I. Meeting Packet

State of Florida
Public Service Commission
INTERNAL AFFAIRS AGENDA
Tuesday, March 7, 2017
Following Commission Agenda
Room 105 - Gerald L. Gunter Building

1. Presentation on Energy Storage Technology

   - Maria Robinson, Associate Director of Energy Policy and Analysis, Advanced Energy Economy (Attachment 1)

   - Sharon Hillman, VP Market Policy and Business Development, AES Corporation (Attachment 2)

   - Steve McKenery, VP, Storage Solutions, 8minutenergy Renewables, (Attachment 3)

2. Presentation on Comcast's Internet Essentials
   - David Konuch, Vice President of Government and Regulatory Affairs, Comcast – Central Division (Attachment 4)

3. Legislative Update

4. General Counsel's Report

5. Executive Director's Report

6. Other Matters

BB/ks

OUTSIDE PERSONS WISHING TO ADDRESS THE COMMISSION ON ANY OF THE AGENDAED ITEMS SHOULD CONTACT THE OFFICE OF THE EXECUTIVE DIRECTOR AT (850) 413-6463.

Attachment 1

ENERGY STORAGE: AN OVERVIEW

March 7, 2017

Florida Public Service Commission Internal Affairs

Advanced Energy Economy

Energy storage is a well-established technology field with ongoing innovations

Electro-Chemical

- Rechargeable battery, e.g. Li-ion
- Flow battery

Mechanical

- Pumped hydro
- Compressed air
- Flywheel

Thermal

- Molten salt
- Ice storage air conditioning

Source: Advanced Energy Economy, *This is Advanced Energy: 52 Technologies That Are Powering the U.S., Economy, Modernizing our Energy System, and Lowering Costs for Consumers* (2016). available at http://info.aee.net/this-is-advanced-energy.

Energy storage provides a range of technical benefits to the grid, including reliability.

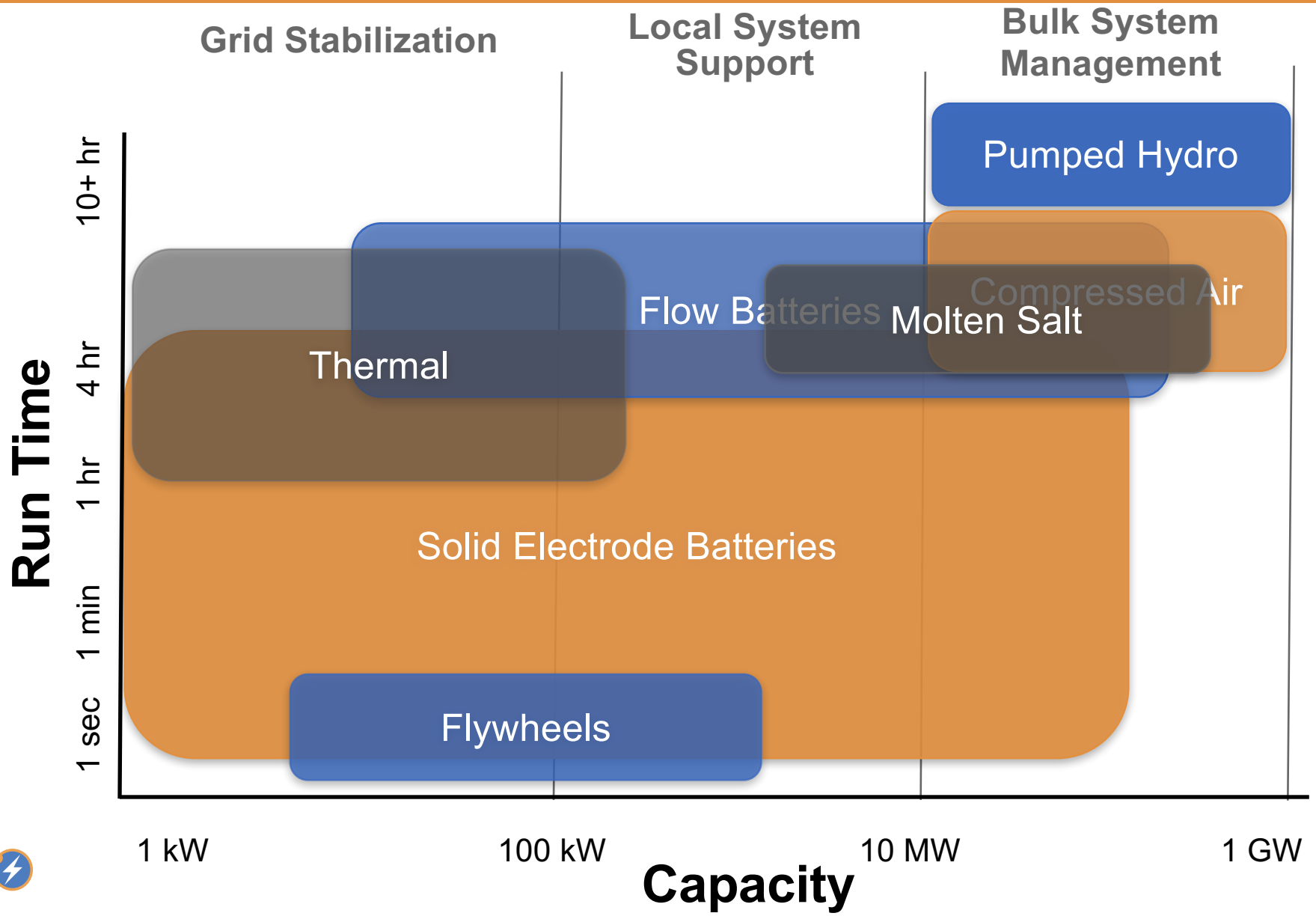
Grid-Scale

- Integrate variable renewables
- Relieve congestion
- Voltage support
- Flexible peaking capacity
- Frequency regulation

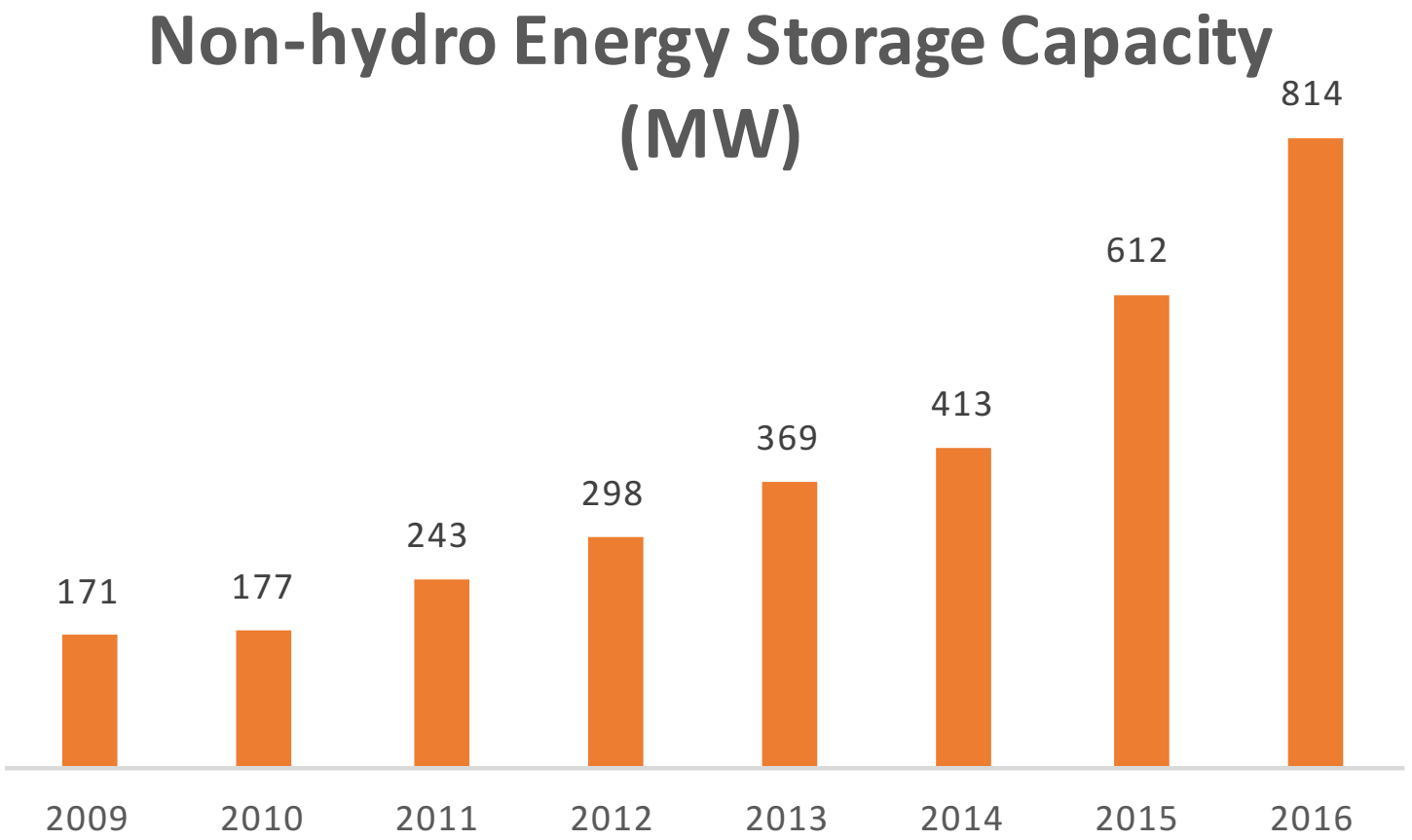
Behind-the-Meter

- Microgrid or island-capability for universities, military bases, etc.
- Ramping support
- Peak shaving and demand reduction for large customers
- Smooths quantity of distributed solar generation sold back to grid

Storage has multiple use cases in front and behind the meter.

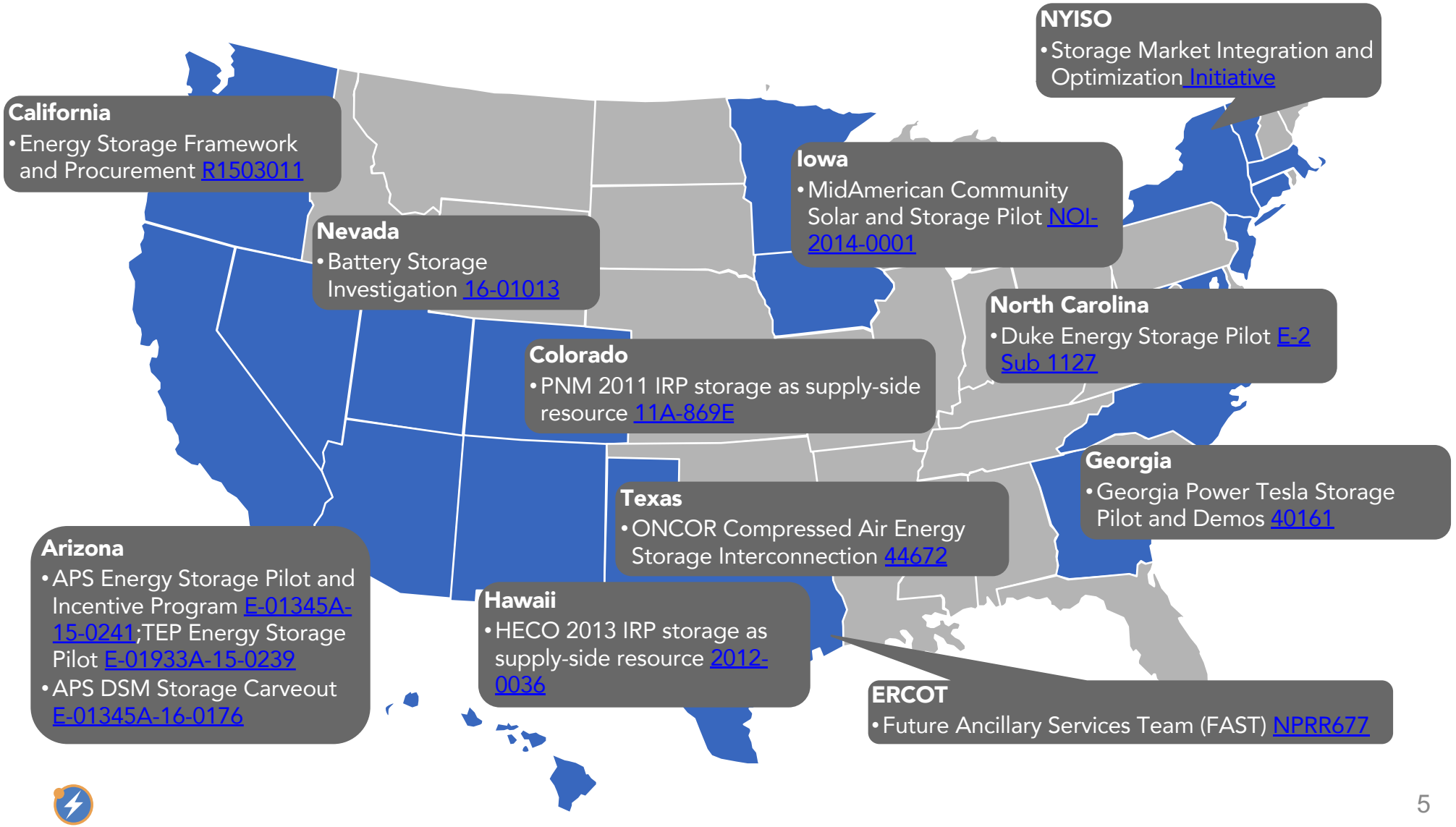


Storage deployment more than tripled between 2009 and 2016.



Source: Bloomberg New Energy Finance and the Business Council for Sustainable Energy, "2017 Sustainable Energy in America Factbook," at 114 (Feb. 2017), available at: http://www.bcse.org/sustainableenergyfactbook/#.

States across the country are looking to storage to solve grid challenges



Recommended technical resources

- *State of Charge: Massachusetts Energy Storage Initiative Study,* Sept. 2016, Massachusetts Dept of Energy Resources. http://www.mass.gov/eea/docs/doer/state-of-charge-report.pdf
- *State Strategies for Advancing the Use of Energy Storage,* Oct. 2016, National Governors' Association. https://www.nga.org/files/live/sites/NGA/files/pdf/2016/1610StateStrategiesEnergyStorage.pdf

Questions?

Maria Robinson
Advanced Energy Economy
Associate Director, Energy Policy and Analysis
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mrobinson@aee.net

Attachment 2

Storage for the Grid in Florida – Clean, Reliable and Cost Effective

Advancion® Energy Storage

Florida Public Service Commission

Sharon Hillman

March 7, 2017

AES we are the energy

Agenda

Overview of AES

Applications and Needs in Florida

Including Storage in Planning and Procurement

Questions

1 Will require funding

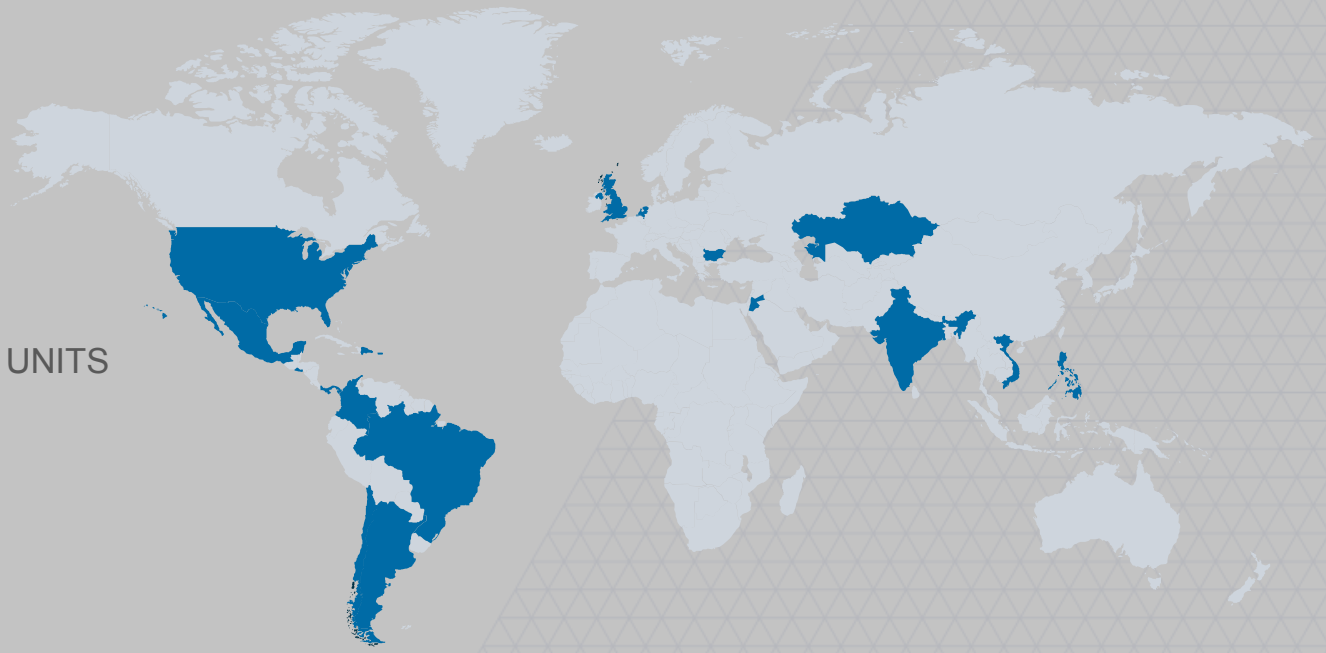
About the AES Corporation

Mission: Improving lives by providing safe, reliable and sustainable energy solutions in every market we serve.

6 MARKET-FACING STRATEGIC BUSINESS UNITS

4 CONTINENTS

17 COUNTRIES



AES Serves **10M** CUSTOMERS

8 **UTILITY** COMPANIES

21,000 GLOBAL WORKFORCE

$37B
TOTAL ASSETS
OWNED & MANAGED

$15B
TOTAL 2015
REVENUES

36,000 MW
GENERATION CAPACITY

AES is the global leader in utility-scale energy storage.

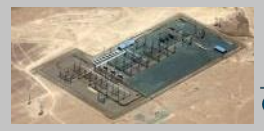
20 MW
USA | Tait, OH

20 MW
USA | IPL, IN

20 MW
USA | TX

100 MW
USA | Alamitos, CA

37.5 MW
USA | San Diego, CA



12 MW
CHILE | Los Andes

20 MW
CHILE | Angamos

20 MW
CHILE | Cochrane

32 MW
USA | Laurel Mountain, WV

2 MW
USA | ADA, PA

10 MW
USA | Warrior Run, MD

28 MW
DOMINICAN REPUBLIC | S.D.

10 MW
NORTHERN IRELAND | Kilroot

90 MW
NORTHERN IRELAND | Project #2

10 MW
THE NETHERLANDS | Zeeland

10 MW
INDIA | Delhi

10 MW
PHILIPPINES | Masinloc

OPERATIONS | 156 MW
CONSTRUCTION | 67.5 MW
LATE STAGE DEVELOPMENT | 208 MW
ADVANCION 4 ARRAY

Contains Forward Looking Statements

Advancion® is a complete solution for clean flexible power combined with full turn-key delivery

Available around the globe for owners and operators of Energy Storage assets

KEY DIFFERENTIATORS

1. Nodal architecture
2. Proprietary and patented controls
3. Supply chain and Advancion® Certification Program
4. AES operational experience

Advancion Nodes in an Array | **AES NETHERLANDS** | Zeeland, The Netherlands

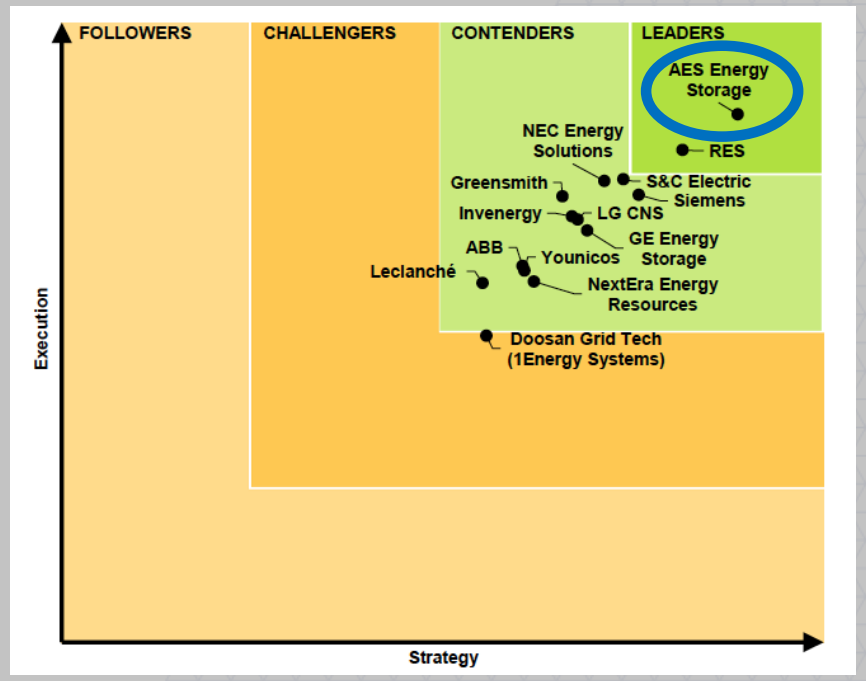
Advancion Node Controller

Batteries in a Advancion Node

HMI Control Screen

Advancion® is recognized as the leading solution for grid storage

Advancion®
Energy Storage



#1 Energy Storage Systems Integrator – 2015 & 2016

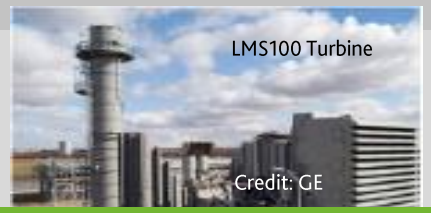
NAVIGANT RESEARCH

EEI Edison Electric INSTITUTE

2016 International Edison Award

Energy storage is a proven solution for multiple applications.

Enhancing grid efficiency and reliability

SEGMENT	OFFERED SOLUTIONS
 1. Generation Alternatives	1. Capacity Release 2. Frequency Regulation/Ancillary Services 3. Flexible Peaking Power 4. Renewables Integration
 2. T&D Alternatives	5. Capacity Release 6. Investment Deferral, Replacement
 3. Commercial & Industrial	7. Demand-charge Management & Reliability


20 MWi Angamos, Chile

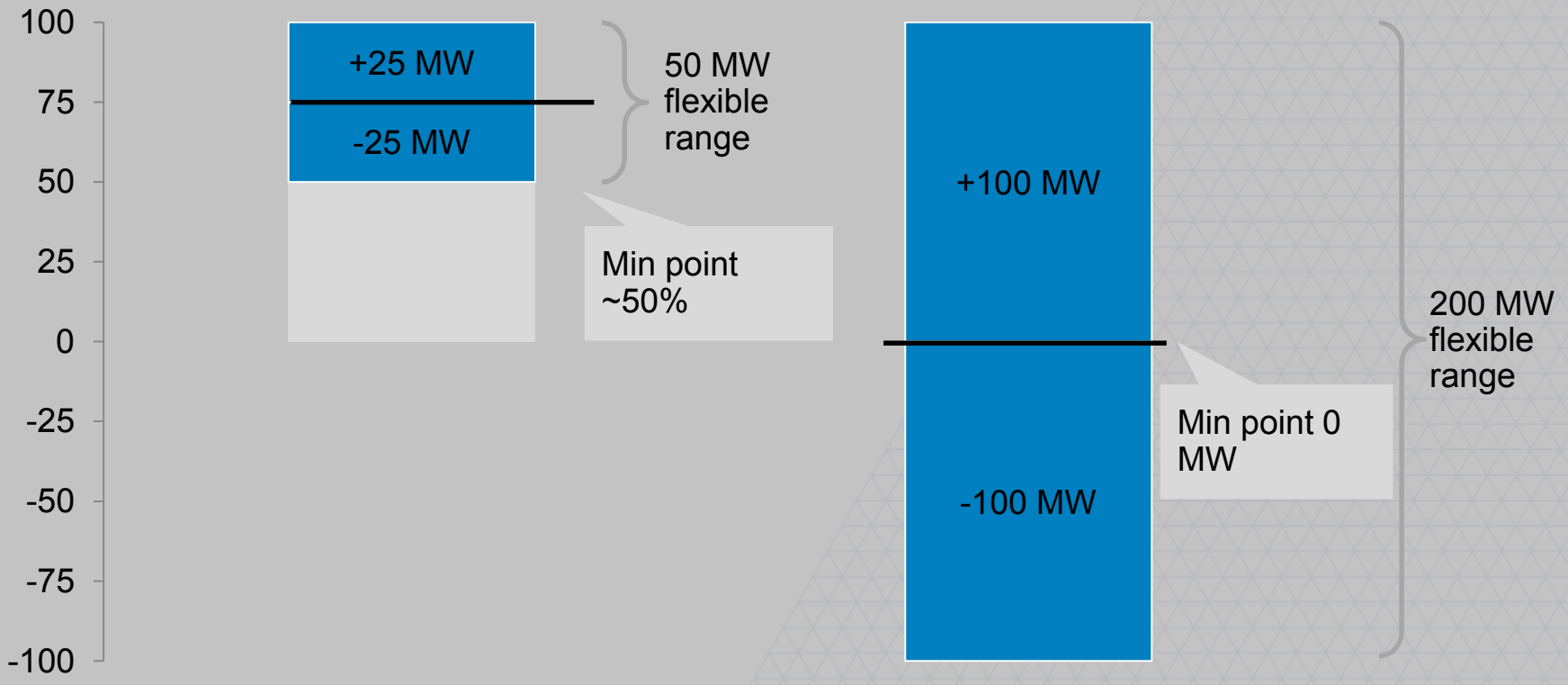

20 MWi IPL Array, USA


10 MWi India

Storage provides up to 4 x the effective resources and unique flexibility compared to traditional peakers

100 MW CT

100 MW Advancion® Array

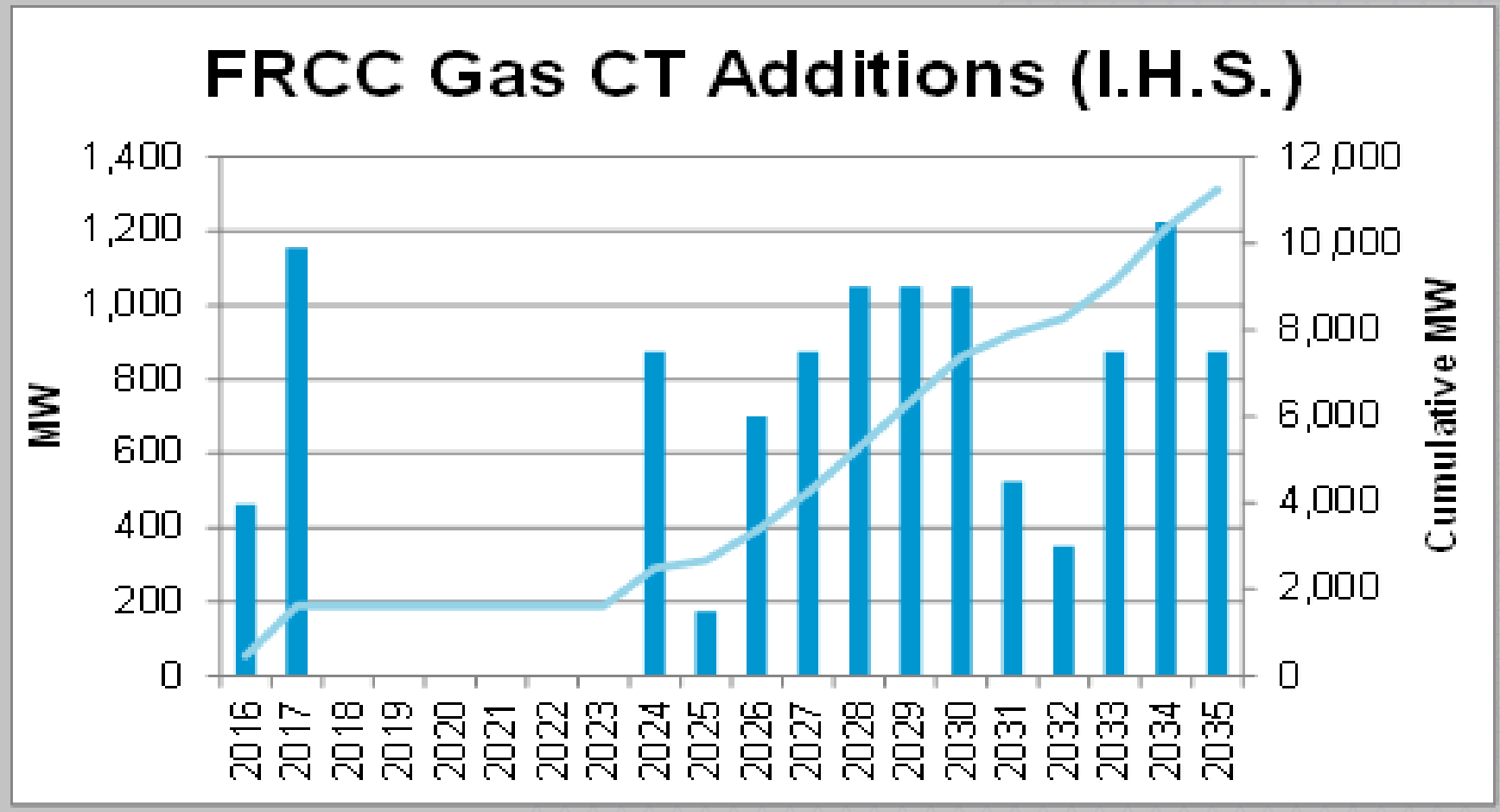


Unique capabilities of battery storage

- Fast ramp (<250 msec)
- Always synchronized
- Unlimited starts / stops (no cost)
- Broader operating range

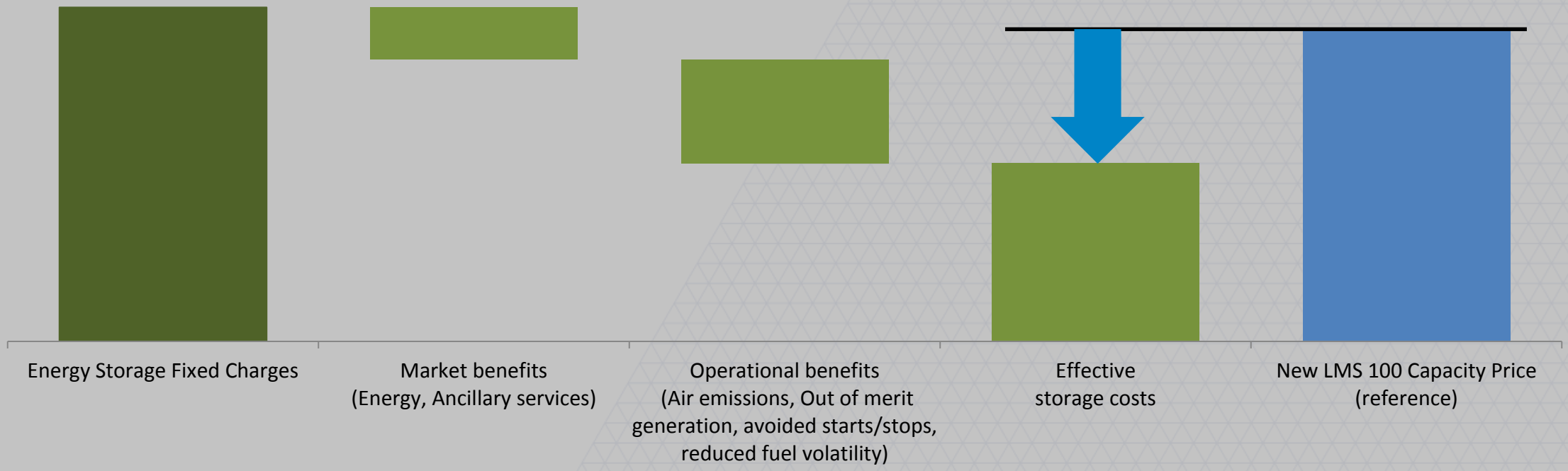
Projected Peaker Growth in Florida

Storage is a Competitive Clean Alternative for Peakers and Demand Management



Source – IHS Energy North American Power Market Outlook (Vertigo Scenario 2016)

Storage is competitive today; Operational benefits are significant.



Reduced deployment risk

Broad stakeholder appeal

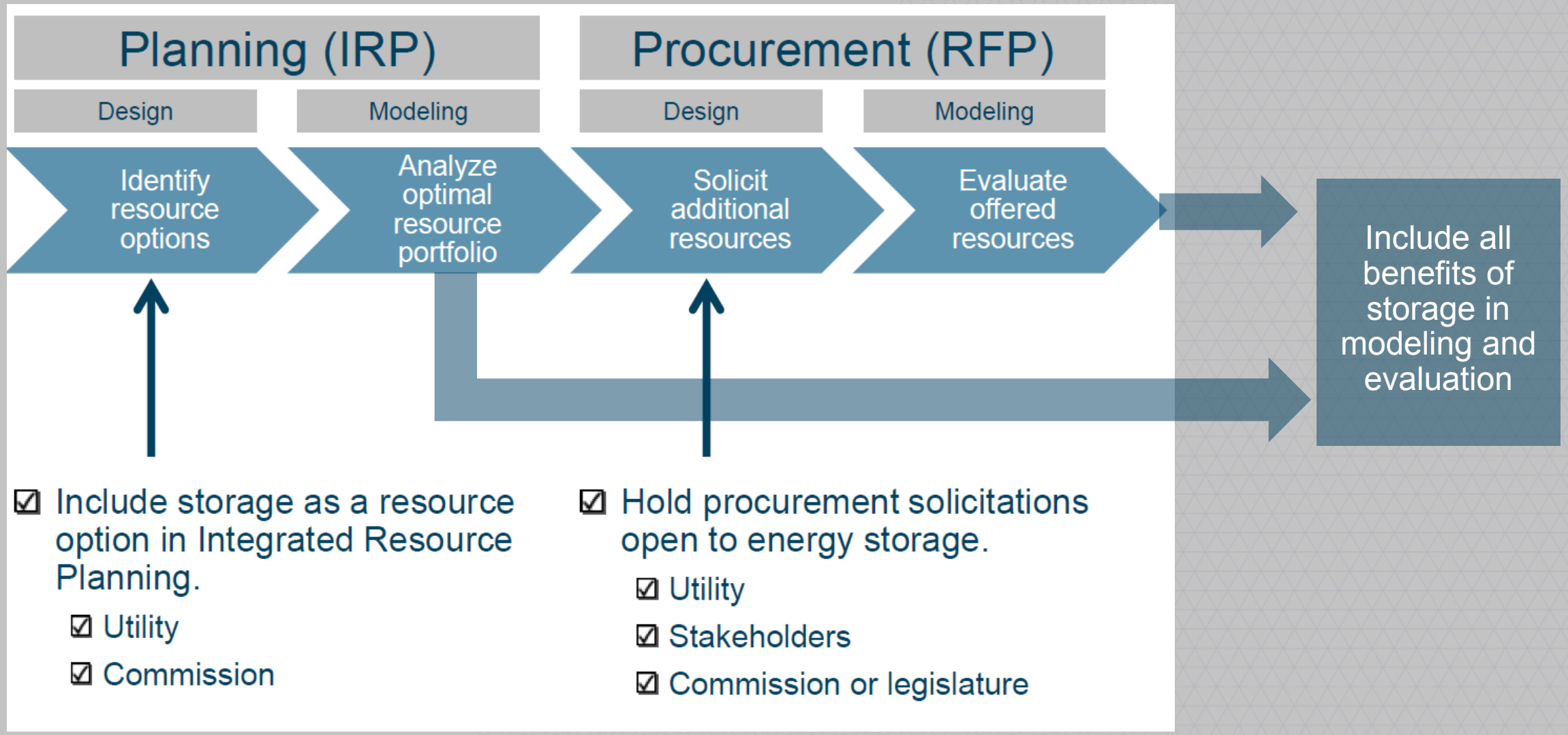
- No water use
- Zero direct emissions
- Reduced system-wide emissions
- Supports renewables integration
- Permitting profile similar to datacenter or warehouse
- Minimal traffic
- Minimal noise (<45 dB at 10m)

10 MW Interconnected | Online November 2015 | **AES WARRIOR RUN** | Cumberland, MD

10 MW Interconnected | Online December 2015 | **AES NETHERLANDS** | Zeeland, The Netherlands

10 MW Interconnected | Online December 2015 | **AES KILROOT** | Carrickfergus, Northern Ireland

How can states and utilities incorporate energy storage in resource planning and procurement?



Appendix

- Storage Project Use Case Examples

San Diego Gas and Electric procures 37.5MW in record time

Meeting peak energy needs in southern California

LOCATION
San Diego, California

In southern California where resources are needed to meet local peak capacity needs

THE NEED
Reliable and affordable energy to meet peak demand

Deliver energy storage for peak capacity applications in 6 months.

Credit: Utility Dive

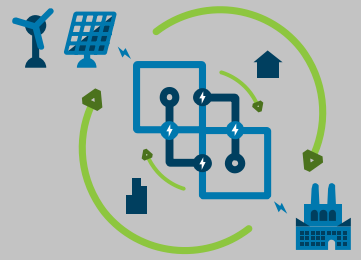
Alamitos: meeting southern California energy needs as infrastructure retires

Delivery 100 MW of peak power for 20 years

LOCATION
Long Beach, California

In the densely populated Los Angeles basin with limited site, modernizing existing generation sites is critical.

THE NEED
Environmentally responsible and highly flexible resources in preferred locations



California's environmental objectives and rapidly changing net load profile require clean, fast ramping peak power solutions to reduce emissions and improve utilization of renewable energy.

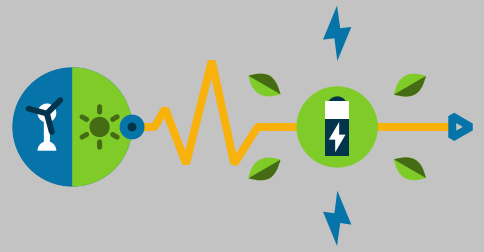
IPL facility built in under 12 months from ground breaking to commissioning

How fast is fast?

LOCATION
Indianapolis, IN

A city with the second highest solar energy production per capita in the US

THE APPLICATION
Grid and transmission reliability



Energy storage allows infrastructure to be more appropriately sized and get higher utilization out of the assets we already have.

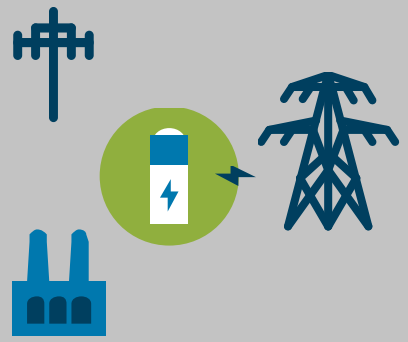
APS builds energy storage for grid reliability in just over 6 months

Right-sizing distribution investments

LOCATION
Phoenix area, AZ

A city with increasing penetration of renewables

THE APPLICATION
Feeder reliability



Enabling Arizona to right size their distribution investments to fit the need of their growing renewables portfolio

Energy storage can provide multiple T&D services

1 N-1 Capacity Release

- Automatic power injection to support grid stability during contingency.
- Increase the operational capacity of existing line (value creation from existing assets).
- Arrests line overloads and frequency/voltage deviations until grid is redispatched

2 Peak Load Relief

- Injects power downstream of thermal constraints during peak hours
- Avoids or defers new transmission capex to meet load
- Improves power quality and voltage conservation

3 Feeder reliability

- Back-up power to reduce frequency and duration of outages
- Injects real and reactive power to maintain voltage stability and support high penetration of intermittent renewables
- Reduces wear and tear on existing equipment
- Defers cost of traditional poles and wires solution

Improves reliability, lowers cost

Thanks!

Sharon Hillman
Sharon.Hillman@aes.com

Attachment 3

ENERGY STORAGE OVERVIEW

Florida Public Service Commission

March 7, 2017

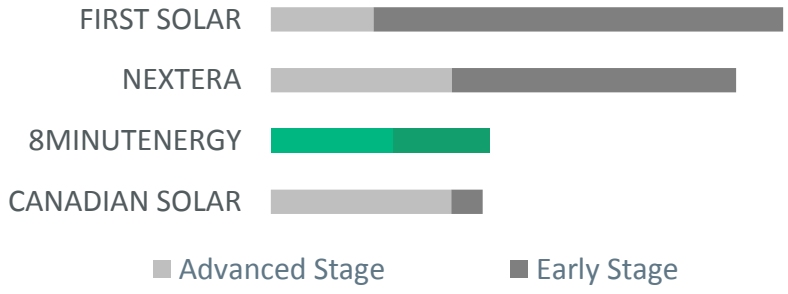
8minutenergy RENEWABLES

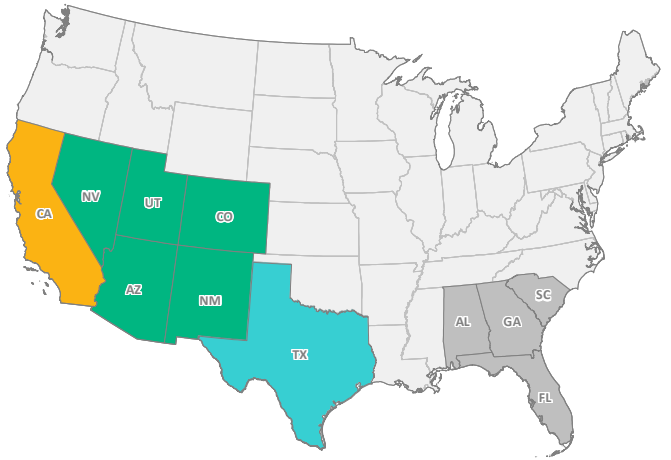
8minutenergy Renewables is the Nation's Largest Independent Solar PV and Storage Developer

PORTFOLIO AND TRACK RECORD

- 3rd largest utility-scale developer in the U.S.*
  - **5,500+ MW PV** under development
  - 500 MW storage under development
- **700+ MW** of utility-scale projects producing power
- **500+ MW** are construction ready and have PPAs
- 20,000+ acres under development
- 8minutenergy's projects have secured **$1.2B** in financing
- Executed **1.5 GW** of PPAs, representing **$5B** in contracted revenues
- Technology agnostic allows selection of best products to match client needs

TOP 5 UTILITY-SCALE DEVELOPERS IN U.S.





(NY008J6H) 843350_1

Graph source: Bloomberg New Energy Finance, April 2016

PV is Normally Paired with Storage Batteries …
Lithium-ion or Flow

Energy Storage Is A Very Broad Asset Class

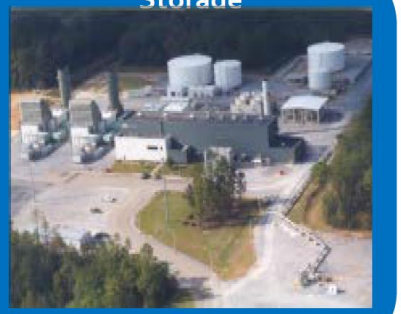
Electro-Chemical Storage

(Flow battery / Lithium Ion)

Mechanical Storage

(Flywheel)

Bulk Mechanical Storage



(Compressed Air)

Thermal Storage

(Ice / Molten Salt)

Bulk Gravitational Storage

(Pumped Hydro)

Transportation

(Electric Vehicles)

Energy Storage Market … Technology Improvements and Cost Reduction Will Soon Reach the Tipping Point on Cost and Value

Storage Opportunity

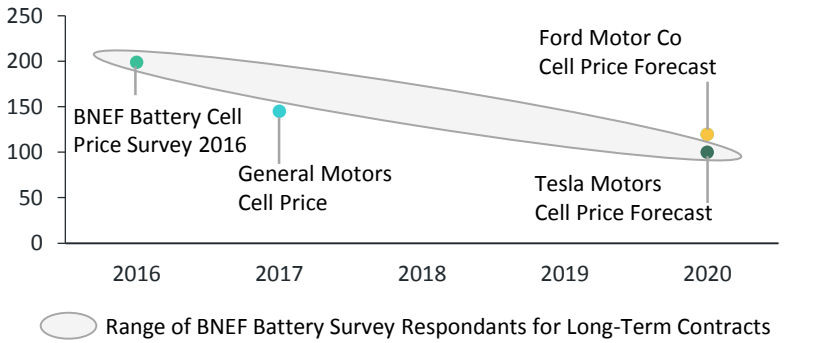
- 171 GW of energy storage in operation globally (96% pumped storage hydro); 24 GW in the US (94% PSH)
- Battery Storage: 1.6 GW deployed globally; 600 MW in US
- Lithium-ion is the battery technology of choice (96% of all BESS)
- NMC is the Lithium-ion chemistry of choice (75%); Lithium Iron Phosphate (LFP) is 2nd
- Predicted to grow to $2-4bn per year by 2020 (from $300mm)
- Continued Lithium-ion battery cost declines driven by massive growth in EV battery demand

Energy Storage Market Drivers

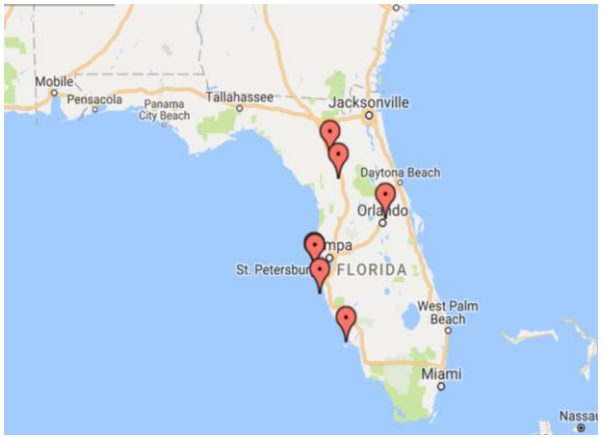
- PJM created market mechanism to recognize BESS for fast frequency regulation (Reg D signal)
- Utilities began to experiment with “pilot” scale BESS 1-5 MW
- Continued renewable growth (PV and wind) causes growing chasm between peak generation and peak demand
- Solar + Storage provides resiliency against prolonged weather induced outages
- Florida will be an emerging market for PV+S as FPl and others ramp up more solar (just announced replacement of 250MW coal plant with solar)

Significant Battery Cost Decline

Lithium-Ion Large-Format Battery Cell-Price Outlook, 2016–20 ($/kWh)



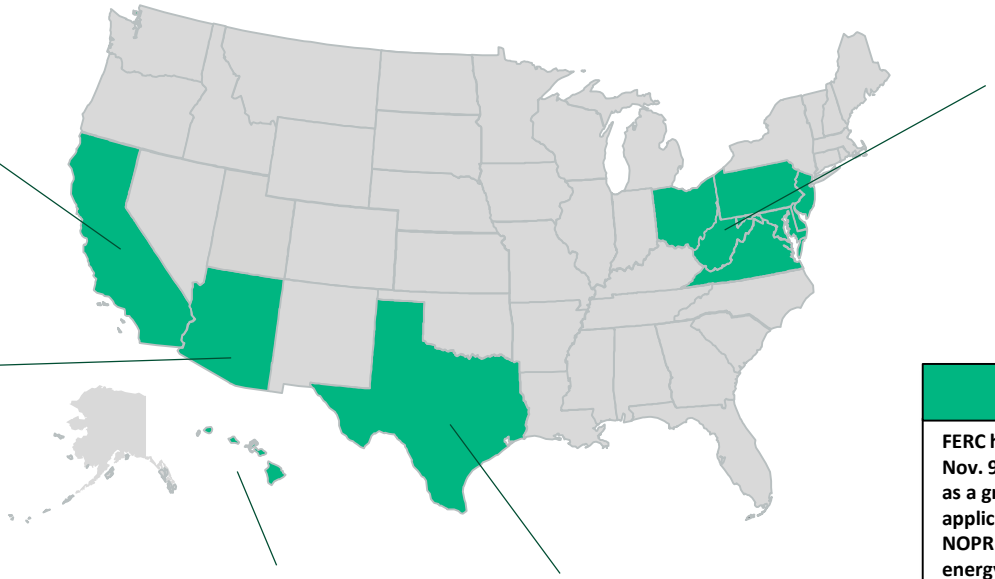
6 Storage Projects Operating (ice storage and batteries)



Sources: Bloomberg New Energy Finance, Morgan Stanley.

8minutenergy

1GW of Battery Energy Storage Deployed / Contracted / Announced



California (49%)

AB 2514 authorized 1.325GW of energy storage by SCE, PG&E and SDG&E by 2020. Aliso Canyon gas leak accelerated 84.5MW in 2016. LADWP plans 404MW by 2025. SB 584 proposes to raise RPS to 100% by 2045.

Arizona (3%)

TEP approved for two 10 MW storage projects, integrated with PV. APS and SRP both conduct all-source RFP's for >600 MW to evaluate PV+S against natural gas turbines.

PJM (29%)

By creating a viable market mechanism for frequency regulation in 2015, PJM kick-starts the Lithium-ion BESS market in the US.

Federal

FERC held a technical conference on Nov. 9 to examine the role of storage as a grid asset for T/D grid applications and on Nov. 17 issued a NOPR to open wholesale markets for energy storage and aggregation.

Hawaii (5%)

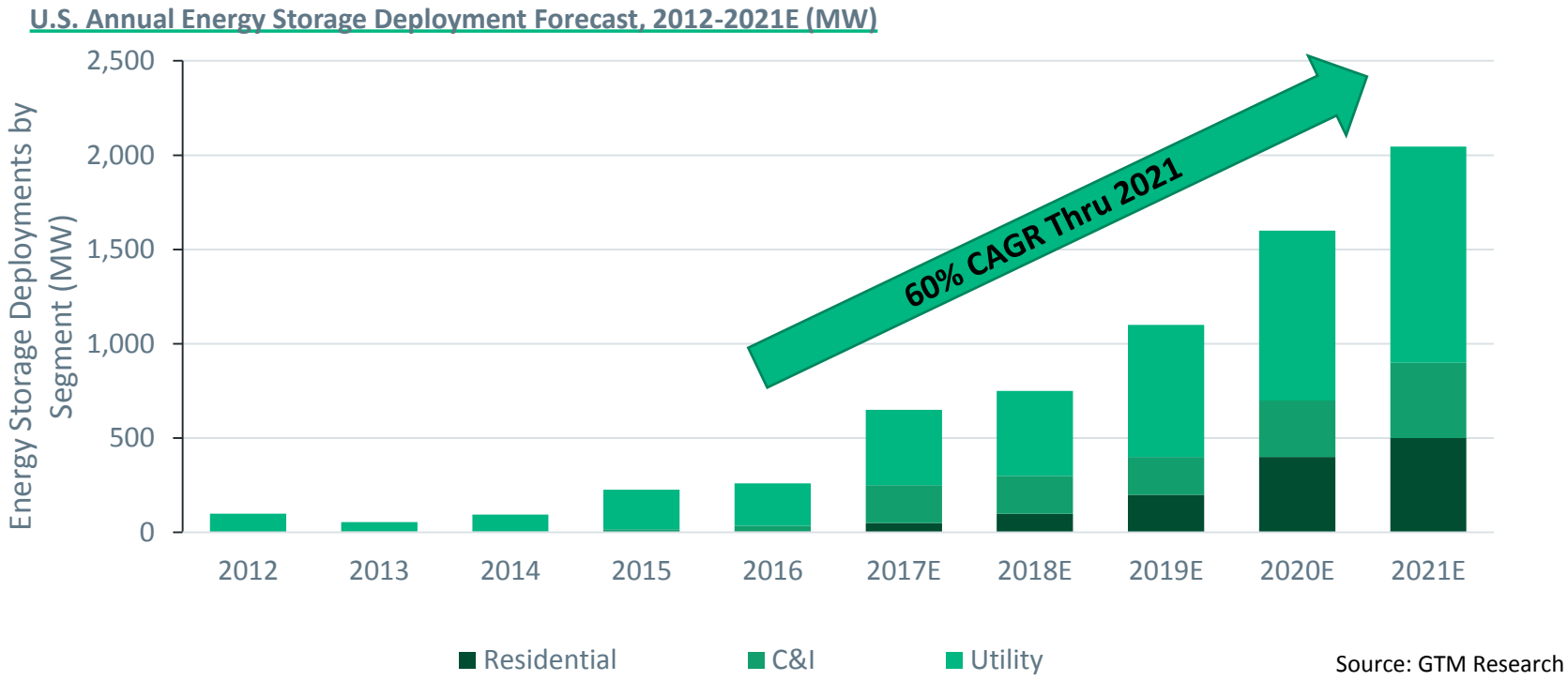
Several wind+storage projects in operation. KIUC selects SolarCity for 13MW PV+S, and AES for 32MW PV+S. PV penetration so successful that new large PV without storage unlikely.

Texas (5%)

ERCOT is incorporating EV and storage scenarios into regional planning. Notrees 36 MW BESS shifting and firming 153 MW wind farm. CPS PV+S project being bid.

Source: Bloomberg New Energy Finance, GTM Research.

U.S. Energy Storage Annual Deployments Will Exceed 2 GW by 2021

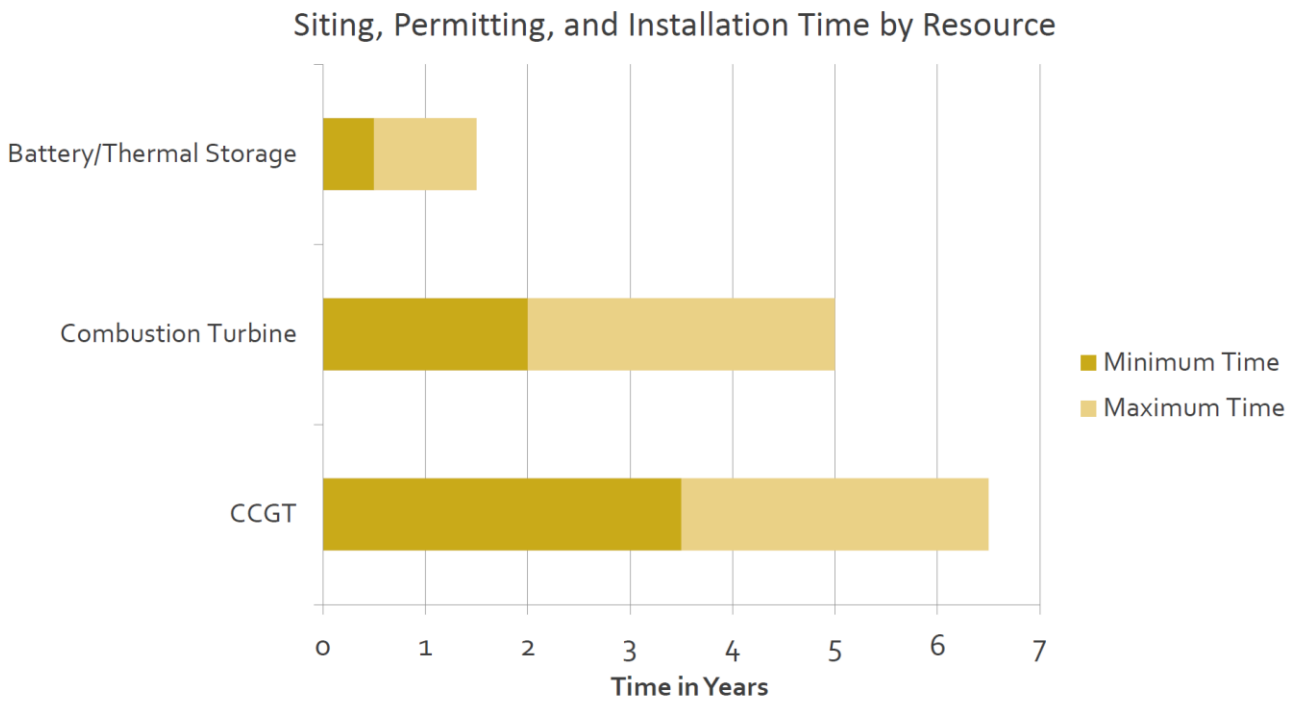


- Navigant Consulting - 9 GW cumulative new U.S. energy storage by 2020, 29 GW globally
- McKinsey & Company – $2.5 Billion US market in 2020 and globally could reach 1,000 GW by 2040
- Renewable Energy World – 22 GW globally by 2025
- Bloomberg New Energy Finance – 938 GW of “flexible capacity” energy storage and controls globally by 2040

Battery Energy Storage with PV Can be Deployed Quickly

Solution: Energy Storage!

Diverse, modular, faster to install than traditional resources … reduces risk and increases portfolio diversity & flexibility

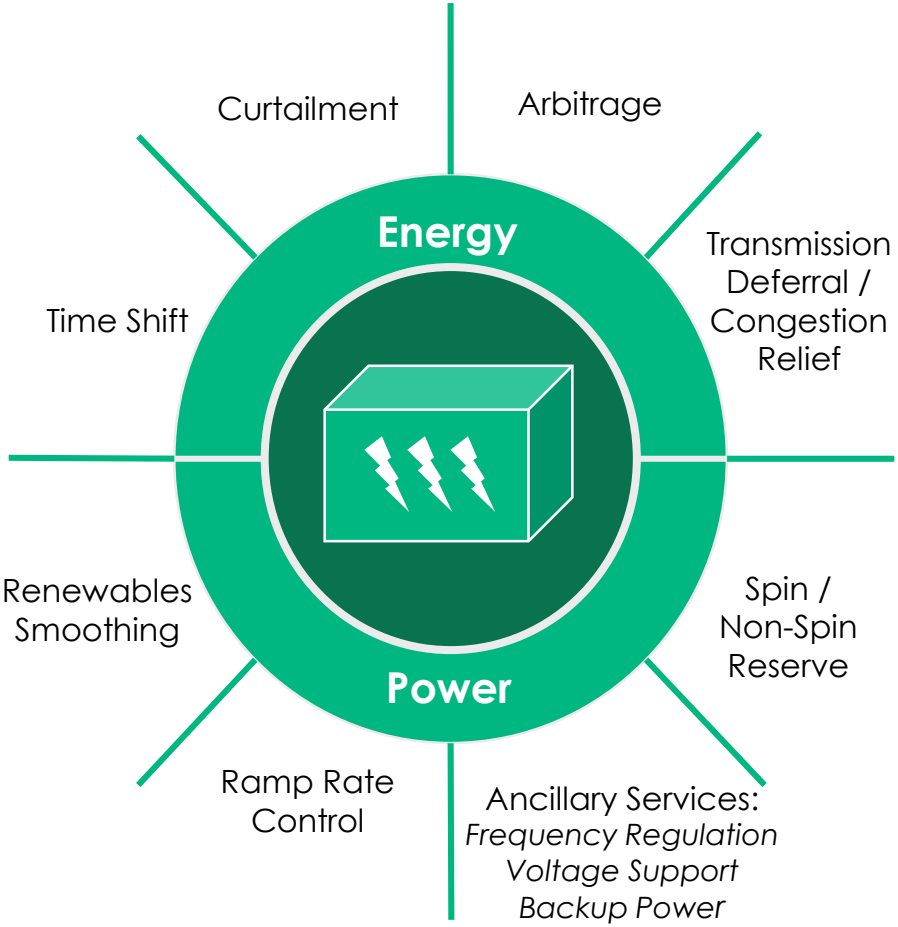


1. Joint CESA, LSA, SEIA idea list available at www.storagealliance.org/content/storage-resources

Energy storage is rapidly growing in adoption as it enables new value propositions for utilities and grid operators

WHY ENERGY STORAGE?

- Energy storage can address a large number of traditional problems for the utilities, such as:
  - *Energy Issues*: Time shift, arbitrage, curtailment, and transmission congestion
  - *Power Issues*: Ancillary services, ramp rate control, frequency response, and renewables smoothing
- Energy storage with PV helps utilities to achieve constant dispatchable energy, which complements and firms any renewable portfolio
- Energy Storage can provide significant benefits to emergency management and disaster recovery.



Applications in Florida……

Discussion

Thank You

Steve McKenery

VP, Storage Solutions

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smckenery@8minutenergy.com

8minutenergy RENEWABLES

Attachment 4

INTERNET ESSENTIALS
from Comcast

Connection is essential.

a **5-YEAR** PROGRESS REPORT

Equal opportunity is essential.

3
MILLION
LOW-INCOME
AMERICANS CONNECTED*

*That's 750 thousand families!

INTERNET ESSENTIALS
from Comcast

Since its founding by Ralph Roberts in 1963, Comcast Corporation has been focused on shaping the future by driving innovation through technology—and staying connected to the communities we serve.

In 2011, we launched Internet Essentials, our signature high-speed internet adoption program for low-income families. Over the past five years, the program has grown into the nation's largest and most comprehensive broadband adoption program and the company's number one community investment initiative.

We are extremely pleased to announce that, through August 2016, Internet Essentials has connected 3 million low-income Americans (or 750,000 families) to the internet at home.

Over the last 5 years, we've made more than 25 enhancements to the program. With these enhancements, we've doubled down on our investment by consistently improving the quality of the program's internet service, improving the application process, engaging communities on the relevance and value of the internet, and expanding Internet Essentials to reach additional communities.

For example, just this summer, we redefined the Internet Essentials program—by expanding program eligibility beyond families with children eligible to participate in the National School Lunch Program to all HUD-assisted households living in our service area, even if they have no school-aged children.

The true power behind the success of this program comes from the on-the-ground partnerships between Comcast and the communities we serve.

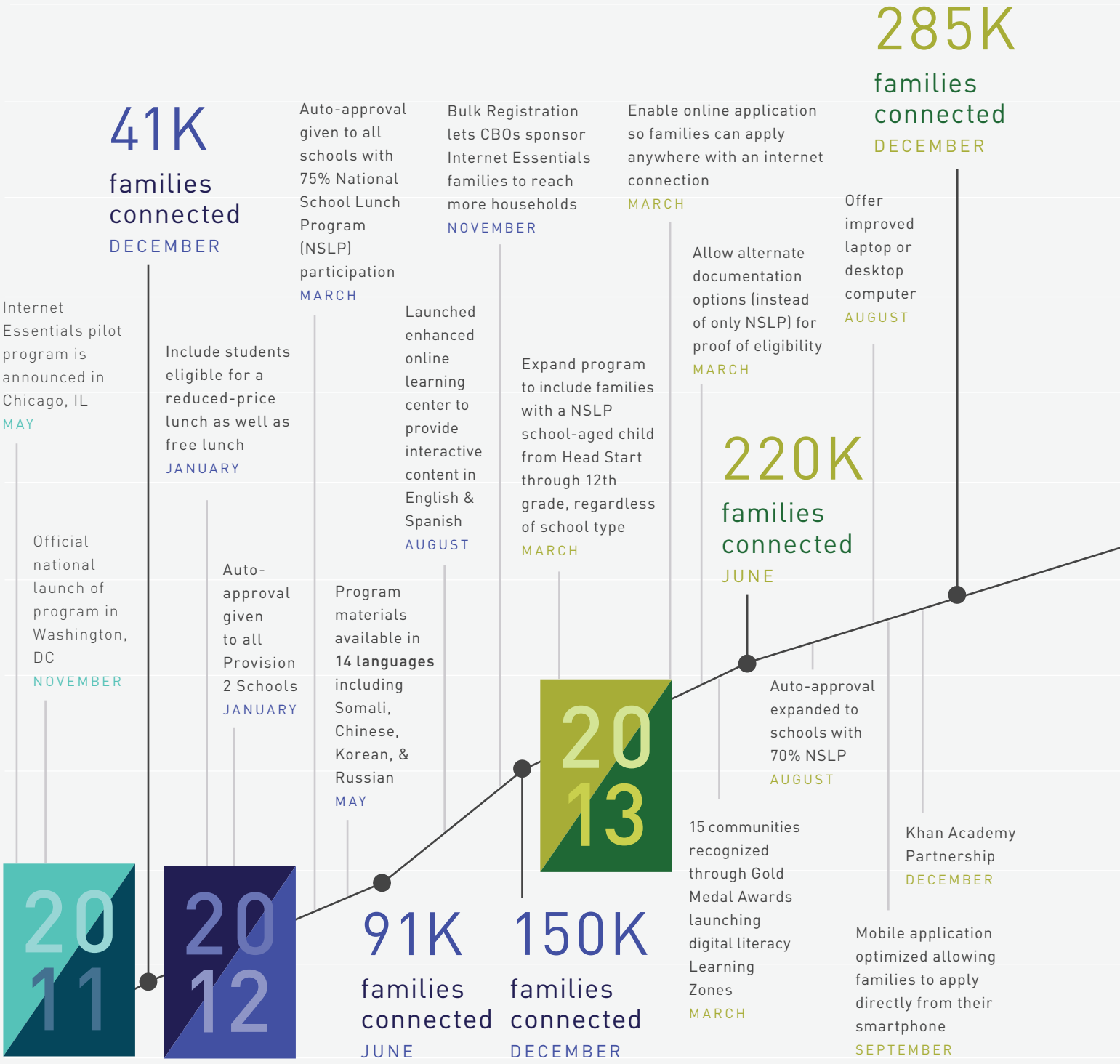
As you will see in this report, we have made tremendous progress in closing the digital divide, and our resolve is stronger than ever. We invite everyone who shares that vision to work with us to create even more digital opportunity in the years ahead.

Sincerely,

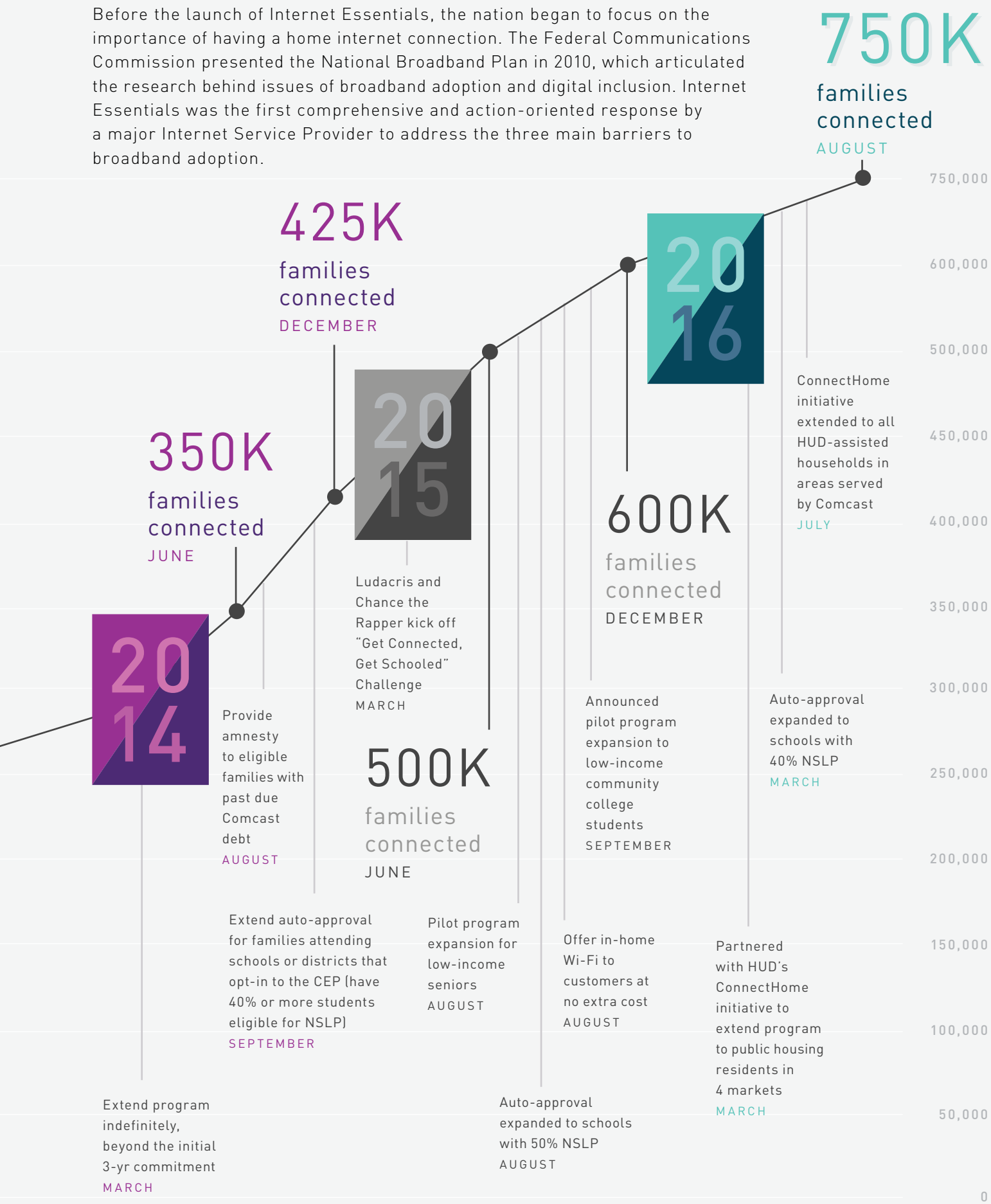
DAVID L. COHEN

Senior Executive Vice President and Chief Diversity Officer

Five Years of Changing Lives



Before the launch of Internet Essentials, the nation began to focus on the importance of having a home internet connection. The Federal Communications Commission presented the National Broadband Plan in 2010, which articulated the research behind issues of broadband adoption and digital inclusion. Internet Essentials was the first comprehensive and action-oriented response by a major Internet Service Provider to address the three main barriers to broadband adoption.



How Have We Done?

Internet Essentials is a tremendous success by any measure. In five years, we have connected 750,000 families, or 3 million low-income Americans, to the internet at home.

SINCE 2011, WE'VE MADE MORE THAN 25 PROGRAM ENHANCEMENTS, INCLUDING:

- Increasing speeds 3 times
- Increasing eligibility 9 times, including a historical expansion to up to 2 million HUD-assisted households
- Building a website and an online application
- Offering in-home Wi-Fi service at no additional cost
- Providing amnesty to families with past-due balances owed to Comcast
- Launching pilot programs to extend Internet Essentials to low-income seniors and community college students

$300 MILLION

Invested by Comcast in digital literacy initiatives benefitting more than 4.4 million people

of Internet Essentials customers are highly satisfied with the program

$110 MILLION

Broadcast more than 8.5 million public service announcements, valued at $110 million

55 THOUSAND

Offered Internet Essentials in 55,000 schools in 5,000 school districts, covering 39 states and the District of Columbia

6.4 MILLION

Welcomed nearly 6.4 million visitors to our fully bilingual website and Online Learning Center in both English and Spanish

54 THOUSAND

Subsidized computers sold at $150 each

4.4 MILLION

Fielded more than 4.4 million phone calls at our dedicated call center

9 THOUSAND

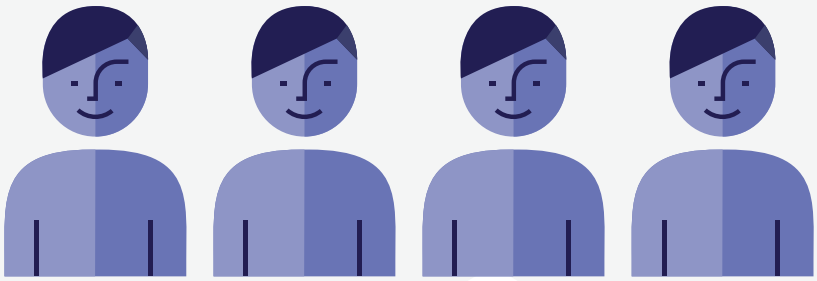
Partnered with a diverse network of over 9,000 community partners, including schools and school districts, libraries, community-based organizations, elected officials, and businesses

Who Have We Connected?

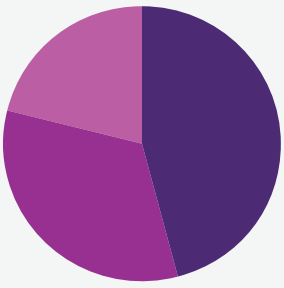
It is critical that we understand our customers to provide them with a more comprehensive product and digital literacy training to help cross the digital divide. Below is a snapshot of our typical connect.

39

Average age of an Internet Essentials customer*



The average number of people in an Internet Essentials household is 4.



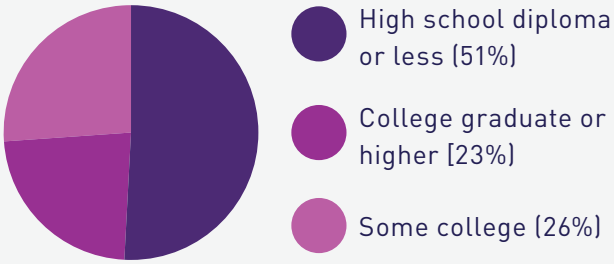
- Married (46%)*
- Unmarried (33%)*
- Divorced/Widowed/ Separated (21%)*

*Based on respondents, not necessarily the head of the household.

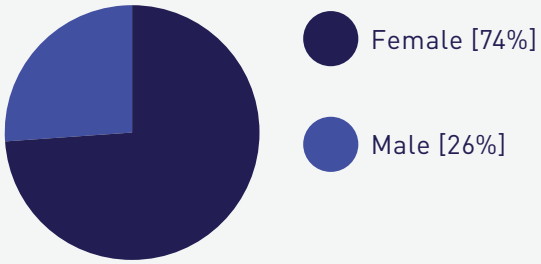
55%

Of these households identify as Latino

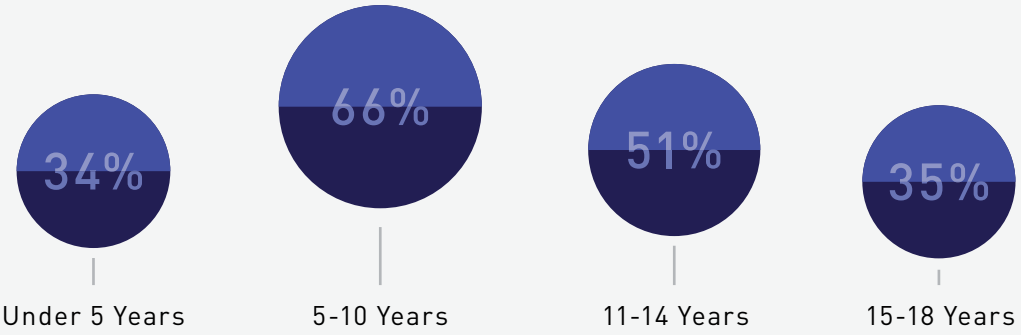
EDUCATION*



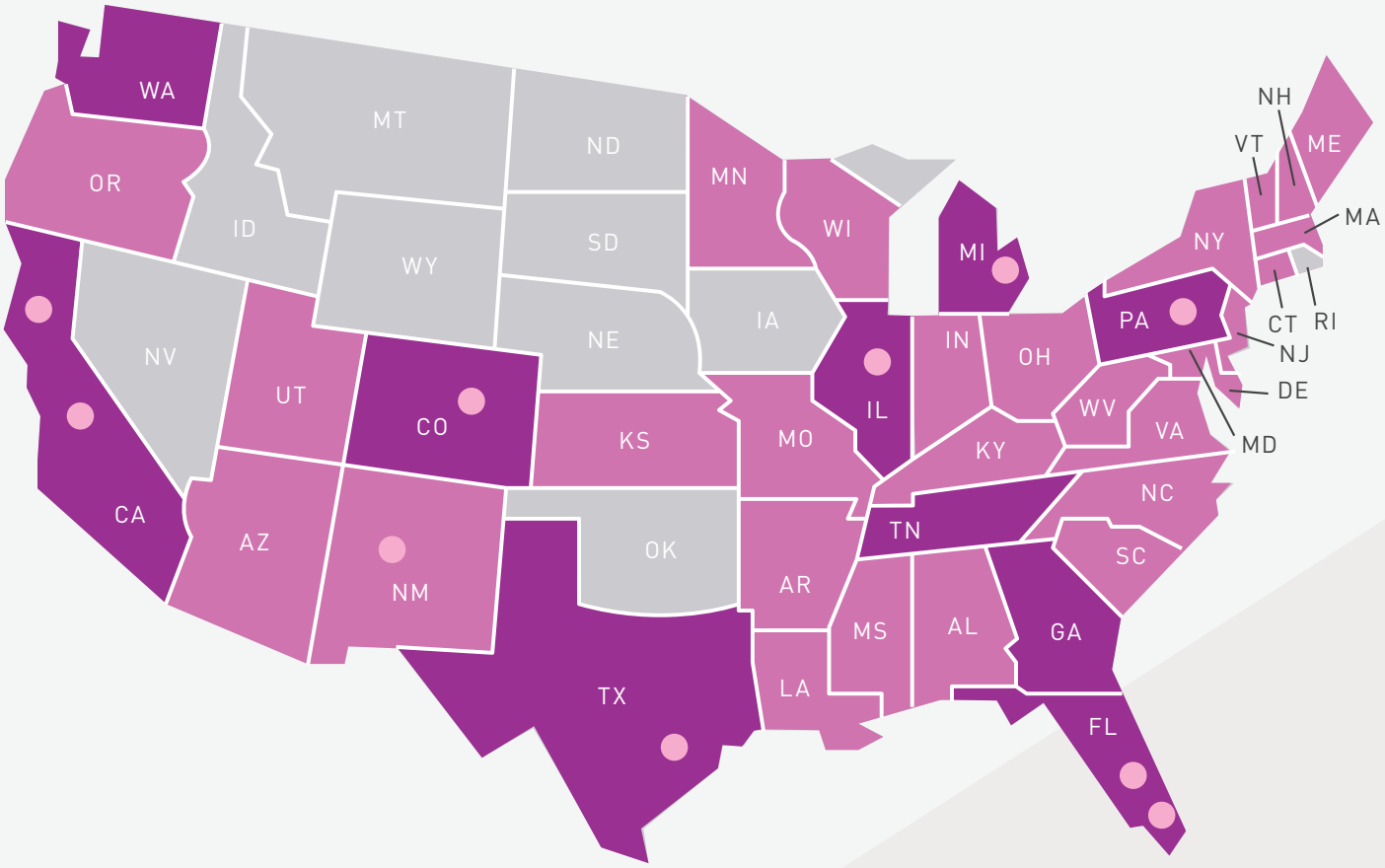
GENDER*



AGES OF CHILDREN IN HOUSEHOLD



Where do they live?



CONNECTED HOUSEHOLDS BY REGION

States where Internet Essentials is Offered

Top 10 States by Connected Households

Top 10 Cities by Connected Households

TOP 10 CITIES BY CONNECTED HOUSEHOLDS

RANK	CITY	HOUSEHOLDS (through 8/16)
1	Chicago, IL	**42,800**
2	Houston, TX	**29,400**
3	Miami, FL	**22,600**
4	Philadelphia, PA	**21,300**
5	Fresno, CA	**14,400**
6	Sacramento, CA	**12,800**
7	Detroit, MI	**9,600**
8	Albuquerque, NM	**9,400**
9	Hialeah, FL	**8,400**
10	Denver, CO	**8,000**

TOP 10 STATES BY CONNECTED HOUSEHOLDS

RANK	STATE	HOUSEHOLDS (through 8/16)
1	CA	**114,800**
2	FL	**96,600**
3	IL	**92,300**
4	GA	**46,300**
5	PA	**45,600**
6	TX	**41,200**
7	MI	**39,900**
8	WA	**35,100**
9	CO	**32,800**
10	TN	**21,600**

How Do We Reach Those in Need?

As a company dedicated to diversity, committed to community, and whose services provide access to the world through the internet, it is essential that we work toward bridging the digital divide.

When we launched Internet Essentials, we understood the internet's massive potential to transform lives—but we also understood that addressing the fear and relevance of the internet and the lack of digital literacy skills is vital to getting more Americans online. So, we tackled digital inclusion in three ways:

1

By raising awareness around the digital divide through multilingual program materials, PSAs, earned media, and grassroots community partnerships (schools, government officials, community nonprofits, etc).

2

By providing financial support and computer hardware for nonprofits offering free digital relevance and literacy training in multiple formats—print, online, and in-person.

3

By providing low-cost, high-speed internet service for $9.95 a month plus tax with the option to purchase an internet-ready computer for less than $150.

Changing Lives Every Day

Before subscribing to Internet Essentials, 80% of the program's customers lacked an internet subscription at home. For the rest, most used their data plan on a smartphone or tablet to access the internet at home. But with Internet Essentials, the daily lives of those families are dramatically impacted. Kids can connect to educational resources, parents can search for better jobs, and everyone is more connected to what's going on in the world.

MAKING AN IMPACT ON FAMILIES*

95%

Have seen positive impact on child's grades

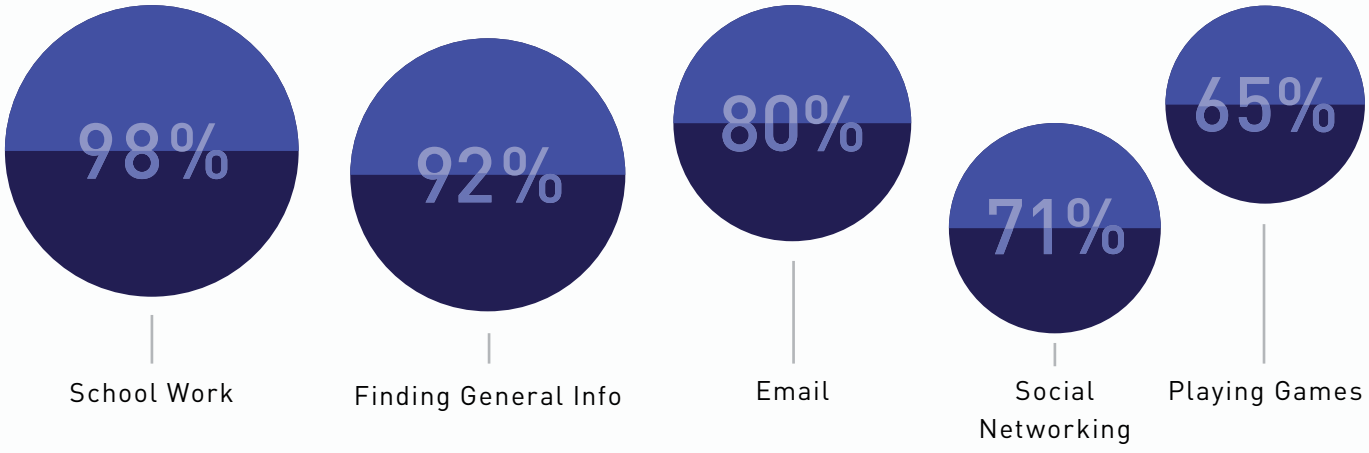
98%

Subscribed to Internet Essentials to use the internet for homework/ school projects

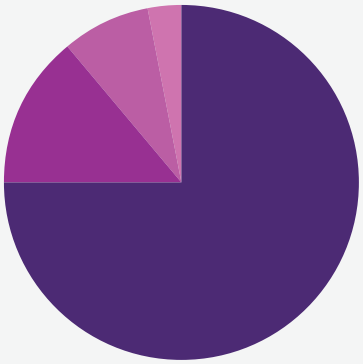
51%

Of customers said Internet Essentials helped them or someone in their family find a job

CUSTOMERS USE INTERNET ESSENTIALS FOR:*

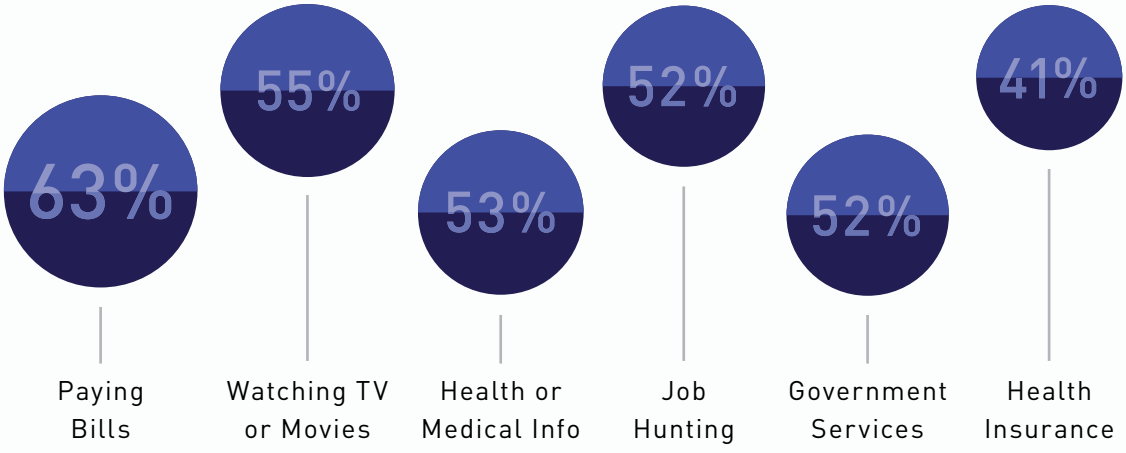


*DATA FROM COMCAST INTERNET ESSENTIALS CUSTOMER SATISFACTION SURVEY FROM 2015 AND 2016

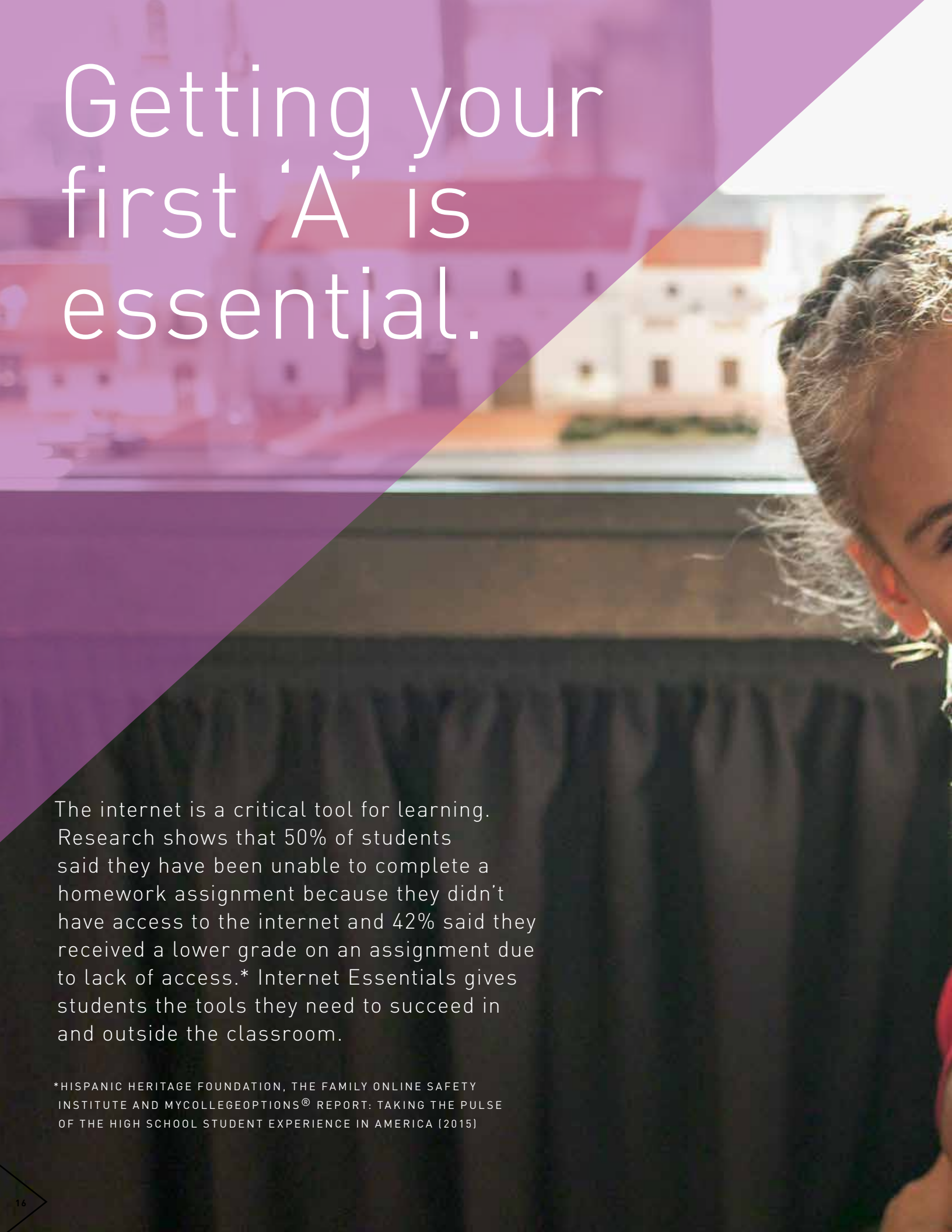


- Every Day (75%)
- Almost Every Day (14%)
- Few Times a Week (8%)
- Once a Week or Less (3%)

For 89% of customers, Internet Essentials is an integral part of their everyday lives. It has had such an impact that 86% have already recommended the program to friends or family.



Getting your first 'A' is essential.



The internet is a critical tool for learning. Research shows that 50% of students said they have been unable to complete a homework assignment because they didn't have access to the internet and 42% said they received a lower grade on an assignment due to lack of access.* Internet Essentials gives students the tools they need to succeed in and outside the classroom.

*HISPANIC HERITAGE FOUNDATION, THE FAMILY ONLINE SAFETY INSTITUTE AND MYCOLLEGEOPTIONS® REPORT: TAKING THE PULSE OF THE HIGH SCHOOL STUDENT EXPERIENCE IN AMERICA (2015)

95%

HAVE SEEN POSITIVE IMPACT ON CHILD'S GRADES

Going Beyond the Connection

Connectivity is the heart of our business. But to make sure Internet Essentials worked, we had to design a special program—from making signups easy to providing subsidized computers for those who need them.

EASY ACCESS

Comcast has made countless improvements to its online and mobile Internet Essentials application sites, cutting by more than half the amount of time it takes between application and connect. Auto-approval of applicants attending income-eligible schools or school districts and residents of HUD public housing has significantly streamlined the process. In 2015, 69% of Internet Essentials connects were through the auto approval process (or 64% of applications). Also, agents at our dedicated call centers are specially trained for this program and cannot sell any other Comcast products.

PROVIDING DEVICES

Since 2011, Comcast has subsidized more than **54,000 computers** to help Internet Essentials families connect to the digital world. Desktops and laptops are sold to consumers at less than $150, a significant discount off the retail price. In addition to subsidizing computers, Comcast has donated more than 3,500 computers to individuals and computer labs.

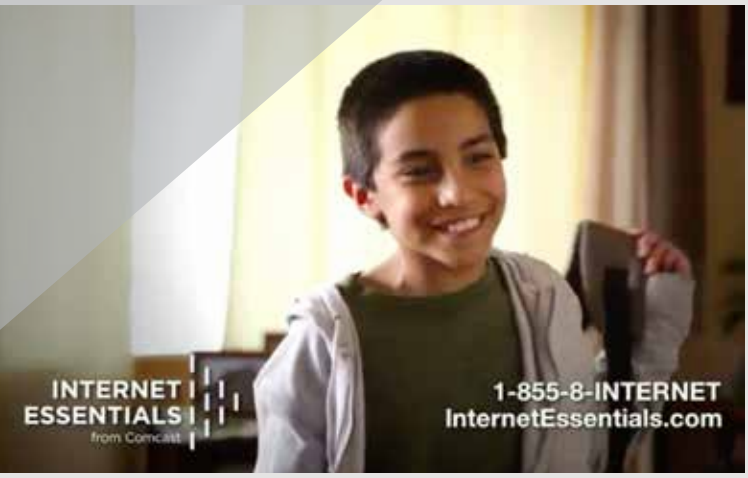
LEARNING CENTERS

The Internet Essentials Online Learning Center (Learning.InternetEssentials.com) is provided in both English and Spanish. In addition, Comcast has provided more than $1.8 million in grants to create 14 Internet Essentials Learning Zones in 9 states, spread across 24 cities, provided in 110 partner organization locations. Our networks of nonprofit partners work together to enhance public Internet access and to increase family-focused digital literacy training, with the goal of creating continuums of connectivity.


PLEASE READ
For more information, please read the included Set Up Guide.
Microsoft Windows 7 and Microsoft Office Home and Business have been activated on this device.
Laptop Set Up Guide
LÉEME PRIMERO
DELL

Creating Awareness of the Program

One step in getting the word out about Internet Essentials is to advertise through a variety of more traditional marketing channels. Public Service Announcements, print collateral, and earned media on a number of channels provide critical information about the program in a variety of languages. These efforts direct customers online or to call centers where we take the first steps toward connecting them to low-cost internet.



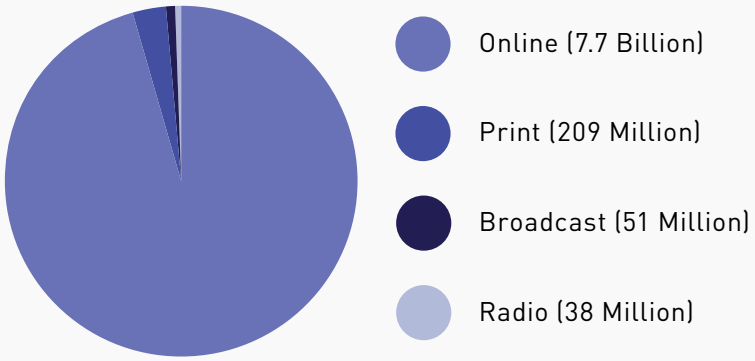
NUMBER OF PSA SPOTS AND VALUE OVER THE PROGRAM'S LIFETIME

$110 MILLION

Broadcast more than 8.5 million public service announcements, valued at $110 million.

EARNED MEDIA

NEARLY 8 BILLION EARNED MEDIA IMPRESSIONS OVER THE PROGRAM'S LIFETIME



Collateral

NUMBER OF PRINT PIECES DISTRIBUTED OVER THE PROGRAM'S LIFETIME

SOURCE: INNERWORKINGS THROUGH JUNE 2016

DISTRIBUTION

Since 2011, Comcast has distributed nearly **53 million** pieces of collateral in 14 languages, including English, Spanish, Somali, Chinese, Korean, and Russian. Materials are distributed by our partners—community-based organizations, school districts, libraries, government agencies, and federal, state, and local elected officials.

51%

OF CUSTOMERS SAID INTERNET ESSENTIALS HELPED THEM OR SOMEONE ELSE IN THEIR FAMILY FIND A JOB

Being able to find a better job is essential.

Creating Partnerships to Boost Our Efforts

Closing the digital divide takes nothing short of a movement. Because traditional marketing tactics alone are not sufficient, we created a grassroots campaign, focused on meaningful partnerships to connect with the communities we hoped to help.

Comcast has used its infrastructure and capacity to build a diverse network of over 9,000 community partners, including schools and school districts, libraries, community-based organizations, elected officials, and businesses. All who understand the importance of bringing the internet home.

WORKING WITH OUR PARTNERS

Comcast and our partners have hosted over 2,000 community events and stakeholder briefings. Through these activities, Comcast employee volunteers (known as Internet Essentials Ambassadors) have reached and distributed program information to nearly 1 million individuals.

PARTNERING WITH THE COMMUNITY

Since 2011, Comcast has provided $300 million in cash and in-kind donations for digital literacy training reaching 4.4 million individuals. This critical community service focuses on overcoming the skills gap necessary to ensure widespread adoption of internet at home.

PARTNERING WITH SCHOOLS

Collaboration with our school partners is critical in raising awareness of the program with families. Through thousands of back to school nights, millions of program materials shipped directly to schools at no cost, and countless meetings with parents, our school partners have been simply phenomenal in helping to get their students connected to the internet at home.

CONNECTHOME COLLABORATION WITH HUD

In July 2016, Comcast and the U.S. Department of Housing and Urban Development (HUD) took a historic step to close the digital divide in America. Through HUD's ConnectHome initiative, HUD public housing and HUD-assisted residents living in Comcast's service area are now eligible to apply for Internet Essentials. Including homes covered by Comcast's initial pilot public housing expansion announced in March 2016, an estimated 2 million HUD-assisted homes, including Public Housing, Housing Choice (Section 8) Voucher, and Multifamily programs, now have access to Comcast's low-cost internet service. This was the ninth time in five years Comcast has expanded eligibility for Internet Essentials. This was the first time, nationally, that households without school-age children were able to apply for Internet Essentials.

ADAPT & IMPROVE

Reaching Out to New Communities

We've always used a try, test, restructure, and try again approach to grow the Internet Essentials program. This is especially important when working with new partners in pilot programs. It's that process that ensures we are always learning, growing, and evolving as a program.

PILOTS

In 2015, Comcast launched two new pilot programs to adapt and improve the program to further close the digital divide—one for low-income seniors and one for low-income community college students. Over the last decade, low-income older adults have adopted home internet at a much slower pace than most other populations because many seniors lack digital literacy skills and face financial and physical challenges. We targeted low-income seniors by partnering with organizations like the Urban League, OATS, and departments of aging and adult services to offer computer-training classes designed specifically for seniors. Our program also targets low-income community college students who receive Federal Pell Grants—the same population that fills middle-skill jobs—because research found that this population struggles to complete an associate's degree. Through these pilots, we have expanded our partnerships and helped 2,500 more households cross the digital divide in less than one year.

On a Mission to Connect Everyone

Five years ago, we launched Internet Essentials in an unprecedented effort to connect more Americans to an essential part of everyday life—the internet. Internet Essentials is now the largest, most comprehensive, and most successful high-speed internet adoption program for low-income Americans in the country.

Although we've made tremendous progress narrowing the digital divide, we have much more work to do. As we look ahead, our goal is to connect the unconnected and provide them with the tools and training they need to connect to a world of knowledge and opportunity.

WE HOPE TO STRENGTHEN THE MOMENTUM MOVING FORWARD WITH THREE GOALS IN MIND:

1. Connecting the unconnected in under-served communities
2. Engaging new partners
3. Growing the internet adoption rate through digital literacy training

We hope you continue to support our effort to provide equal access to all by narrowing the digital divide.

Acknowledgements

SENIOR EXECUTIVE LEADERSHIP To our company's senior executive leadership, whose passion for using technology to help the communities we serve is simply unmatched. Thank you for your support and for embracing this program to bridge the gap between policy and practice, and ensuring that the promise of Internet Essentials could become a reality.

"THE FOUNDERS" Launching Internet Essentials across our service area was an incredible organizational feat, as no company had ever attempted an initiative of this size and scope. Our sincerest gratitude goes to the leaders and teams who were there from the very beginning, as well as those who continue to move us forward.

COMCAST CABLE LEADERS AND TEAMS

Thank you for taking us under your wing and helping us evolve into the most high-performing team that we can be. Your support and leadership is integral to the growth and success of this program.

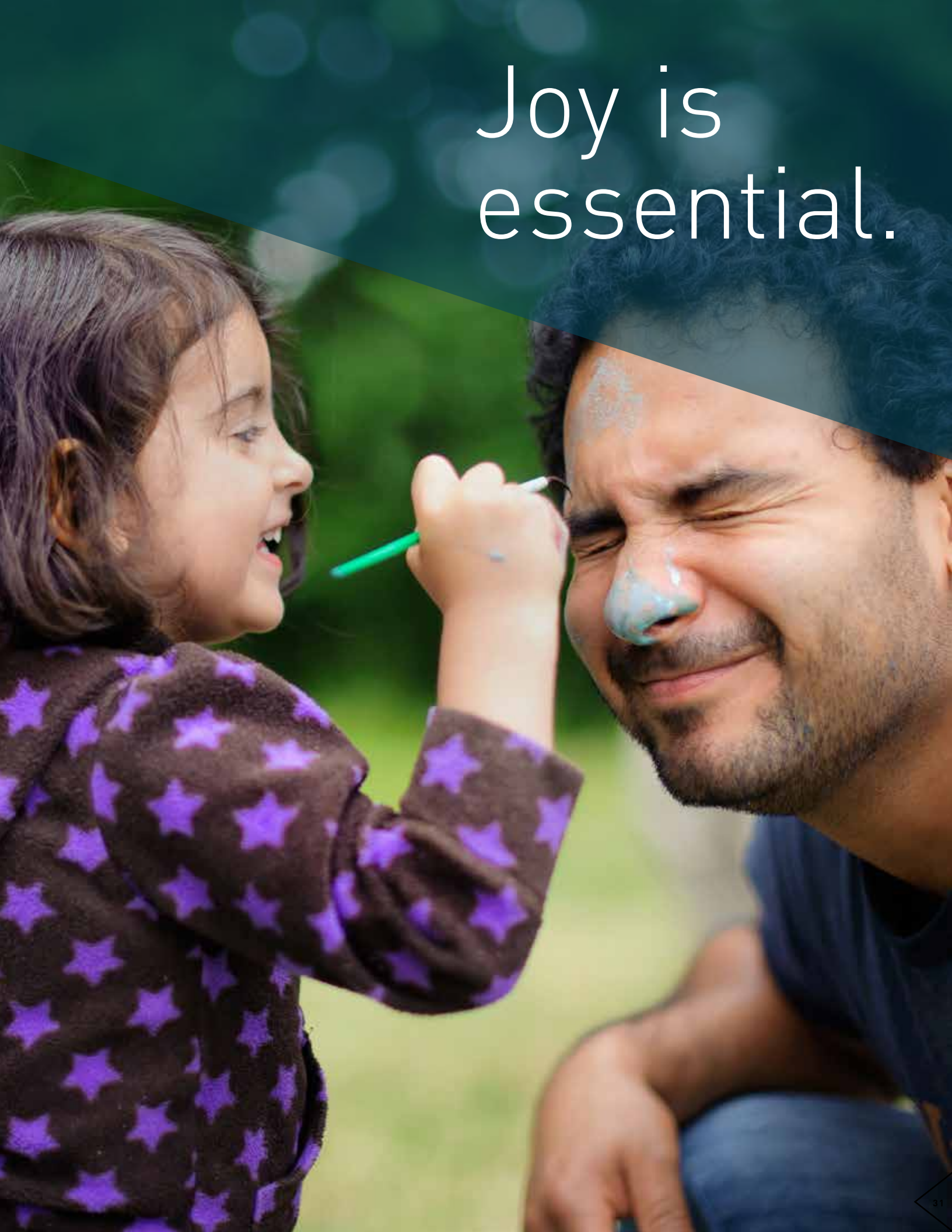
COMCAST FIELD LEADERS AND TEAMS

To the hundreds of Comcast employees on the ground every day advocating for this program and the communities we serve. You are truly the lifeblood of this program. Thank you for your unyielding dedication and energy—none of this would be possible without you.

AND ALSO...

To the Philadelphia team charging hard every single day to make a meaningful difference in the lives of our customers. Your unrelenting commitment provides the foundation for our mission to get everyone connected, online and at home.

Creative Direction and Design by: Message


Joy is
essential.

LEARN MORE. DO MORE. SHARE MORE.

Visit InternetEssentials.com to learn more

II. Outside Persons Who Wish to Address the Commission at Internal Affairs

OUTSIDE PERSONS WHO WISH
TO ADDRESS THE COMMISSION AT

INTERNAL AFFAIRS
March 7, 2017

Speaker	**Representing**	**Attachment**
Maria Robinson	Associate Director of Energy and Policy Analysis, Advanced Energy Economy	1
Sharon Hillman	VP Market Policy and Business Development, AES Corporation	2
Steve McKenery	VP, Storage Solutions, 8minutenergy Renewables	3
David Konuch	VP, Government and Regulatory Affairs, Comcast, Central Division	4

III. Supplemental Materials for Internal Affairs

Note: The following material pertains to Item 2 of this agenda.

LEARN MORE. DO MORE. SHARE MORE.

Internet Essentials℠ from Comcast brings affordable, high-speed Internet to your home and greater access to what's important to you. You may qualify if you have at least one child who is eligible for the National School Lunch Program or if you receive HUD housing assistance.

$9.95
PER MONTH + TAX

NO TERM CONTRACT
NO CREDIT CHECK
NO INSTALLATION FEE
IN-HOME WiFi INCLUDED

APPLY NOW AT
InternetEssentials.com 1-877-592-2050

COMCAST

INTERNET ESSENTIALS
from Comcast

Restrictions apply. Not available in all areas. Limited to Internet Essentials service for new residential customers meeting certain eligibility criteria. Advertised price applies to a single outlet. Actual speeds may vary and are not guaranteed. After initial participation, if a customer is determined to be no longer eligible for the program but continues to receive Comcast service, regular rates will apply. Subject to Internet Essentials program terms and conditions. Call 1-855-846-8376 for restrictions and complete details, or visit InternetEssentials.com. IE_UMB_FLY_0816

APRENDE MÁS. HAZ MÁS. COMPARTE MÁS.

Internet Essentials℠ de Comcast trae Internet de alta velocidad económico a tu hogar y un acceso mayor a lo que es importante para ti. Podrías calificar si tienes al menos un niño que califica para el Programa Nacional de Almuerzos Escolares o si recibes asistencia para viviendas públicas (HUD).

$9.95
AL MES + IMPUESTOS

SIN REVISIÓN DE CRÉDITO
SIN CONTRATO DE PLAZO FIJO
SIN CARGO POR INSTALACIÓN
WiFi PARA EL HOGAR INCLUIDO

SOLICÍTALO AHORA EN
es.InternetEssentials.com 1-877-592-2050

COMCAST

INTERNET ESSENTIALS
from Comcast

Se aplican restricciones. No está disponible en todas las áreas. Limitado a Internet Essentials de Comcast para nuevos clientes residenciales que satisfagan ciertos requisitos de elegibilidad. El precio anunciado se aplica a una sola conexión. Las velocidades actuales pueden variar y no están garantizadas. Tras la participación inicial, si se determina que un cliente ya no es elegible para el programa, pero continúa recibiendo el servicio de Comcast, se aplicarán las tarifas regulares. Sujeto a los términos y condiciones del programa Internet Essentials de Comcast. Llame al 1-855-765-6995 para obtener las restricciones y detalles completos o visite es.InternetEssentials.com. IE_UMB_FLY_0816

LEARN MORE. DO MORE. SHARE MORE.

Internet Essentials℠ from Comcast brings affordable, high-speed Internet to your home for **$9.95** per month. Home Internet gives you greater access to what's important to you.

ELIGIBLE HOUSEHOLDS MUST:

- Have at least one child who is eligible for the National School Lunch Program or receive HUD housing assistance
- Live in an area where Comcast Internet Service is available
- Not have subscribed to Comcast Internet within the last 90 days
- Not have outstanding debt to Comcast that is less than one year old

LEARN MORE AND APPLY,
VISIT **InternetEssentials.com**
OR CALL **1-855-832-9548**

HIGH-SPEED HOME INTERNET

$9.95

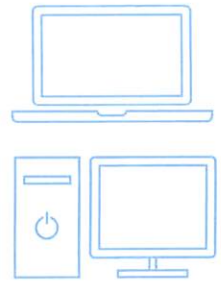
PER MONTH + TAX

- NO TERM CONTRACT
- NO CREDIT CHECK
- NO INSTALLATION FEE
- IN-HOME WiFi INCLUDED

OPTION TO PURCHASE DESKTOP OR LAPTOP

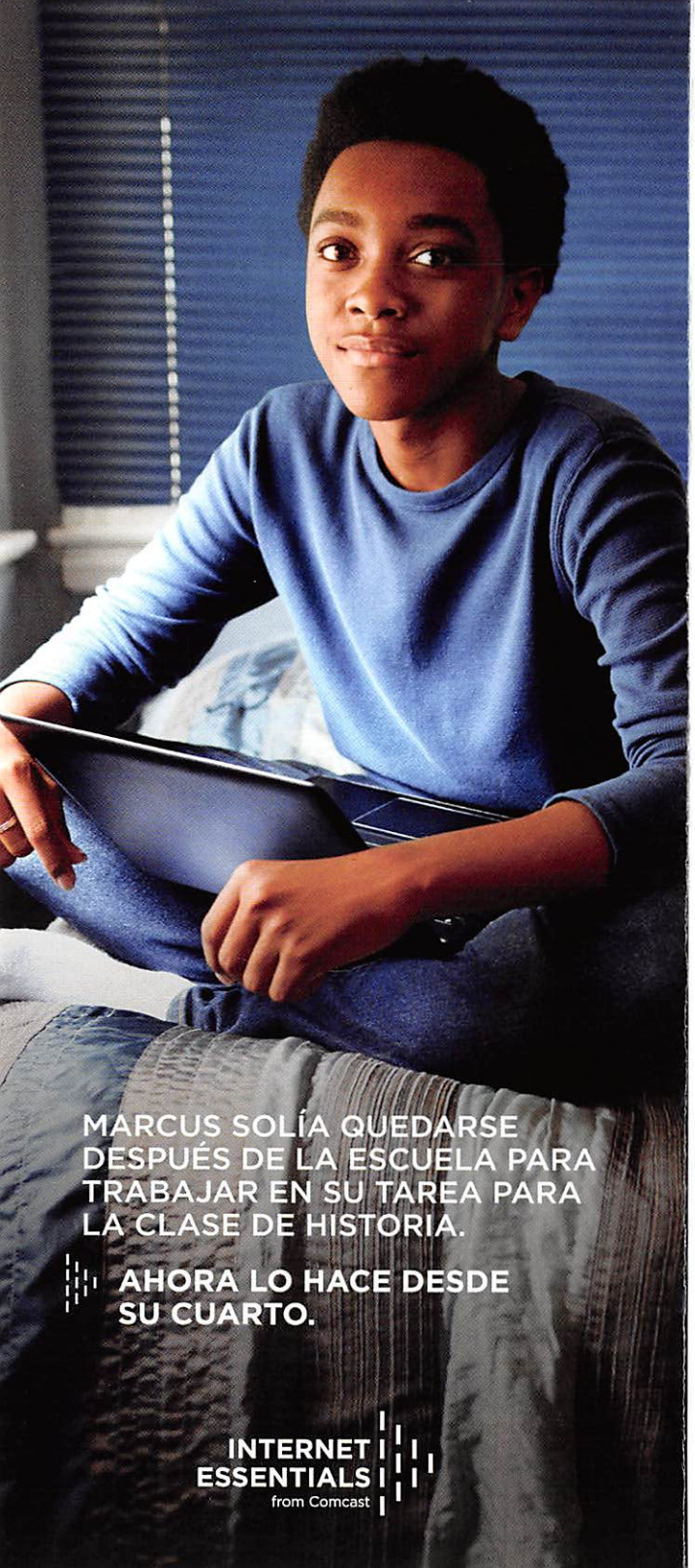
$149.99 + tax

- INCLUDES MICROSOFT OFFICE
- 90-DAY WARRANTY
- INCLUDES NORTON™ SECURITY SUITE



FREE INTERNET TRAINING

AVAILABLE ONLINE, IN-PERSON, & IN-PRINT



APRENDE MÁS. HAZ MÁS. COMPARTE MÁS.

Internet Essentials℠ de Comcast trae Internet de alta velocidad económico a tu hogar por **$9.95** al mes. El Internet en el hogar te da un acceso mayor a lo que es importante para ti.

LOS HOGARES ELEGIBLES DEBEN:

- Tener al menos un niño que califica para el Programa Nacional de Almuerzos Escolares o recibir asistencia para viviendas públicas (HUD)
- Vivir en un área donde el servicio de Internet de Comcast esté disponible
- No haber estado suscrito a Internet de Comcast durante los últimos 90 días
- No tener ninguna deuda pendiente con Comcast de hace menos de un año

PARA MÁS INFORMACIÓN Y PARA SOLICITARLO, VISITA
es.InternetEssentials.com
O LLAMA AL **1-855-832-9548**

INTERNET DE ALTA VELOCIDAD PARA EL HOGAR

$9.95

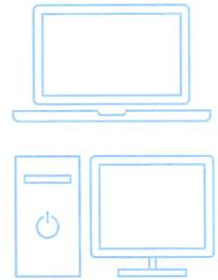
AL MES + IMPUESTOS

- **SIN REVISIÓN DE CRÉDITO**
- **SIN CONTRATO DE PLAZO FIJO**
- **SIN CARGO POR INSTALACIÓN**
- **WiFi PARA EL HOGAR INCLUIDO**

OPCIÓN A COMPRAR UNA COMPUTADORA DESKTOP O LAPTOP

$149.99 + impuestos

- INCLUYE MICROSOFT OFFICE
- GARANTÍA DE 90 DÍAS
- INCLUYE NORTON™ SECURITY SUITE



GRATIS CURSOS DE INTERNET

DISPONIBLES EN LÍNEA, EN PERSONA O EN MATERIALES IMPRESOS

Se aplican restricciones. No está disponible en todas las áreas. Limitado a Internet Essentials de Comcast para nuevos clientes residenciales que satisfagan ciertos requisitos de elegibilidad. El precio anunciado se aplica a una sola conexión. Las velocidades actuales pueden variar y no están garantizadas. Tras la participación inicial, si se determina que un cliente ya no es elegible para el programa, pero continúa recibiendo el servicio de Comcast, se aplicarán las tarifas regulares. Sujeto a los términos y condiciones del programa Internet Essentials de Comcast. Llame al 1-855-765-6995 para obtener las restricciones y detalles completos o visite es.InternetEssentials.com. Internet Essentials es un programa que proporciona escolar y no lo patrocina ni lo requiere su escuela. Su escuela no es responsable de las cuentas. IE_NSLP_BRO_0916

IV. Transcript

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

PROCEEDINGS:	INTERNAL AFFAIRS
COMMISSIONERS PARTICIPATING:	CHAIRMAN JULIE BROWN COMMISSIONER ART GRAHAM COMMISSIONER DONALD J. POLMANN
DATE:	Tuesday, March 7, 2017
TIME:	Commenced at 10:56 a.m. Concluded at 11:54 a.m.
PLACE:	Gerald L. Gunter Building Room 105 2540 Shumard Oak Boulevard Tallahassee, Florida
REPORTED BY:	LINDA BOLES, CRR, RPR Official FPSC Reporter (850) 413-6734

P R O C E E D I N G S

CHAIRMAN BROWN: Good morning. We're going to begin. If you could take your seats, please.

Thank you so much. We have a great Internal Affairs today, and I want to welcome you all to this IA meeting this March 7th. We have a few folks here, here to talk about energy storage technology, and I want to extend my appreciation for you being here. Please do not feel rushed by any means. I know we were moving fast in agenda, but it is a treat for us to have you here. I want to introduce you all to the audience here.

We have with us Sharon Hillman, who's vice president at AES. We have with us Steve McKenery, if I pronounced that correctly.

MR. McKENERY: Yes, ma'am.

CHAIRMAN BROWN: He's vice president of storage solutions, 8minutenergy.

MR. McKENERY: Correct.

CHAIRMAN BROWN: And we have Maria Robinson, a fellow MIT graduate, by the way. She's associate director of energy policy analysis. And she works -- I believe you're at AEE; correct?

MS. ROBINSON: Yes.

CHAIRMAN BROWN: All right. And you're in Florida or Nevada?

MS. ROBINSON: Neither. I work in both places, but I am up in Boston actually.

CHAIRMAN BROWN: Okay. Great.

MS. ROBINSON: It was 11 degrees when I left my house yesterday, so it's very nice to be here.

COMMISSIONER GRAHAM: Welcome to sunny Florida.

MS. ROBINSON: Yes.

CHAIRMAN BROWN: And getting to Tallahassee is not really easy.

MS. ROBINSON: But worth it, worth it.

CHAIRMAN BROWN: Well, it's a treat to have you all here. And this Internal Affairs meeting is very informal. Please just feel free to walk through the slides, or you can summarize what you want. And Commissioners may interrupt you and ask questions, but it's treated very informally. With that, I will turn the floor over to you all.

MS. ROBINSON: All right. Thank you very much, Chair, and thank you all for the opportunity to have this conversation about energy storage. We were just actually having conversation with a few other folks in the room, who said, you know, "I heard a presentation on storage maybe eight years ago," and they said, "It hasn't gone anywhere in 50 years." Well, the past

eight years have been busy, I will tell you, and there's been a lot of great technological as well as financial changes that have been going on, and I look forward to digging into the details with Sharon and Steve here. I'll try and keep it high level to start out as part of this.

So I think we think of energy storage as being a really nascent technology, but the underlying technology has been there for quite a long time and it's well established. There's just a lot of ongoing innovation particularly over the last decade.

And so energy storage can really be thought of in sort of three general technology categories, which is thermal, electro-chemical, and mechanical. I know some people tend to think of storage as being just batteries, but there are other opportunities. And I think pumped hydro is the probably the energy storage that's been in the common usage for the past 50 years or so. I'm thinking of some of the larger dams in use particularly across the east coast. And so certainly as the economies of scale have increased, we've seen the costs decrease over time.

Right now, the largest battery in the world and the largest storage project is a 50-megawatt sodium sulfur battery which is in Japan. But soon the largest

one will be in California, which will be a 100-megawatt lithium ion battery, which has, I believe, a four-hour duration, and that will be finished in 2018.

CHAIRMAN BROWN: Are those utility scale or large industrial users? What is that?

MS. ROBINSON: I'll let Sharon answer because it's her project.

MS. HILLMAN: Yeah. The one in California, we just christened one this week. It's 30 megawatts, four-hour duration. That's the largest lithium ion right now, and it is managed by San Diego. And the one being built for Southern California Edison, 100 megawatts, four-hour duration, is also -- it's a PPA agreement where we're the -- manage the project for Southern California Edison.

CHAIRMAN BROWN: Got it. Thank you.

MS. ROBINSON: Excellent. Absolutely. There are distributed behind-the-meter batteries in usage. They can be aggregated into what's called a virtual power plant, or a VPP. And right now the largest is about a thousand batteries being used together into about a 5-megawatt plant, which provides about an hour and a half of storage, and that's by Sunverge.

And so I think it's important to think about the different technology benefits to the grid

particularly in terms of reliability, for the folks here in the room. That one seems to have gone away, so I'll look over on this side.

And when you're talking about grid scale, we're talking about integrating variable renewable energy. As renewable energy makes up more and more of the generation mix in our states, we see batteries and different types of storage being used to integrate that variable technology. It relieves congestion, provides voltage support. Sharon will, in particular, be talking about some of the flexible peaking capacity that energy storage can provide as well as frequency.

CHAIRMAN BROWN: Commissioner Polmann has a question for you.

COMMISSIONER POLMANN: Can you clarify "relieve congestion"? I didn't quite understand that term.

MS. ROBINSON: So that's to provide congestion relief on the grid. So at certain points in time you won't be able to use the transmission grid because you need more power than is available at that point in time. And so if the battery is located in an area that doesn't go --

MS. HILLMAN: Push it out.

MS. ROBINSON: -- yeah, can push it out to

where it's -- the electricity is actually needed. So if the congestion is over here and the power needs to go over here, the battery, if it is located there, will be able to provide that.

MS. HILLMAN: Yes. There's a category -- it's actually not the primary focus I was going to speak about today. I was going to talk more about peaking. But there's transmission and distribution alternatives. There's a lot of that going on in New York right now where, for example, it costs over a billion dollars to build a substation in Manhattan. And so rather than build a new substation, you're putting batteries in the right place to put more energy out in that peak.

So it's oftentimes -- if you think about demand response or energy efficiency, it can be a more directly controlled form of that. It's another alternative for building new wires, and it can be done very quickly and it's dispatchable.

MS. ROBINSON: And I know here in the southeast there are certainly plenty of concerns about land usage. And when you want to build new transmission and distribution, that has a lot of issues associated with it. So this provides an alternative use.

And then behind the meter, of course, that's localized, and you can use that as sort of a small

microgrid. We saw that during Hurricane Sandy and other locations where -- for different universities, military bases, hospitals that need power all the time, provide some ramping support and peak shaving, demand reduction, and then smooths the quality of distributed solar, which is, of course, seeing a rise here in Florida, and the quantity of that sold back to the grid.

So we just made this slide, and I kind of like it. So storage has a number of different use cases both in front and behind the meter, and this gives you a sense in terms of the capacity and size as well as the run time of these different technologies as well as the different purpose -- purposes that they serve. So whether -- if you're trying to do a bulk management system, that's great for pumped hydro, but pumped hydro doesn't do a whole lot for grid stabilization necessarily.

And as you can see, there's a lot of overlap. The solid electrode batteries provide a lot of these different technologies and these -- a bunch of these services. But that can help you better understand which technology would be right for which usage.

CHAIRMAN BROWN: Can I ask you, which are in front and which are behind the meter based on your chart?

MS. HILLMAN: They can be both.

MS. ROBINSON: Both. Usually the behind the meter ones tend to be a little smaller.

MS. HILLMAN: They're smaller.

MS. ROBINSON: So that's more on the 1 kilowatt to 100 kilowatt size. It's not necessarily less run time. It's just a smaller capacity.

MR. McKENERY: Behind the meter would be batteries; whereas, pumped storage is -- ice storage you could do at a CNI level, maybe an air-conditioning load. So battery is nice for probably the two for behind the meter, and pumped storage and molten salt are more utility scale.

CHAIRMAN BROWN: So the technology that produces the longest run time would be what?

MR. McKENERY: The longest run time is pumped hydro just because you could have it if you have a big reservoir. And a big reservoir, obviously you could get, you know, a lot of hours, but it's tough to locate it in Florida.

CHAIRMAN BROWN: We're not going to see pumped hydro.

MS. ROBINSON: Yeah, and it's not as flexible as batteries for here.

MS. HILLMAN: Yeah. And typically, like New

York State, for example, which has a lot of pumped hydro both because of their nuclear history, which is now shrinking, but their water resource. Their pumped hydro is typically a four-hour duration. And right now, most lithium ion battery systems that are used for peaking needs are built for a four-hour duration. That's very common. These new projects that she mentioned in California are all four-hour duration projects.

CHAIRMAN BROWN: So what energy storage technology do you think is most ripe for Florida? Is it the batteries?

MS. ROBINSON: Most likely batteries to be here. I don't see you using flywheels, to be honest. But within -- but within batteries, that's also a very large category and a number of different technologies, whether you're talking about, you know, a solid electrode or the liquid metal batteries. There's a wide variety, and we're happy to provide more information later on on the variety of batteries within that general category.

CHAIRMAN BROWN: But really the run time for batteries is typically four hours?

MS. HILLMAN: It depends on the use. If you're using it just for ramping, you know, it might be 15 minutes, 30 minutes. Regulation in the current

market state is usually about an hour duration, and for peaking needs, somewhere between two and four hours.

And when you think about what you mean by duration. So say you built a 50-megawatt four-hour duration battery, you could also run that for eight hours at 25 megawatts. The only thing that the battery limit has is if you are -- it's by its, you know, inverter and interconnection. If it's a 50-megawatt battery, you can't run it above 50. You can go to negative 50, okay, and put grid in, but you can also run it for a longer period at a lower peak level. So it's a very dispatchable reacts-within-seconds resource.

CHAIRMAN BROWN: Thank you for that.

MS. ROBINSON: And it depends on the specific purpose that you're looking for here.

CHAIRMAN BROWN: Commissioner Polmann.

COMMISSIONER POLMANN: How does a flywheel work, I mean, other than the fact that it's spinning? I understand the mechanics of it, but --

MS. ROBINSON: Can you say a little more about the question? Sorry.

COMMISSIONER POLMANN: Well, you know, the battery, it's a chemical type thing. You put energy in and it's stable. I mean, it bleeds off over a long period of time. But I don't understand the application

of the flywheel.

MR. McKENERY: I would be happy to answer that. A couple of companies have developed those. Basically you have a big spinning mass with a DC motor generator mounted to the shaft.

COMMISSIONER POLMANN: Right.

MR. McKENERY: So you either apply energy, electricity to the motor and spin the mass to get it rotating when you want to charge it, or when you want to discharge it, you know, you're using the inertia of the spinning mass to turn that generator and again generate electricity.

So normally they're -- you know, you're using it much the same as a battery. You're charging it up at some period of time, and then you're storing the energy and using it to then discharge later. So it's using that spinning mass to turn the generator basically rather than a gas turbine turning a generator. Same concept.

COMMISSIONER POLMANN: I guess my curiosity is how soon before you need the electricity generated do you spin it up? How long will it keep spinning?

MR. McKENERY: They can -- once you spin it up to full, they can keep it -- you know, operate it at that indefinitely. You can apply a small charge to it.

COMMISSIONER POLMANN: Right.

MR. McKENERY: So spin time is similar to batteries. They're kind of geared for this four-hour market. So you'd ramp it up slowly over four hours and discharge over four hours.

Not a lot of companies have a commercially viable product. A lot of that's in the R&D stage. The lithium ion battery business, which most of us are focused on, is clearly the predominant technology. Some interesting projects out of MIT and others looking at flywheels, though. Kind of an emerging technology.

COMMISSIONER POLMANN: I imagine they're fairly large.

MR. McKENERY: Yeah. I mean, generally the flywheels in operation today are fairly small. They're for telecommunications devices. There is a company in California that has one about a 4-foot diameter, one-foot-thick steel mass. It weighs about the same as a Ford Expedition. They spin at 10,000 RPMs hooked up to a motor. So it's big, big scale stuff, but, again, not really proven.

COMMISSIONER POLMANN: Okay. Thank you.

CHAIRMAN BROWN: Maria?

MS. ROBINSON: Absolutely. And I'll be finished soon, I promise. And this is just to provide

you with some sense of scale in the size of the storage market, how much it has grown over time in terms of deployment, just to give you a little bit of sense of that. And that's sort of tripled over the past seven years here.

And then on the next page -- so the print is small, and I apologize for that. That always happens. The states that are in blue here have different regulatory actions going on, and so we provided that to you in case you wanted to take a look at what the different pilots are that are happening across the country. A number of them tend to be battery storage as opposed to other types of storage there that they're looking at.

CHAIRMAN BROWN: So why is Florida in gray?

MS. ROBINSON: Well, Commissioner, I think that's a little bit of a question to you and your fellow Commissioners as well. I think that it's something where you could open an exploratory docket or ask some of the major utilities to move forward with a pilot. I know in Nevada they're actually --

CHAIRMAN BROWN: We have approved a pilot. We have approved a storage pilot project for a different utility. But the ones in blue, do they have legislation? Are they universal pilot projects across

the industry? I mean, do you --

MS. HILLMAN: California, for example, has a storage mandate. When the SONGS nuclear plant was put into retirement, there were both local needs plus a realized need for peaking plus heavy solar penetration, which is creating the classic what they call dot curve where there's actually too much power because of the amount of solar in the afternoon. So batteries are going in to absorb the power in the afternoon and then serve the customers when they come home at 5:00 o'clock. So 5:00 to 9:00 o'clock. So California has probably taken the lead.

Another example of a leading state is New York. They have something called New York Reforming the Energy Vision, which I'm sure you've probably heard about it in a NARUC meeting or other type.

And in New York right now, the current heavy emphasis is on T&D alternatives. So if a utility has a transmission or a distribution need and they come and look for capital, they have to evaluate alternative technologies as part of the process. That typically involves energy efficiency and demand response, increasingly batteries.

CHAIRMAN BROWN: So is that by rule or by statute?

MS. HILLMAN: By rule.

CHAIRMAN BROWN: By rule. Okay.

MS. HILLMAN: The governor started the initiative with Commissioner Audrey Zibelman, who's now leaving for Australia.

CHAIRMAN BROWN: Yeah, who's in Australia. Lucky dog.

(Simultaneous conversation.)

MS. HILLMAN: So those are examples of very active states. It typically tends to come either by the T&D need or the generation need because of the change of the economy from traditional generation to renewables.

MS. ROBINSON: Right. And I know in Nevada, they're -- they've insisted that the utilities take a look at battery storage as a potential alternative for generation whenever they're proposing new generation as well. And we're starting to see that sort of spread across --

CHAIRMAN BROWN: Well, just to update you, we did approve a storage pilot project in the FPL docket, and --

MS. ROBINSON: I will add that.

CHAIRMAN BROWN: Thank you.

MS. ROBINSON: Yes, ma'am. Excellent. And so these are just a couple of technical resources, if you

feel like having some reading before bed.

And so I will turn it over now to Sharon to talk a little bit more about the specifics on different battery technologies.

MS. HILLMAN: Do you have to open it?

MS. ROBINSON: I think she's taking care of it.

MS. HILLMAN: Well, thank you. I'm excited to be here. I actually live in Florida, and --

CHAIRMAN BROWN: Where?

MS. HILLMAN: Naples.

CHAIRMAN BROWN: Naples, ahh.

MS. HILLMAN: Yes.

CHAIRMAN BROWN: I'm Fort Myers. Naples is nicer.

MS. HILLMAN: The governor is in Naples, so that's --

CHAIRMAN BROWN: He is. It's beautiful.

MS. HILLMAN: So I'm happy to be here today to talk a little bit about energy storage. I work for the AES Corporation, and I'm going to talk a little bit about who is AES. It kind of gives you an experience as to why we got into batteries, what we see as needs in Florida, just looking at statistical projections of the power market in Florida. And then I'll conclude with a

slide about what could the Commission be doing to improve the visibility of storage in Florida.

AES is a global power company. We own two utilities in the United States: Dayton Power & Light and Indianapolis Power & Light. Indianapolis is the second most solar intense city in the country. Not too many people know that. So we do have some direct experience there. And we got into the battery business because some very smart people in our development group started reading some college professor papers about batteries. Primarily initially they were looking at transportation, but they realized it could be put on the grid.

And we developed our initial projects for real needs that we had at our own facilities, and for the last four to five years we've been basically doing projects for other utilities or other large CNI customers around the globe.

This is just a quick map of projects that we have in late stage development or in conclusion. The two projects that we're talking about, which are the two largest ones, on the left-hand side there's a 100-megawatt four-hour duration battery being built for Southern California Edison, and the 30-megawatt one in San Diego was just commissioned this last week. The

ribbon cutting was last week.

Some of you may have heard about Aliso Canyon. That's the leakage on the gas storage field. So they had an emergency in California that they needed to find peaking needs or they were going to have rolling brownouts.

CHAIRMAN BROWN: Again.

MS. HILLMAN: And so that was -- the solution was -- and there's multiple storage companies that participated in open procurement for that. Our project was basically our peak commissioned in six months. Now I don't want to set an expectation that six months is typical for a 30-megawatt storage project. Part of the reason it was able to happen so quickly is that the state and California had studied what are the needs, and they had concluded that they really needed to have a mandate for storage. And so they were in this process of all the utilities were already putting together who are the qualified providers, what is the contract going to look like, what are potential sites? So when this happened, they were able to do it.

A more typical procurement cycle for grid scale storage would be somewhere between nine months and 18 months. It's really just a matter of local permitting, which is -- it's not emissions permitting.

It's more site permitting and getting the land in place.

CHAIRMAN BROWN: And in California, that can be temperamental.

MS. HILLMAN: Yes. And that's part of the reason -- Southern California has air emissions, so you really cannot build a new gas peaker in southern California. If you need to have redundancy, you know, in certain parts of the basin, there just aren't enough emissions available to build, for example, new combined heat and power. So that's part of in that part of California why you're starting to see batteries.

CHAIRMAN BROWN: Wow.

MS. HILLMAN: Part of the reason.

We have a proprietary product called Advancion. We will build and operate under a long-term contract for a utility or a large customer or we will, in essence, sell a turnkey solution.

So I, for example -- we sell our Advancion product to, for example, solar developers, who then may want to make it part of their integrated system. We do both.

We are also technology agnostic. What does that mean? That means that if in two or three years we think there's a better solution than lithium ion, that controller technology can be used on that same control

system, and we can evolve the product to that control system. So we are technology -- very consciously technology agnostic.

We basically have a testing center, like our own little UL labs out in California. It started in Indianapolis, but it's now out in California. And we run procurements from various battery providers and inverter and other equipment providers and test all the systems to meet our standards, and then we integrate the systems, either sell them as a system or sell them under a long-term contract. So this is just -- we have had some awards recently being a leader in this space.

So the next slide gets to what Maria was talking about. What can batteries be -- or what can electric storage be used for? And there's three general categories: Generation alternative, which includes peaking needs, which I'm going to primarily focus on one or two slides today because we see that as a real need in California -- or in Florida, excuse me; T&D alternatives, I talked a little bit about what's going on in New York already in response to one of the questions; and then commercial and industrial.

What commercial and industrial customers are typically looking for is, one, peak shaving their wires charges, their distribution charges. If they're a peaky

use, they can lower their distribution charges by, in essence, running the battery at their peak and then charging the battery in the offpeak. Those are typically behind-the-meter solutions.

CHAIRMAN BROWN: So are you seeing a lot of industrial and major retailers taking advantage of these technologies at least from --

MS. HILLMAN: We see some of that in terms of the larger ones behind the meter. For example, a Wal-Mart type customer would have a lot of refrigeration, so it gives them some redundancy, plus it potentially allows them to do some peak shaving to control their bill. And so those are examples of applications behind the meter.

I'm going to flip ahead and change my order here a little bit. So when we look at Florida, we see Florida as one of the best states for storage to provide an alternative to combustion turbines, natural gas combustion turbines for peaking in the U.S. And this is just a slide from IHS, which is, you know, an independent forecast company that forecasts need by state. And we see a lot of need over the next ten years for peaker growth, so I made up this slide.

CHAIRMAN BROWN: I guess the major question, the major question on this slide really is how do the

levelized costs of these technologies compare to the levelized costs of a peaker?

MS. HILLMAN: Okay. So I'll get to that. That's the next slide. I'll talk about that.

So we see a lot of need for growth in Florida, and then I'm going to go backwards. And one of the advantages of batteries over traditional combustion turbine -- and we do contracting for combustion turbines too. We're not anti-combustion turbine. We are building them in Indianapolis as well as batteries in Indianapolis -- is that batteries allow you to both inject and push out onto the grid. And you can do it in milliseconds and they don't have to be standing by. You know, they can provide black start service also. So you have a much wider range.

And typically these systems are being built for four hours. And what's the magic about four hours? Typically when you study a grid, that's kind of the key period. If you can be at peak for four hours, there's a lot of problems that you can solve when you look at what are the needs of the grid. That's why the New York pumped hydro tariff is a four-hour tariff. So lots of -- that's kind of a good number.

Typically a two-hour duration can also greatly help with peaking needs. An independent consulting firm

recently studied ERCOT, and they said four hours gives you 100 percent what you need. Two hours gives you about 60 percent. So there's variations in terms of -- every system is a little bit different in terms of what's the best setup, and so planning is really key.

So when you talk about cost, if you look at the -- on the left-hand side you have, let's just say, a four-hour battery system. On the right-hand side you have a traditional turbine. The difference with batteries is the capital cost on an installed per-kilowatt-hour basis is still higher than a typical combustion turbine. But the battery doesn't just sit idle when it's not being used. It has other benefits.

So typically if you have a four-hour battery installed, and it might be called five times a summer and that's it. It's really only dispatched, let's say, on the most peak days, similar to, say, for example, a demand response program. However, in all of the hours that it is not providing peaking service, it can be connected to the grid and provide regulation and other ancillary services. So from the market, you get those benefits that offset the cost because you can do multiple services.

CHAIRMAN BROWN: Can you elaborate on "ancillary services"?

MS. HILLMAN: Services? So typically in, for example, competitive ISOs like California or PJM or New York, they would be selling regulation, competing just with the traditional generators. And PJM, for example, recognized -- we did our first pilot in PJM. We actually took a battery to their parking lot to get them comfortable with it. It sat in a container truck. I think they just finally dismantled it in the last six months.

But it provides regulation services and it provides it much faster and much more accurately so that it actually saves money for ratepayers because you are sending a more accurate signal. You need to use less energy, in essence, to provide that service.

And PJM did a study, I think, after the first two years or so that they were doing this. And, you know, I can't remember exactly how many millions of dollars it saved the ratepayers within the footprint of PJM. And so then they put up a separate tariff that pays, in essence, a higher price per megawatt-hour -- that's how regulation is measured -- than a traditional frequency generator source of frequency regulation. And the FERC NOPR, for example, right now, that's part of what they're looking at is this whole issue of how should the compensation be handled for fast response

resources, whether they're batteries or other technologies, versus traditional.

CHAIRMAN BROWN: Thank you. All right.

MS. HILLMAN: And just in conclusion, you know, what can states and utilities do? What do we see as what they should be looking at?

In essence, include storage as a resource when you look at your integrated resource planning. It should be considered whenever you're doing a planning model. And we'll be frank; it's an evolving capability. Most traditional planning software doesn't have a separate module for batteries, but they are starting to do that. And with some thought, you can adjust that planning. And encourage open procurement, open to energy storage, whether it's for peaking needs, transmission and distribution alternatives. Those are two things that we see as the path forward.

CHAIRMAN BROWN: Thank you so much. And I will -- I mean, we've just approved our ten-year site plans, and we -- as I mentioned, the FPL docket. And the Commission has at least expressed in those settings the interest in energy storage, which is why I thought it was very ripe to have this discussion. So we are interested. Sorry for speaking on behalf of you all, but we are.

MR. HILL: Thank you. I had some appendix slides, so let me just flip -- get all those out of your way. If you want more information about any of those project, they're at the back.

CHAIRMAN BROWN: Thank you.

MR. McKENERY: All right. Well, thank you. And my colleagues here went through a lot of the background information, so we don't have to go into that.

I'm Steve McKenery. I'm the VP of storage solutions for a development company called 8minutenergy. We are based in California. So I apologize; I'm the only man in the room without a tie on. It's good to see --

CHAIRMAN BROWN: I'm sure they would do it, if they knew you were doing it.

MR. McKENERY: -- ties are still worn somewhere, so I will make sure I bring one next time. So I apologize for that.

So what we do, we develop primarily solar projects, photovoltaic projects with a storage component. We got into the business a number of years ago as a solar developer, and recently, with the influx of storage and the benefits of storage, we've added that to our portfolio.

CHAIRMAN BROWN: Could you focus on the storage aspect?

MR. McKENERY: Yeah, that's what I'm going to do. So just real quickly, we're focused in the -- throughout the southwest and the southeast. I have a colleague here. We have operations here in Florida, Alabama, and the south looking at developing solar projects and storage projects, both hybridized together and as standalone.

One of the benefits of putting storage with a solar project is a lot of clients, a lot of utilities, a lot of commissions like the benefit of renewable power. You want the power when you need it. Obviously demand here is primarily in the early evening. Air-conditioning load is over the course of the day. In the winter, you've got heating demand in the morning. So solar power is great, but it doesn't necessarily produce the power when you're -- when the customers need it.

With storage, what you can do is you can capture that energy that's generated by the sun, put it in the battery, and then deploy it when you need it. So it's -- that's really the benefit.

You asked one of the other questions about ancillary benefits. We have a thing called non-spinning spinning reserve. So for those of you that are

operating -- used to operating fossil fuel gas turbines, you obviously have an amount of power you keep in reserves, spinning reserves so these turbines are operating at a low speed burning fuel. With a battery, you can, in essence, turn those turbines off, use the battery as your spinning reserve, have it sitting there. If you need power, you can deploy it in 50 milliseconds. You don't have the ramp up time of gas turbines. You don't have the waste of fuel and greenhouse gas emissions while it's sitting there idling. So --

CHAIRMAN BROWN: And that technology is being utilized around the country?

MR. McKENERY: It is. Southern California Edison is deploying a system putting a 10-megawatt battery on a GE gas turbine. So the concept there is the turbine is turned off. The battery is there when it needs the call. The battery provides 15 minutes of power while they then ramp the turbine up. So you're saving all that gas that the turbine normally consumes in the non-spinning mode. So a great, great application.

Again, we talked about the different kinds of power. I think this is kind of interesting. If you look at the Department of Energy's energy storage website, there are six energy storage projects in

California. I guess there will be seven now after this pilot gets built. They're primarily lead acid batteries and thermal storage. A lot of use of, you know, generating ice at night, using that for air-conditioning.

What our company does, we advocate lithium ion battery systems both as a standalone product and as a -- and hybridized with PV. And, again, I won't waste a lot of time here on the details.

Again, we kind of went through this. We will make sure that Florida is --

CHAIRMAN BROWN: Green.

MR. McKENERY: -- green in ours with a pilot project. So thank you.

In terms of the market, why are you hearing about storage now when you didn't a few years ago? The number one driver, we can thank Elon Musk at Tesla in terms of publicity, in terms of EV vehicles. The demand from GM, Ford, BMW, Mercedes, Tesla to produce electric vehicles is really what's driven the lithium ion battery market. The companies that produce the batteries are companies like Toshiba, Panasonic, LG, Samsung. Big industrial billion-dollar conglomerates are now producing lithium ion batteries at half the price that they did 24 months ago.

CHAIRMAN BROWN: Wow.

MS. HILLMAN: So we've had this massive cost drop in the price of batteries.

CHAIRMAN BROWN: 50 percent?

MR. McKENERY: 50 percent.

CHAIRMAN BROWN: Wow.

MR. McKENERY: And it's still got a ways to go. It's kind of like solar was ten years ago. You had this massive cost decline. You know, there's lots of charts out there. Basically you can see the demand for batteries in 2016, you know, was twice what it was in '14, but where is it going to be in 2020 or 2021? It's going to be ten times what it is today. And companies like AES is -- they're the leader in the field really in deploying this technology. Companies like ours are developing projects using lithium ion battery technology. Again, we don't make batteries. We help utilities design systems and develop projects. So --

CHAIRMAN BROWN: What's the biggest project you all have out there?

MR. McKENERY: Our storage development is relatively new for us. We have about 5 gigawatts of solar projects in development, about a gigawatt operating. We are now going back, looking at adding storage to those operating assets as well as deploying

storage on the new assets.

CHAIRMAN BROWN: Where are you primarily located?

MR. McKENERY: Our offices are kind of across the southwest. The nearest office to here would be Houston. We started in California and kind of worked east. So we have several projects in development in Florida currently that we're looking at and expanding that continually as times goes on.

CHAIRMAN BROWN: Good. Good.

MR. McKENERY: That's kind of it in a nutshell. You know, we talked about storage does a lot of great things, and that's kind of it.

CHAIRMAN BROWN: I think it's great. Thank you, guys, so much for your presentation. It really capped -- you know, encapsules a lot of the different concepts we've talked about and got into the technologies. And you've got two engineers sitting next to me, so, Commissioners, any questions on the technical aspects or anything? Commissioner Graham.

COMMISSIONER GRAHAM: What's going on as far as the life of the battery, especially on the back side of the meter? Because, you know, years and years of having phones, you have it the first year, it lasts so long. After five years, it lasts five minutes. And so

what's going on as far as technology? Because I see a lot of graphs and other things, but I don't see anybody talking about life of batteries.

MS. HILLMAN: Right. Life cycle. So typically when we design a project, we typically design it for 20 years. And we have -- we built a -- our project is nodule, which means if you think of a data center with all those racks in it, that's what a battery storage facility looks like. And if a battery lasts five to seven -- most of the batteries that historically have been in sort of, like, if they're heavily used, it's, say, five to seven years. If it's not used every day, it's less -- it's more.

But what you can do is, unlike a power plant, when a battery dies, you do not have to go in and shut down the whole plant. You, in essence, shut down that node. So think about it as a data center. You pull out that rack, replace the battery pack, and put it back in.

So 20-year contracting is very standard. Typically most developers want to see at least ten years because that's the most efficient and economic. And when we design a product, we assume certain things about what the costs will be over time when we go in and augment. It's called augmentation of the system.

COMMISSIONER GRAHAM: You were saying before

about improvements, just like you were saying about the solar. Because the improvements are coming so fast and furious, why do you really want to tie something up for ten years or 20 years where, you know, the battery is going to be twice as efficient four years from now than it is today?

MR. McKENERY: I think you can ask the same thing about solar. If you look at solar panels ten years ago, you know, they were more efficient than they are now. But they're products that are built for 20 or 25 years. The lithium ion battery technology we use is the same thing. We warrant our systems for 20 years. So, I mean, you can always wait, you know, a few years and it probably gets cheaper. But, you know, it's a question of when do you make that decision to move?

What we've seen now is the costs are competitive. We compete against -- in all source RFPs. We have a project in California. We just beat natural gas on a combustion turbine basis. So we offer -- are able to offer a PBA to the client at lower than the cost of a natural gas combined cycle.

COMMISSIONER GRAHAM: That's like that flat screen TV. Did you get the plasma or did you get the LCD or the LED?

MR. McKENERY: And if you waited, you'd still

have the big TV with a tube in it; right?

But clearly I think the point -- there's a tipping point when it becomes, you know, you make that purchase decision. I would advocate that we're kind of right there now. Two years ago we weren't. You know, it'll be cheaper two years from now. But if we can put in a solar plus storage plant and generate the power for 5 cents all in, that's pretty competitive, I think.

MS. ROBINSON: And I think one of the benefits of having the rack-related system is you can continually update with the newer batteries as you move along as the five years expire, five to seven years.

MS. HILLMAN: Right. And when we design a project, we know how much augmentation we're going to have to do based on what the project is designed to do, and we factor in what those costs are going to be at the time of augmentation. So that is getting factored into the pricing, as the marketplace has seen.

MS. ROBINSON: Which is a little different than your solar panel, which you're going to use the same exact one --

MS. HILLMAN: Just sits there, right.

MS. ROBINSON: -- and not necessarily replace.

MS. HILLMAN: Right.

CHAIRMAN BROWN: Thanks. Commissioner

Polmann, any questions?

COMMISSIONER POLMANN: No. This was excellent. I really appreciate it.

MS. ROBINSON: Thank you.

MS. HILLMAN: Thank you.

MR. McKENERY: We are a technology as well looking at flywheels, interestingly enough. It's just not quite commercially there; whereas, we would advocate lithium ion batteries are a proven technology that's there.

CHAIRMAN BROWN: Staff, do you have any questions for this fine group of folks?

I want to thank Sharon and Steve and Maria for being here today. Thank our staff for reaching out, Cayce and Mark, for getting in contact with them. It's an issue that's very important, I believe, to our country, to Florida, and so thank you for helping educate us.

MS. ROBINSON: Thank you.

MS. HILLMAN: Thank you.

CHAIRMAN BROWN: Appreciate it. Thank you. And we'll follow up on getting some additional materials from you all.

MR. McKENERY: You know, I'm sorry. Thanks. One last thought I meant to throw out there, and

breezing through the slides, I completely forgot about.

We talked about hurricane protection. One of the benefits of batteries with a PV system is you now have ability to create little microgrids. So if you did have a natural disaster, you lost power, poles are broken and stuff, with PV in storage, you now have a power system that can keep going while you're restoring the grid. So another benefit you need to -- I'm sorry. I had my California hat on. I wasn't --

CHAIRMAN BROWN: We hear about this in NARUC.

MR. McKENERY: So that's another benefit that I'm sure has some value.

MS. ROBINSON: You're sitting in a room with people who have experienced power outages.

CHAIRMAN BROWN: Thank you. That's why we've got to be green, not gray. Thank you very much for your time. Appreciate it.

We have one more panelist here before we get into the business, which should go pretty swiftly. Mr. David Konuch is here from Comcast Central Division. I know you guys in Leon County are pretty much all on Comcast most likely, so I thought this would be a nice presentation.

Mr. Konuch serves as vice president of government and regulatory affairs. He covers 12 states.

I've had an opportunity to talk with him about what he's going to talk about. Also David used to work for the FCC. He's been a long practitioner, attorney in this area of law, a Stanford grad and Tulane. And I'm happy that you're here with us today. Thank you.

MR. KONUCH: Thank you so much for inviting me, Chairman Brown. And I don't have any slides, but I do have some colorful handouts.

CHAIRMAN BROWN: Yeah.

MR. KONUCH: So actually if you want to just take one and pass it down.

CHAIRMAN BROWN: Sure. David, we're very informal here too.

MR. KONUCH: Okay.

CHAIRMAN BROWN: So I do have your report, so you could save your report.

MR. KONUCH: Okay. Fantastic. And I've got some for our audience members as well.

CHAIRMAN BROWN: Sure. So my understanding is that you're going to talk a little bit about the Internet Essentials program for Comcast.

MR. KONUCH: That is correct.

CHAIRMAN BROWN: Okay.

MR. KONUCH: Internet Essentials is something that we're very proud of, and it's our way of helping

bridge the digital divide.

So just a little bit about our company. And we are fairly ubiquitous. Every time you turn on your TV around -- especially around here, you probably see a lot of what we do. But we're really more than just video, voice, and internet at this point. We also have -- operate cable networks such as everything from Sprout; the Golf Channel, one of my personal favorites; Weather Channel; USA. We also have broadcast properties: NBC; Telemundo; film studios, Universal; and also Universal Studios' theme parks. Harry Potter is really excellent. I encourage everyone to go down and visit that. It's amazing.

So anyone who's spent more than five minutes talking to me in the last six months or so since I've been working for Comcast, you've probably heard me talk about the X1 voice remote. So one of the things that we've developed is our X1 voice remote, which you can basically press a button, you can talk into the remote, and it will turn to whatever channel that you want to go to. That's very important in a 500-plus channel universe that we have right now. It also will help you search for On Demand choices. You can put your -- you can basically say a quote from your favorite movie, and it will pull up that movie if we have it On Demand. So

we're very proud of that. We feel it's cutting edge technology. And if you're a Comcast customer, you can typically upgrade to that.

CHAIRMAN BROWN: Is it an actual remote controller? Is it like the Ok Google or, you know, it's kind of compatible, similar to that where you connect it to your TV and it automatically turns it on, you don't have to even to push a button?

MR. KONUCH: Well, it's an actual remote, so you do have to push a microphone button, unlike some of the other products like, I think, Amazon's. We're not actually -- we're not listening to what you say in conversation. You have to press a button.

CHAIRMAN BROWN: Oh, I need to get rid of that then.

MR. KONUCH: Yes. So that's a selling point. So we now -- we're -- the voice control, we're in 13 million-plus homes. More than 45 percent of our customers have it. We're getting 300 million voice commands per month on that system. People love it. We -- I personally love it. We have three middle schoolers. They're crazy about it too.

Wi-FI hot spots, we have 16 million-plus Wi-Fi hot spots. For On Demand, we're getting -- there are 4 billion cross-platform hours viewed annually On

Demand. And we're very -- we really view ourselves as a technology company.

We have a large -- it's a 50-story skyscraper in Philadelphia, which is our headquarters, and we're building another one right nextdoor to it that's going to be even taller. And it's going to house basically our growing workforce of technologists, engineers, and software architects. It's going to be the eighth tallest building in the U.S., the tallest building in the U.S. outside of New York and Chicago.

CHAIRMAN BROWN: You're doing a great advertisement for Comcast, but can I get you to focus on the Internet Essentials?

MR. KONUCH: Sorry, sorry, sorry. So let me focus on -- I just wanted to kind of bring it -- anyway, Internet Essentials. So this is a very important part of our company DNA. What is the state of high speed Internet adoption today? Well, one in four Americans are still not connected to the internet. So just who are we talking about? It really has to do with income.

So if you look at the U.S. Census Bureau's survey from 2013, if you look at those families that are earning under $25,000 per year, 47 percent of them -- only 47 percent have access to broadband internet at home. If you're looking at families from 100,000 to

150,000, it's 92 percent. And if you're looking at above 150,000 in annual income, 95 percent have access to broadband internet at home. So that's what we refer to as the digital divide.

The Pew Research Center did a study on this in April of 2015 looking at access to broadband by income level for families with children. For 25 -- those families earning 25,000 or less, 60 percent have access to the internet; whereas, for 150 -- those earning 150K or more, it's 97 percent.

CHAIRMAN BROWN: So, David, I've got a question to you really to talk about the FCC's decision on Lifeline and inclusion of broadband.

MR. KONUCH: Yes.

CHAIRMAN BROWN: And just first, is Comcast interested in becoming a provider of Lifeline here, a Lifeline broadband provider?

MR. KONUCH: We've -- that's something that we never actually have done as a company, so I think we -- you know, we're supportive of those efforts, but we're still -- we're taking kind of a wait-and-see approach because there still have been some changes.

CHAIRMAN BROWN: I was going to say, let's talk about the wait-and-see.

MR. KONUCH: Sure.

CHAIRMAN BROWN: You've been involved in the industry for, you know, a few years or so.

MR. KONUCH: Yes, going on 20, 25. I lost count. It's been decades at this point, yes.

CHAIRMAN BROWN: So it seems that the FCC has really kind of taken a direction, and now it seems to be reversing the direction of the previous administration. Do you see a potential repeal of the rule, the FCC broadband expansion, Lifeline?

MR. KONUCH: I think there -- we have a team of people who are much smarter than I am who --

CHAIRMAN BROWN: No.

MR. KONUCH: They have their finger on the pulse of what's going on in Washington, so I think they would be more qualified than I would to really answer that question. I really can't speculate on it, so I think we'll just have to take a wait-and-see approach.

CHAIRMAN BROWN: That sounded like a good answer.

MR. KONUCH: Well, thank you.

So as the role of the internet in everyday life expands at dizzying speed, those left behind face a dangerous level of isolation. And if you have school-age children, you're probably used to getting many emails per day from teachers, principals about

assignments. 79 percent of teachers have their students access or download assignments from an online site, 76 percent ask students to submit their assignments online, and 50 percent of students have been unable to complete homework assignments because of internet access issues, and 42 percent of students received a lower grade on an assignment due to lack of access. So you can see this is where the rubber really hits the road. If you don't have good internet access, it's going to affect your school performance no matter how good of a student that you are.

CHAIRMAN BROWN: How is that going to -- the FCC's decision to eliminate the qualifying factor of participation in the school lunch program going to affect Comcast's participation in assisting consumers that need it?

MR. KONUCH: That's actually a very good question. We -- originally the way Internet Essentials worked is you had to have at least one student in your household who was on -- was eligible for the National Student Loan -- National Student Lunch Program. So if you had that, then you were eligible. But we've broadened it since then. So -- and I'll actually be addressing that a little bit later, but there are other ways that you can become eligible. So I actually hadn't

really thought about how that might affect the eligibility. But we've broadened the eligibility over the years, so it's beyond just the National Student Loan (sic) Program. And I'll be getting into that a little bit more as we go forward, and so I hope that answers your question.

CHAIRMAN BROWN: We'll get there.

MR. KONUCH: Okay. So -- and this also is very telling. More than 80 percent of Fortune 500 companies require online job applications. Some national chains like Foot Locker, for instance, you can no longer walk into a Foot Locker and apply for a job. You have to have an internet connection. You can't apply in person.

But it's not just about bringing a wire to homes. There are -- it's about confronting the barriers to internet adoption because just because, you know, the wire passes your house, you're not necessarily going to sign up for it.

There are really three issues: Relevancy, does a potential customer view it as relevant to their daily lives; training, they might not know about how to get access to the internet; and, of course, cost. So addressing these issues is no small challenge, but it doesn't mean we shouldn't be trying.

In August of 2011, Comcast started our Internet Essentials program. It was really an experiment to try to bridge the divide.

CHAIRMAN BROWN: Could you summarize that, if you could, in five minutes or less?

MR. KONUCH: Yes. Okay. And I will try to be quick. But, in essence -- and hopefully everyone has one of these.

CHAIRMAN BROWN: We do.

MR. KONUCH: Excellent. So for 9.95 per month, if you qualify, if you're in -- if you're on the -- well, there's -- eligible households must have at least one child eligible for National School Lunch Program or receive HUD housing assistance, you have to live in an area that we serve, have not subscribed to Comcast for the last 90 days, and not have an outstanding debt to Comcast that's less than one year old. And if you meet those criteria, then you are eligible for 9.95 per month internet, plus tax. You can also get a computer from us heavily discounted, for less than $150 for a nice computer that --

CHAIRMAN BROWN: How many people qualify and how many people are receiving these benefits per month?

MR. KONUCH: Well, nationally it's about 750,000 connections. So we usually multiply that number

by four for -- we view that as 75 -- 750,000 families. So about 3 million low income Americans. And here in Florida specifically, we have -- if you go to pages 10 and 11 of our progress report, you can see some statistics on Florida specifically. But Florida -- Miami is actually the third largest city with the most connections in the entire U.S. behind Houston and Chicago. So we have about 22,000 families that we're serving in Miami. And then Hialeah is seventh on the list. So Florida is definitely represented. And among all the states, Florida is second among all the states that we serve in the number of connections.

So just to kind of -- to not -- to conclude and kind of -- I think the key facts to me that really stand out in the progress report are that: 95 percent of families have seen a positive impact on their children's grades as a result of participating in Internet Essentials; 98 percent subscribe to the service to use the internet for home or school projects, homework or school projects; and then probably maybe my second favorite statistic, second to the 95 percent have seen positive impact on their child's grades, 51 percent of customers said that Internet Essentials actually helped them or their family member find a job.

CHAIRMAN BROWN: That's great.

MR. KONUCH: So when you can do that, you're really changing lives.

CHAIRMAN BROWN: David, great facts, great statistics. We will absolutely keep the material that you have and look at it and continue to have a dialogue with you in the future. Appreciate you taking the time to come out here and educate us about Internet Essentials.

Commissioner Polmann, do you have any questions or comments?

COMMISSIONER POLMANN: Well, I wanted to echo the Chairman's thoughts. I did read through the material. I appreciate you providing it in advance. And the tremendous amount of work that I see in here benefiting the communities and the fact that the state of Florida was second on the list shows a great deal of work here in our state, and I see that benefiting many of our families. Very good report, annual report. I see a lot of work, a lot of progress here, and great news.

MR. KONUCH: Well, thank you very much.

COMMISSIONER POLMANN: So thank you to the company for your efforts, and I encourage you to continue in that effort and reach out further.

MR. KONUCH: Thank you very much. And we're

always looking for partners to help us. So to the extent, you know, people are interested in, you know, using their email lists or handing out brochures, like we're doing today, that is something that we always -- we love and try to encourage.

CHAIRMAN BROWN: Thank you.

Staff, if you have any questions.

Seeing none, David, thank you for taking the time to come out here.

MR. KONUCH: My pleasure.

CHAIRMAN BROWN: Appreciate it.

All right. We're going to move into the business of our IA. And with that, we will go to the legislative update, which our folks have been busy. I think, Cayce, you've got be downtown soon.

MR. HINTON: Yes, this afternoon.

CHAIRMAN BROWN: You've got a presentation coming up.

MR. HINTON: I do. I'll let Katherine and Adam walk you through the calendar and fill you in on all the details.

CHAIRMAN BROWN: I just want to say publicly, I know we've talked about it, but I want to extend my appreciation to you guys for keeping the Commissioners involved and updated. And you've been very active and

proactive in reaching out, and I cannot say enough fine things about your performance so far. Thank you.

MS. PENNINGTON: Thank you. We sent yesterday the tracking report and the calendar for the week to you. We will update that calendar on a daily or two-or-three-times-a-week basis as need be.

I will tell you that the calendar you have in front of you just will highlight, of course, as you mentioned, Cayce's presentation this afternoon to the Senate committee. And we have added to the House Energy and Utilities Subcommittee for tomorrow morning a PCB that they'll be discussing that we got late yesterday and have just started to look at.

CHAIRMAN BROWN: Who will be discussing it on behalf of the Commission? Is there going to be --

MS. PENNINGTON: Oh, today? There's -- tomorrow? No. There's no PSC participation in that. So if you have any questions about any of the bills, we'll be happy to answer. I don't -- I doubt you really want me to go through every single one of them.

CHAIRMAN BROWN: No, we don't. Thank you. But we have been -- that's why I wanted to say at the outset how much you've been keeping us informed. We appreciate the reports, the updates, and I don't have any questions.

Commissioners, I know they've been keeping your offices apprised too. If you don't have any questions, we can move along.

COMMISSIONER POLMANN: No. I would echo your remarks. Very helpful, the work you do. Thank you.

MS. PENNINGTON: Thank you.

COMMISSIONER GRAHAM: This is good stuff. Thanks.

CHAIRMAN BROWN: Thank you. Good work, guys.

MS. PENNINGTON: Thank you.

CHAIRMAN BROWN: Good stuff. Good luck today, Cayce.

MR. HINTON: Thank you.

CHAIRMAN BROWN: You're welcome.

Moving on to General Counsel's report. Seeing none --

MR. HETRICK: None.

CHAIRMAN BROWN: Thank you.

Executive Director.

MR. BAEZ: Only to reiterate that Consumer Protection Week is this week. And if you all haven't been checking out the Twitter account, each of our Commissioners are participating in a --

CHAIRMAN BROWN: Oh, it's just so embarrassing. It's horrible.

MR. BAEZ: -- in the video.

COMMISSIONER POLMANN: Speak for yourself.

CHAIRMAN BROWN: Sorry. You haven't been out yet. Wait till yours goes out.

MR. BAEZ: Every Commissioner is getting a turn, so keep your eyes peeled. And I don't know if the Chairman had put out the hashtag, which apparently the hashtag, we got it at hashtag by the pound because it's the longest hashtag I've ever seen.

CHAIRMAN BROWN: It is.

MR. BAEZ: It is #psccelebratesconsumersncpw.

CHAIRMAN BROWN: Can you guys please like it? Please? I have, like, 40 friends. That's it.

MR. BAEZ: That hashtag again is --

COMMISSIONER POLMANN: I feel terrible for you.

MR. BAEZ: -- #psccelebratesconsumersncpw.

COMMISSIONER POLMANN: Can you just send that to everybody in the house?

CHAIRMAN BROWN: Yes. We issued a press release.

MR. BAEZ: I'm just glad this doesn't count against the 140 characters. That's all of them.

CHAIRMAN BROWN: Well, and also staff is traveling around the state this week.

MR. BAEZ: They are, doing outreach, as they do, incorporating NCPW, among other things. So thank you for reminding me.

CHAIRMAN BROWN: You're welcome.

MR. BAEZ: That's one of the things that we --

CHAIRMAN BROWN: Anything else?

MR. BAEZ: No, that's it for today.

CHAIRMAN BROWN: They do great work. This is a very important week. It's the 19th anniversary of National Consumer Protection Week. And we're very involved, and I love our PIO office. They just do -- they're going to be very, very busy -- look at Laura -- traveling throughout the week, and Cindy too, and thank you very much for the work that you do.

With that, are there any other matters? We just --

MR. BAEZ: Only yours.

CHAIRMAN BROWN: Oh, employee -- thank you.

I have another matter. I wanted to recognize Patty Zellner, who is the employee of the month for March. Patty started out with the Commission in 2004, I believe, as a research assistant, and then she moved to management analyst and administrative assistant in the ENG office, Administrative Assistant III. She's known -- she very trusted. She is the go-to person in

that department, and we're very proud of her and would like to recognize her here today for her work at the Commission. Patty, are you in here?

(Applause.)

I'll embarrass you a little bit more later, a little bit more later. And with that, seeing no other matters, this IA is adjourned. Have a good lunch, everyone.

(Internal Affairs adjourned at 11:54 a.m.)

STATE OF FLORIDA)
: CERTIFICATE OF REPORTER
COUNTY OF LEON)

I, LINDA BOLES, CRR, RPR, Official Commission Reporter, do hereby certify that the foregoing proceeding was heard at the time and place herein stated.

IT IS FURTHER CERTIFIED that I stenographically reported the said proceedings; that the same has been transcribed under my direct supervision; and that this transcript constitutes a true transcription of my notes of said proceedings.

I FURTHER CERTIFY that I am not a relative, employee, attorney, or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorney or counsel connected with the action, nor am I financially interested in the action.

DATED THIS 14th day of March, 2017.

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