTICS LLC
+1 (281) 506-8234
info@adi-analytics.com
www.adi-analytics.com

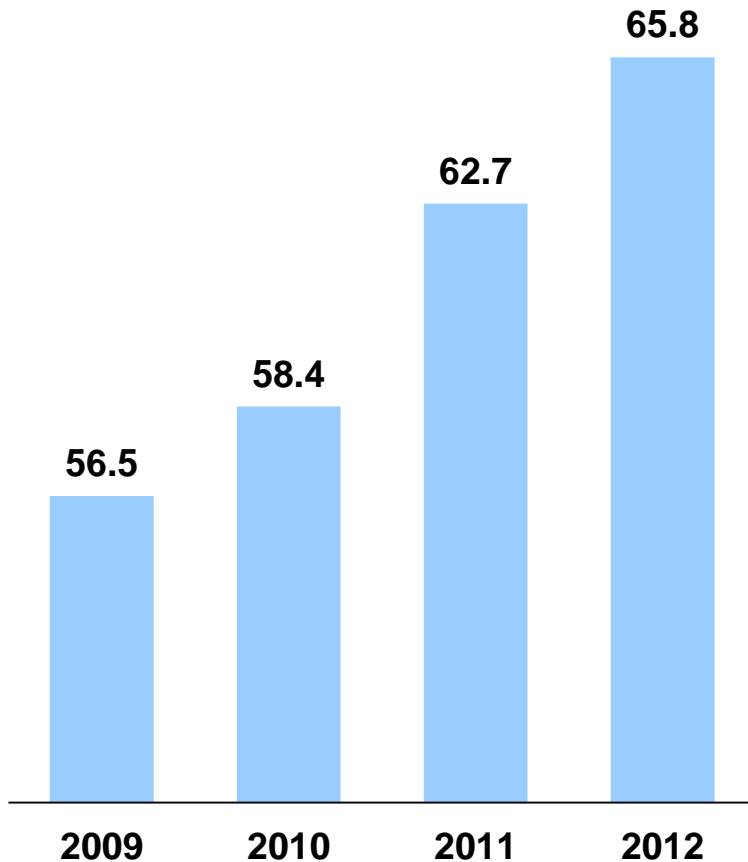
Outline

▶ **Prospectus**

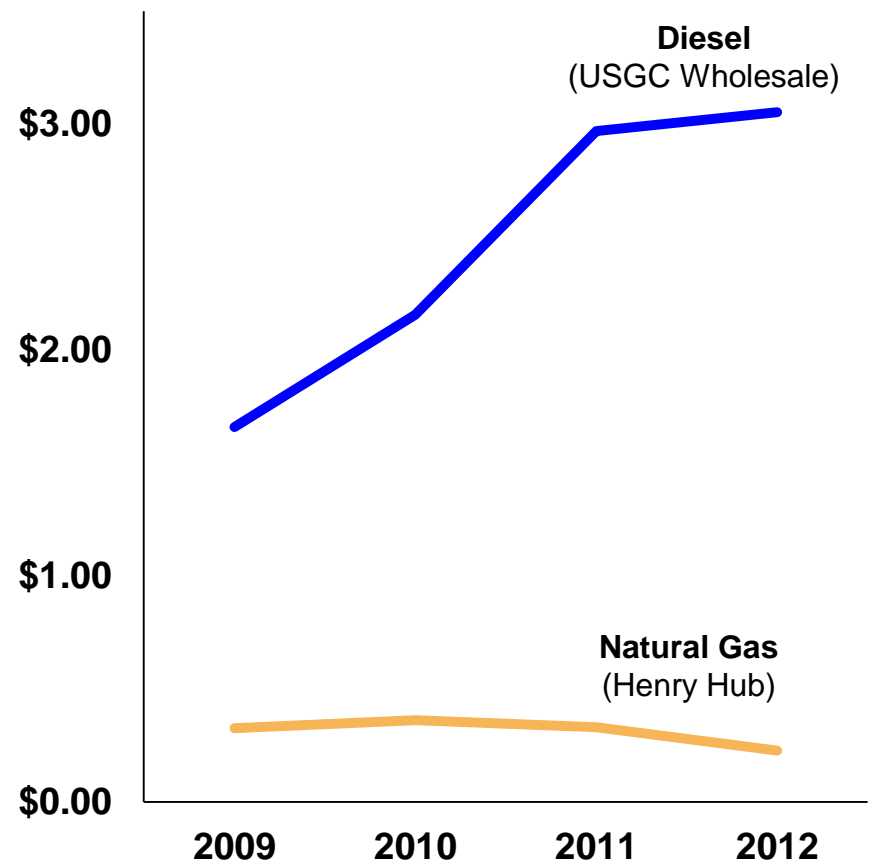
▶ Sanitized Content

The widening price spread between natural gas and diesel and environmental mandates are driving interest in LNG ...

Natural Gas Supply
(Dry Gas, BCF/Day)



Diesel and Natural Gas Prices
(\$/Diesel Gallon Equivalent)



Source: EIA

... As a substitute fuel for diesel with a number of market and regulatory developments

LNG Supply

- Shell has announced multiple merchant plants
- Clean Energy Systems and GE to deploy two micro LNG plants
- Encana and Ferus planning for a plant in Alberta

Fueling Infrastructure

- Clean Energy added 70 LNG stations in 2012 and plans 80 in 2013
- Shell partnering with Travel Americas to build 100+ US stations

LNG Adoption

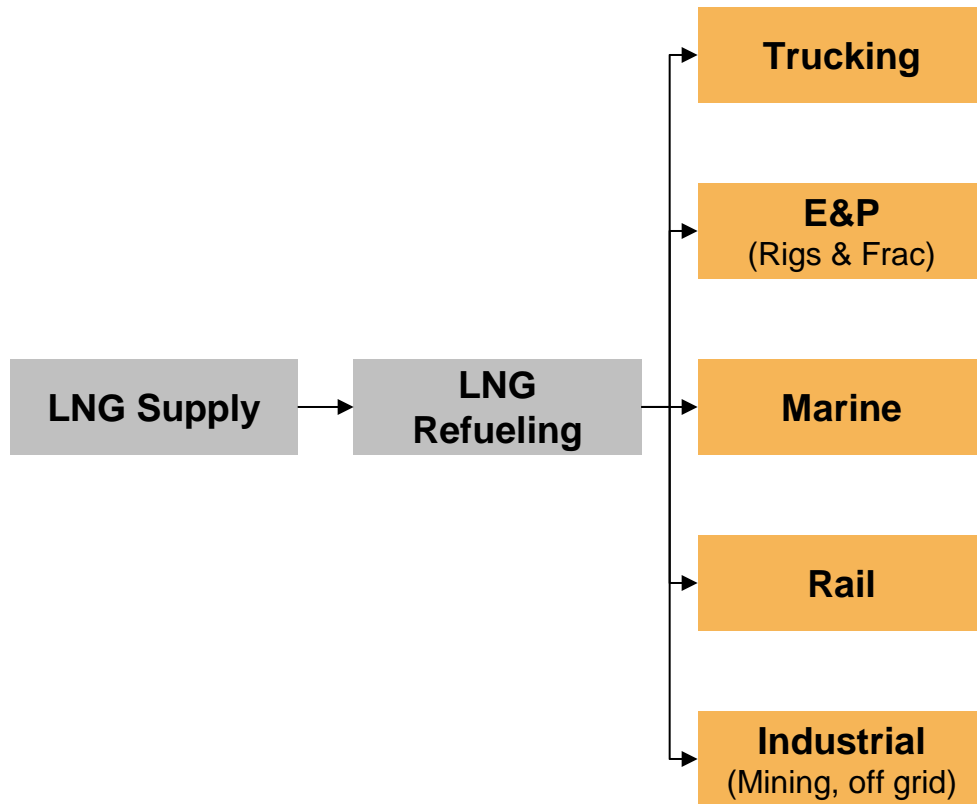
- Fleet operators placing orders for class 8 LNG trucks
- LNG-fueled containerships, offshore vehicles, and ferries planned
- E&P industry adopting LNG for drilling rigs and frac equipment

Regulatory Support

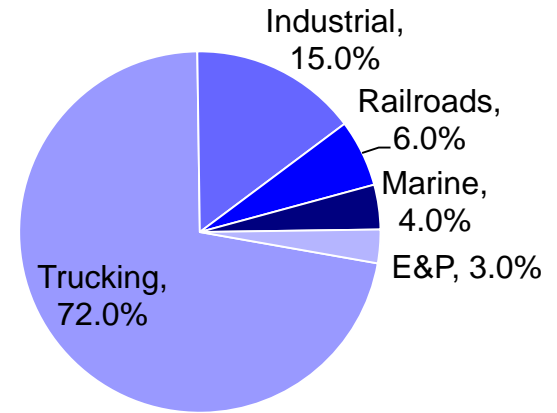
- Bill H.R 1380 (NATGAS act) proposed to stimulate NG fuel market
- Federal tax credits and other incentives extended to December 2013

“Shell will increase LNG for transport projects to 5 million tons/year by 2022” --Shell CFO

Our study will conduct a deep dive of LNG supply, fueling infrastructure, and five promising end-use sectors



U.S. Diesel Use in Target Markets
(50 Billion Gallons Per Year in 2011)



Our study addresses several urgent questions around the use of LNG as a fuel along with key elements of its value chain ...

Overarching Questions

- How large is the US market for LNG fuel? What are the key end-use sectors?
- What are profitable niches in the value chain? Where are stakeholders best aligned to participate?
- What infrastructure/technology/regulatory developments are required? Development scenarios?

A

LNG Production

- How is the US landscape for LNG supply evolving? Players, projects, etc.
- What are the key strategic and economic considerations for new capacity?
- What are the economics of LNG supply from wellhead-to-retail?

B

LNG Refueling

- How is LNG distribution & refueling infrastructure developing, by end use?
- What economics of LNG refueling? What is its contribution to LNG cost?
- What are key barriers to infrastructure development? Solutions?

C

LNG End-Use

- What commercial options for LNG engines are/will be available, by end use?
- What are drivers/barriers/economics for conversion, by end-use sector?
- What market penetration of LNG engines is likely in each end-use sector?

... Through a structured and comprehensive report reflected in the proposed “Table of Contents”

1	Executive Summary		
2	LNG Supply	<ul style="list-style-type: none">▪ Current projects, players, technology, vendors▪ Future projects – strategic and economic considerations	
3	LNG Refueling Infrastructure	<ul style="list-style-type: none">▪ LNG supply economics, pricing, contract structures▪ Infrastructure needs, costs, barriers, developments	
4	LNG End-Use	Trucking <ul style="list-style-type: none">▪ Overall market size, growth, drivers, barriers by	
5		E&P <ul style="list-style-type: none">▪ Market trends, developments (new engine models, fleet conversions, partnerships, technology)▪ LNG engine conversion economics	
6		Marine <ul style="list-style-type: none">▪ Non-economic considerations and issues for conversion	
7		Rail <ul style="list-style-type: none">▪ Current and future market penetration of LNG▪ Regulatory, policy, and advocacy initiatives	
8		Industrial <ul style="list-style-type: none">▪ Commercial considerations (LNG price, logistics, risks)▪ Case studies (success, failures, takeaways)	
9	Scenario Analysis <ul style="list-style-type: none">▪ Supply-Demand by sector▪ Scenarios and signposts▪ Stakeholder implications	10	Appendix <ul style="list-style-type: none">▪ Profiles▪ Methodology▪ Assumptions

The authors bring top-tier industry and consulting experience along with deep natural gas and transportation expertise



Uday Turaga holds a PhD in Fuel Science from Penn State and an MBA from UT Austin. Through stints at ExxonMobil, ConocoPhillips, and Booz, Uday brings a deep commercial and technical understanding of the natural gas value chain with emphasis on monetization through various options. Leveraging this experience, Uday has developed strategy for shale gas operators, benchmarked various alternative fuels, and conducted lifecycle analyses on key powertrains.



Amol Wayangankar holds a Masters in Industrial Engineering from Penn State. Amol has 11 years of energy consulting experience advising clients on market, and commercial aspects of natural gas, LNG, and NGL markets. Amol has significant LNG consulting experience performing market and asset due diligence for LNG terminal developers, lenders and capacity holders as well as commercial experience in negotiating LNG agreements. Recent work includes assisting clients to develop and execute strategies for entry in the emerging NA LNG fuels market.

This study builds on our previous multi-client studies, which have helped numerous clients accelerate decision making ...

Our studies offer many benefits ...

- ▶ Enable focus on decision making
- ▶ Provide an independent, expert viewpoint
- ▶ Based on a rigorous, fact-based methodology
- ▶ Delivered quickly, cheaply, and collaboratively

... Address critical industry issues and ...

- ▶ Bottom-up cost and economic analyses
- ▶ Appraisals of best-in-class technologies
- ▶ Competitive landscapes and benchmarking
- ▶ Supply, demand, market, and pricing outlooks

... Provide actionable deliverables

- ▶ On-site findings workshops
- ▶ Final reports and data packs
- ▶ Interim updates via conference calls
- ▶ Team access and analyst time for follow-up



Repowering transportation with natural gas
Summer 2012

New!



Benchmarking shale gas monetization options
Spring 2012

New!



Innovation needs in Marcellus shale
Fall 2011



Economics of carbon conversion and utilization
Fall 2010

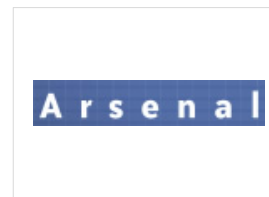
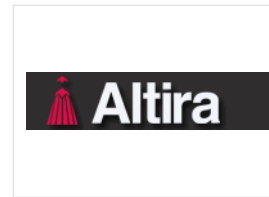
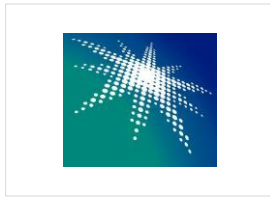


Supply outlook for advanced biofuels
Spring 2010



Strategic overview of geothermal energy
Fall 2010

... Including Fortune 500 and mid-sized companies, start-ups, investors, and government agencies



In summary, our study is current, independent, and cost-effective, and will benefit you with actionable insights

Deliverables

- ▶ Final report with appendices available immediately (~100 pages)
- ▶ Executive summary presentation (~15 slides)
- ▶ Half-day workshop / conf call to review report
- ▶ Data package in spreadsheet format

Benefits

- ▶ Enable focus on decision making
- ▶ Provide an independent, expert viewpoint
- ▶ Based on a rigorous, fact-based methodology
- ▶ Delivered quickly, cheaply, and collaboratively

Audience

Oil and Gas Producers	Midstream Companies	Fuel Distributors
Refining Sector	Industrial Gas Cos.	Fleet Owners
Strategy Groups	Drilling companies	R&D Groups
Investors / VC / PE	Retail Fueling	Government Agencies

Contact

Uday Turaga,
+1.832.768.8806
turaga@adi-analytics.com

**Call us for a
sanitized executive
summary!**

Outline

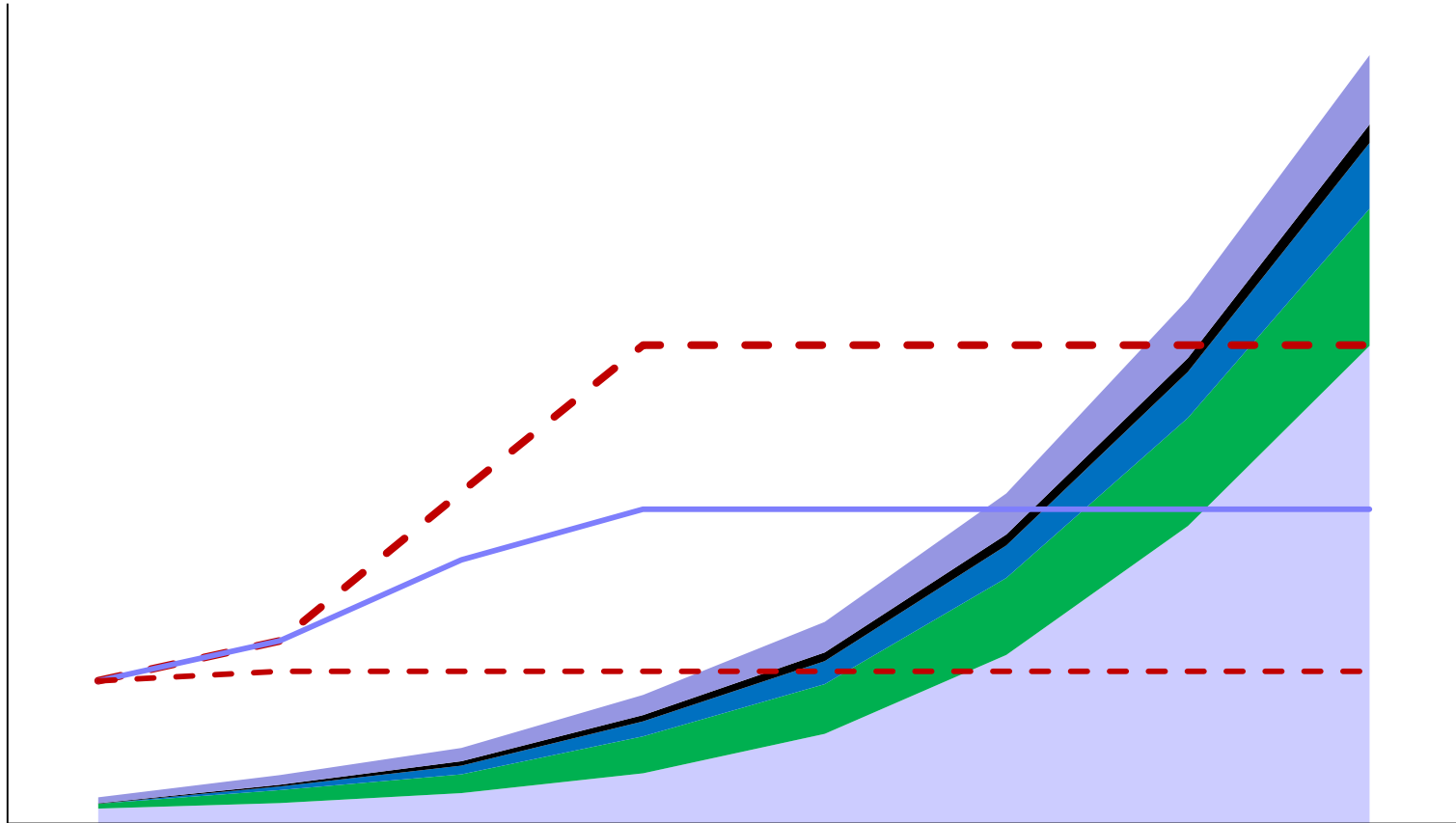
▶ Prospectus

▶ **Sanitized Content**

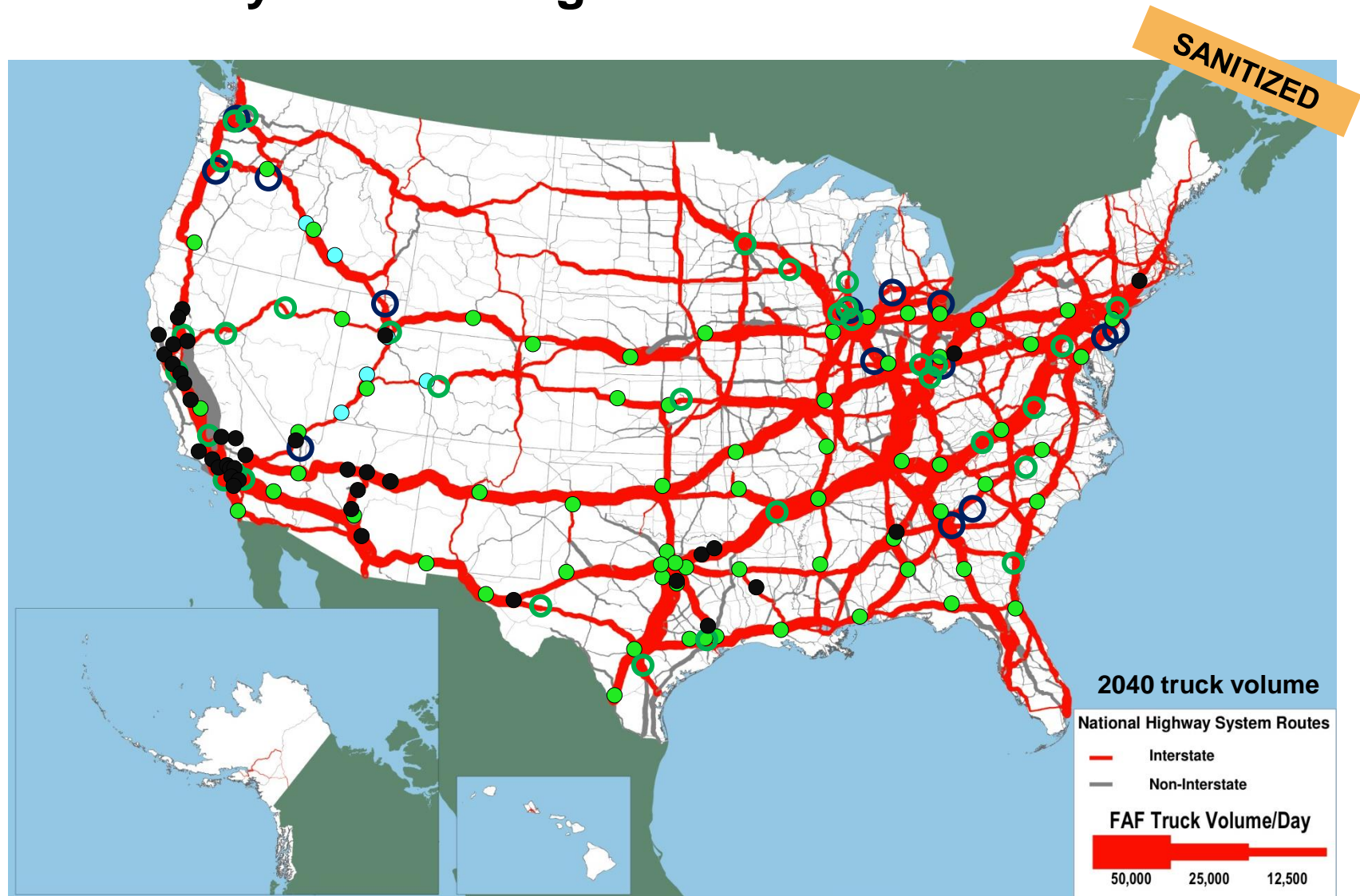
Forecasts of LNG demand and supply in various scenarios

U.S. LNG Demand and Supply
(Million Gallons Per Year)

SANITIZED



Outlook for LNG fueling infrastructure and its capacity to serve to key end-use segments

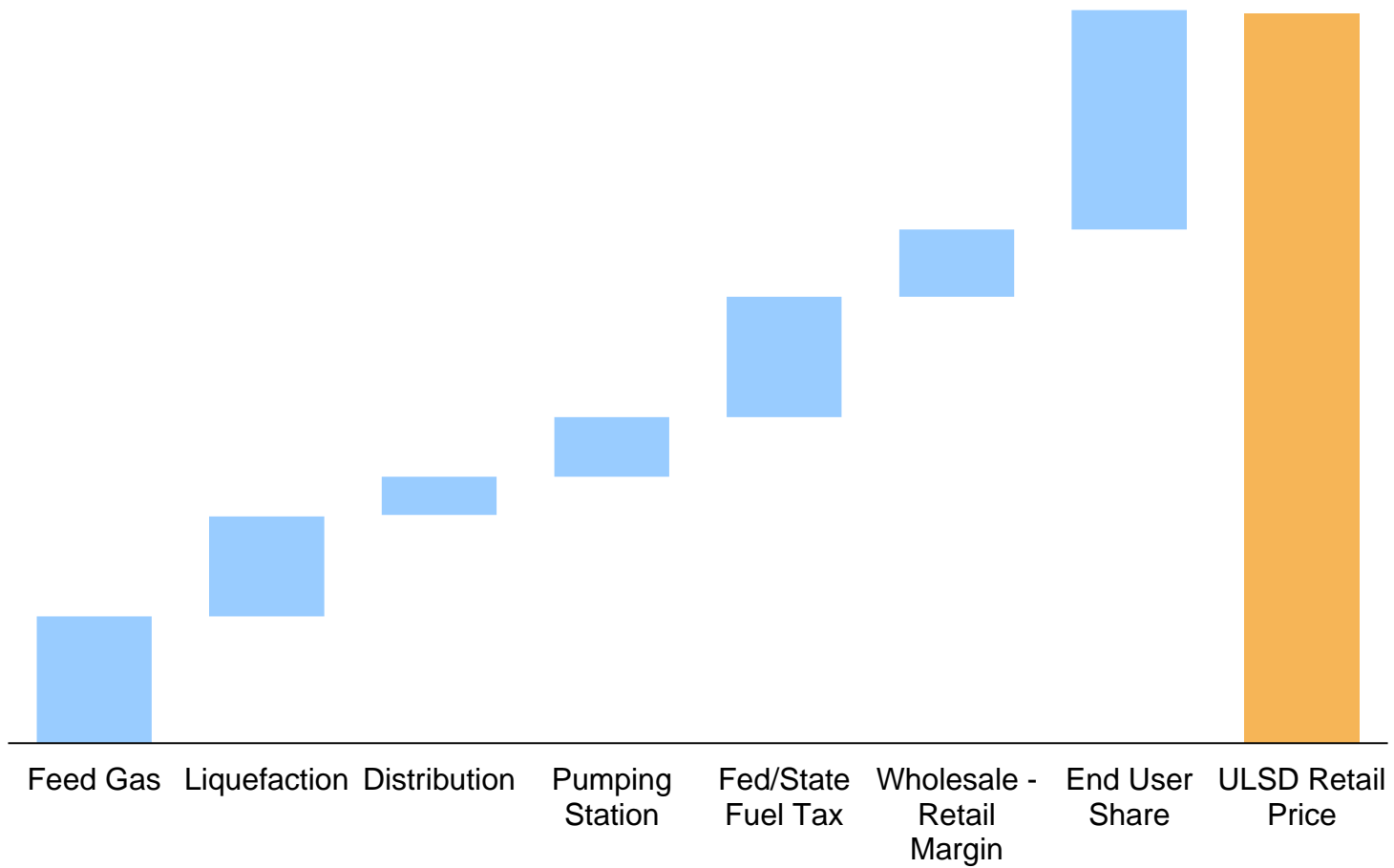


Source: Federal Highway Administration

Value chain economics and margins for the LNG industry

Value Chain Economics in \$/MMBtu

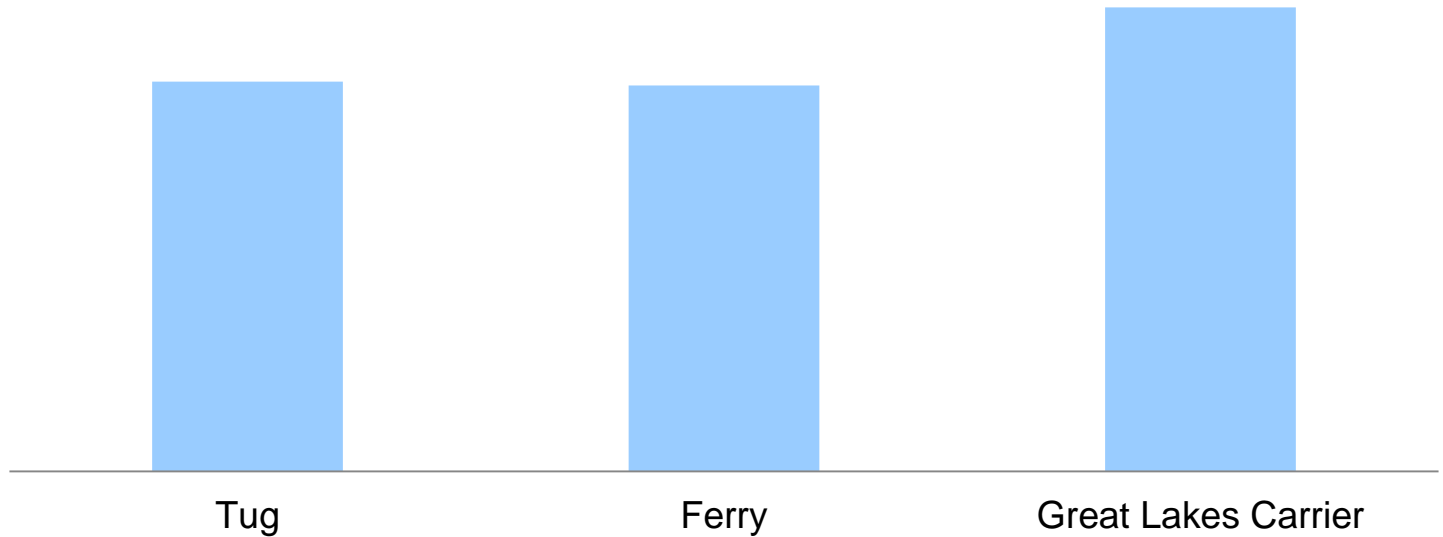
SANITIZED



Economics of converting or purchasing new LNG-fueled trucks, ships, locomotives, and E&P and industrial equipment

Payback period for marine vessels, by type

SANITIZED



Assumptions

Typical Upcharge (\$)

Annual Fuel Use (MMBTU)

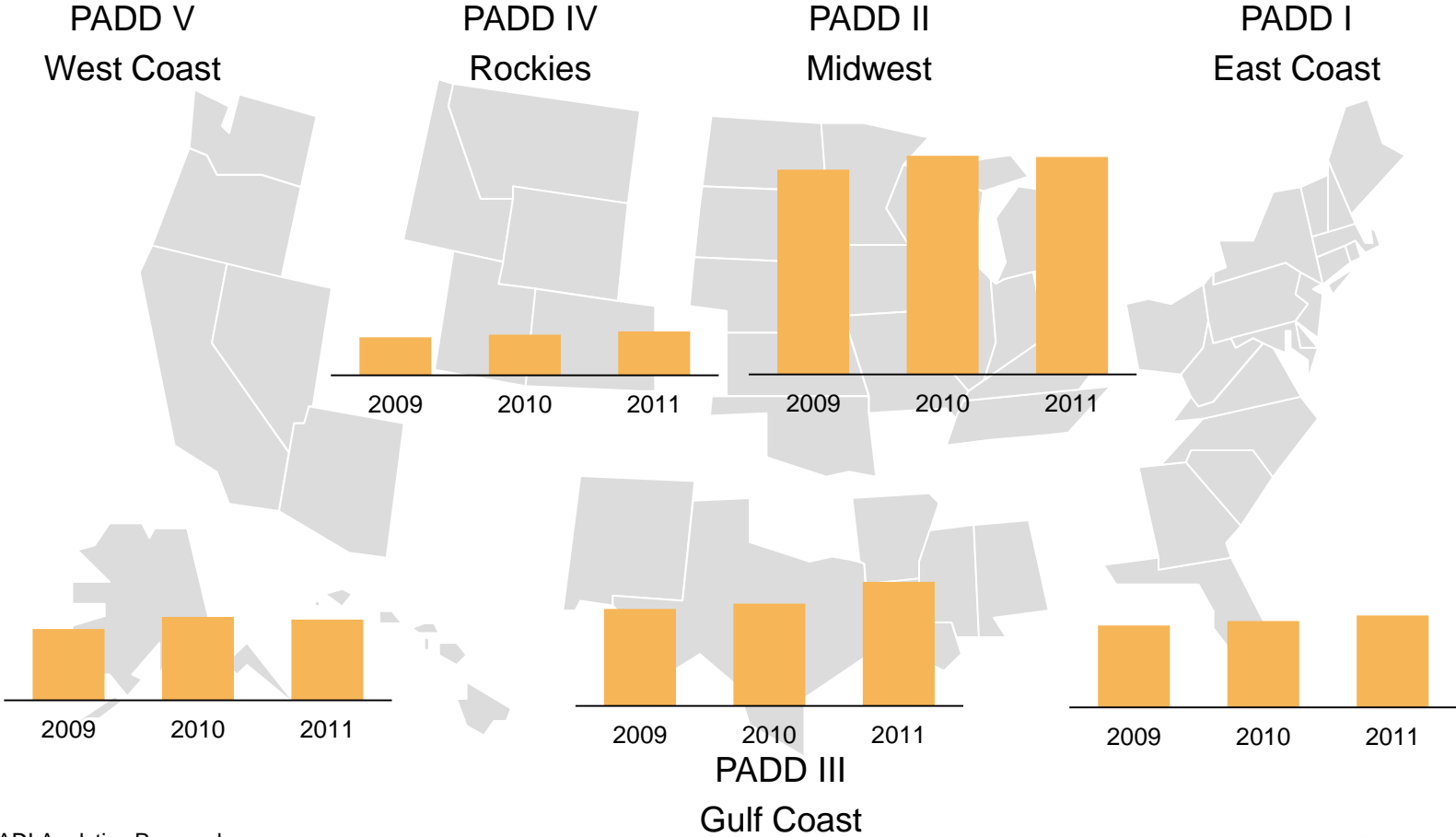
Legacy fuel price (\$/gallon)

Annual fuel price rise (%)

Regional distribution of supply and demand by segment

SANITIZED

Diesel Demand in Railroads by PADD



Source: ADI Analytics Research



ADI Analytics

ENERGY INSIGHT AND CONSULTING

14511 Old Katy Road
Suite 374
Houston, Texas 77079

+1.281.506.8234
info@adi-analytics.com
www.adi-analytics.com