



# THE NEW GE POWER

November 9-10, 2016

**Caution Concerning Forward-Looking Statements:**

This document contains "forward-looking statements" – that is, statements related to future events that by their nature address matters that are, to different degrees, uncertain. For details on the uncertainties that may cause our actual future results to be materially different than those expressed in our forward-looking statements, see <http://www.ge.com/investor-relations/disclaimer-caution-concerning-forward-looking-statements> as well as our annual reports on Form 10-K and quarterly reports on Form 10-Q. We do not undertake to update our forward-looking statements. This document also includes certain forward-looking projected financial information that is based on current estimates and forecasts. Actual results could differ materially.







### Belfort

- COEs: Gas Power Systems, Power Services, Steam Power Systems



### Bourogne

- COE: Heavy Duty Gas Turbine Machining



### Baden

- Power Services, Steam Power Systems Global HQs
- COEs: Gas turbine technology, Steam R&D, Powering Efficiency



### Birr

- COEs: Gas Plant Technology & Services, Gas Turbines



**ANDREAS LUSCH**  
President & CEO  
Steam Power Systems



**JOE MASTRANGELO**  
President & CEO  
Gas Power Systems



**PAUL McELHINNEY**  
SVP, President & CEO  
Power Services



**GANESH BELL**  
Chief Digital Officer  
GE Power

# Agenda

## WEDNESDAY, NOVEMBER 9

- 1:00 PM** Steam Power Systems & Gas Power Systems Presentation
- 2:00 PM** Belfort Factory Tour
- 3:30 PM** Bourogne Factory Tour
- 7:30 PM** Dinner @ Seerose in Zurich

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# GE Power

~\$28B\* revenue ~58,000 employees >150 countries

## GAS POWER SYSTEMS



Schenectady,  
NY, USA

## POWER SERVICES



Baden,  
Switzerland

## STEAM POWER SYSTEMS



Baden,  
Switzerland

## WATER & DISTRIBUTED POWER



Treviso,  
PA, USA

## GE HITACHI NUCLEAR ENERGY



Wilmington, NC,  
USA

## POWER DIGITAL SOLUTIONS



San Ramon,  
CA, USA

FUNCTIONAL  
EXPERTISE

OPERATIONAL  
EXCELLENCE

DIGITAL  
CAPABILITY





# Adding value for our customers

## DIFFERENTIATED Products & Services



## GLOBAL Presence/Talent



## DIGITAL Capability



### **Alstom execution**

- ✓ Integration on track
- ✓ On pace to beat synergy target
- ✓ Global footprint/capabilities

### **Expanded capability**

- ✓ Extended scope/↑ \$/Kw
- ✓ Steam (equipment + services)
- ✓ Services upgrades/oOEM

### **Margin enhancement**

- ✓ Global sourcing w/scale
- ✓ Vertical integration/insource
- ✓ Brilliant factory

A more valuable business ... well positioned to lead





# Steam Power Systems

*Smarter. Cleaner. Steam Power.*

Andreas Lusch



# What is our Steam business

## Integrated offerings

- ✓ Integrated packages (EP)
- ✓ Power Block/Turbine Island (EPC)
- ✓ Full turnkey (EPC)

### Boiler island

- Boilers for all fuels: Coal, Oil, Gas
- Two-Pass, Tower and CFB technology
- Coal Mills
- NO<sub>x</sub> control: SCR Systems

### Turbine island

- Steam turbine
- Generator
- Condensers/heaters

### Digital

- Performance Optimization
- Boiler Optimization
- FlexiLoad
- Fuel Analyser

### AQCS

- Flue Gas Desulphurization
- Particulate Control
- Mercury Control

**30%**  
of the world's steam turbine capacity

**30%**  
of the world's boilers

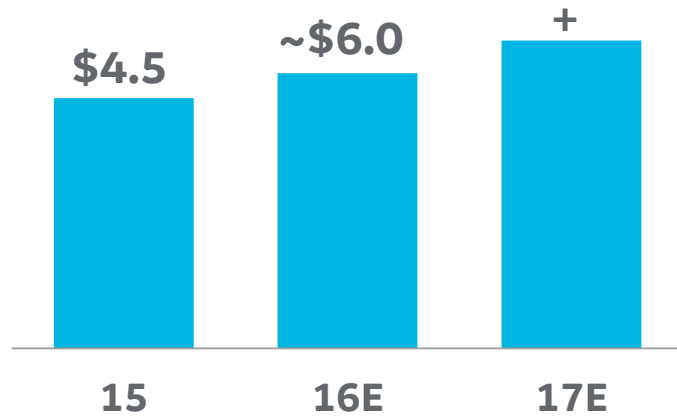
**50%**  
of steam turbines for nuclear power plants



# Steam Power Systems overview

(\$ in billions)

## Orders backlog



*Driving book to bill >100%*

## Industry update

- Overall segment up outside China
- Growth in India & Asia, Middle East/Africa picking up
- Opportunities developing in adjacent segments: Biomass, waste to energy, industry

## Business imperatives

- 1 Grow with GE Store/presence**
  - ↑ penetration in India and South East Asia
  - Grow partnership with Chinese EPCs to win globally
  - OEM for Power Service business ... winning in coal/nuclear installed base
- 2 Lead with technology**
  - First to market advanced ultra-supercritical (A-USC) steam plant ... driving towards 50% efficiency
  - Delivering technology for Gas CC and Services
  - Differentiate through Digital Steam plant capabilities
- 3 Competitive cost position**
  - Alstom synergies above plan ... \$0.1B to date, \$0.4B by 2020
  - Radical footprint change aligned with global demand
  - 20% product cost out by 2017

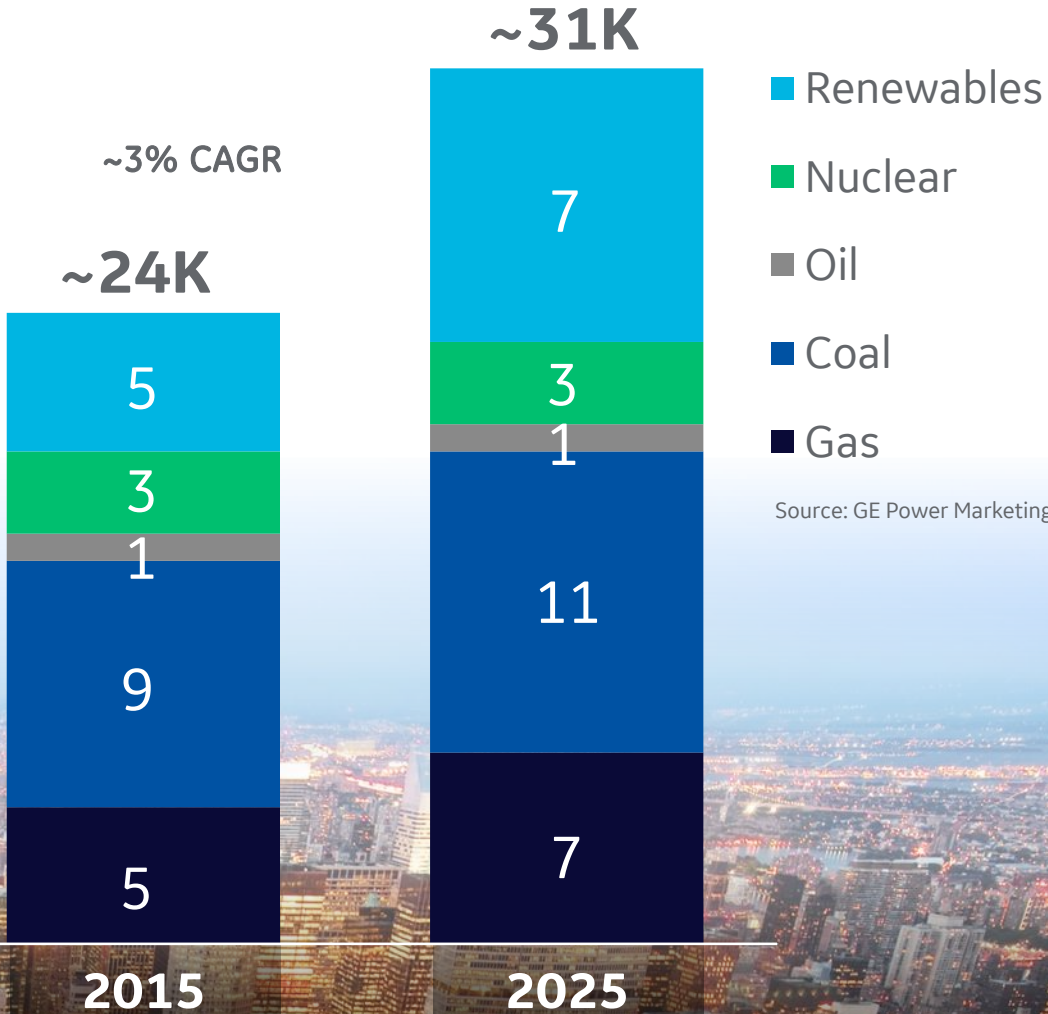




# Global Power

**Coal and nuclear** continue to play important role. Additional capacity coming on line.

### World electrical generation by fuel (TWh in '000s)





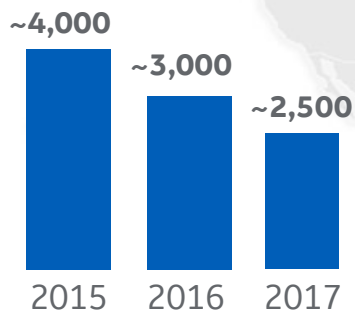
# Footprint aligned to global demand

# 95%

of global coal power demand over the next decade will come from **India, China, Asia,** the Middle East and Africa.

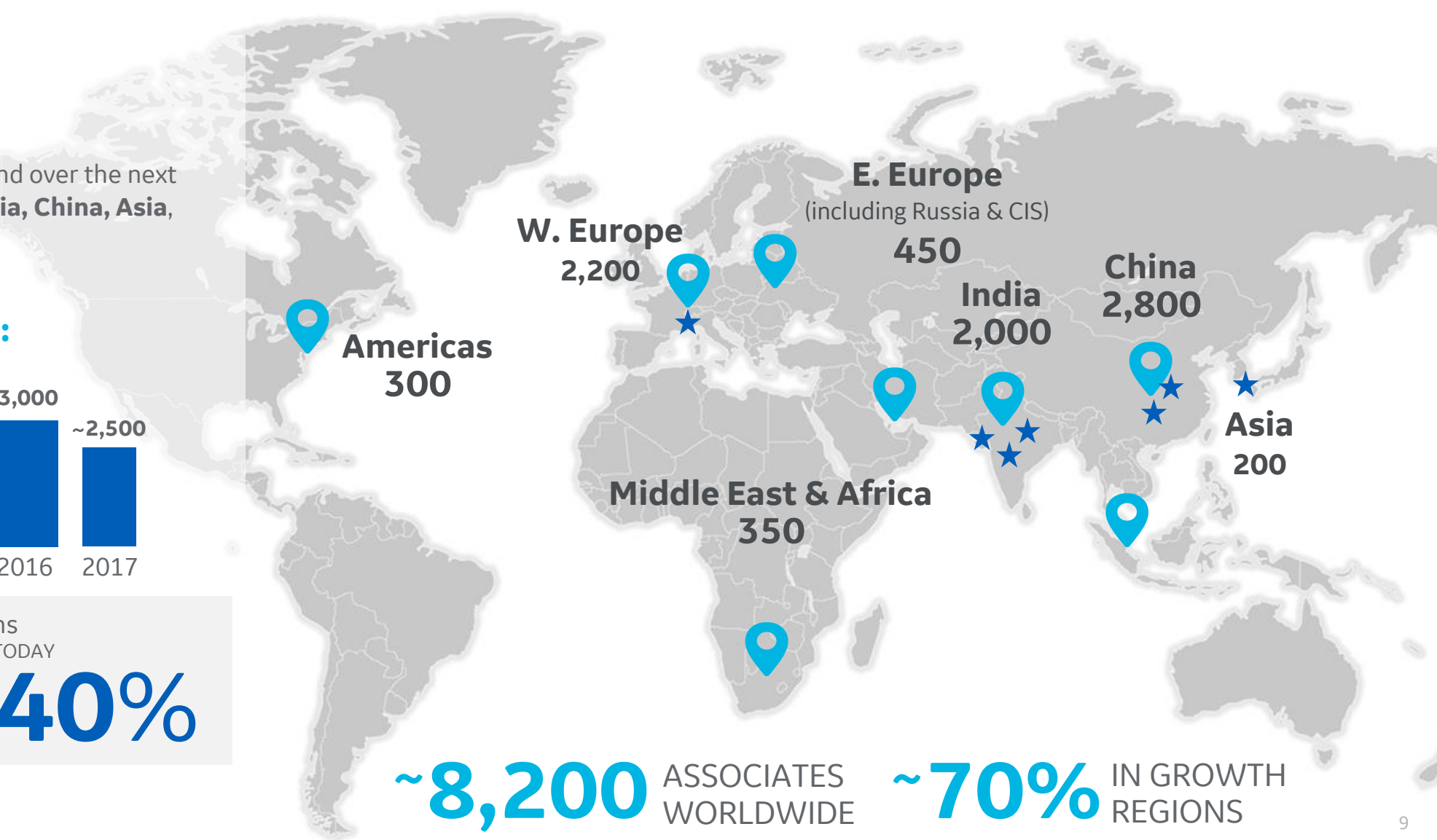
## ORGANIZATION TRANSFORMATION:

North America and Western Europe Headcount



Executives in growth regions  
A YEAR AGO → TODAY

# 20% → 40%



# ~8,200 ASSOCIATES WORLDWIDE

# ~70% IN GROWTH REGIONS



# How we win in Steam

## World's most efficient coal plant

**47.5%**  
Efficiency

**RDK8 (GERMANY)**  
Customer: EnBW  
Full Turnkey Plant (EPC)

## Leader in project execution and risk management

**2 AWARDS:**  
EPC of the Year &  
Coal Plant of the Year



**TANJUNG BIN 4 (MALAYSIA)**  
Customer: Malakoff  
Full Turnkey Plant (EPC)

#APW #PoweringEveryone

**\$1.1B**  
+0.8B USD

**HINKLEY POINT (UK)**  
Customer: EDF Energy

Two conventional power islands / ARABELLE™

**\$800M**  
USD

**HASSYAN (DUBAI)**  
Customer: ACWA

4x660MW USC Integrated Power Package (i.PP)

**\$220M**  
USD

**TELANGANA (INDIA)**  
Customer: NTPC

2x800MW USC Steam Turbine Generator Islands

**\$165M**  
USD

**HUBCO 2 (PAKISTAN)**  
Customer: NWPDI

2x660MW Steam Turbines, Generators, Boilers





# Smarter. Cleaner. Steam Power.

Steam Power Systems has accelerated the development of **leading efficiency, lower emission** technologies to deliver more value to customers ... first to market with **Advanced Ultra-Supercritical**.

Driving towards

**50%**  
efficiency

**\$80M**  
additional  
customer value  
over plant life

FASTWORKS  
APPROACH

POWERED  
BY PREDIX



## Technology Advancements

1½ % points more efficient  
and 3% lower emissions  
compared to today's best

**PREDIX**

## Digital Capabilities

Delivers up to  
1 ½% more power over  
the life of a plant



## Environmental Controls

Able to lower emissions by 70% more  
than the world's most stringent  
emission standards



# Gas Power Systems

Joe Mastrangelo





# Gas Power Systems overview

## Key metrics



## Business imperatives

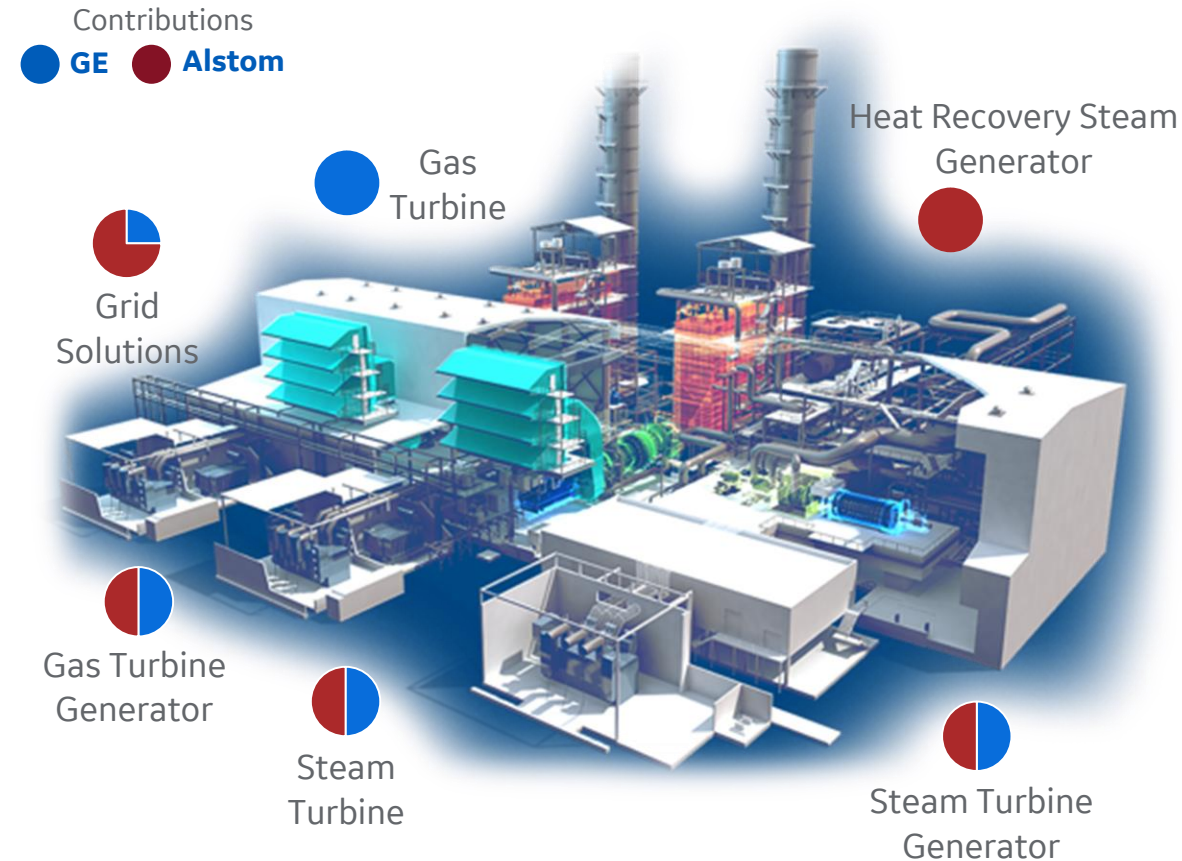
- 1 Growing installed base ... winning w/the HA**  
 Plan to deliver ~110-115 HDGT in '16  
 HA program on plan with positive '16 margin
- 2 Alstom integration ... ↑ capabilities w/synergies**  
 YOY orders ↑... +30% HRSG and +80% steam turbines  
 Delivering \$250MM synergies ... multi-year plan on track
- 3 Fast power ... ~3GW opportunity**  
 Speed ... power to grid in ~3 months  
 Timing ... predictability challenging
- 4 Digital ... improve performance**  
 ↓ Cycle time, ↑ reliability and performance  
 Opportunity to improve customer interface

Delivering better customer outcomes and shareholder value





# Integrated Gas Power Systems



## Alstom value creation

- ↑ **Combined cycle performance**
  - +0.5 pts CC efficiency improvement
  - Bottoming cycle enhancements
- ↓ **Cycle time for quicker power**
  - ~\$2.5B extended scope orders
  - 20% faster with virtual plant and modularity
- ↓ **Product cost + ↑ volume**
  - Cost ↓ ~\$350MM and performance ↑
  - \$25MM+ CM from insourcing initiatives

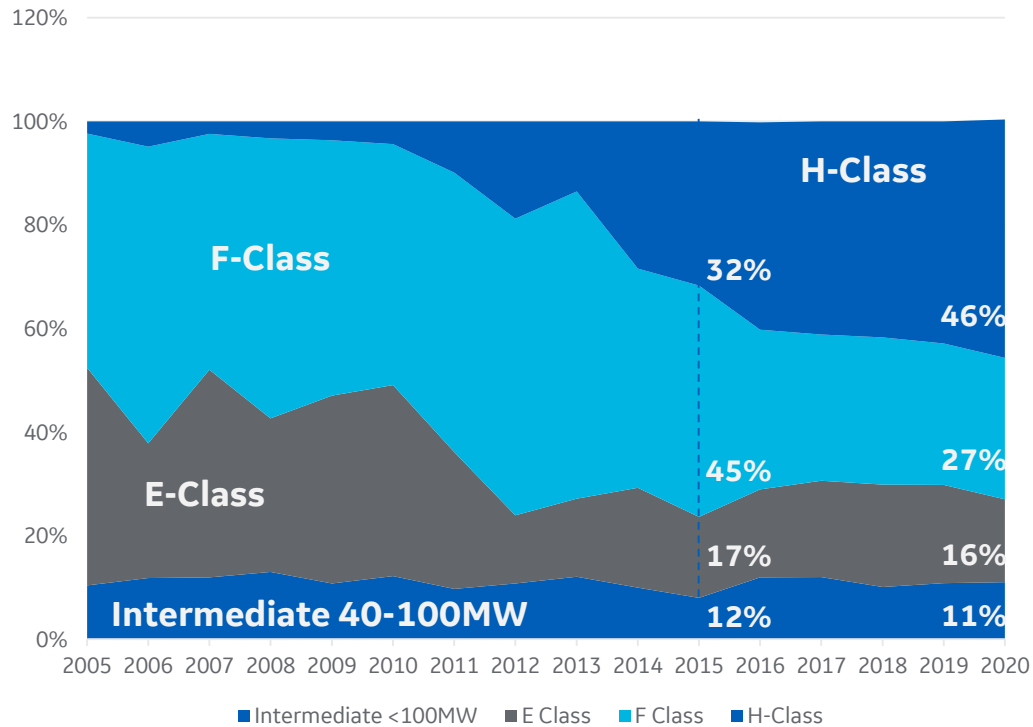
Expanded offering + improved performance = better outcomes



# Outlook

## Industry dynamics

Gas Turbines >40MW



Overall gas segment expected to be flat  
Industry shifting to H class

## How GE wins

- 50%+ less cost/kw than all other energy sources  
**1 Gas Turbine** | **750,000** homes powers
- Best power density/land use of all technologies  
**1,100mw Combined Cycle Plant** requires | **17** acres of land
- Operating flexibility offsets renewables variability  
**Full Gas Turbine output** in less than | **10** minutes
- World record efficiency ... 62.2%  
**~1pt. Combined Cycle Advantage** investing for | **65%** By 2023



Source – GE Power Marketing



# HA platform launch on-track

## 2016 PROGRAM OVERVIEW

- ✓ 25 unit shipments
- ✓ TY margin positive
- ✓ 50/60Hz models fully validated
- ✓ 2017 returns improving

## ESTIMATED HA BACKLOG 1/1/17

30

Gas turbines

21

Steam turbines

40

Generators

22

HRS

## DIFFERENTIATED TECHNOLOGY

62.2% efficiency



**Record output:** 432MW simple cycle and 603MW plant



2 models in 1 year

**Flawless validation:** zero fault testing (7HA.02)

## WORLD-CLASS EXECUTION



1<sup>st</sup> 7HA.02 Shipment

**Fulfillment on-track:** 17 shipments with 8 to go



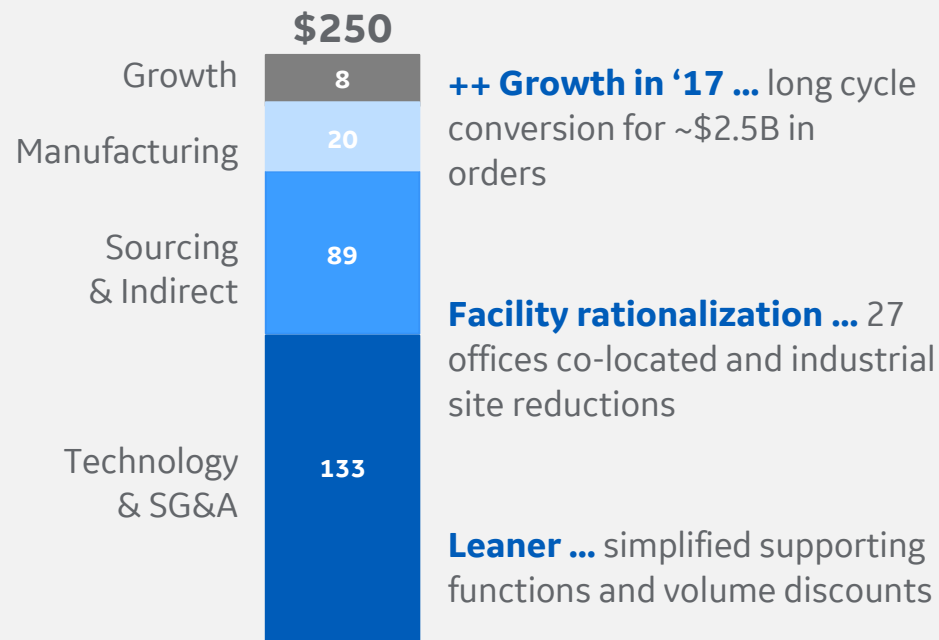
Extended scope ~\$550MM

**Integrated solutions ...** Turnkey with partner



# Driving cost-out

## Synergies



## Additional product cost out

### Vertical integration: Metem

**\$36MM** cost out for new units + services in Post Cast operations



### Design: Structures

**\$10MM+** savings on HA's from design enhancement activities



### HRSB: Doosan

**\$30MM+** cost out through Sourcing and Product Structuring activities



On track to deliver 2016 Alstom synergies

\$350MM+ product cost out through new technology





# Integrated digital ecosystem



## e-Design models

- Enables digital twin
- Lower cycle time



**\$12MM**  
per GT

## Advanced manufacturing

- New design spaces
- Tighter tolerances

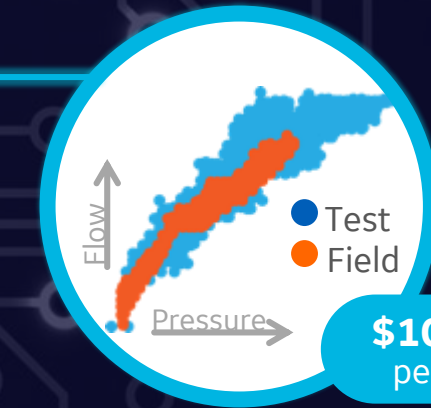


## Robust testing

- 6,000+ sensors
- 500TB data/200hrs



**\$15MM**  
per GT



**\$10MM**  
per GT

## Performance mapping

- Services upgrades
- Higher plant output

Deliver \$35MM+ per GT in differentiated performance



# GE well positioned as the clear leader in gas



## best products

Leading in H-class, stronger portfolio with Alstom

## competitive cost

10th HA turbine = 1,000th F \$/kw ... scaling across portfolio

## integration benefits

↑28% \$/kw ... selling expanded scope capabilities

## global scale

Local project execution capabilities and footprint

## innovation

Integrated digital thread ... performance and customer outcomes

## delivering value

Delivering higher \$ value @ same MW sold

Fastest growing installed base







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# GE in Switzerland

~5,500  
EMPLOYEES





# The New Power Services

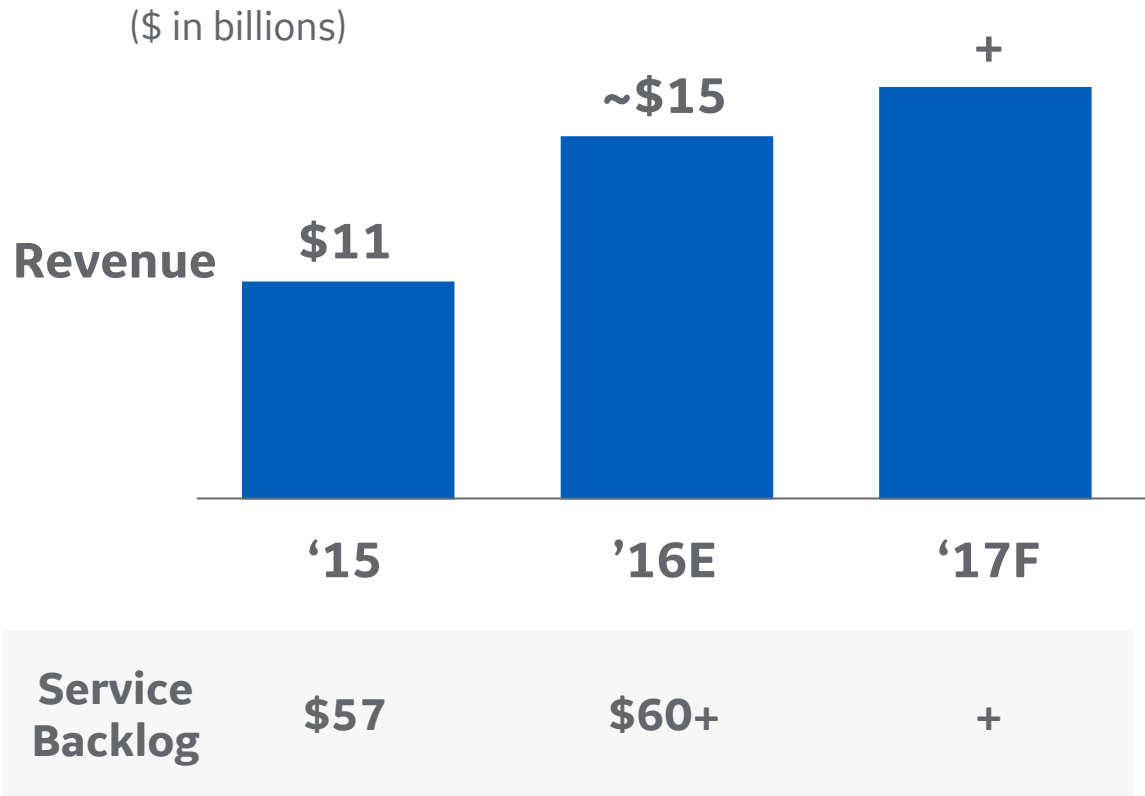
Paul McElhinney





# Power Services growing

## Key metrics



## Business imperatives

### Alstom integration

- ✓ Synergies \$300MM+, ahead of deal model ... outage cost, shop footprint, sourcing, growth
- ✓ Executing on 10 pts. Alstom margin improvement

### Growth through technology

- ✓ Growth in gas upgrades ... extending to Alstom fleet
- ✓ New campaigns ... rotors, steam, total plant
- ✓ Digital solutions in every offering

### Expand Cross-Fleet (other OEM) capability

- ✓ Alstom expertise + GE technology + Digital

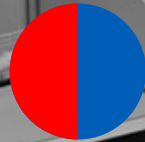


# The New Power Services

SOFTWARE AND CONTROLS



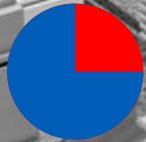
GENERATOR



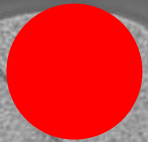
STEAM



GAS



TOTAL PLANT



OPERATIONS AND MAINTENANCE



BOILER



CROSS-FLEET (OOEM) GAS



CORE STRENGTH

GE

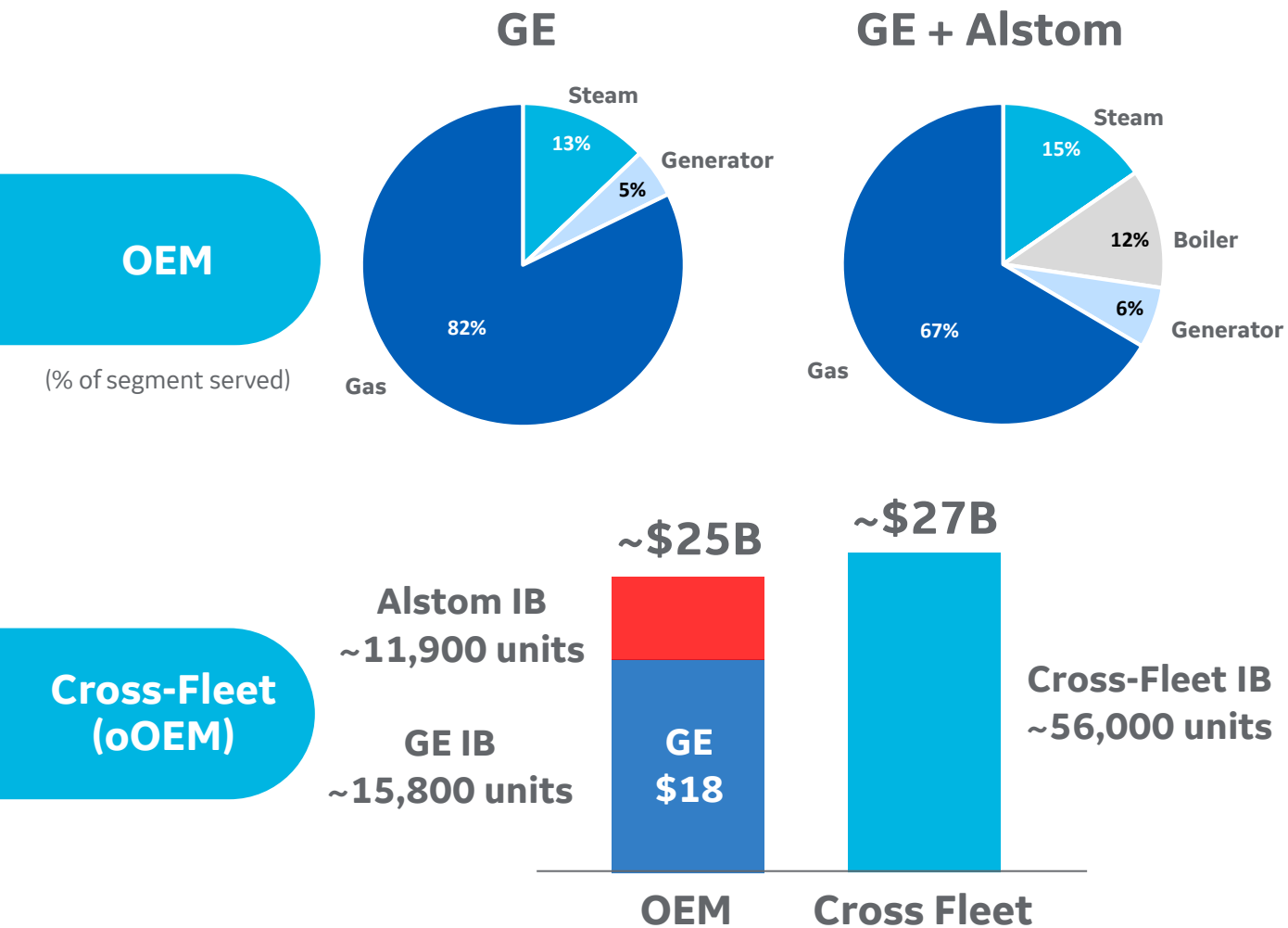
Alstom

**Alstom capability** enables Fleet360\*  
total plant service solutions

\* Trademark



# Power Services expanding



## GE + Alstom: a more capable service business

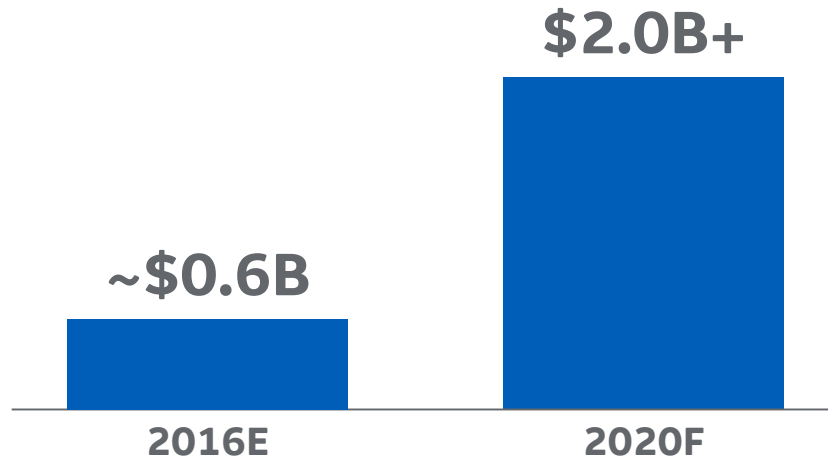
- ✓ Largest installed base
- ✓ New capabilities beyond gas turbines
- ✓ Fleet360\* total plant service solutions
- ✓ Stronger local presence and footprint

Source – GE Power Marketing



# Building a cross-fleet business

## Cross-Fleet (oOEM) Orders



- 1 Built on **Alstom capability**
- 2 Enhanced with **GE technology**
- 3 ~500 **dedicated engineers**
- 4 Significant **NPI investment**
- 5 **Digital & Plant solutions** differentiator

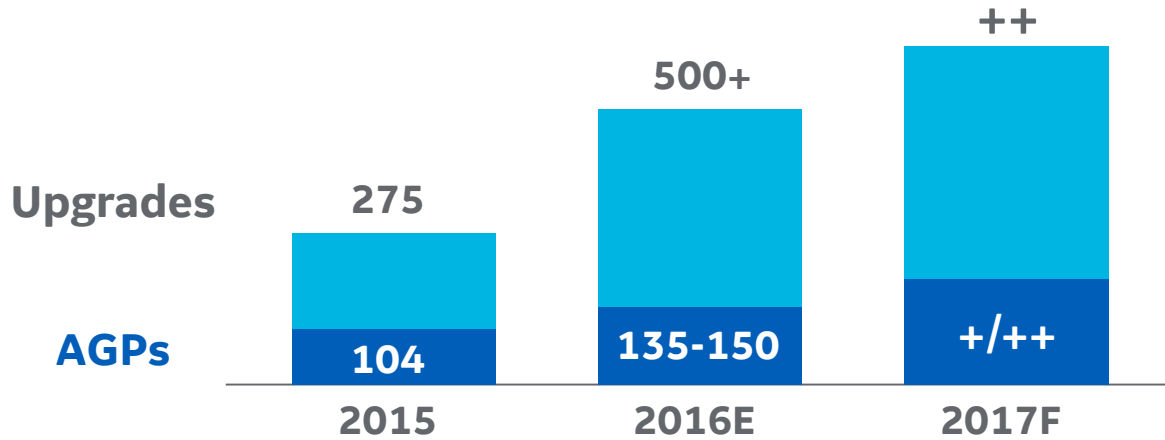
New segment with attractive margins





# Winning with technology

## Upgrades growth

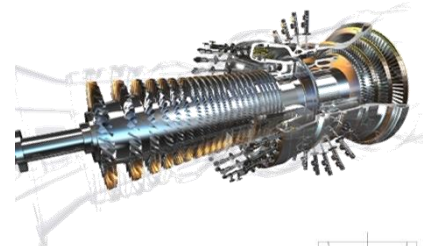


## Clear customer value proposition

- ✓ Output, efficiency, flexibility, reliability, emissions
- ✓ Sustain gas growth ... continued investment in NPI
- ✓ Expand upgrades to rotors, steam, total plant

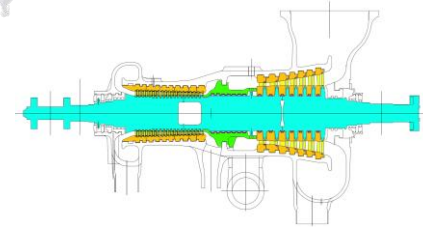


## Better Together



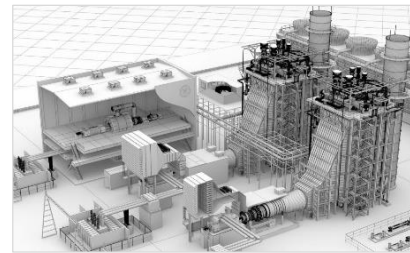
### Gas upgrades

- ✓ Alstom IB, combined technologies
- ✓ 2%+ efficiency, extended life



### Steam upgrades

- ✓ GE IB, combined technologies
- ✓ 2%+ efficiency, lower product cost



### Total plant solutions

- ✓ Plant outcomes incl. GT/ST/Boiler
- ✓ Improved performance/economics

# PREDIX

### Analytics: Lifing, M&D, Digital

- ✓ Advanced analytics for plant
- ✓ Improved productivity on full plant

# Winning with customers

**\$1B**



**IRAQ**

Customer: MOE

UPGRADES, DIGITAL, FINANCING

**\$47MM**



**JAPAN**

Customer: TEPCO

DIGITAL TRANSFORMATION MOU

**\$50MM**



**CZECH REPUBLIC**

Customer: CEZ Group

MODERNIZATION PROJECT FOR 10  
NON-GE COAL BOILERS

**\$32MM**



**KOREA**

Customer: POSCO

RETROFIT OF 4 NON-GE INDUSTRIAL STEAM  
TURBINES AND GENERATORS





# Power Digital Solutions

Ganesh Bell



# Digital transformation of electricity



~\$1.3T

INDUSTRY VALUE

\$2T+

SOCIETAL IMPACT

\$387B

APM

## Business models under threat



Self-generation

2-way grid

Behind the meter

Distributed Energy

Customers investing “**innovation dollars**” into software companies



**+\$500M+**

e.on

SOUTHERN COMPANY

RWE

ENGIE



Exelon®

## Digital is a Board priority

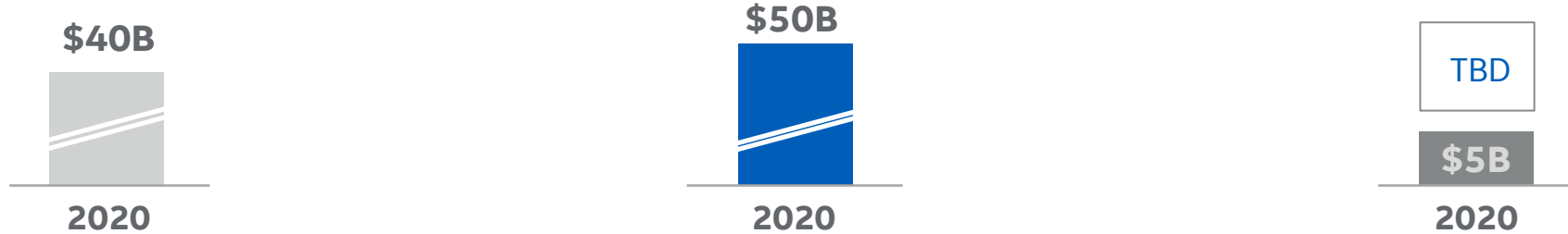




# Digital transformation opportunity



## Opportunity



**\$95B OPPORTUNITY ACROSS THE EVN BY 2020**

## Current categories

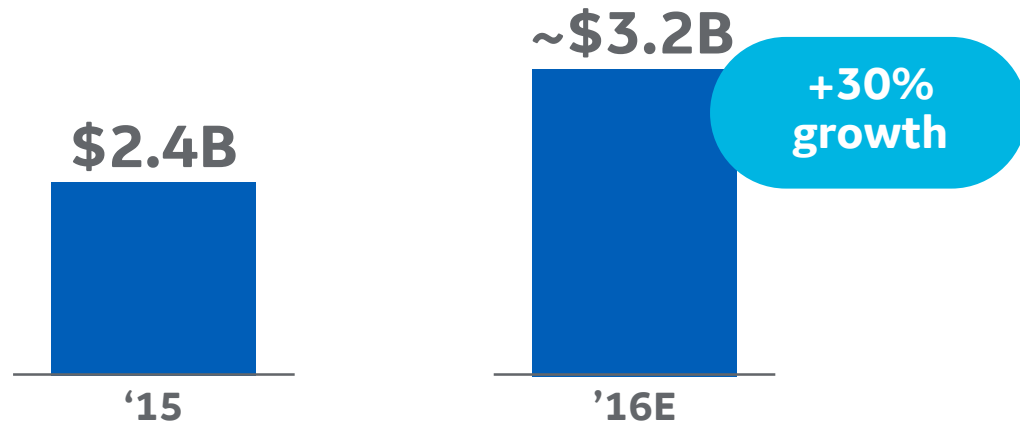
Business Opt	Outage Management	Energy Eff as a Service
Plant Operations Opt	Wide Area & Congestion	Energy Intelligence
Energy Management System		
Asset Performance Management		
Predix		

## Emerging categories

Renewable Integration Management	Micro-Grid Management
Distributed Energy Resource Management	Integrated Customer Services
Digital Field Worker	
Cyber Security	
Platform for Supply Flexibility	Platform for Demand Flexibility

# Power Digital Solutions

## Orders



## Environment

- Customers are embracing digital transformation
- Electricity value network is an emerging opportunity: **\$95B by 2020**

## Growth drivers

- 1 Delivering outcomes to **maximize services growth**
- 2 Driving incremental productivity by combining **physics + analytics**
- 3 Winning from **edge to cloud** ... Predix operating system for the industrial
- 4 **Leading in enterprise** digital transformation





# Innovating with new business models

Customer  
outcomes

## Software as a Service (SaaS)

- ✓ Connect assets, platform sales
- ✓ APM, OO, BO

## Expanded CSA with software

- ✓ Underwrite outcomes, ↑ return
- ✓ Include digital in every renegotiation

## Software enabled next gen CSA

- ✓ Convert transactional customers
- ✓ Next generation CSA offering



Maximizing wallet share

# Power Digital builds services backlog

DIGITAL OUTCOMES DRIVE ...

... BACKLOG GROWTH

**+5%**  
Starting  
reliability

**+1%**  
Total plant  
availability

**-10%**  
Startup  
fuel

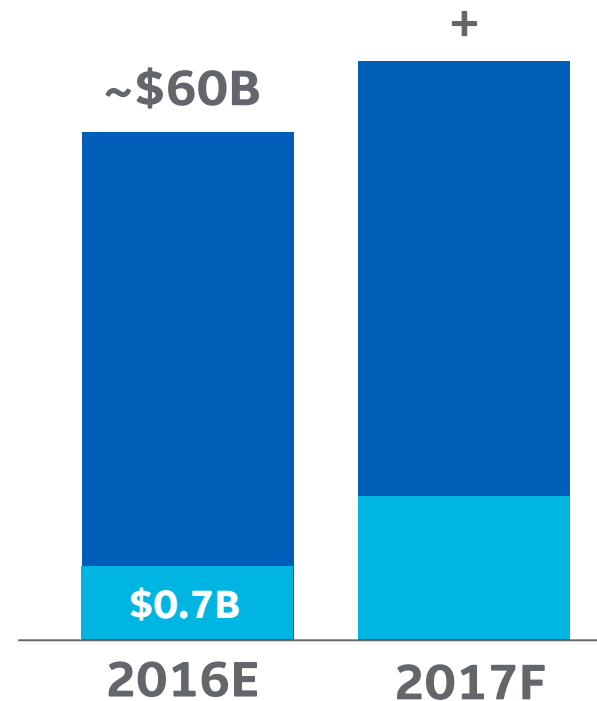
**+1%**  
Efficiency

**+3%**  
Capacity

**-10%**  
Emissions

Average values, site-specific dependent

## Services backlog



■ Core services/additional sales  
■ Digital backlog

1

~\$60B Power Services backlog ... driving **growth**

2

**Delivering outcomes** by deploying digital solutions

3

Maximizing value by combining plant **engineering & analytics**

4

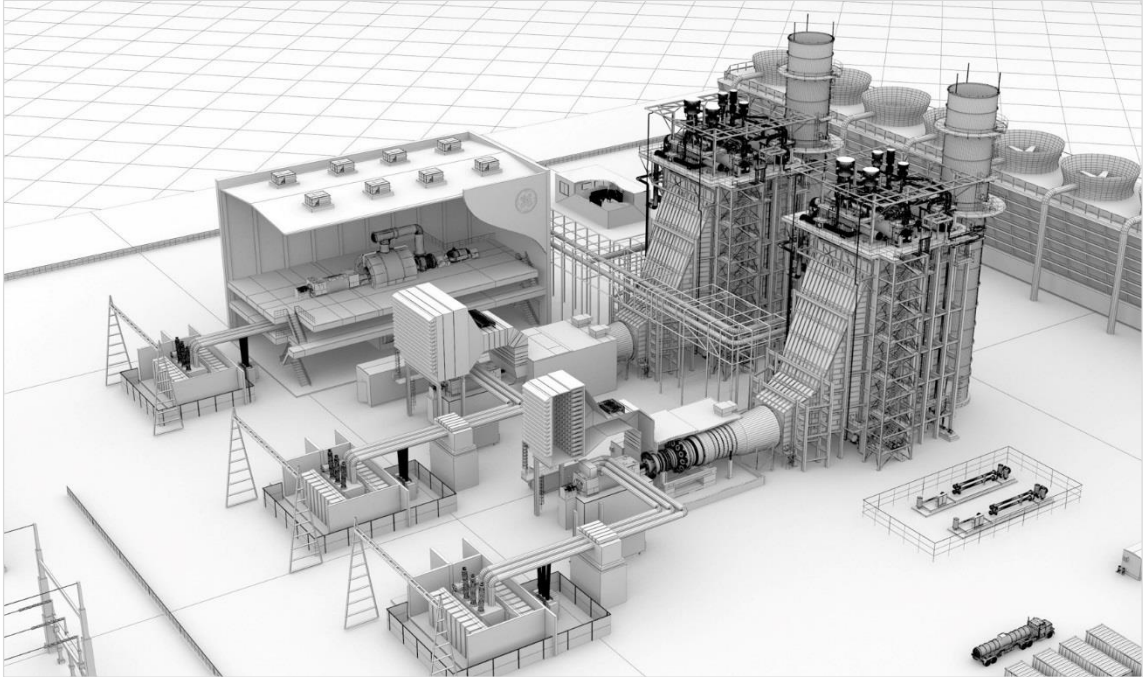
**Total plant focus** ... expanding coverage beyond our equipment





# Case study: HUBCO – selling outcome as a service

4% efficiency driven by Digital Twin ... optimizing process and hardware at plant level



- ✓ GE advantage: bringing physics based expertise and data analytics to deliver value for customer
- ✓ How we are executing:

Predix-Powered Product	Efficiency	10 year value
APM	1%	\$30MM
Neuco ... OO	1%	\$30MM
OO (Gas)	1.5%	\$45MM
Hardware/svc	0.5%	\$15MM

- ✓ \$240MM of additional value from existing installed base
- ✓ Gain share model

Improving efficiency of aging installed base ... outcome focus



