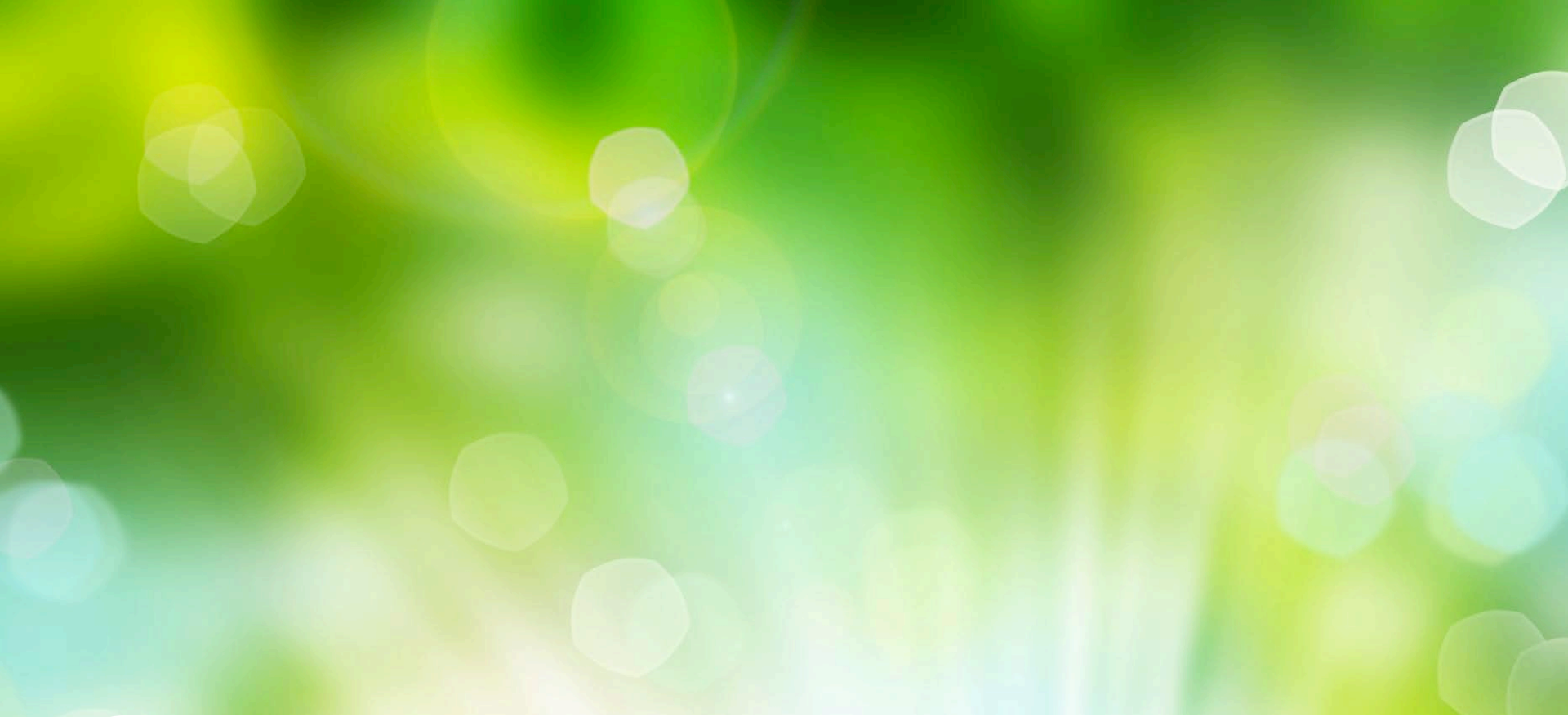
REINHOLD ENVIRONMENTAL Ltd.

2017 APC & Wastewater Round Table & Expo Presentation

July 17 & 18, 2017 in Charlotte, NC / Hosted by Duke Energy



EH&S at Duke Energy

Paul Draovitch, SVP Environmental, Health and Safety

DUKE ENERGY®

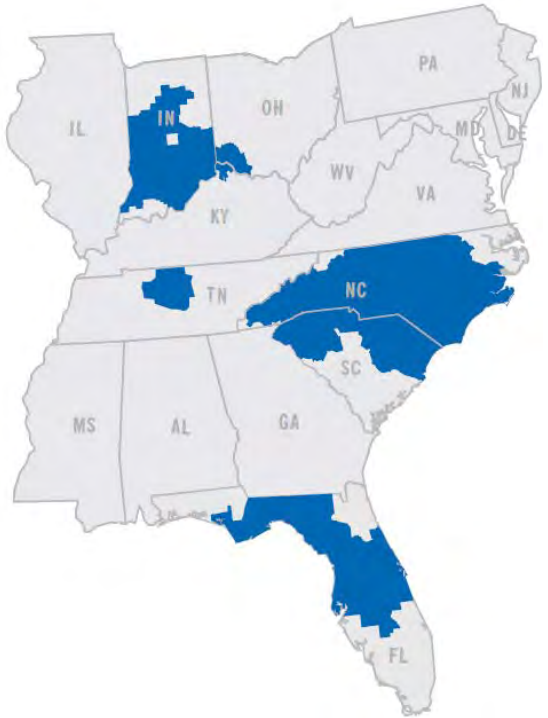
About Duke Energy

Quick Facts

Environmental, Health and Safety

Corporation	
Market Cap (as of 3/7/17)	$57 billion
2016 Operating Revenues	$22.7 billion
Total Assets (as of 12/31/16)	$133 billion
Employees (as of 12/31/16)	28,798
Total U.S. Generating Capacity (owned capacity)	49,300 megawatts (MW)
Electric Utilities and Infrastructure	
States Served	NC, SC, IN, OH, KY, FL
Size of Service Area	95,000 square miles
Total Generation Capacity (owned capacity)	49,300 MW
Total Transmission Lines	32,200 miles
Total Distribution Lines	268,700 miles
Total Electric Retail Customers	7.5 million
North Carolina	3.3 million
South Carolina	740,000
Ohio/Kentucky	850,000
Indiana	820,000
Florida	1.8 million

Electric and Gas Utilities Service Area

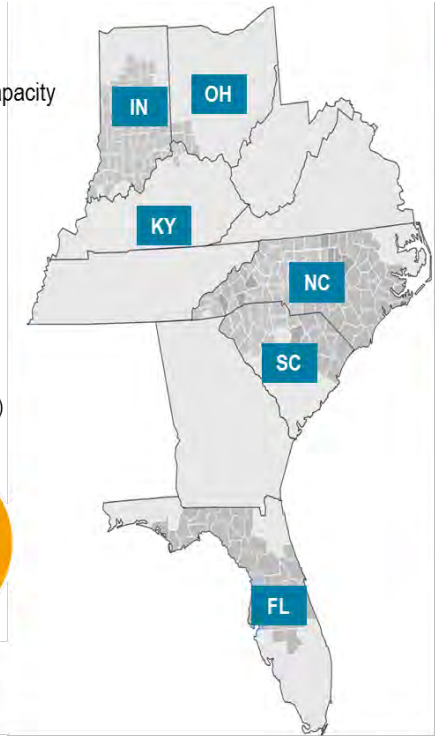


Duke Energy Generation Portfolio Today

Environmental, Health and Safety

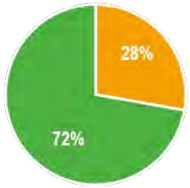
Portfolio Scale (1)

– ~50 GW owned, available summer capacity

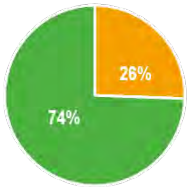


Florida

Generation (GWh)

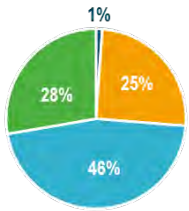


Capacity (Owned MW)

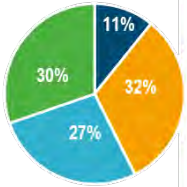


Carolinas

Generation (GWh)



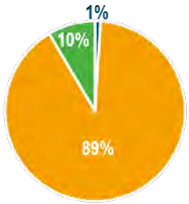
Capacity (Owned MW)



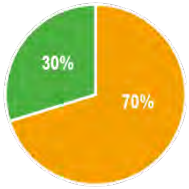
Coal Gas/Oil Nuclear Hydro/Other

Midwest

Generation (GWh)



Capacity (Owned MW)

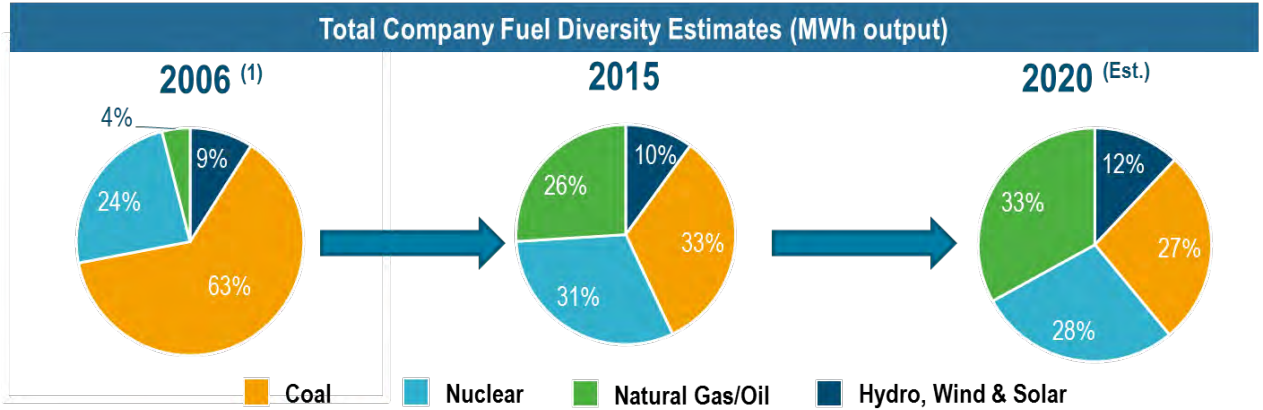


Coal Gas/Oil Hydro/Other

(1) Generation energy mix for owned generation only for 2015 as of 12/31/2015. Capacity estimates illustrative of 2015.

Moving Toward a Lower Carbon Footprint & Increased Fuel Diversity

Environmental, Health and Safety



Reduction of Generation Emissions From 2005 – 2015 (2)

CO_2 ↓ 28% SO_2 ↓ 90% NO_X ↓ 68%

Reduction in emissions due to the following actions:

- Additions of pollution control systems
- Decreased coal generation
- Retirement of higher-emitting plants
- Increased natural gas generation

(1) 2006 data does not include Progress Energy .
(2) Data based on Duke Energy's ownership share of generating assets as of the end of each calendar year. The data exclude emissions from the commercial Midwest generation assets sold in April 2015, and include emissions from the NCEMPA generation assets (partial ownership interest in several Duke Energy Progress plants) purchased in August 2015.

Rogers Energy Complex

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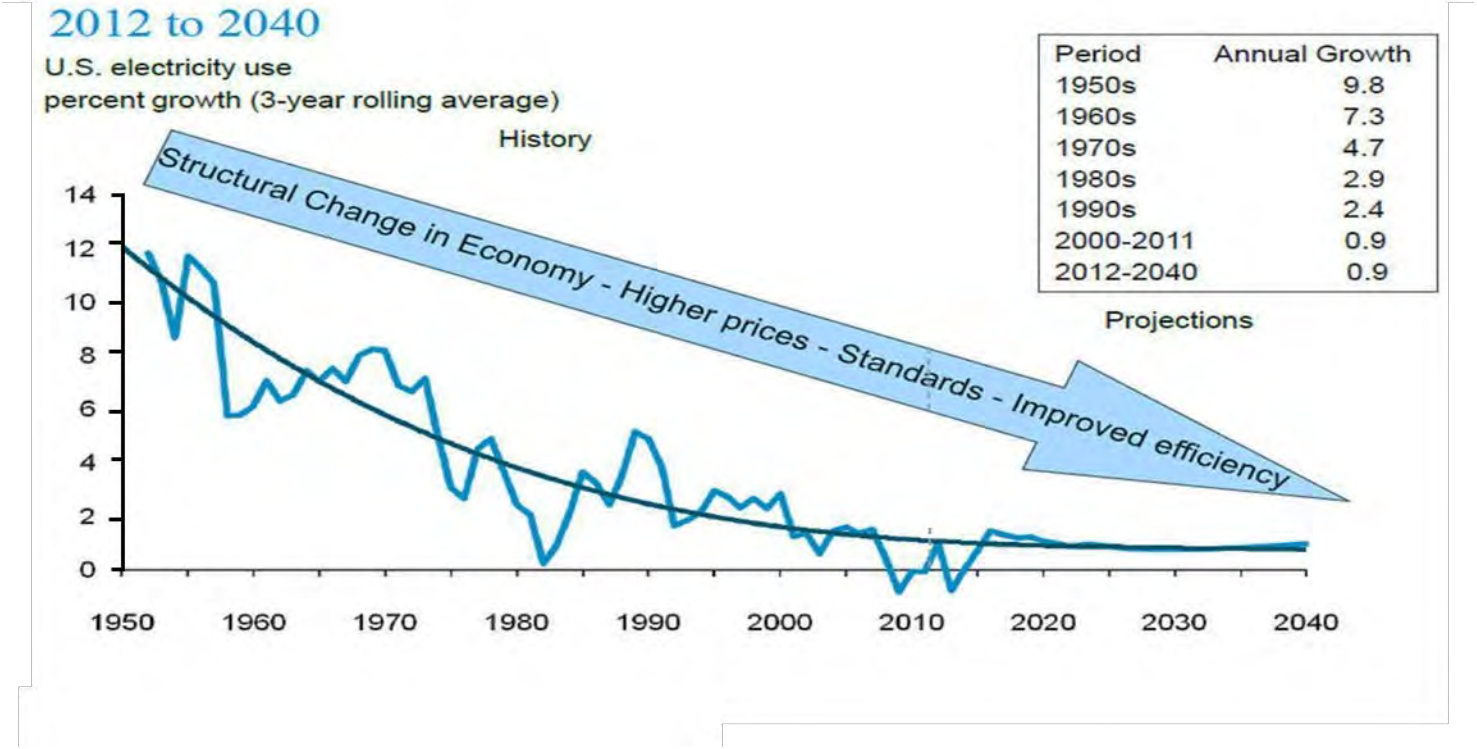
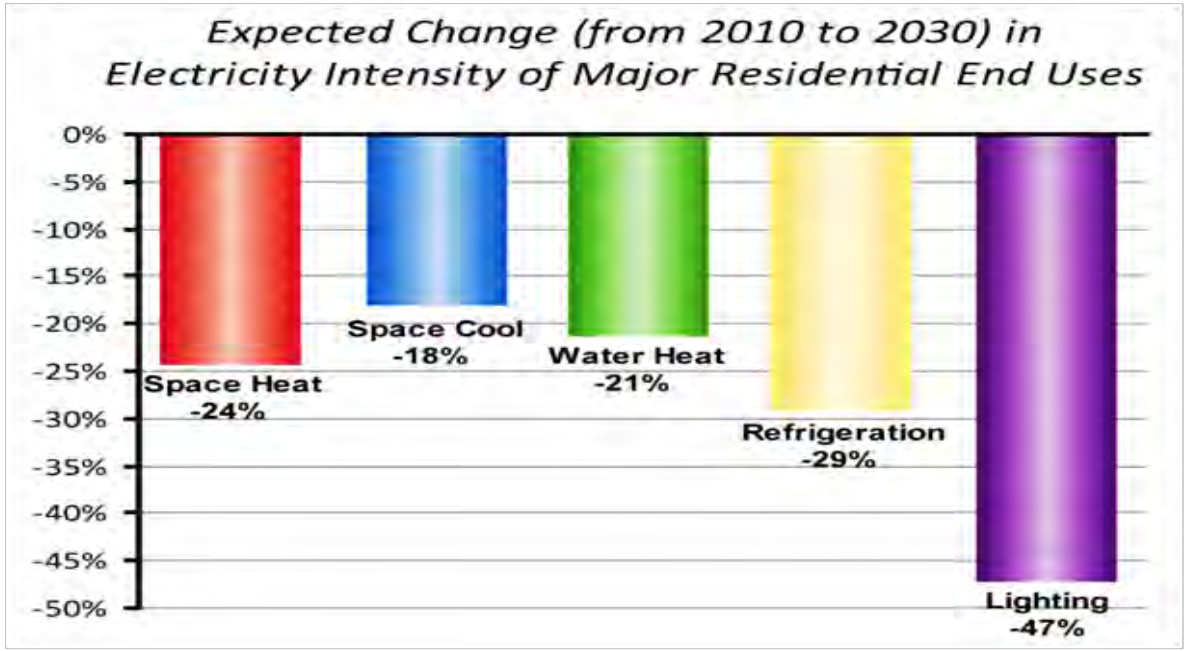
Electric Use and Economic Growth



Period	Annual Growth
1950s	9.8
1960s	7.3
1970s	4.7
1980s	2.9
1990s	2.4
2000-2011	0.9
2012-2040	0.9

Advances in Technology - Efficiency Projections



Annual Energy Outlook (AEO) 2030 Prediction

Fuel Markets - Growth in Shale Gas by Basin

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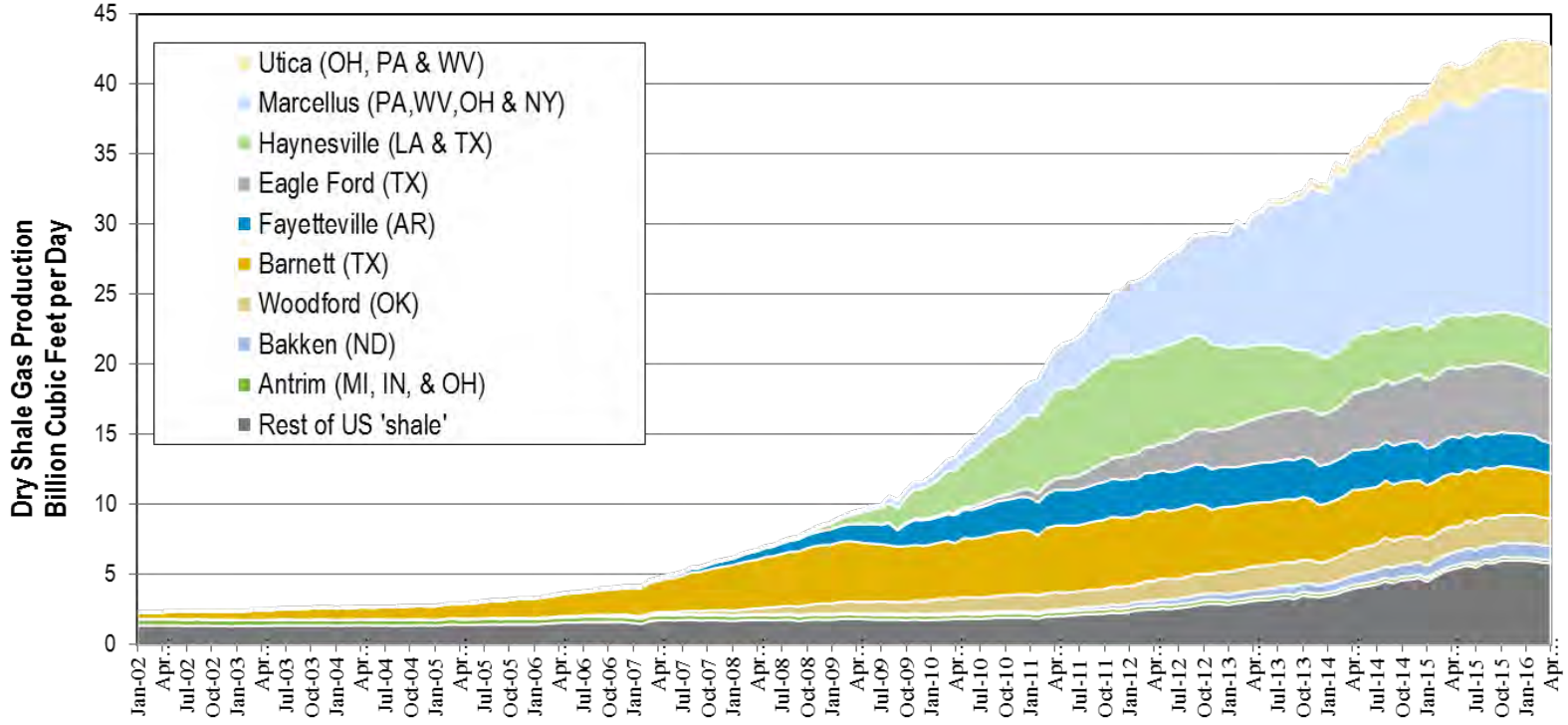

Source: EIA

Renewables - Large Scale Solar Developments

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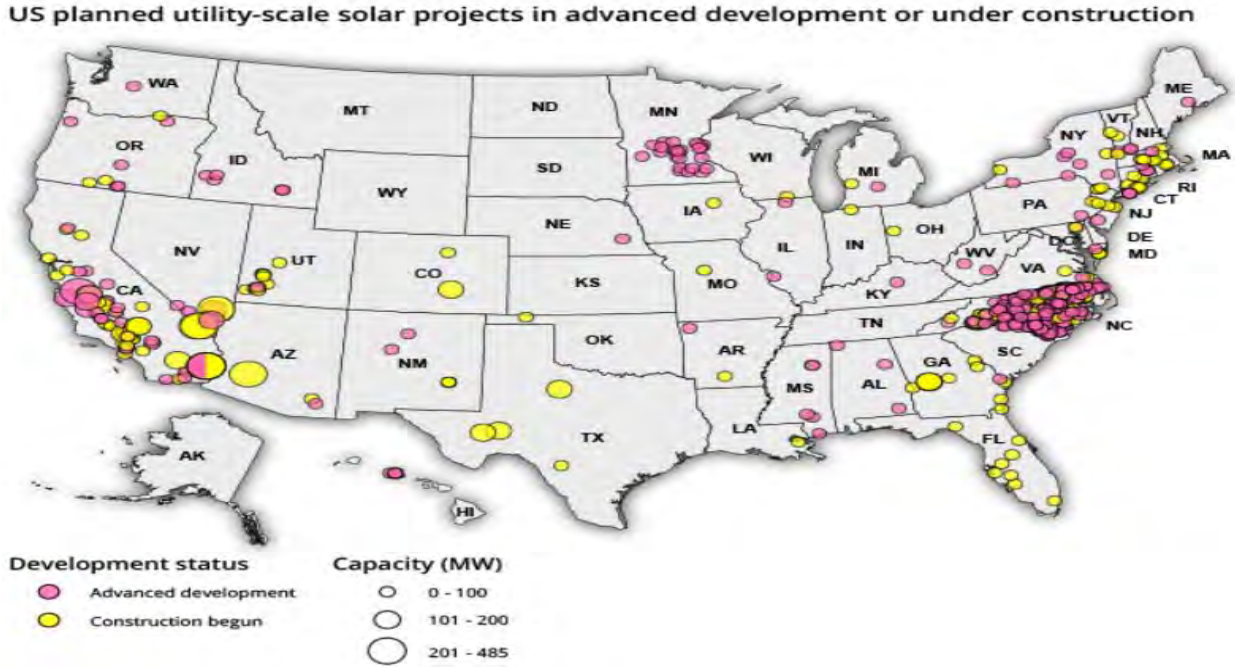
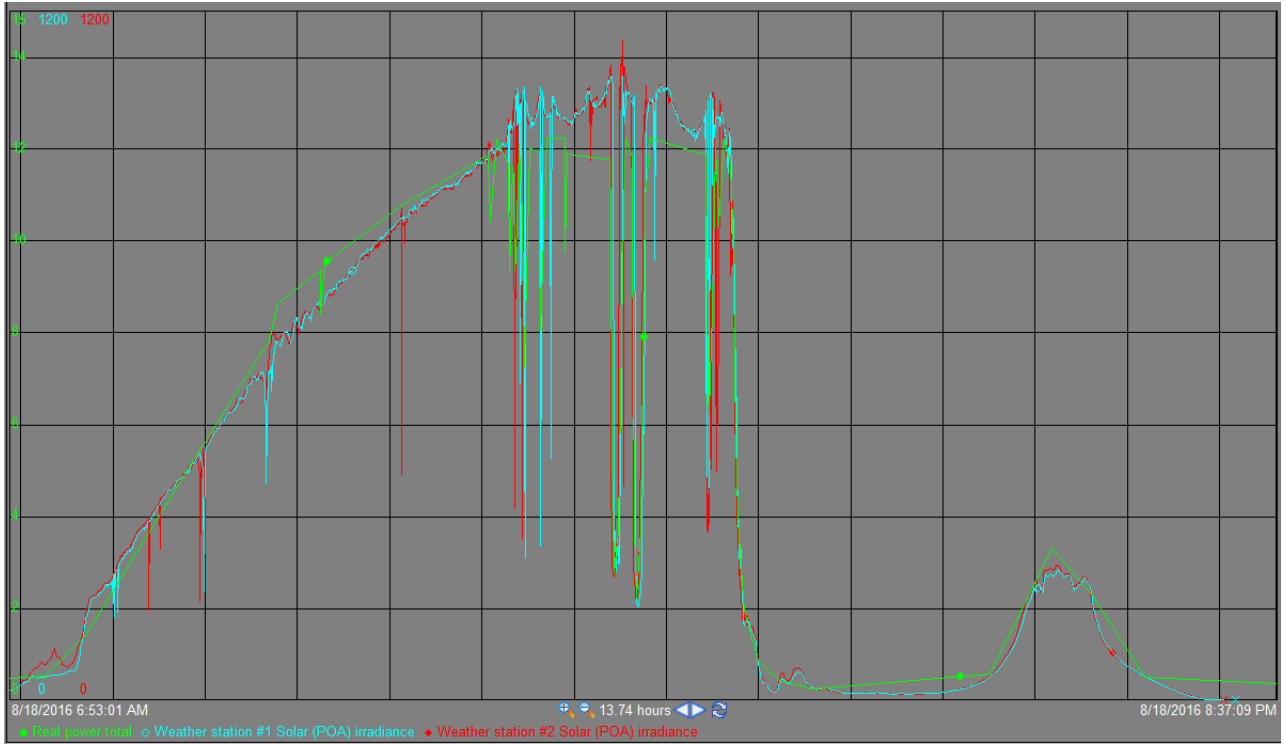


Slide Source: SNL Energy, an offering of S&P Global Market Intelligence
As of Feb 12, 2016


1200
1200
0
0
8/18/2016 6:53:01 AM
13.74 hours
8/18/2016 8:37:09 PM
Weather station #1 Solar (POA) irradiance
Weather station #2 Solar (POA) irradiance

- Implications
  - Increased cost from ramping/cycling
  - Pressure on safety & reliability
  - Decreased efficiency
  - Pressure on staffing
  - Electrical System Pressures

EHS at Duke Energy

EHS 2017 Key Objectives

- Launch EHS Management System aligned with international standards, and develop compliance task registers.
- Begin integration of Piedmont into Duke EHS policies, programs and processes and improve Piedmont safety performance.
- Execute Permanent Water Supply Project in accordance with NC legislation.
- Complete risk assessment in all areas of EHS and execute mitigation strategies to reduce risk exposure.
- Continue *Keys To Life* risk reduction efforts started in 2014.
- Fully support the CCP items, including groundwater monitoring, permitting, probation compliance and ash basin closure.
- Focus on near-miss reporting and analysis, with new metrics and action plans.
- Implement our *EHS 2020 Vision*, a five-year plan with five strategic goals

EHS 2020 Vision

Environmental, Health and Safety

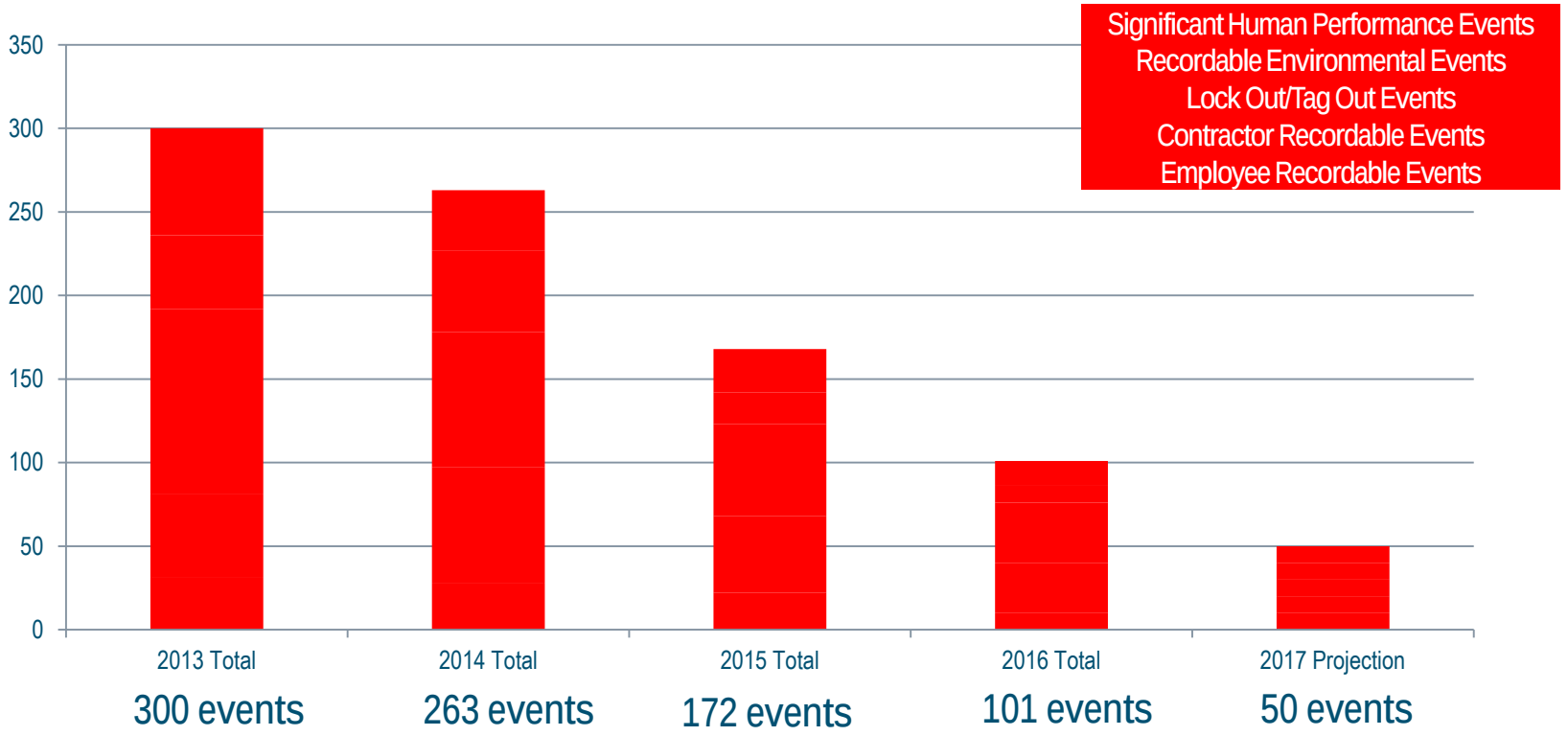
EHS Management System

- The management of EHS risks and requirements requires contributions from all departments and all organizational levels, including our employees and the contractors working on behalf of the company.
- A management system is a tool broadly used across many industries to set expectations for performance, align various activities toward these expectations and provide a structure for continual improvement.
- EHS has enhanced its management system to align with international standards, increase the consistency of related work activities across our business units and ensure compliance on every task, every day.

Improving Health & Safety Performance

Looking Back At Event Free Performance

Environmental, Health and Safety



Targeted Efforts

Keys to Life
Stay focused. Stay safe.

Employee Care

Contractor EHS Management
We partner. We care. We coach.

QUICK FIT

EHS Training
Environmental, Health and Safety

Cardinal Vegetation Rules
Eradicating VMs Big 3

Cardinal Electrical Safety Rules
Eradicate electrical contacts and flashes.

Keys to Life

- Support Duke Energy's fatality and serious injury prevention strategy by outlining standards and defining expectations and behaviors necessary to prevent fatalities and serious injuries
  - Identify hazards of high-risk activities known to cause fatalities and serious injuries
  - Define behaviors and controls necessary to prevent fatalities and serious injuries based on those high-risk activities

Contractor EHS Management

- This program establishes requirements to ensure that EHS expectations associated with contractors, other than staff augmentation or supplemental, are addressed and managed.
- Duke Energy, as the contracting company and site owner, has a primary interest to:
  - Protect company employees and contingent workers from personal injury
  - Prevent damage to company assets from contractor operations
  - Comply with regulatory requirements
  - Avoid EPA and OSHA citations
  - Ensure the protection of Duke Energy's brand name

Cardinal Electric Safety Rules (CESR)

- **Objective**: Eradicate electrical contacts and flashes for employees and contractors. These non-negotiable safety rules focus on the following areas:
  - Cover-up/Isolate and Insulate
  - Grounding/Zero Energy Check
  - Electrical Safety PPE

CESR Events												
	6/30/2016 Recordable Injuries		6/30/2016 Events		6/30/2016 Deficiencies		6/30/2017 Recordable Injuries		6/30/2017 Events		6/30/2017 Deficiencies	
	Employee	Contractor	Employee	Contractor	Employee	Contractor	Employee	Contractor	Employee	Contractor	Employee	Contractor
CESR Contact/Flash Events												
T & D Total	**1**	**2**	**11**	**25**	**25**	**78**	**1**	**0**	**9**	**19**	**240**	**186**
Transmission	1		2	1	2	10			1	7	13	64
Grid Solutions										1	0	0
Distribution - 1DForce	0	2	9	24	23	68	1	0	8	11	227	122
Carolinas		1	4	13	6	25			3	7	120	73
Midwest			3	5	4	3	1		1	3	79	21
Florida		1	2	6	13	40			4	1	28	28

Cardinal Electric Vegetation Rules (CEVR)

- **Objective**: Eradicate the most serious injuries for Vegetation Management (VM) workers. These non-negotiable safety rules focus on the following areas:
  1. Falling Objects/Line of Fire
     - Drop Zone (Working Aloft)
     - Danger Zone (Tree Felling)
  2. Electrical Safety
     - Minimum Approach Distances (MAD)
     - Grounding Lines
  3. Falls from Elevations

Ensuring Environmental Compliance


1. Unit 2 Pyrite/Economizer
2. Unit 1&2 Waste Water
3. Unit 2 Wetdust/Hydroveyor
4. Unit 1 Wetdust/Hydroveyor
5. Abandoned?
6. 3A Hydroveyor
7. 3B Hydroveyor
8. 4A Hydroveyor
9. 4B Hydroveyor
10. 3A Bottom Ash
11. 3B Bottom Ash
12. 4A Bottom Ash
13. 4B Bottom Ash
14. Unit 3/4 Waste Water (abandoned)
15. Unit 1 Bottom Ash
16. Unit 2 Bottom Ash
17. Scrubber to Bioreactor
18. U3&4 Waste Water
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

- Water
- Ash
- Air

316(b) of the Clean Water Act

- The Environmental Protection Agency (EPA) issued their final rule regarding Section 316(b) of the Clean Water Act. The rule establishes requirements for cooling water intake structures (CWISs) at existing facilities.
- 27 facilities subject to the rule across five states
  - 16 stations with once-through cooling
  - 11 stations with closed-cycle cooling
  - Plus three new units at existing facilities
- In progress of completing the 2nd year of required entrainment studies
- On track to meet our submittal deadlines in the 2019 – 2022 timeframe

Duke Energy Groundwater Program

Environmental, Health and Safety

- Historically, Duke Energy has performed routine groundwater monitoring at power plant facilities under several programs, including Landfill and Ash Basin Compliance, National Pollutant Discharge Elimination System (NPDES) Monitoring, and Radiation Protection.
- Recently, Duke Energy's groundwater monitoring program has expanded tremendously after initiating two new programs:
  - North Carolina's Coal Ash Management Act (CAMA) - initiated in mid 2015.
  - The Federal Coal Combustion Residuals Rule (CCR) - initiated in early 2016.
- Multiple firms are engaged due to large number of sites, wells, and regulatory deadlines.

Duke Energy Groundwater Monitoring Expansion

- Monitoring increased significantly from 2015 to present under CAMA and CCR
- 21 sites from Florida thru the Midwest are involved in CAMA/CCR required programs.
- The following chart indicates the approximate number of groundwater monitoring wells, with each sampled multiple times a year:

	CAMA	CCR	AB/LF	RP	Total
Pre-2014	0	0	261	269	530
2017	1,573	617	300	269	2,759
2018	1,023	617	300	269	2,209
2019+	550	617	300	269	1,736

- Compliance program to support Monitored Natural Attenuation (MNA) or other solutions at CAMA/CCR sites - expected 20 – 30 years of monitoring

2015 Revisions: Steam Electric Effluent Limitations Guidelines (ELG)

- Still must comply with the CCR Rule, N.C. CAMA, and meet NPDES Permit Limits
  - 12 facilities currently impacted by the 2015 Revisions
  - Installing new or improving the dry bottom ash handling systems at nine facilities
  - Enhancing flue gas desulfurization (FGD) wastewater treatment at six facilities
  - Water re-routes and new lined-basins occurring at eight facilities along with pond closure
  - Dry fly ash handling at all stations, except for announced retirements
  - All systems to be installed by 1st Quarter 2019

Mercury and Air Toxics Standard Compliance

- 32 MATS Coal/ Integrated Gasification Combined Cycle (IGCC) Sources
- Approximately 75 percent complied April 2015
- One year extensions obtained for remaining sources
- Mercury Monitors installed on all units
- PM and SO2 CEMS used to demonstrate compliance on most units
- Stack testing employed on a limited number of units

Cross State Air Pollution Rule (CSAPR) and Ozone Season NOx Control

CSAPR Ozone Season Update Rule (finalized in September 2016)

- FL, GA, NC and SC are no longer affected
- But for affected states, the rule is significantly more stringent:
  - 37% overall reduction in NOx budgets for affected states
  - Assumed emissions rate of 0.10 lb/MMBtu on average for existing units with retrofit SCR

The Challenge for Utilities

- Coal-fired EGU operation has been impacted by Fuel Markets and Renewables
- SCR operation must be managed to meet competing concerns:
  - NOx emissions, reliability (ABS formation and catalyst replacement schedules), minimum load dispatch, and MATS mercury compliance, for example

Opportunities / Solutions

- Low load SCR operation – manage conditions to allow SCR to remain in service
- Enhance process controls to maintain tighter performance
- Catalyst Management Planning is critical

Sulfur Dioxide National Ambient Air Quality Standard (NAAQS)

EPA SO2 NAAQS is 75 ppb one-hour average, based on three year average of 4th highest daily maximum

- States must demonstrate based on either actual monitored data or by using air quality models
- Few areas have ambient SO2 monitors so modeling has been widely used
- Modeling tends to be very conservative overstating the impacts of emissions
- If modeling suggests a problem, states had the option to install new ambient monitors by January 2017
- Important to maintain equipment and manage performance – models use actual emissions profiles and high short-term emissions might model high ambient impacts
- EPA will reopen attainment demonstrations if emissions increase significantly at a modeled facility.
- Ambient monitoring data will be available to the public

Current EHS Performance

Employee Recordables

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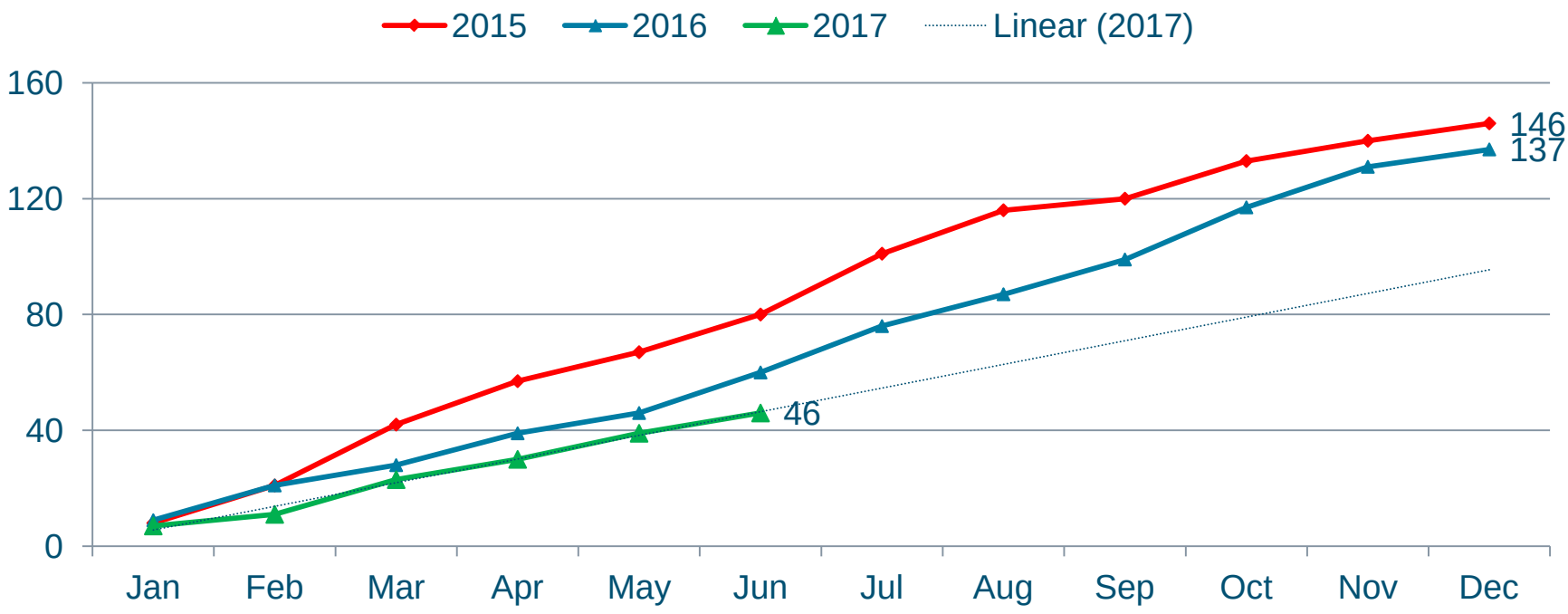
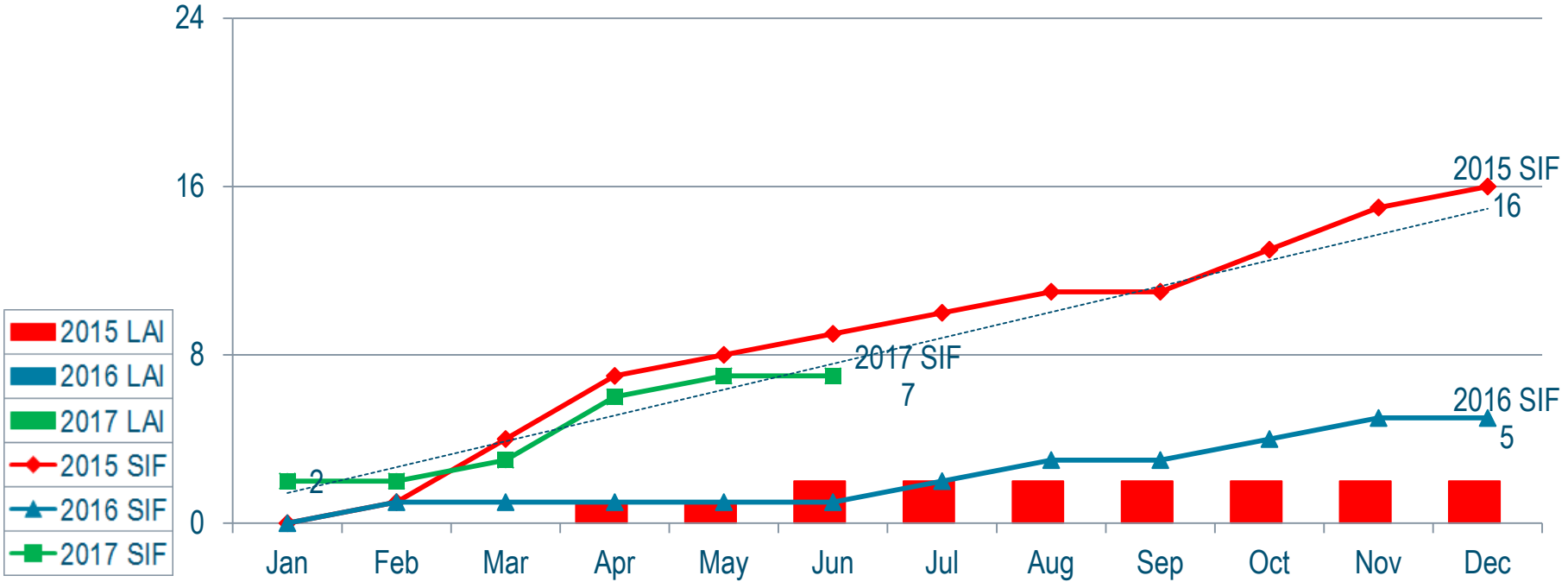


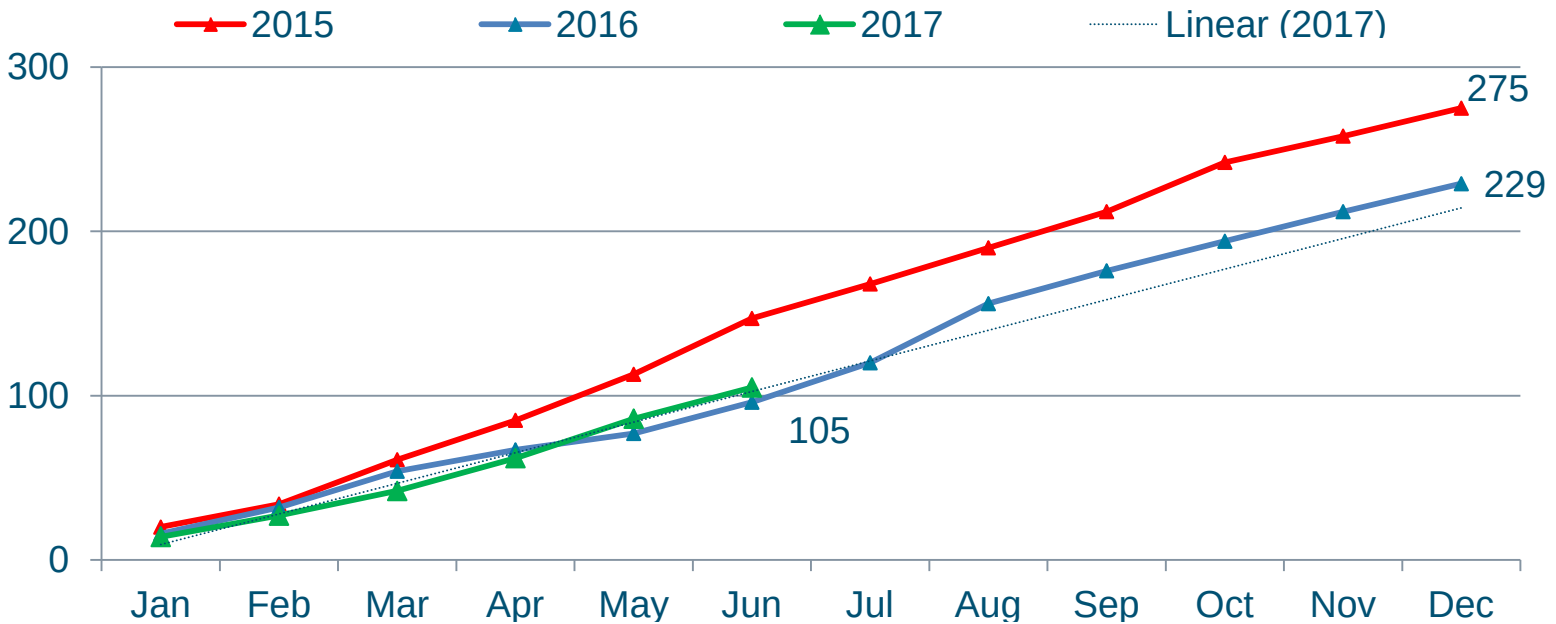
Employee SIF and LAI

Environmental, Health and Safety



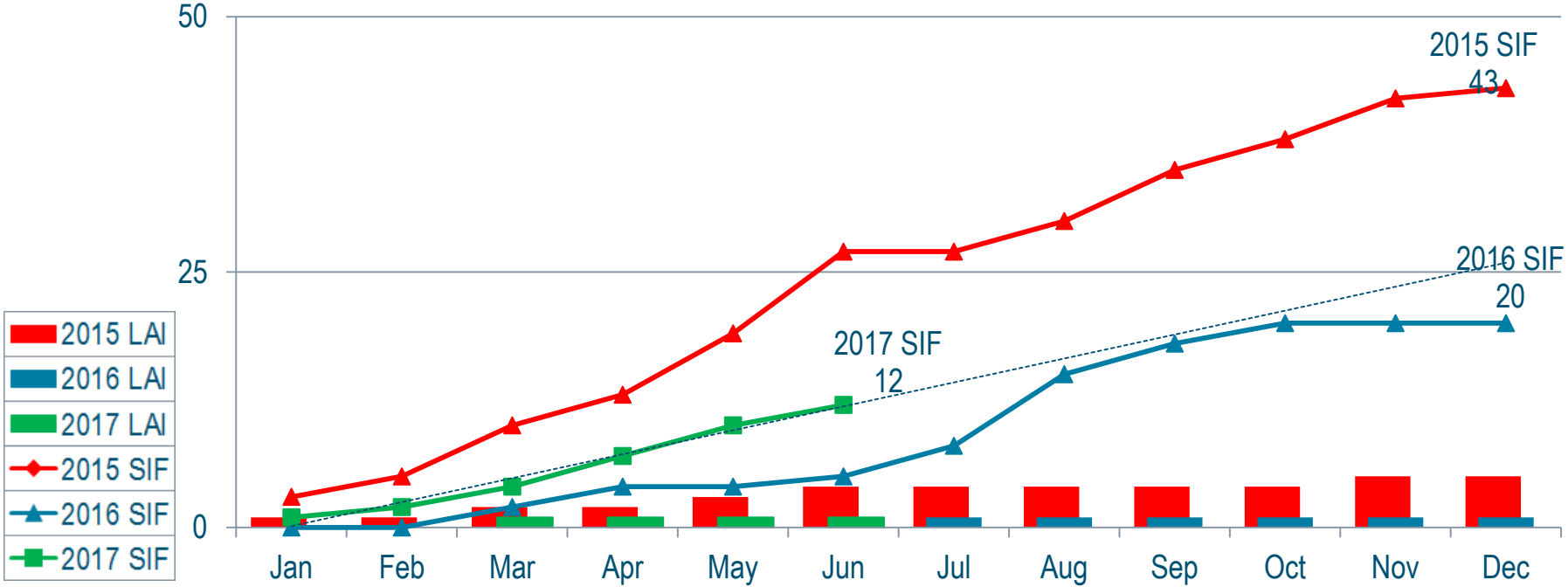
Contractor Recordables

Environmental, Health and Safety



Contractor SIF and LAI

Environmental, Health and Safety

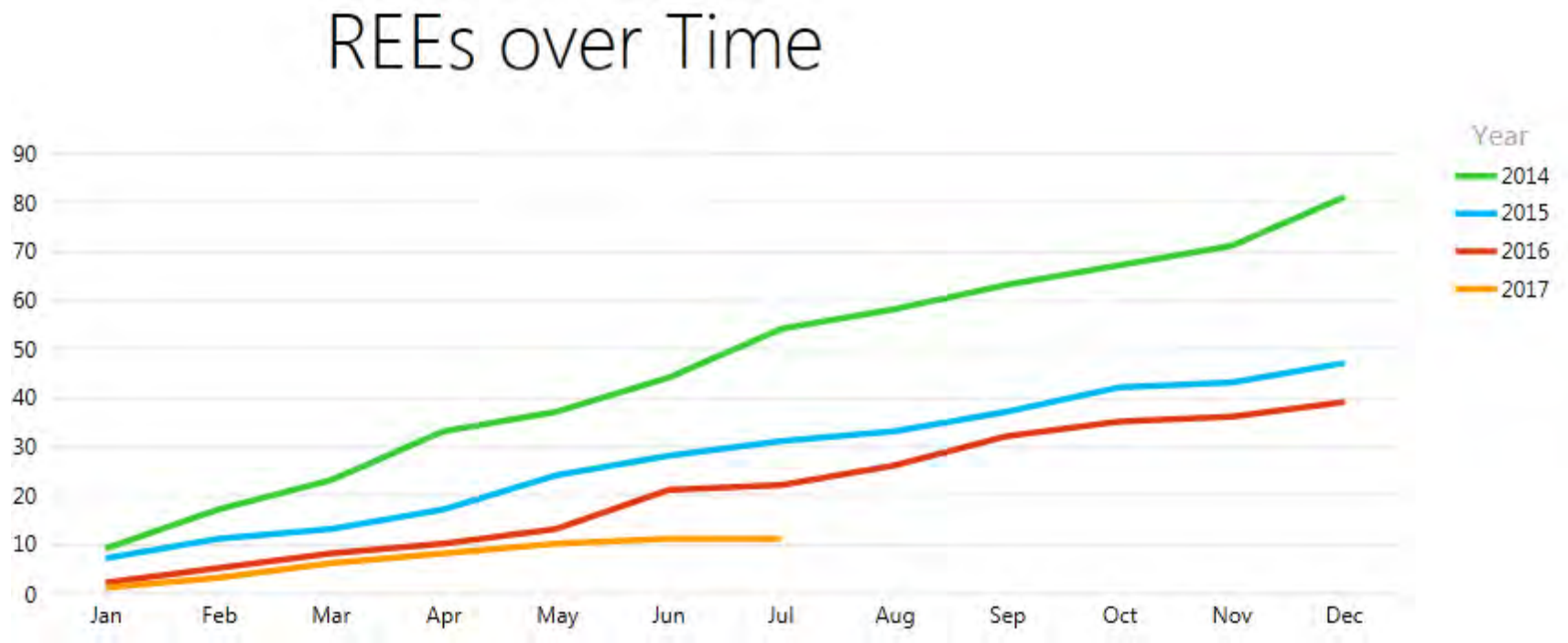


EHS Definitions

- Reportable Environmental Event (REE)
  - Category 1 REE: An event resulting from Duke Energy operations or contractors operating under the direction of Duke Energy personnel that has an impact on the environment, requires the notification (verbal/written/electronic) of a regulatory agency within 24 hours of the event, and carries a fine greater than $10,000.
    - Release of oil into waters of the US greater than 25 gallons.
    - Any environmental event caused by Duke Energy or a contractor under Duke Energy's direction that results in a response by EPA or the Coast Guard under the direction of an On Scene Coordinator.
    - Any category 1 REEs associated with Piedmont Natural Gas
    - Any other event as determined by Environmental Services management discretion.
  - Category 2 REE: An event resulting from Duke Energy operations or contractors operating under the direction of Duke Energy personnel that has an impact on the environment, requires the notification (verbal/written/electronic) of a regulatory agency within 24 hours of the event, and carries a fine less than $10,000.

REE Performance

Environmental, Health and Safety



Delivering Results

Environmental, Health and Safety

- No fatalities and continue reduction in life-altering injuries for employees and contractors.
- Continue to achieve top decile performance in employee safety.
- Continue to decrease REEs while meeting current and new Environmental Regulations.
- Improve communications and transparency including intranet, external websites, tools and reports.
- Win the hearts and minds of our employees and contractors.


DUKE
ENERGY®