

Micro- and Small-Scale LNG Global Market Assessment

Study Prospectus



ADI Analytics

OIL & GAS • ENERGY • CHEMICALS



Outline

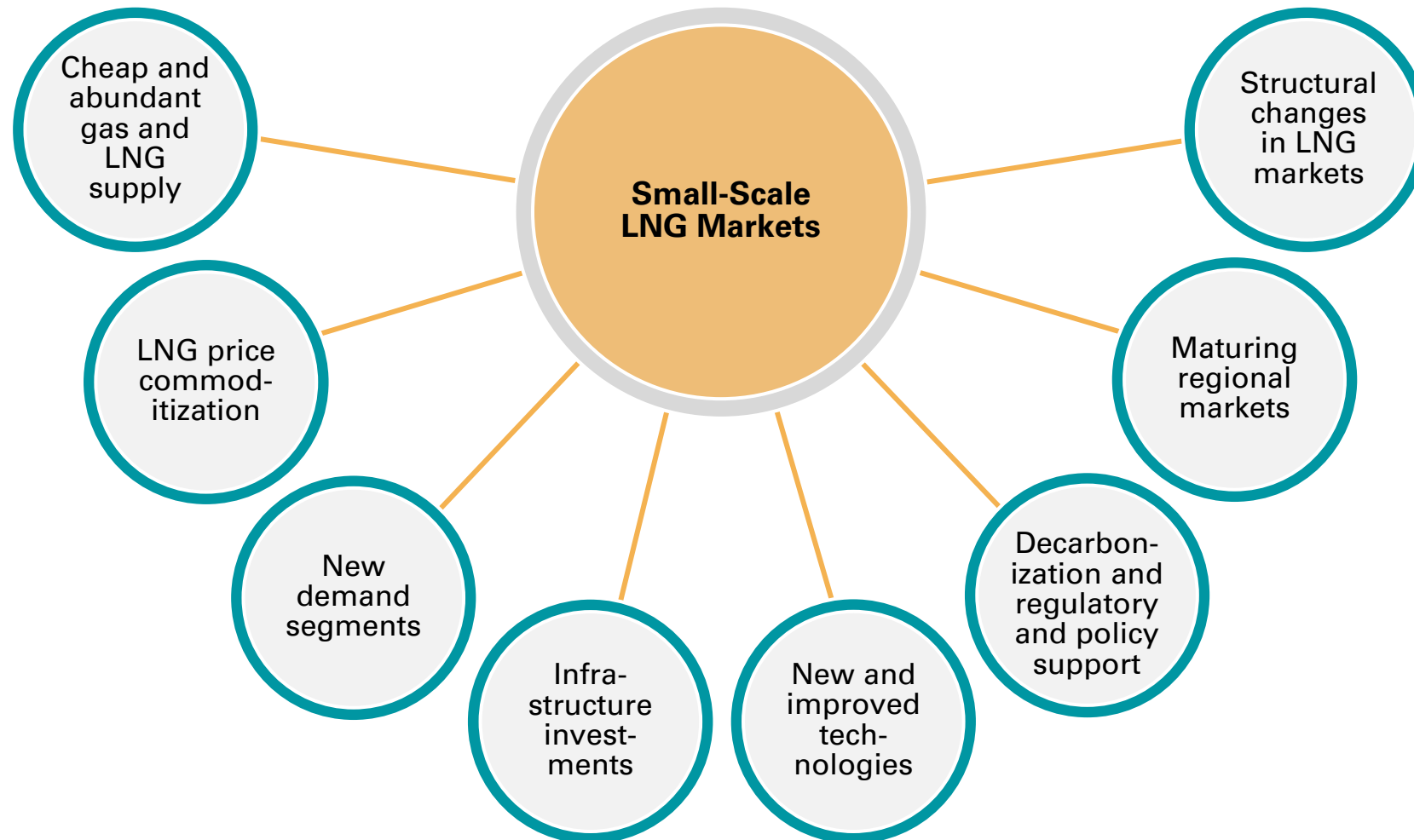
Global Small-Scale LNG Prospectus

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ADI's LNG Experience

About ADI Analytics

Micro-, small-, and containerized LNG markets are growing rapidly around the world due to several factors



Even so, there are several questions on demand, supply, costs, infrastructure, and outlook for global small-scale LNG markets

Key Questions

- ▶ How large can small-scale LNG demand grow? In what regions and applications?
- ▶ Where is currently supply and how much new capacity will be added? What are the key supply models?
- ▶ What is the current state of infrastructure in truck refueling, marine bunkering, and other areas? Where is infrastructure developing?
- ▶ How cost competitive is small-scale LNG today? Does that change by region and segment?
- ▶ Who are the key players in the small-scale LNG landscape? What projects are they investing in?
- ▶ Where in the small-scale LNG value chain are technologies innovating the most?
- ▶ How should companies explore and expand in small-scale LNG?
- ▶ Where are the best opportunities? What should the go-to-market strategy be for small-scale LNG players?

ADI's new multi-client study will provide a strategic view of global small-scale LNG reflected in the report's table of contents

1	Demand	<ul style="list-style-type: none">▪ Drivers of small-scale LNG demand by region and globally▪ Key drivers including regulations, policies, and incentives by region▪ LNG demand/forecast to 2030 in marine, trucking, industrial, power, etc.
2	Supply	<ul style="list-style-type: none">▪ Current and forecasts of small-scale LNG supply to 2030 by region▪ Existing and upcoming supply infrastructure by location and volume▪ New supply costs and economics by region
3	Infrastructure	<ul style="list-style-type: none">▪ Infrastructure activity review and outlook through 2030▪ Regional and global look at small-scale LNG infrastructure▪ Regional export infrastructure including transport and shipping models
4	Costs, economics, and pricing	<ul style="list-style-type: none">▪ Costs and economics of switching to LNG in various demand segments▪ Costs and economics of micro-, small-, and mid-scale LNG supply▪ Price forecasts and mechanisms by region and demand segment
5	Projects and players	<ul style="list-style-type: none">▪ Select list of key projects and players in the small-scale LNG market▪ Select LNG supplier and end-user company applications / case studies▪ Project feedstock sourcing and LNG product off-take strategies
6	Technology landscape	<ul style="list-style-type: none">▪ Current and emerging technology profiles with costs and economics▪ Technology fit assessment and outlook by region and applications

ADI has developed this multi-client report on global small-scale LNG using its prior experience and several methodological tools

ADI's Small-Scale LNG Experience

- ▶ ADI brings experience of 25+ projects in small-scale LNG ...
- ▶ ... For LNG producers, traders, end-users, and government agencies ...
- ▶ ... In North America, Europe, Asia, Africa, and Latin America ...
- ▶ ... Covering heavy-duty trucking, marine, rail, industrial, peak-shaving, and power markets.

Study Methodology

- ▶ Primary research focusing on ~100 interviews across the small-scale LNG value chain globally
- ▶ Secondary research covering trade journals, media, corporate collateral, investor disclosures, patents, and technical articles.
- ▶ Analytical modeling to estimate and forecast market size and costs and economics using ADI data and analytics

The ADI global small-scale LNG study includes several insightful deliverables including a workshop with the research team

Study Deliverables

- ▶ Comprehensive report
 - ~150 pages, PPT and PDF
- ▶ Executive summary
 - ~25 slides, PPT
- ▶ Global asset database
 - ~300 projects
- ▶ Data spreadsheet
- ▶ Two-hour workshop / conference call
- ▶ Access to study team for Q&A

Content Deliverables

- ▶ Demand by region and application through 2030
- ▶ Supply outlook and breakdown by region
- ▶ Supply, transportation, and delivered costs
- ▶ Pricing and commercial trends
- ▶ Cost and economic analysis for various markets
- ▶ Comprehensive view of global projects
- ▶ Analysis of key technology developments

Contact Uday Turaga at +1.281.506.8234 and turaga@adi-analytics.com for more info

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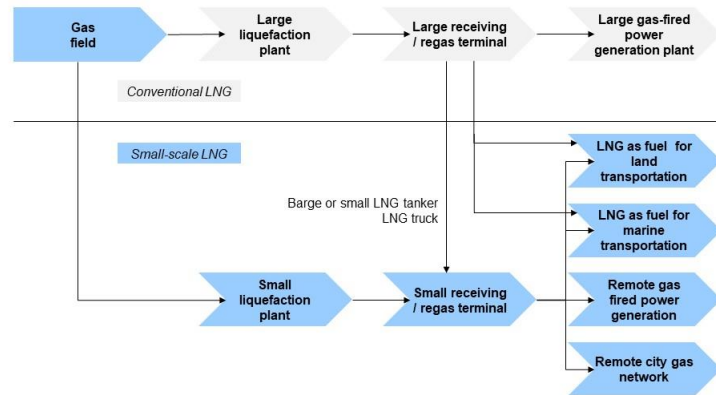
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ADI's LNG Experience

About ADI Analytics

The ADI study includes value chain-wide perspectives and insights on costs, economics, and margins in small-scale LNG

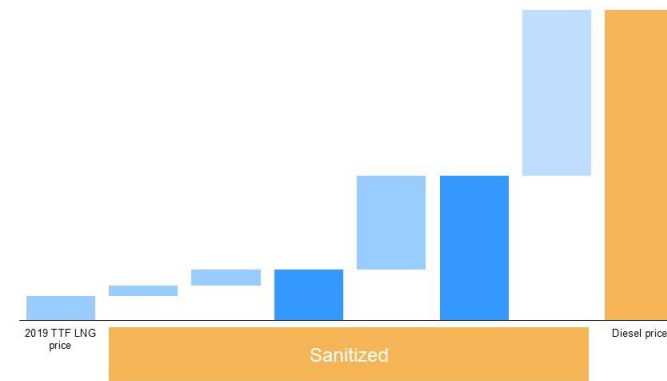
Described small-scale LNG infrastructure requirements and identified key players along each touch point



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Provided a detailed breakdown of small-scale LNG prices and compared it to diesel prices

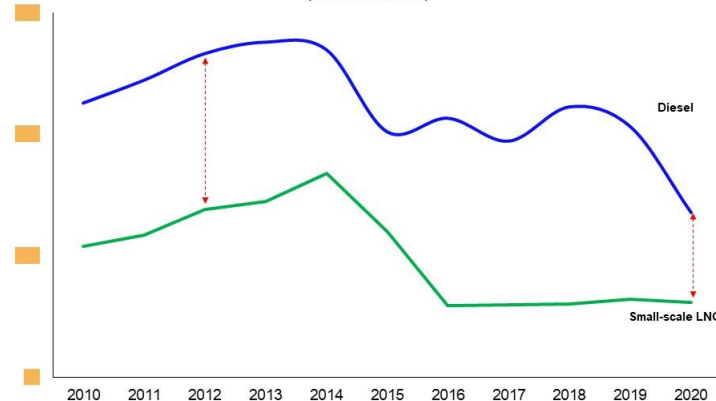
Average LNG Delivered Price to Replace Diesel in Heavy-Duty Trucking (Euro per Liter)



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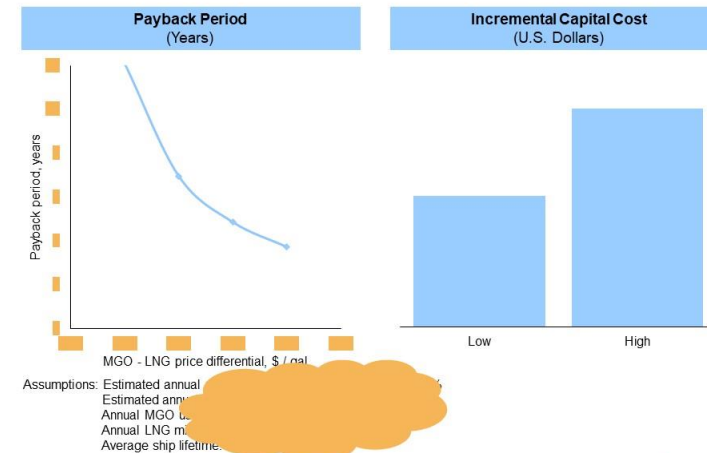
Assessed diesel and small-scale price differentials by region to assess the price competitiveness of small-scale LNG

China Diesel and Small-Scale LNG Prices (USD / Million Btu)



CONFIDENTIAL ADI Analytics 2

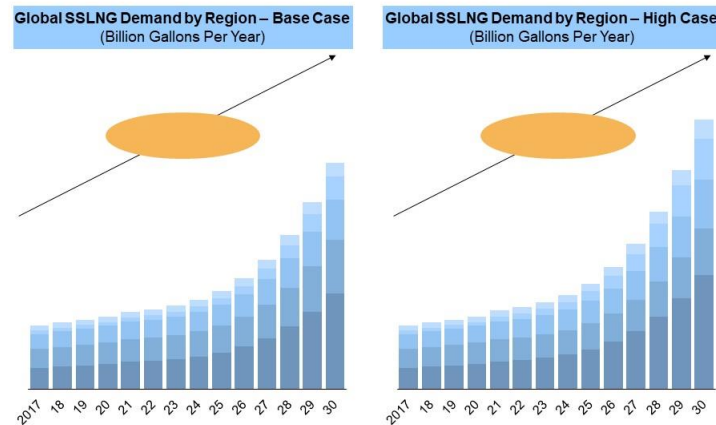
Evaluated the payback period when switching to LNG in marine, industrial, and trucking applications



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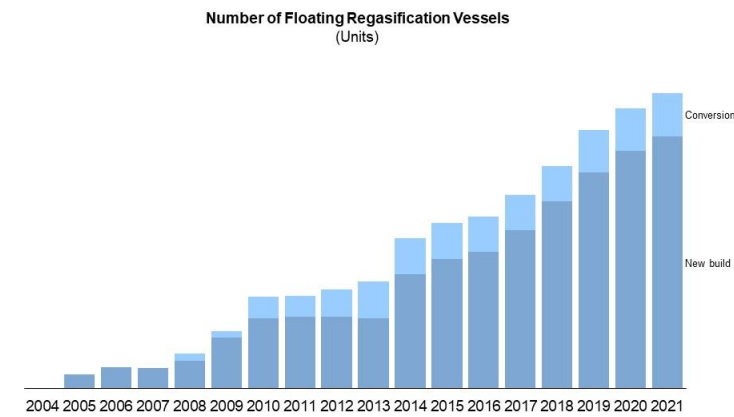
The report includes a granular, bottoms-up approach to demand for small-scale LNG globally and in many segments to 2030

Created a proprietary model to assess and forecast small-scale LNG demand by region and application



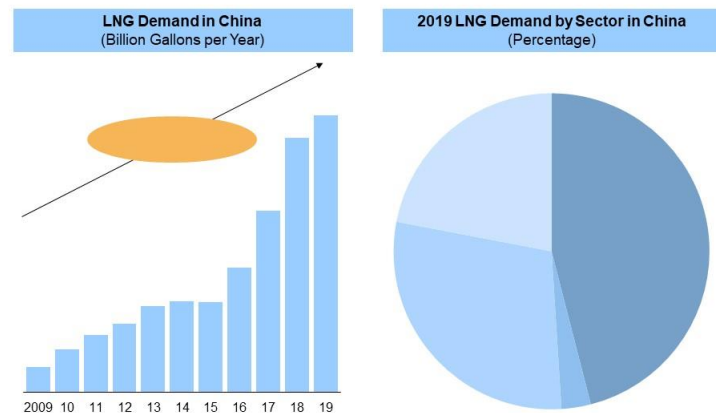
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Detailed adoption drivers of new technologies and provided an outlook segmented by new build and conversion projects



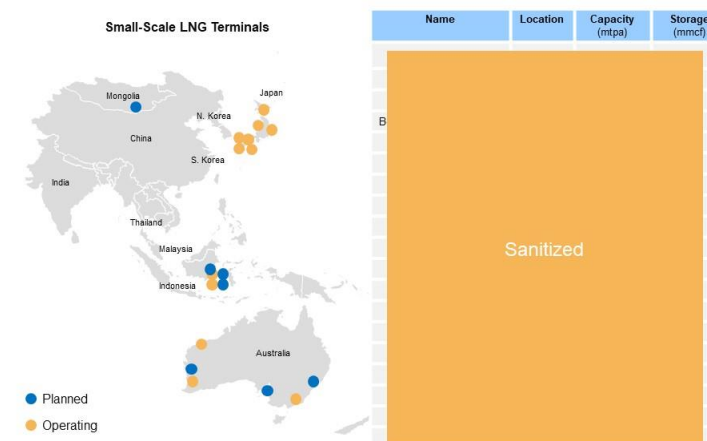
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Profiled key regions, identified key demand segments, and provided an outlook on how this will change over time



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Created a database of operating and planned small-scale LNG projects and segmented them by region and ...



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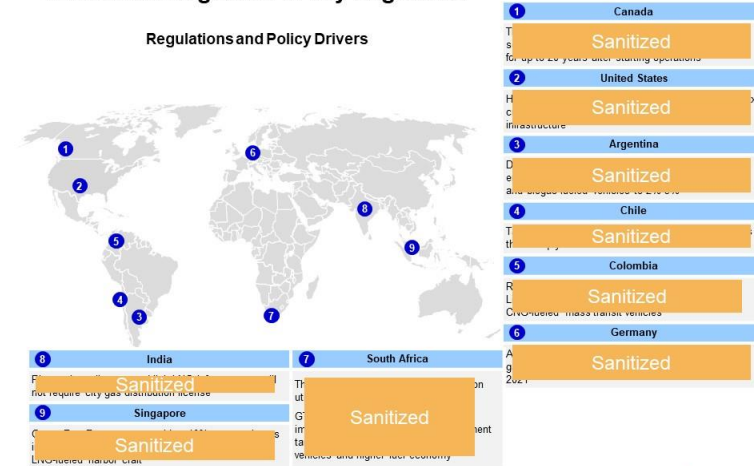
Finally, the ADI's study has a comprehensive view of projects, players, policies, market trends, and technologies

... By project type with a detailed description on scheduled start date, partners, volumes, and location

Company	Project type	Location	Description
Company 1	Power plant	Sanitized	
Company 2	Remote power		
Company 3	Pipeline		
Company 4	Off-grid/ Peak shaving		
Company 5	Off-grid		
Company 6	Remote power		
Company 7	Storage/ remote power		
Company 8	Off-grid		

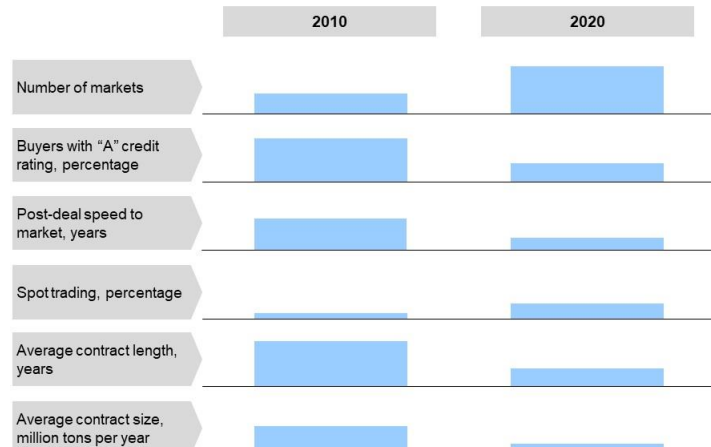
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Identified and detailed regional regulatory policies impacting LNG demand growth in key segments



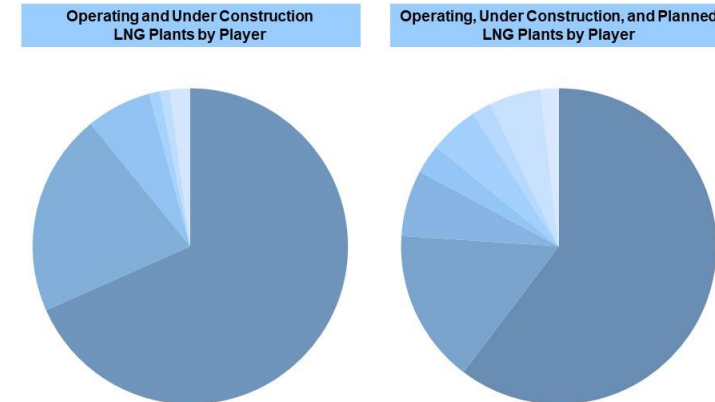
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Assessed trends in LNG contracting including number of markets, lengths and size, and spot trading percentage



11

Provided an assessment of the technology licensor landscape based on operating, under construction, and planned plants



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ADI's LNG Experience

About ADI Analytics

Our gas and LNG work has assessed global supply / demand, M&A, business strategy, and new projects and technologies

1	Market research	<u>Forecasted U.S. LNG exports in 2025 and benchmarked 40+ projects</u> to identify best, most likely one for investor	<u>Projected share of LNG in global marine fuel and bunkering market through 2030</u> to comply with IMO regulations
2	Business strategy	Advised major on <u>gas portfolio strategy prioritizing investment opportunities</u> in U.S., Canada, Australia, and Africa	Developed <u>gas monetization strategy for super major</u> benchmarking LNG against gas-to-liquids across multiple criteria
3	Feasibility studies	Evaluated <u>feasibility of Canadian LNG project</u> for oil major by estimating capex, target markets, feed cost, and opex	Led <u>due diligence on LNG bunkering project in Europe</u> for lender based on demand, LNG supply, and regulations
4	Transaction support	<u>Benchmarked 20 U.S. small-scale LNG projects</u> and advised Japanese LNG portfolio player through investment	<u>Analyzed LNG portfolio impacts of oil major's acquisition</u> of mid-sized E&P company with LNG and offshore assets
5	Competitive intelligence	Studied <u>competitive strategies of LNG peers</u> covering target markets, costs, and sales agreements for oil major	<u>Profiled 45 LNG project announcements</u> with in-depth competitive intelligence for Japanese LNG investor
6	Technology assessment	<u>Assessed micro-scale LNG technology</u> for costs, benefits, risks, and returns for an Asian project developer	<u>Piloted a go-to-market strategy for OEM with micro-scale LNG process</u> targeting niche, remote power generation needs

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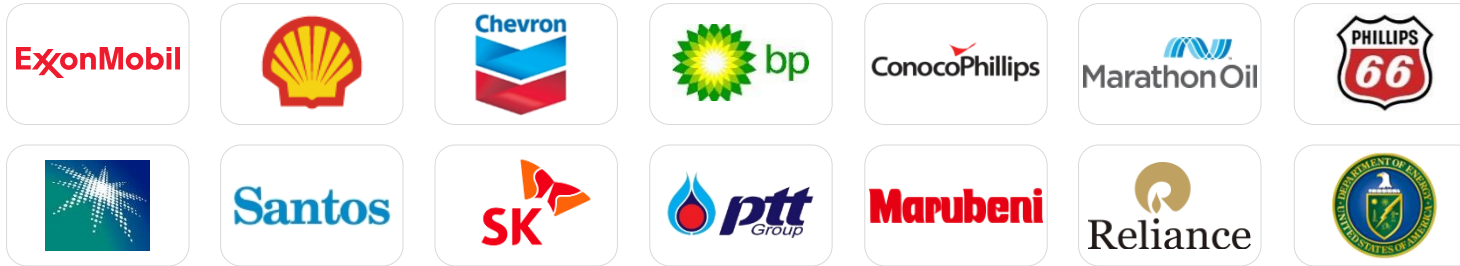
About ADI Analytics

ADI Analytics is a consulting firm serving oil & gas, energy, chemical, and industrial clients with expertise, rigor, and passion



Over 200 clients including Fortune 500 brands, mid-sized firms, start-ups, and investors have engaged ADI to shape decisions

Oil & Gas



Investors



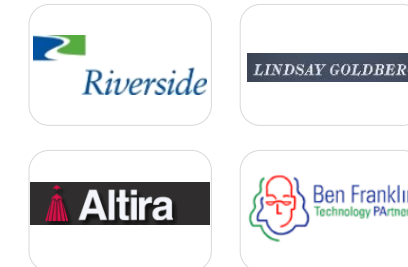
Start-ups



Chemicals

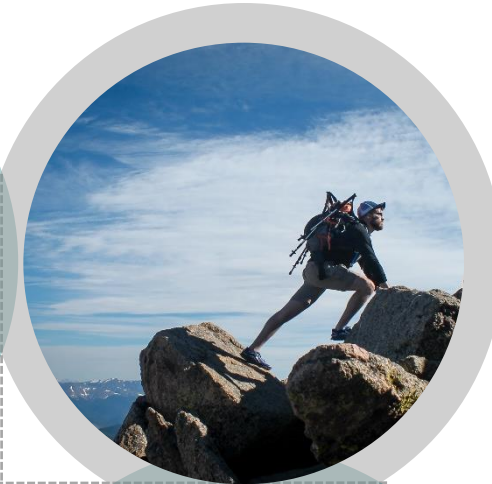


Industrials



Our value proposition – expertise, proven experience, thought leadership, and analytics – is designed to help clients succeed

Deep, frontline
industry expertise



Over **500 projects** for
200+ clients since 2009

Differentiated
thought leadership

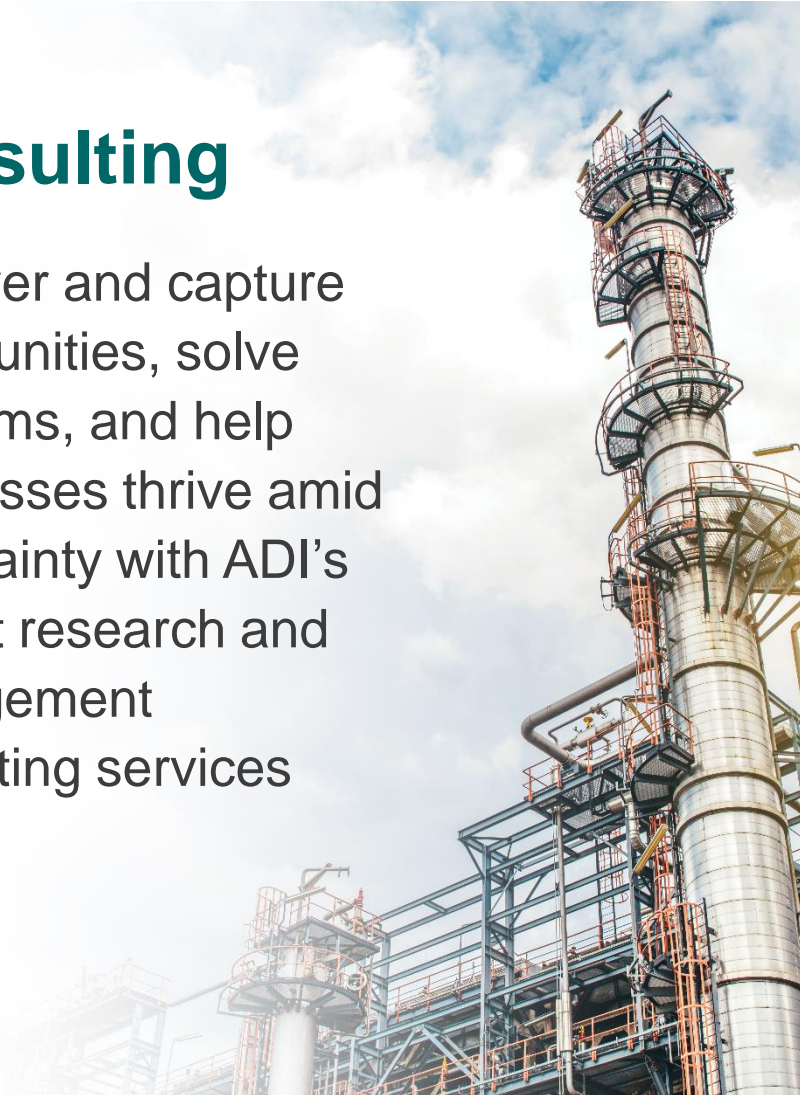


Proprietary analytics-
and data-driven

Organizations accelerate their priorities with ADI's consulting services, subscription research, data analytics, and conferences

Consulting

Discover and capture opportunities, solve problems, and help businesses thrive amid uncertainty with ADI's market research and management consulting services



Research

Track markets with ADI's subscription research



Analytics

Inform workflows with ADI data, models, and analytics

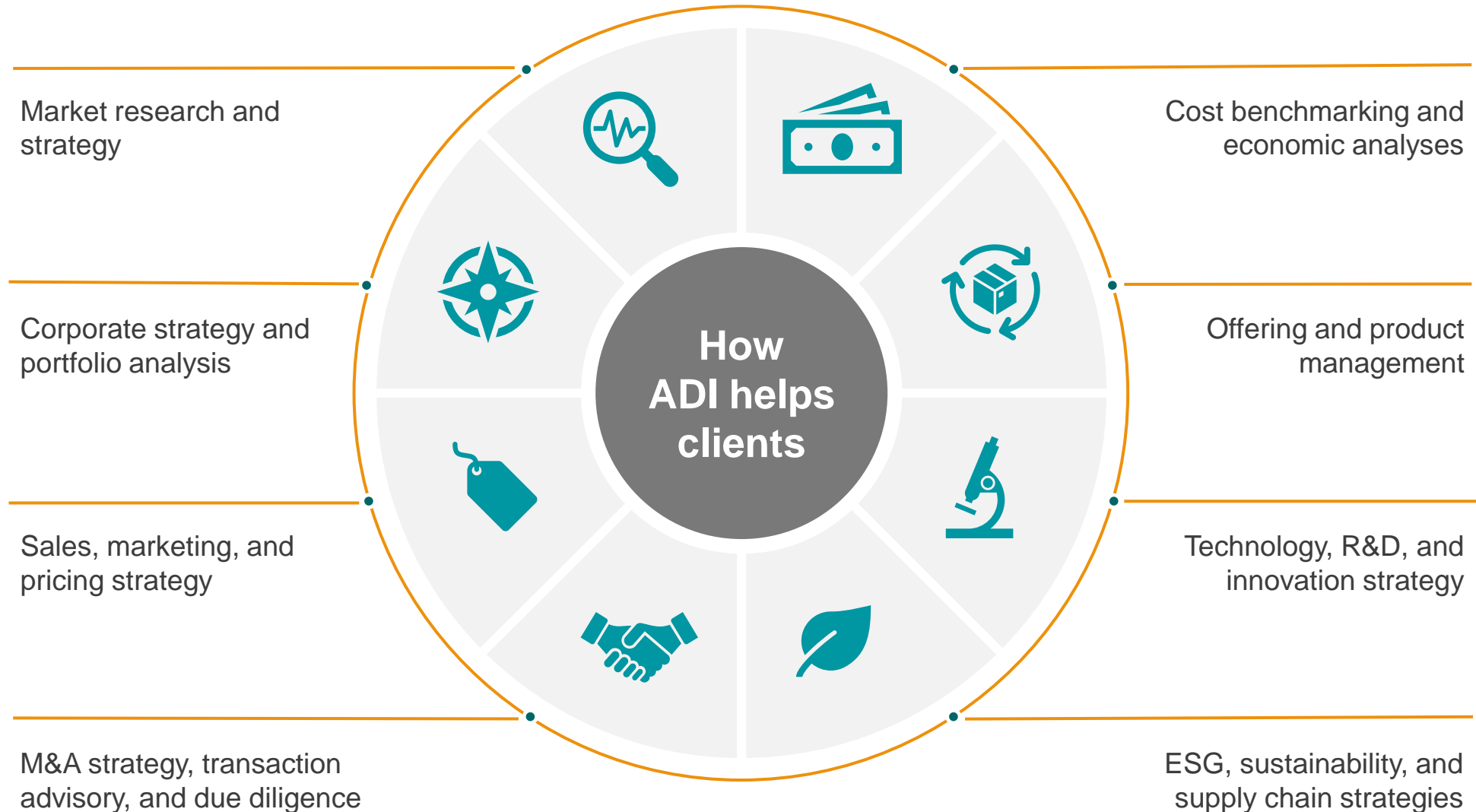


Forums

Build a strategic view and network at our conferences



Clients shape strategy, grow sales, refine costs, drive deals, and build competencies with ADI's management consulting services



Access rich industry knowhow across energy and chemical value chains with ADI's team of MBAs, PhDs, engineers, and analysts



Upstream

- Oil basins / shale plays
- Exploration trends
- Completion strategies
- Production services
- Oilfield services
- Offshore operations
- Digital and automation
- Oilfield waste mgmt.
- Wastewater treatment
- Oilfield equipment
- Oilfield chemicals
- Enhanced oil recovery
- Upstream technology
- Asset valuations
- Country assessments



Midstream

- On/offshore pipelines
- Gathering & process.
- Gas processing plants
- NGL fractionators
- Oil, LPG, NGL exports
- Ethylene exports
- Ethane rejection
- LNG project feasibility
- Condensate splitters
- Midstream equipment
- Compressor services
- Drag reducing agents
- Corrosion inhibitors
- Sulfur removal units
- Methane emissions



Downstream

- Refining markets
- Refinery operations
- Fuel demand / supply
- Fuel trading and retail
- IMO 2020 regulations
- Fuel product export
- Auto regulations
- Crude-to-chemicals
- Process automation
- Refining catalysts
- Process licensors/EPC
- H2S scrubbers
- Wastewater treatment
- Small-scale GTL / LNG
- Fuel / lube additives



Chemicals

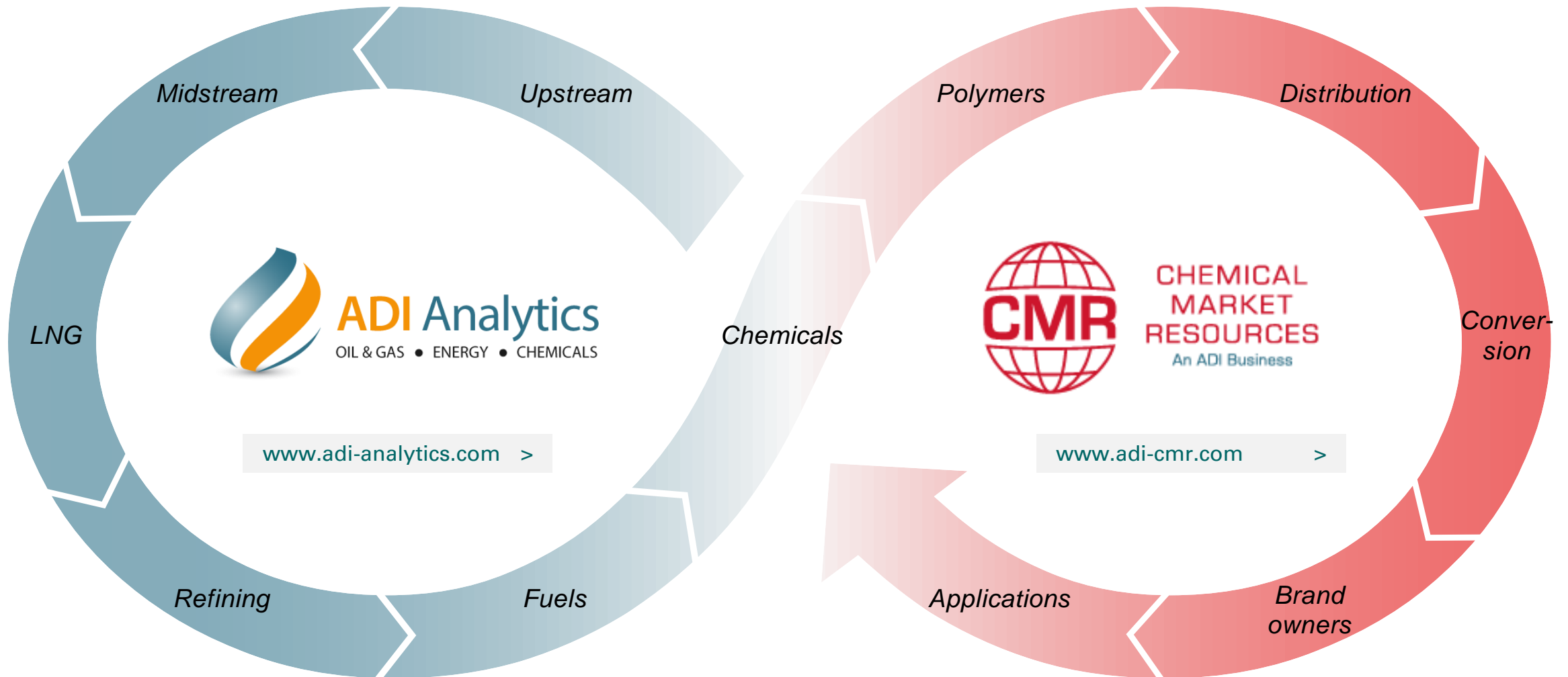
- Olefins and aromatics
- Polyolefins / plastics
- Flexible packaging
- Styrene-block copoly
- Ethylene value chain
- Propylene value chain
- C4 value chain
- Pygas and derivatives
- Bio-based chemicals
- Oxo-chemicals
- On-purpose olefins
- Methanol / ammonia
- Specialty tolling
- Electronic chemicals
- Specialty amines



Energy Transition

- Coal-/gas-fired power
- Solar and wind
- Steam turbines
- Micro gas turbines
- Small modular nuclear
- Geothermal and EGS
- Distributed generation
- Power systems
- Transmission
- Li-ion batteries
- Energy storage
- Boiler feed pump
- Microgrids
- Smart meters
- Demand response

After acquiring Chemical Market Resources, ADI's expertise has grown and now spans the entire hydrocarbon value chain



Stay ahead of the curve with market intelligence, forecasts, and analysis from ADI's subscription research services



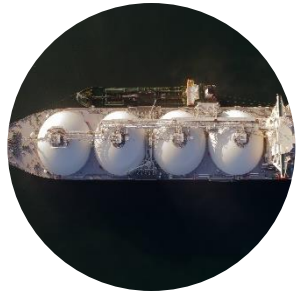
Downstream Market Advisory

Monthly intel, oil prices, fuels supply and demand, capex, margins, and downstream and refining insights



Gas Monetization Advisory

Review of natural gas to power, LNG, fuels (GTL), and chemicals costs, economics, and markets



LNG Analytics

LNG project benchmarking tool; global and NA small-scale LNG studies; and global LNG database



Energy Transition Advisory

Monthly energy transition deep dives, e.g., biofuels, hydrogen, low-carbon, CCS, flaring, biomaterials



Global CapEx Outlook

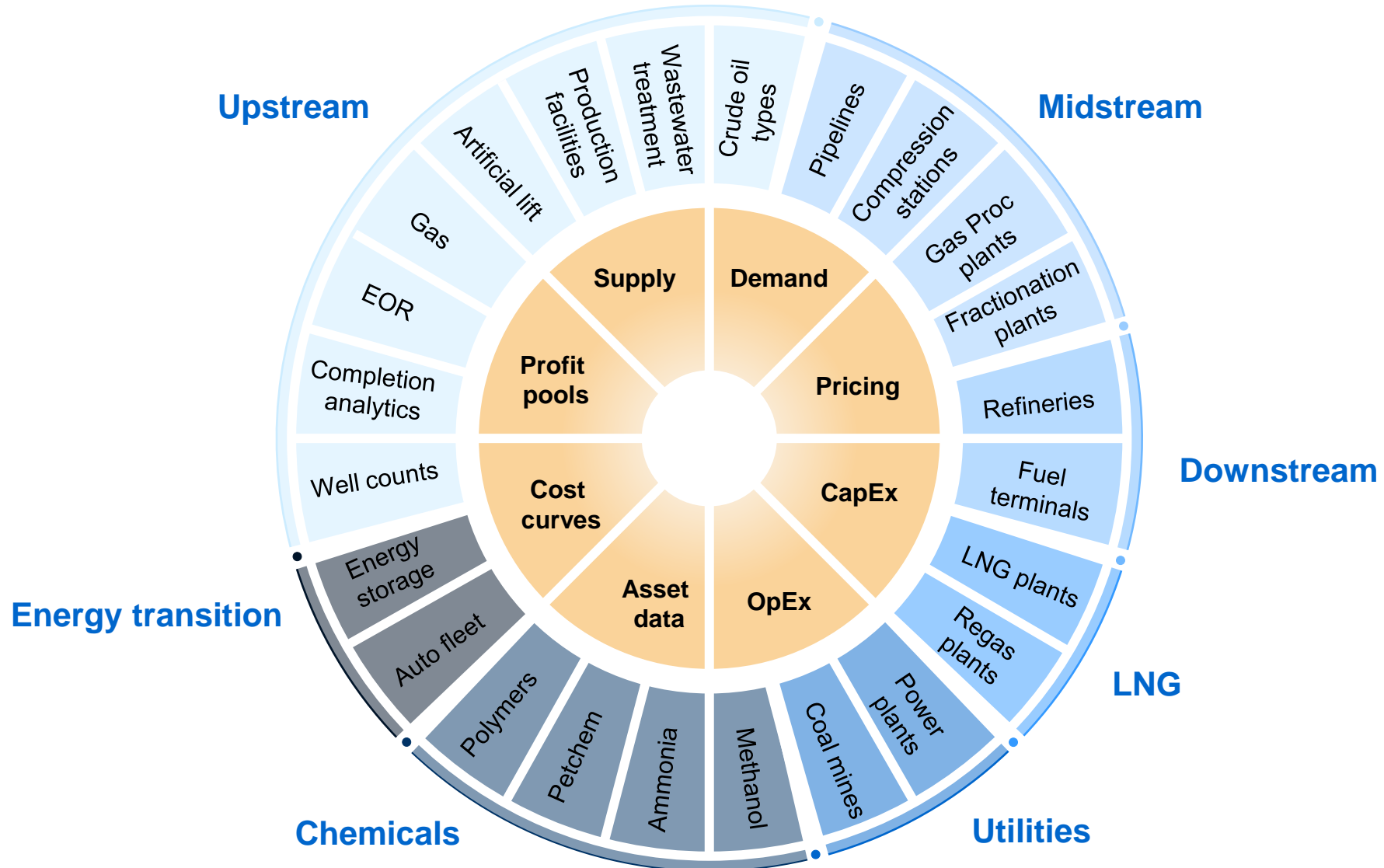
Quarterly forecast and analysis of global capital spending in E&P, midstream, refining, LNG, petchem



Global OpEx Outlook


Quarterly forecast and analysis of operating expenses in upstream, midstream, downstream, and LNG


Inform workflows with ADI's on-demand databases, models, and analytics developed and maintained by experts



Build a strategic view of energy and chemical value chains informed with executive perspectives at ADI's conferences



ADI Forum, our flagship conference held annually since 2017 in Houston, focuses on the oil & gas value chain 

FlexPO+, hosted by ADI Chemical Market Resources since 1996, covers polymers, plastics, chemicals, and petrochemicals 



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90+
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2
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