NAVIGANT’S ENERGY MARKET OUTLOOK

2017 VIEW OF THE NORTH AMERICAN ENERGY MARKETS

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INTRODUCTIONS

ROB PATRYLAK
MANAGING DIRECTOR

DAVID WALLS
MANAGING DIRECTOR

MATTHEW SPADY
MANAGING CONSULTANT
ABOUT NAVIGANT AND NEMO
NAVIGANT AT A GLANCE

TOTAL REVENUES: $1.03B

2016

ADJUSTED EBITDA:

$10Bm $12Bm $16Bm $12Bm $14Bm

WORKED IN 43 COUNTRIES (2016)

CLIENTS FOUR KEY BUSINESS SEGMENTS

HEALTHCARE 38%
DISPUTES, FORENSICS & LEGAL TECHNOLOGY 33%
FINANCIAL SERVICES ADVISORY AND COMPLIANCE 17%
ENERGY 12%

LOYALTY

97% OF OUR LARGEST 100 CLIENTS IN 2016 = REPEAT ENGAGEMENTS

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SIGNIFICANT CLIENT RELATIONSHIPS:

5+ YEARS = 68%  10+ YEARS = 50%

AWARDS AND ACCOLADES

= 8 CONSECUTIVE PERFECT SCORES ON THE HUMAN RIGHTS CAMPAIGN FOUNDATION’S CORPORATE EQUALITY INDEX (CEI)

2016 VAULT AWARDS
BEST CONSULTING FIRM FOR:
#7 Energy Consulting
#12 Healthcare Consulting
#15 Public Sector Consulting
#18 Economic Consulting

AMERICA’S BEST EMPLOYERS 2016
TOP 250 MID-SIZE FIRMS - FORBES

MEDIA COVERAGE: 2,400 Citations in 2016 in National, Local & Industry Publications

PEOPLE

5,500+ EMPLOYEES
1,900+ EXPERT CONSULTANTS
2,700+ BUSINESS PROCESS PROFESSIONALS

* EBITDA is earnings from continuing operations before interest, taxes, depreciation, and amortization. Adjusted EBITDA excludes the impact of severance expense and other operating costs (benefit).

**Based on Navigant’s largest revenue-generating clients in 2016.
ENERGY PRACTICE GEOGRAPHIC PROFILE

Many North American locations and an expanding global footprint.
The following megatrends underpin the industry transformation:

1. The power of customer choice and changing demands
2. Rising number of carbon emissions reduction policies and regulations
3. Shifting power-generating sources
4. Delivering shareholder value through mergers and acquisitions (M&A)
5. Regionalizing of energy resources
6. Merging industries, new entrants, and colliding giants
7. The emerging Energy Cloud: Replacement of old infrastructure and transition toward an increasingly decentralized and smarter power grid architecture

The transformation includes a wide range of strategic, operational, technological, commercial, environmental, and regulatory changes that are transforming the traditional strategies and business models.

1 Take Control of Your Future: Megatrends in the Utilities Industry
NAVIGANT ENERGY MARKET OUTLOOK (NEMO)

FEATURES

- Integrated Power, Gas, Environmental Modeling
- Nodal Pricing
- Full Transmission Representation
- Benchmarking to Capture Market Volatility
- Plant Retirement and Retrofit Decisions

PRODUCTS

- Energy Price Forecasts
- Gas Price Forecasts
- All Capacity Markets
- Emission Allowance Prices
- REC Prices
- Reports for 13 Regions in North America
- Semiannual Data Subscription
KEY UPDATES IN THE 2017 MID-YEAR OUTLOOK

• Latest announced/planned generation additions and retirements
• Latest load forecasts
• New coal price forecast from John T. Boyd and Associates
• Continued renewable generation build-out
• Overhaul of solar profile shapes, now accounting for regional and technological differences as well as differences between residential and commercial-scale systems
• Updated regional solar and wind capacity factors
• Introduction of future storage capacity additions
• Updated VOM and start-cost assumptions for thermal units
• Polynomial heat rate curves for combined-cycle and simple-cycle gas turbines
• Accelerated clean energy policies in Canada
  - Coal phase out by 2030 to achieve 90% generation from non-emitting resources
  - Federal carbon floor price of CAD $10/ton starting in 2018 and increasing to CAD $50/ton in 2022
STORAGE AND INCREASED RENEWABLE PENETRATION

California needs storage to meet renewable targets without adding significant new natural gas generation.

Declining costs, technological advancement, revised load forecasts, and updated capacity factor and profile assumptions are driving solar penetration throughout North American markets.

Source: Navigant

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Energy Storage Capacity Additions in WECC

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<tr>
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<th>MW</th>
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<td>2018</td>
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<tr>
<td>2020</td>
<td>300</td>
</tr>
<tr>
<td>2021</td>
<td>400</td>
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Source: Navigant

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Solar Additions

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<tr>
<th>Year</th>
<th>PJM</th>
<th>NYISO</th>
<th>CAISO</th>
<th>ERCOT</th>
<th>Ontario</th>
<th>Alberta</th>
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<tr>
<td>2018</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
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</tr>
<tr>
<td>2019</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
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<td>2020</td>
<td>500</td>
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<tr>
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<tr>
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<td>500</td>
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<td>500</td>
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</tbody>
</table>

Source: Navigant
POWER MARKET OVERVIEW

• Renewables and distributed energy resources (DER) continue to grow across North America
• Solar capital costs are expected to continue to decline, although at a slower rate than recent years
• Navigant expects:
  - 34 GW of DER and 47 GW of energy efficiency/demand-side management by 2030
  - 202 GW of wind and solar additions and 166 GW of net gas additions over the next 20 years
  - 63 GW of coal retirements over the next decade
• Removal of the US Clean Power Plan and real gas price escalation means economics for coal in the United States are better longer term; Canadian provinces are accelerating the retirement of coal-fired generation by implementing of environmental policies that put upward pressure on electricity prices
• Increased renewables and declining battery costs means that storage technology is on the precipice of increased deployment across the electric grid, for both renewable integration and to provide ancillary services
  - Navigant expects over 1 GW of storage additions in WECC over the next decade
CANADA OVERVIEW

**British Columbia**
- Carbon Tax effective 2008
- No coal; ~95% renewable
- 1.1 GW of new hydro, Site C

**Alberta**
- Carbon Tax effective 2017
- Coal phase out by 2030
- 30% RPS by 2030

**Saskatchewan**
- No provincial carbon price
- Coal phase out by 2030
- 50% RPS by 2030

**Manitoba**
- Carbon policy under development
- No coal; ~93% renewable
- 0.6 GW of new hydro, Keeyask

**Ontario**
- Cap and Trade effective 2017
- No coal; ~45% renewable
- 20 GW RPS by 2025

**Quebec**
- Cap & Trade effective 2013
- No coal; ~99% renewable
- 1.5 GW of new hydro, Romaine

**Newfoundland & Labrador**
- Carbon policy under development
- No coal; ~55% renewable
- 0.8 GW of new hydro, Muskrat Falls

**Nova Scotia**
- Carbon policy under development
- Coal phase out TBD (>2030)
- 41% RPS by 2022

**New Brunswick**
- Carbon policy under development
- Coal phase out by 2030
- 40% RPS by 2020

Source: Navigant
ALBERTA

**Alberta Energy Prices**

LMP (2016 $/MWh)

- Alberta Energy Price
- TCPL Alberta, AECO-C Gas Price

**Alberta Generation Mix**

Annual Generation (GWh)

- Hydro
- Other Renewable
- CC
- CT Gas
- EE / DR
- Wind
- Nuclear
- ST Coal
- ST / IC Gas
- Solar

**Alberta Capacity Mix**

Source: Navigant
ABUNDANT AND WIDELY DISTRIBUTED DOMESTIC NATURAL GAS RESOURCES

Select North American Shale Plays

Source: Navigant, Ventyx
PRICE GROWTH TO REMAIN RELATIVELY LOW AFTER REBOUND

Henry Hub Natural Gas Price Outlook: 2017-2040

Source: Navigant Energy Market Outlook Summer 2017
US SUPPLY CONTINUES TO GROW

27.6% of US production now comes from Marcellus and Utica shale plays, up from 0.2% just 8 years ago.

Source: Navigant Energy Market Outlook Summer 2017

Shale: 68% of US production by 2040
WHERE WILL ALL THE ADDITIONAL SHALE PRODUCTION GO?

Demand for US Natural Gas: 2016-2040

- **Primary Growth Sectors (CAGR):**
  - Industrial 1.5%
  - LNG Export 13.5%
  - Mexico Pipeline Export 3.9%
  - NGV 17.3%

- **Low Growth Sectors (CAGR):**
  - Electric Gen. 0.5%
  - Residential 0.1%
  - Commercial 0.3%

Source: Navigant Energy Market Outlook Summer 2017
INCREMENTAL GROWTH FROM NEW MARKETS

Over 32 Bcfd of Demand Market Growth from New and Revitalized Markets

Incremental Demand Growth: 2016-2040

- **Industrial**
  - Chemicals leading expansion with over $160 billion in capital investment between 2010 and 2016

- **Export**
  - Growing liquefied natural gas (LNG) export capacities in the next 5 years
  - Increasing pipeline export due to Mexico demand growth

- **Natural Gas Vehicle (NGV)**
  - Strong long-term demand growth

Source: Navigant Energy Market Outlook Summer 2017
ASIA AND EUROPE WILL DRIVE GLOBAL DEMAND FOR US LNG

US LNG Exports by Importing Region: 2016-2035

Source: Navigant’s Global Natural Gas Outlook using the G2M2 global market model
PIPELINE EXPORTS TO MEXICO ARE ALSO INCREASING SHARPLY

Source: Navigant Energy Market Outlook Summer 2017
By the end of 2017, the United States will become a net exporter (by pipe and by ship) of natural gas for first time since 1957 (60 years ago).

INTERNATIONAL DEMAND FOR US GAS WILL BE A THRESHOLD EVENT

Source: Navigant Energy Market Outlook Summer 2017
NYMEX PRICE SHOWS DECREASING TRENDS

Henry Hub Price: 2010-2022

Historical

Forecast

$-

$1.00

$2.00

$3.00

$4.00

$5.00

$6.00

$7.00

(Real2016$/MMBtu)

Source: Navigant Energy Market Outlook Summer 2017, Ventyx, ICE, NYMEX
CASE STUDY: TODAY’S NYMEX—REALISTICALLY LOW?

NYMEX Henry Hub Price is estimated to be $2.69/MMBtu for 2019

- To derive that price in Navigant’s 2017 Summer Outlook, holding everything else the same:
  - US LNG export growth would need to be stagnant, at Sabine Pass volumes only
  - US industrial and Mexican exports would remain flat

Using more realistic assumptions—the annual average price in 2019 is $3.59/MMBtu:
- This is assuming LNG export of 9.5 Bcfd (12 Bcfd by 2022)
- Growth in US industrial (2.1 Bcfd) and Mexican demand (2.5 Bcfd) per Navigant’s current outlook

This illustrates that current levels of gas demand matter, and perhaps the current NYMEX does not reflect expected current market demand growth

Annual Average Henry Hub Price: 2019

<table>
<thead>
<tr>
<th>Year</th>
<th>Real2016$/MMBtu</th>
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<tbody>
<tr>
<td>Status Quo/NYMEX</td>
<td>$2.69</td>
</tr>
<tr>
<td>Summer 2017</td>
<td>$3.59</td>
</tr>
</tbody>
</table>

Source: Navigant Analysis, Ventyx, NYMEX
NEMO

KEY TAKEAWAYS
The share of gas-fired and renewable capacity increases significantly over the next 15 years.
CHANGING US ENERGY GENERATION MIX

US Energy Demand: 4,156,043 GWh

- EE / DR: 23,203 GWh
- Other: 6,940 GWh
- ST / IC Gas: 47,622 GWh
- CT Gas: 64,914 GWh
- CC: 782,819 GWh
- ST Coal: 1,148,166 GWh
- Nuclear: 1,277,702 GWh
- Other Renewable: 74,182 GWh
- Solar: 68,878 GWh
- Wind: 318,239 GWh
- Hydro: 250,572 GWh

Generation Mix (GWh)

- EE / DR: 164,416 GWh (2017) 31% (2032)
- Other: 6,941 GWh (2017) 1% (2032)
- ST / IC Gas: 36,083 GWh (2017) 6% (2032)
- CT Gas: 212,183 GWh (2017) 8% (2032)
- CC: 807,680 GWh (2017) 19% (2032)
- ST Coal: 1,361,782 GWh (2017) 31% (2032)
- Nuclear: 1,188,361 GWh (2017) 29% (2032)
- Other Renewable: 85,874 GWh (2017) 1% (2032)
- Solar: 184,232 GWh (2017) 3% (2032)
- Wind: 423,820 GWh (2017) 5% (2032)
- Hydro: 250,378 GWh (2017) 5% (2032)

Through 2032, gas-fired and renewable generation increase as the total share of coal generation declines.

US Energy Demand: 4,773,692 GWh
M&A Statistics in Energy Industry

Source: SNL Financial, downloaded September 2017
KEY TAKEAWAYS

• With declining costs and technological advancement, renewables and DER continue to grow in areas with positive state policies and decent renewable potential
• Storage technology is on the precipice of increased deployment across the electric grid for both renewable integration and to provide ancillary services
• Ambitious Canadian environmental policies will put a significant upward pressure on electricity prices
• North American natural gas supply abundance will continue due to vast shale resources across North America, particularly in the Appalachian basin
• With pipeline exports to Mexico and LNG exports to the rest of the world, demand for US natural gas will turn US into a net exporter by the end of 2017
• Removal of the US Clean Power Plan and real gas price escalation means the economics for coal in the United States are better longer term
• Generation market should continue to be active; the number of deals and spending on deals are expected to increase above historical averages
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