WHAT’S FUELING THE CLEAN ENERGY ECONOMY?
NATIONAL TRENDS AND LOCAL OPPORTUNITY
CLEAN ENERGY BUSINESS NETWORK

POLICY
Inform and engage clean energy business leaders in policy issues impacting the industry

BUSINESS DEVELOPMENT
Promote networking/industry collaboration and provide resources to help small businesses reach target markets and grow

EDUCATION
Communicate the benefits of the clean energy economy to the public and policymakers

OUR MISSION
GROWING THE CLEAN ENERGY ECONOMY—ONE SMALL BUSINESS AT A TIME

3,000+ clean energy business leaders across 50 states and nearly 350 Congressional districts

Technology breakdown for members who have been categorized:

- Solar: 413
- Efficiency: 274
- Combined heat and power: 220
- Wind: 146
- Storage and batteries: 132
- Grid technologies: 111
- Vehicles: 106
- Alternative fuels: 104
- Natural gas: 91
- Biomass: 16
- Waste heat to power: 65
- Geothermal: 32
- Waste to energy: 10
- Fuel cells: 49
- Other: 43
- Hydro: 30
- Carbon sequestration: 31
- Tidal/wave/ocean: 31
- Biogas: 28

Visit www.cebn.org or text CEBN to 66866 to join!
CEBN is proud to be a partner!

The Power Network is EPIcenter’s membership group for those interested in new energy innovation. The network engages a broad collective of supporters advancing our mission while enjoying opportunities for networking, continuing education, support, and access to EPIcenter leadership and innovators.

By becoming a member you will:

- Gain first-hand knowledge of start-up companies and breakthroughs in energy innovation
- Support the growth of a new asset for South Texas that will have global impact
- Enjoy the historic preservation of a part of San Antonio’s history and EPIcenter’s unique location on the San Antonio River
CEBN’s Parent Organization

The CEBN was founded by The Pew Charitable Trusts in 2009 to inform and engage clean energy business leaders in policy.

It transitioned in May 2017 to become an independent initiative of the Business Council for Sustainable Energy—a 25-year-old coalition of leading trade associations, corporations, and utilities working to advance market opportunities for energy efficiency, renewable energy, and natural gas. In its new home, the CEBN has reinvented itself to become a one-stop-shop of resources for small- and medium-size clean energy providers.
The CEBN is governed by leaders representing the very core of our small- and medium-size business focus, along with representatives of major corporations that support our mission.

LYNN ABRAMSON
President, Clean Energy Business Network

ANDY BARNES
Program Manager, Clean Energy Business Network

JAMES JACKSON
Chairman of Board / Chief Business Dev Officer, Thermal Energy Partners

LISA JACOBSON
Board Member / President, Business Council for Sustainable Energy

MARK WAGNER
Board Member / Vice-President of Government Relations, Johnson Controls

ANDREA SRESHTA
Board Member / Co-founder, LuminAID

JEN DERSTINE
Board Member / Dir. of Strategy, Policy and Distributor Dev., Capstone Turbo Corp.

DAVE MUCHOW
Board Member / Managing Partner, Muchowlaw

STEVE CROUT
Board Member / Former Vice President of Government Affairs, Qualcomm
READY TO NAVIGATE THE CLEAN ENERGY LANDSCAPE?
73% of the $11.5 trillion global investment in new power generation capacity through 2050 is projected to go to wind and solar.

These two technologies will surge to almost 50% of global electricity generation by 2050.

- Bloomberg New Energy Finance, New Energy Outlook 2018
“There is nothing ‘alternative’ about clean energy.”

- Ethan Zindler, Head of Americas, Bloomberg New Energy Finance
U.S. economic growth no longer relies on expanding energy consumption

In the past 10 years:

- GDP (Indexed): +15%
- Primary energy consumption (Indexed): -1%

Source: Bureau of Economic Analysis, Lawrence Berkeley National Laboratory, BNEF. Notes: Values for 2017 are projected, accounting for seasonally based on latest monthly values from EIA (data available through October 2017). 2017 GDP estimate is a projection from economists compiled at ECFC <CO> on the Bloomberg Terminal.
Sustainable energy resources have become an established part of U.S. power.

U.S. electricity generation by fuel type (% of total generation)

In the past 10 years*:
- Renewables (including hydro): +90%
- Natural gas: +47%
- Nuclear: -2%
- Oil: -38%
- Coal: -38%

Source: EIA, BNEF. Note: Values for 2017 are projected, accounting for seasonality, based on latest monthly values from EIA (data available through November 2017). *Percentage changes over the past 10 years are for share of total generation, not for the absolute number of MWh generated.
Electricity is making up a smaller share of household bills than ever before

Electricity and natural gas as share of total consumption expenditure

Total energy goods and services as share of total consumption expenditure

Source: Bureau of Economic Analysis, BNEF

February 15, 2018
Clean energy is no longer expensive: Wind, solar contracts are economic in parts of the U.S.

Wind, solar power purchase agreement price ranges (estimated) and power price ranges – by region

Source: Bloomberg New Energy Finance, SEC filings, interviews, analyst estimates. Notes: MISO is the Midwest region; PJM is the Mid-Atlantic region; SPP is the Southwest Power Pool which covers the central southern U.S.; NEPOOL is the New England region; ERCOT covers most of Texas. Wholesale power prices are based on market-traded futures for calendar year 2018 for select nodes within each region.
Cheaper batteries are driving the falling cost of electric vehicles

Lithium-ion battery pack prices

<table>
<thead>
<tr>
<th>Year</th>
<th>Pack</th>
<th>Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>599</td>
<td>411</td>
</tr>
<tr>
<td>2014</td>
<td>540</td>
<td>367</td>
</tr>
<tr>
<td>2015</td>
<td>350</td>
<td>234</td>
</tr>
<tr>
<td>2016</td>
<td>273</td>
<td>199</td>
</tr>
<tr>
<td>2017</td>
<td>209</td>
<td>147</td>
</tr>
</tbody>
</table>

In the past 5 years:

-$390/kWh
-65%

In 2017:

-$64/kWh
-23%

Source: Bloomberg New Energy Finance Notes. BNEF has tracked lithium-ion battery prices since 2010 through an annual market survey process. It collects, anonymizes and aggregates price data for battery cells and packs. The numbers presented in the chart above include cell and pack prices for electric vehicles, and are in nominal terms. Prices are given as volume-weighted averages.
For the first time, the U.S. was a net natural gas exporter every month of the year

U.S. natural gas exports and imports

Volume (Ecf/d)

Exports

Imports

Exports to Canada
Exports to Mexico
LNG exports
Imports from Canada
LNG imports
Net exports*

Source: Bloomberg Terminal, EIA. Note: *Net export line shows the six-month rolling average.
Corporations “Are Still In” (Part I)

Renewable capacity contracted by corporations, by technology

- Annual gigawatts
- Cumulative gigawatts

Year: 2008-2018

- Solar
- Wind
- Other

Largest corporate offtakers, 2017

- MW

Apple Inc: 356
Google Inc: 536
Kimberly-Clark: 245
Facebook Inc: 35
T-Mobile USA: 160
Anheuser-Busch InBev NV: 152
Bay Area Rapid Transit: 45
General Mills: 100
Target Corp: 100

Source: Bloomberg New Energy Finance. Note: Charts show offsite PPAs only.
Corporations “Are Still In” (Part II)

Key players: Corporate clean energy procurement

- Retail
  - GROUPE L’OCCITANE
  - BURBERRY

- Financial & Insurance
  - JPMorgan Chase
  - Morgan Stanley
  - Citigroup

- Tech
  - PHILIPS
  - eBay
  - Schneider Electric

- Food & Beverage
  - Kellogg's
  - Carlsberg
  - AB InBev

Key players: Corporate energy efficiency

- Manufacturing
  - Covestro
  - Dalmia Bharat Group
  - Danfoss
  - Johnson Controls

- Automotive
  - Mahindra
  - Detroit
  - Volvo

- Retail
  - H&M
  - Woolworths

- Financials
  - Landsec
  - Swiss Re

Source: Bloomberg New Energy Finance, The Climate Group, company announcements, DOE. Note: Corporate clean energy procurement key players are companies that signed onto the RE 100 in 2017. The key corporate energy efficiency players displayed here are drawn from EP 100 members and the list of ISO 50001 certified facilities. ISO 50001 certification means that a company has met established efficiency standards at one or more of its facilities.
U.S. energy overview: Jobs in select segments of the energy sector

- The renewable, energy efficiency, and natural gas sectors employed an estimated 3.3 million Americans in 2016, according to the Department of Energy. Energy efficiency alone supported 2.2 million jobs, while solar supported roughly 374,000 and natural gas 362,000.

- While renewable sectors like solar, wind, hydropower and geothermal do not require upstream processing or extraction of a fuel, fossil-fired generation does. Adding in these fuel-related jobs notably boosts the total employment by fossil fuel-fired generation and bioenergy. In 2016, 86% of the 362,000 jobs associated with the natural gas sector came from fuel supply. Coal employed 160,000, with about half in coal production and supply.

- Energy efficiency jobs related to construction often hire people who also work on other types of construction tasks (26% of the 1.4 million employees in this category spend only the minority of their time on efficiency).

Source: Department of Energy (DOE) Notes: Transmission, distribution, and oil/petroleum jobs not included as available data does not break out the portion of those jobs relevant to the electricity sector. See footnote on next slide for details on the definition for “Advanced Gas.”
CPS Energy’s ‘New Energy Economy’ initiative has led to more than $1.4 billion in annual economic impact, over 900 jobs, and over $200 million in educational and capital investment.”

- San Antonio Economic Development Foundation

“By focusing entirely on new energy, EPICenter will help grow this segment of our economy, creating jobs and new economic opportunities in the region.”

- Kimberly Britton, CEO, EPICenter
THE CPS PERSPECTIVE

Paula Gold-Williams
President & CEO, CPS Energy
WHERE DO YOU SEE THE POSSIBILITIES?
HOW WILL TEXAS’ ENERGY PORTFOLIO EVOLVE?

TX ENERGY CONSUMPTION, 2016
(13k trillion Btu)

TX ELECTRICITY GENERATION, FEB. 2018
(33k MWh)
<table>
<thead>
<tr>
<th>Current Benchmarks</th>
<th>Potential Growth Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st</strong> in cumulative installed wind capacity (22 GW as of 2017)</td>
<td>Harnessing this resource: Only 10th in electricity generation from wind (14.8% in 2017) and technical potential is 62X greater</td>
</tr>
<tr>
<td><strong>7th</strong> in cumulative installed solar capacity (1.9 GW as of 2018)</td>
<td>Nearly half (46%) distributed solar installations concentrated in San Antonio &amp; Austin</td>
</tr>
<tr>
<td><strong>11th</strong> in electricity generation from natural gas (46% in 2017)</td>
<td>LNG exports</td>
</tr>
<tr>
<td><strong>1st</strong> in cumulative installed CHP/WHP capacity (17 GW as of 2018); various efficiency financing programs and incentives</td>
<td>Only 26th in ACEEE state scorecard (16.5/50)</td>
</tr>
</tbody>
</table>
How do Texas—and San Antonio—stack up?

Using O&G best practices Texas is poised to be the next Geothermal Giant

Up to 4,000 MW of Untapped Potential
WHAT ARE SOME OTHER OPPORTUNITIES FOR/BARRIERS TO CLEAN ENERGY GROWTH?

**Emerging Industries?**
- Renewables, NG, Efficiency
- Storage
- Microgrids
- CCUS
- Load Regulation/Demand Response
- Alternative Fuel Vehicles

**End Users/Economic Sectors?**
- Health Care
- IT/Cybersecurity
- Financial Services
- Higher Education
- Defense & Aerospace
- O&G, Ports, Manufacturing
- Commercial Buildings & Hotels

**Drivers/Motivations?**
- Economic Competitiveness
- Affordability
- Resilience & Reliability
- Investor Climate Risk
- International/Corporate C Pricing
- Corporate Sustainability
- Customer Preference/Demand
CONCLUSIONS

1. The clean energy economy has arrived
2. To compete in the global economy, cities, states, and nations need to compete in clean energy
3. Texas is making progress in diversifying its energy economy, and San Antonio is a leader
4. There remains enormous untapped potential to increase efficiency and low-carbon energy across all economic sectors—and enjoy a cleaner, more affordable, more reliable energy future!
CONNECT TODAY!

CEBN: www.cebn.org (or text "CEBN" to 66866)


Small or Medium Size Business
Corporation or Investor
Clean Energy Changemaker

WE’RE ALL ABOUT THE “NETWORK”