



# Enphase Energy, Inc. Analyst Day

June 19, 2017



# Safe Harbor

## Use of forward-looking statements

- This presentation contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, as amended, including statements related to Enphase Energy's: market assumptions; anticipated progress on goals and results; strategies for achieving its target operating model; new product features, functionalities and expected launch dates; ASIC road map, including features and anticipated size and cost reduction; expected decrease in operating expense; grid-independent "Solar 2.0" technology, including Enphase Ensemble™; beliefs regarding the future size of the market for solar products, and Enphase's share of that market; forecasts for growth in revenue and profits in 2018; potential for significant increase in market share; opportunities in Africa and India; expected near-term and sustained profitability, and positive cash flow; and other measures and market trends.
- These forward-looking statements are based on Enphase's current expectations and are inherently subject to risks and uncertainties. They should not be considered guarantees of future results, which could differ materially from the results set forth in, contemplated by, or underlying this presentation.
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- Enphase Energy undertakes no duty or obligation to update any forward-looking statements contained in this presentation as a result of new information, future events or changes in its expectations.

# Agenda

**Paul Nahi**  
President & CEO

**Badri Kothandaraman**  
Chief Operating Officer

**Raghu Belur**  
Vice President, Products

**Bert Garcia**  
Chief Financial Officer

**All**

Overview

Operations

Quality and Reliability  
Ensemble™: The Future of Distributed Energy

Financial Recap

Product Demonstration  
Q&A



Paul Nahi

President & Chief Executive Officer

# Enphase Energy

**A Global Energy Technology Company**



# Enphase Global Footprint

620,000

110+

Enphase in more than ~~375,000~~ systems in ~~95~~ countries



# Enphase Goals

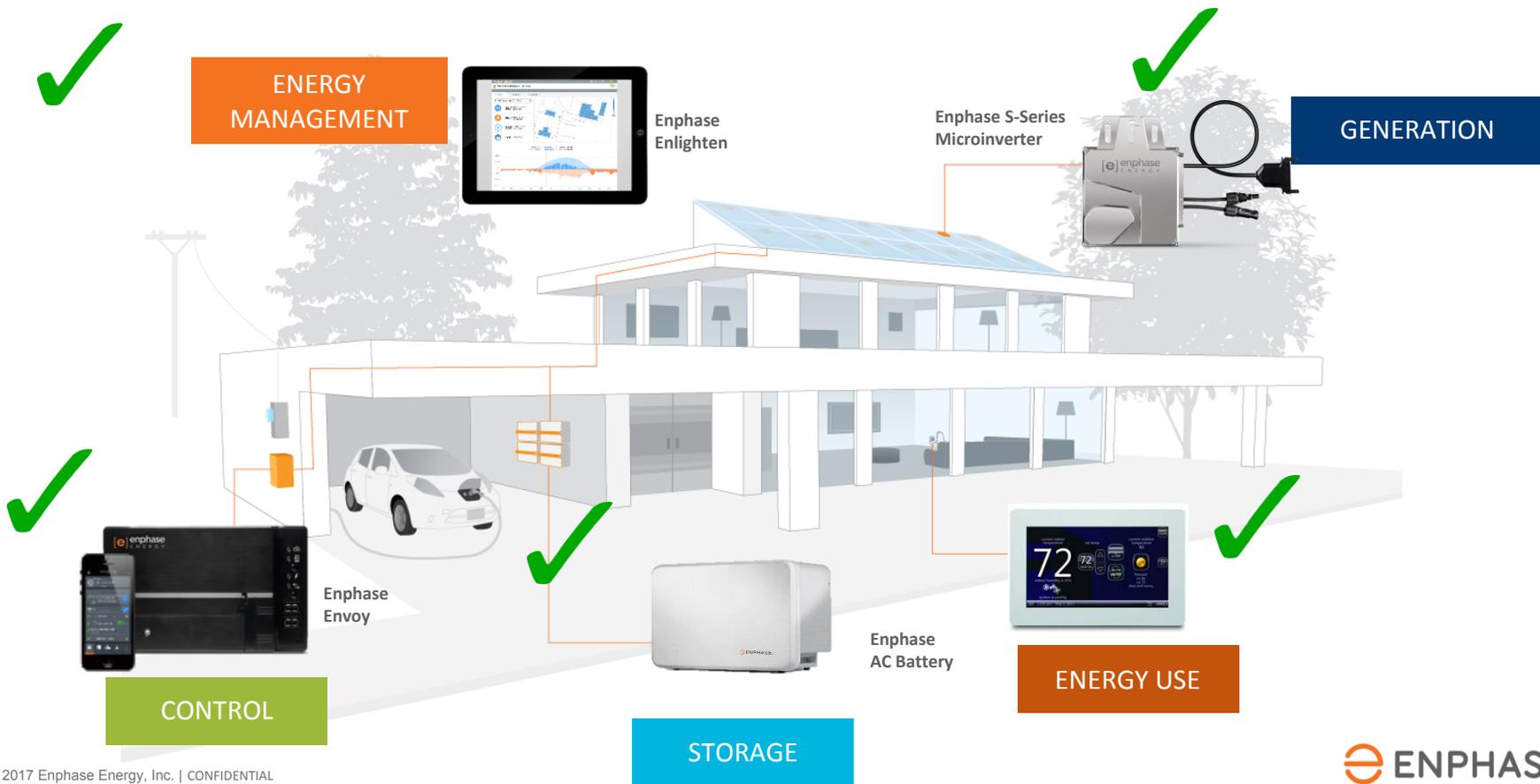
- [1] Invest in our next generation technology to reduce costs by 50% in 24 months, to \$0.10 per Watt**

We have the products to meet our 50% cost reduction; however we are approximately six months late.

- [2] Provide our partners with best-in-class power electronics, storage solutions, communications, and load control all managed by a cloud-based energy management system**

We believe we have the highest quality and highest reliability inverter in the market. Our AC Battery and Enlighten, our cloud-based energy management system, enable a total energy system that is best-in-class for the residential market.

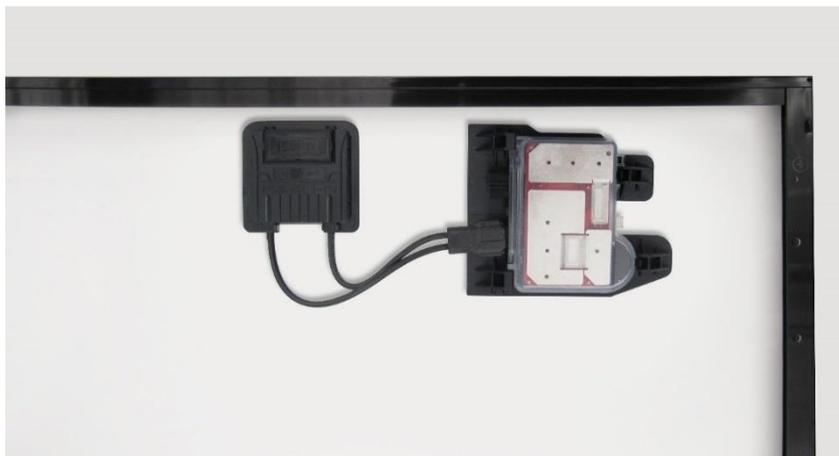
# The Enphase Home: Complete Energy Solution



# AC Module

Advances in size, weight and technology enable the **AC module**

- Next level of integration with PV module
- Eliminates unnecessary components like extra wire and bypass diodes
- Possible removal of PV junction box



# AC Module

Advances in size, weight and technology enable the **AC module**

- Next level of integration with PV module
- Eliminates unnecessary components like extra wire and bypass diodes
- Possible removal of PV junction box
- **AC Modules will be available for sale in July 2017**



*Solar*  
**JinKO**

# Enphase Market Assumptions

- [1] US residential market to grow between 0%-10% in the overall 2017 market, but the small to medium installers are growing faster
- [2] Module power increasing faster than anticipated, which uniquely accelerates cost reduction for microinverters
- [3] Inverter pricing stabilizing at a 7%-10% year-over-year reduction
- [4] The storage market continues to show promise, but is growing slower than preorders indicated

# Enphase Target Operating Model: 30-20-10

## Target Model

### Revenue

Profitable  
Growth

- Increase market share with IQ, ACM, ACB
- World class quality and reliability
- Enter new geographies with ACM, IQ7

### Gross Margin

30%

- Better cost management – cost reduction initiatives
- Continued innovation – IQ7, IQ8
- Improved revenue management

### OPEX

20%

- Focus on key products
- Release a single worldwide SKU: IQ7
- Continue increasing corporate efficiency
- Disciplined lean approach

### Operating Income

10%

- Achieve sustained profitability

# Badri Kothandaraman

Chief Operating Officer

# Enphase Target Operating Model: 30-20-10

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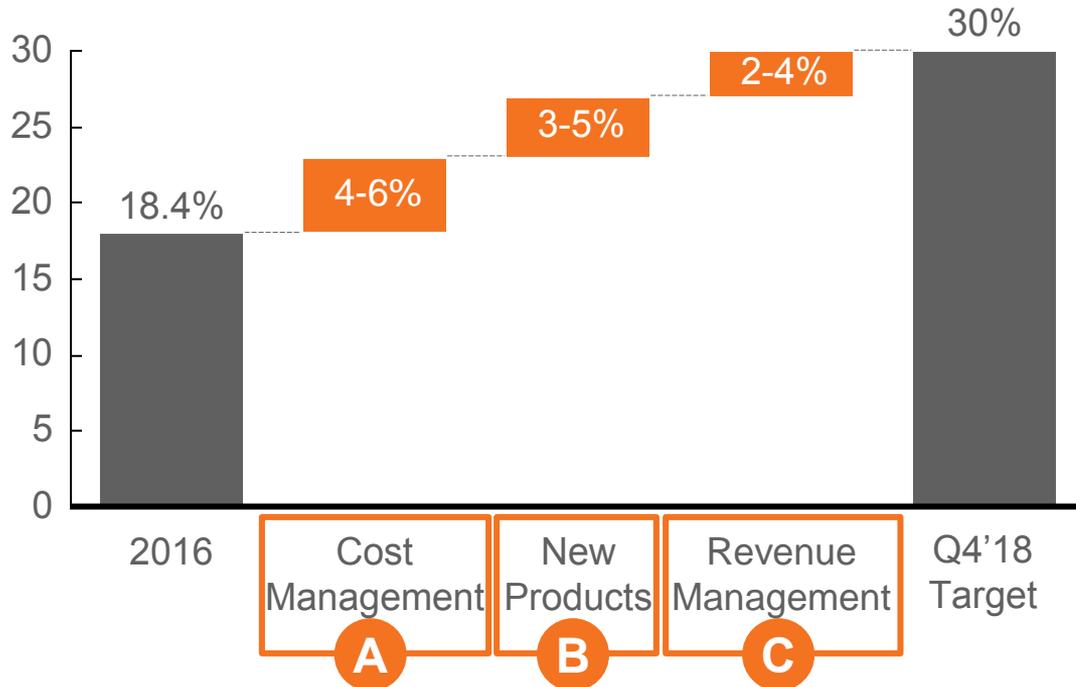
Operating  
Income

10%

- Achieve sustained profitability

# 3 Key Levers to Achieve 30% Gross Margin

Path to Target Gross Margin  
% Gross Margin (Non-GAAP)



## A Cost Management:

- Clear supplier strategies
- Better understanding of commodity landscape
- Overhead reduction

## B New Products:

- Microinverter innovation
- New IQ every 4-6 quarters
- IQ-based AC Module

## C Revenue Management:

- Pricing discipline
- Leverage market trends
- Channel management

# A Cost Management

## Transformation Via Procurement Excellence and Overhead Management

### FY16

- Single supplier
- Unstructured supplier selection
- Limited fact-based rigor in procurement decisions
- Excessive overhead costs

### Today

- Multiple sourcing strategy
- Clear supplier strategies and research of new suppliers
- Collect and understand key market, technology information
- Optimizing all aspects - freight, service, stocking

### Preliminary Results

- Achieved 30% reduction in some key electrical components
- Achieved 30% lower mechanical component pricing
- Reduced warehouse operating budget by 50%
- Reduced return logistics by 25%

# B New Products

## Every Generation Is Better

2014



**M250**

4<sup>th</sup> Generation Product  
Integrated Grounding  
Rapid Shut Down

Q1'17



**IQ6/6+**

Advanced Grid Functions  
2-Wire AC Cabling  
AC Module Support

Q1'18



**IQ7**

Single Worldwide SKU  
Lower Component Count

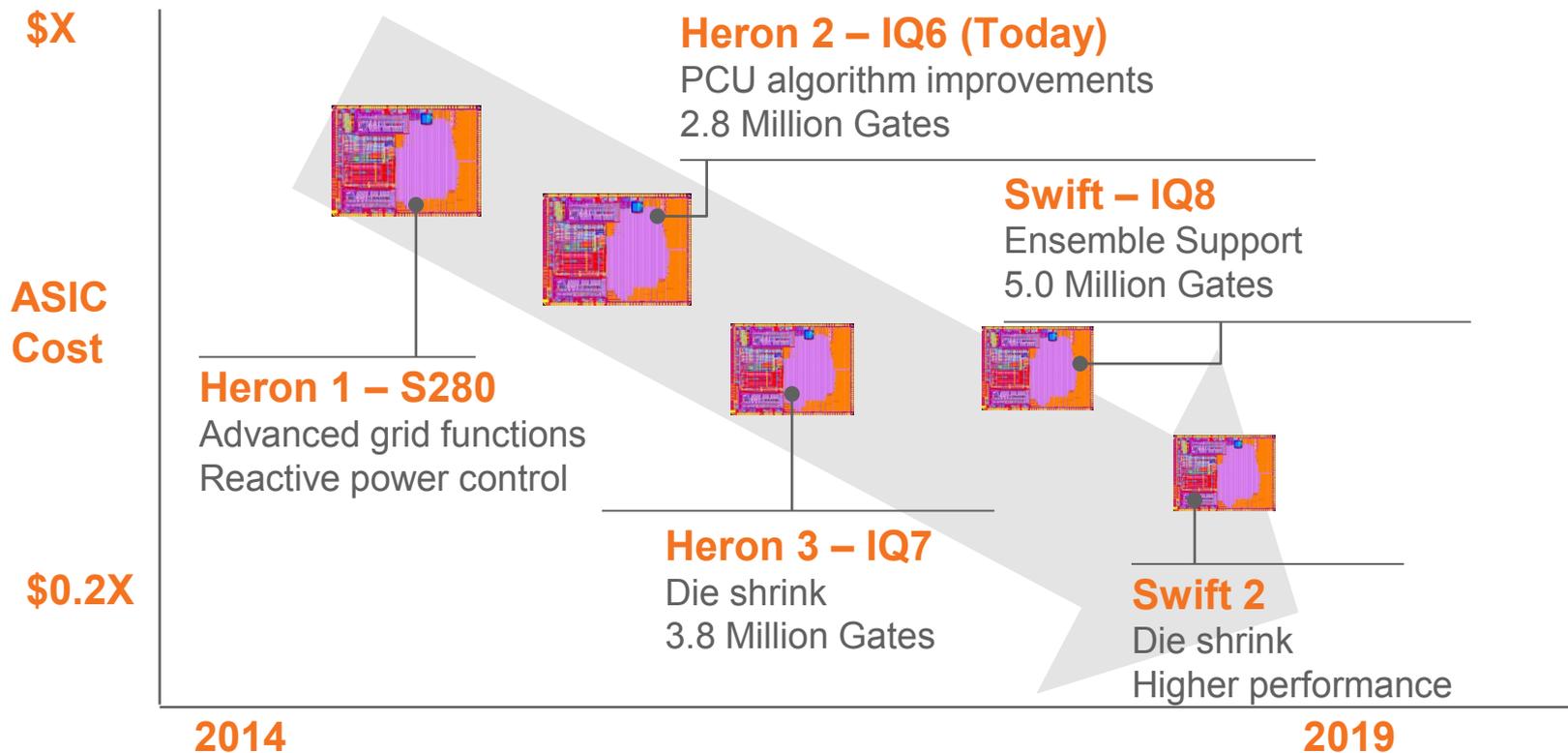


**iPhone 7+**

**B**

# New Products

## ASIC Roadmap Delivers More Integration, Leveraging Moore's Law



# New Products

Enphase IQ Microinverter – Smarter. Lighter. Faster.



## IQ6 Microinverter

- Supports 60-cell modules
- Up to 330W DC
- Advanced Grid Functions
- Available Now



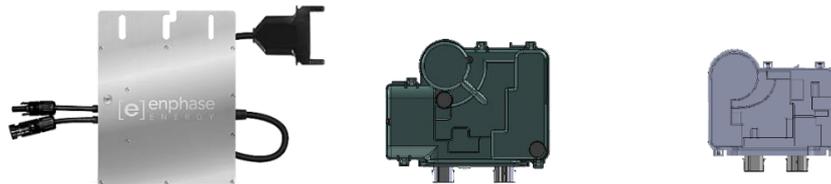
## IQ6+ Microinverter

- Supports 60 and 72-cell modules
- Up to 400W DC
- Advanced Grid Functions
- Available Now

Expect to ship 100,000 units of IQ6/6+ in Q2'17

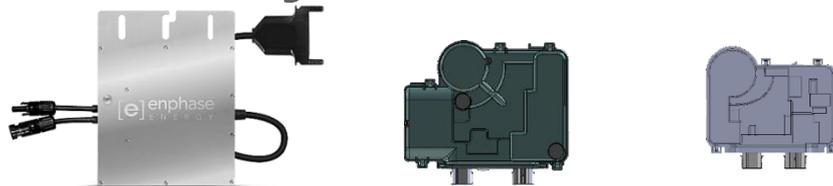
# Cost Reduction – “By the Numbers”

Q4 2015



	M250 2015	S290 2016	S300 2017	% change
Part count	396	339	250	<b>-37%</b>
ASIC count	1	1	3	<b>+200%</b>
ASIC gates (millions)	1.8	2.8	5	<b>+178%</b>
AC cable wires	4	2	2	<b>-50%</b>
Weight (kg)	1.66	1.38	1.15	<b>-31%</b>
AC cable weight (kg)	0.985	0.407	0.407	<b>-59%</b>
Max AC power	250W	290W	300W	<b>+20%</b>

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\* Delayed by 6 months; new schedule on slide 23

## B

# New Products

## Cost Reduction While Adding Functionality and Value

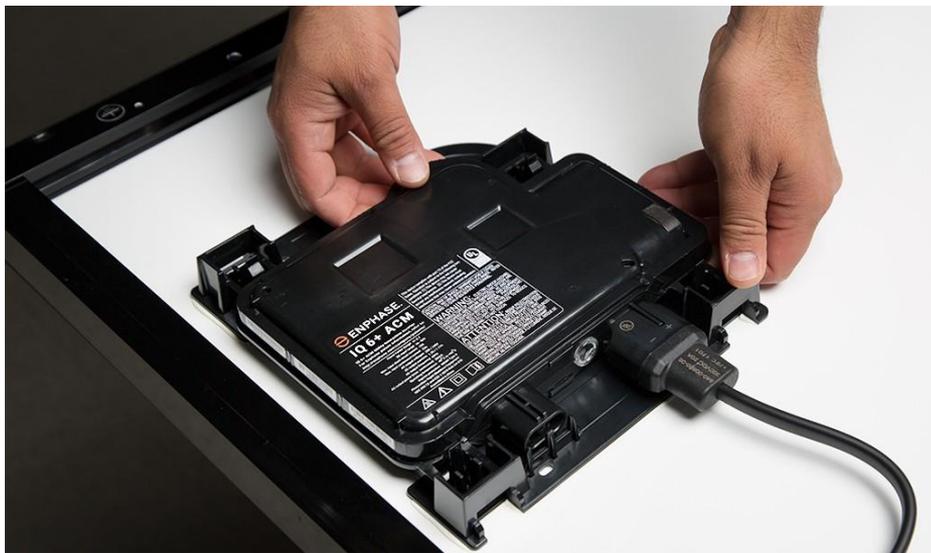

**M250**
**IQ6 – Q1'17**
**IQ7 – Q1'18**
**IQ8 – Q1'19**

Part count	396	364	338	< 250
ASIC gates (millions)	1.8	2.8	3.8	5
Max DC Power (W)	350	400	420	440
Weight (kg)	1.66	1.38	1.15	1.0
Key Feature	Rapid Shut Down	Advanced Grid Functions	Single Worldwide SKU	Ensemble

## B

# New Products

## The IQ AC Module Enhances Our Value Proposition



In partnership with:



- Shipped 18K+ microinverters in Q2'17
- Provides significant value for installers and homeowners:
  - **Easy Installation**  
Pre-assembled inverter and module saves time for installers
  - **Streamlined Logistics**  
Less components means less space and less trips for installers
  - **Higher Production**  
Attaching IQ6+ to high power modules means more production for the same number of modules
  - **Higher Reliability**  
Pre-tested microinverter and module operation in assembly



# Revenue Management

## Innate Product Advantages Provide Higher Value



### Higher Power Production

*Microinverters operate independently with all technology embedded in one unit, resulting in higher efficiency*



### Superior Quality and Reliability

*Reliability of our microinverters is among the best in industry; our distributed architecture requires less maintenance, creating systems without single point of failure*



### Safer

*All AC system means no high voltage DC on the roof, meeting strict government safety requirements*



### Easier to Design, Install and Maintain

*Fewer components and **remote problem-solving** through Enlighten saves time for installers*



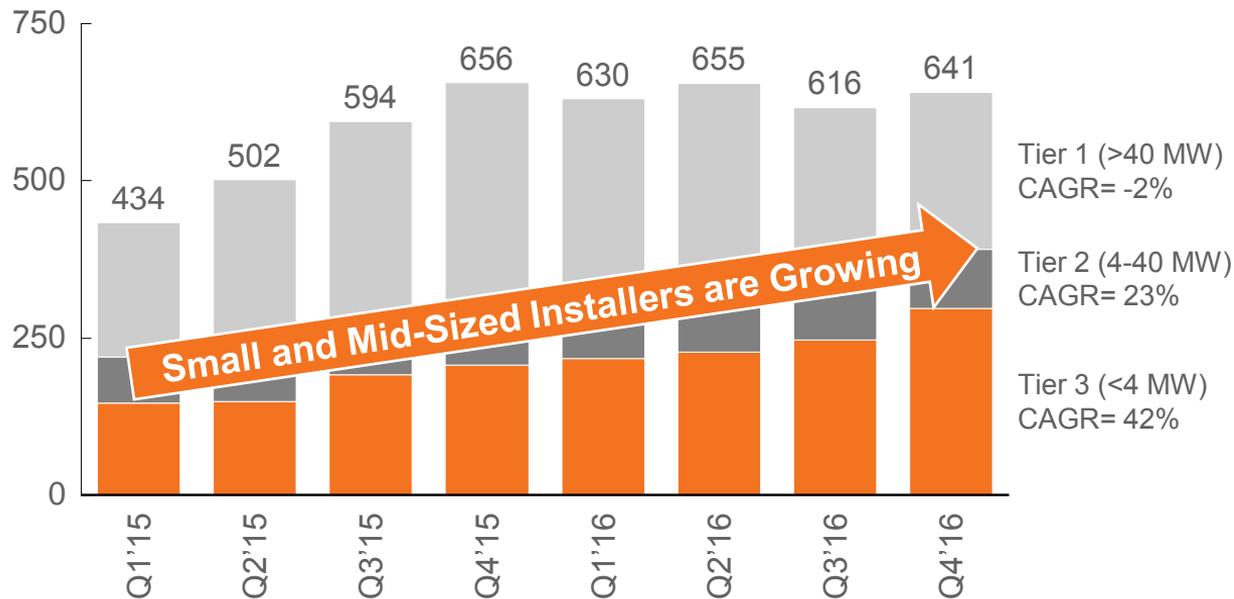
**A microinverter solution provides more value than competitive architectures.**



# Revenue Management:

## Profitable Growth Leveraging Market Trends

**US Market Size by Installer Tier**  
MW, % of total US residential market



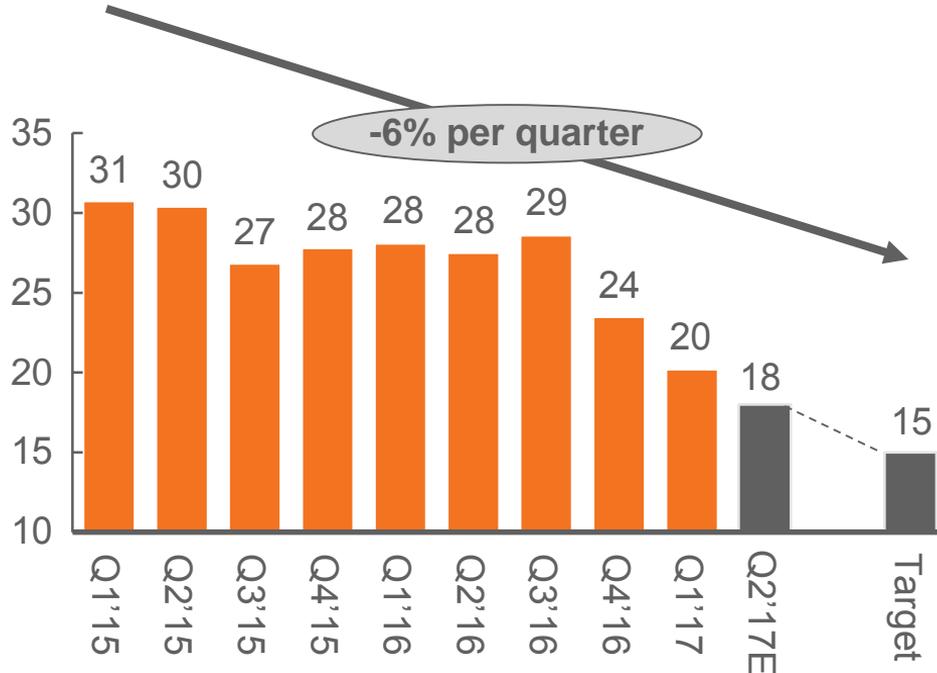
Source - GTM Leaderboard Feb. 2017

- Enphase uniquely positioned to serve small to mid-sized installers due to our:
  - Simplicity
  - Value proposition
  - Broad distribution network

# OPEX Management:

We have cut expenses nearly 50%

## Operating Expense \$M USD (Non-GAAP)



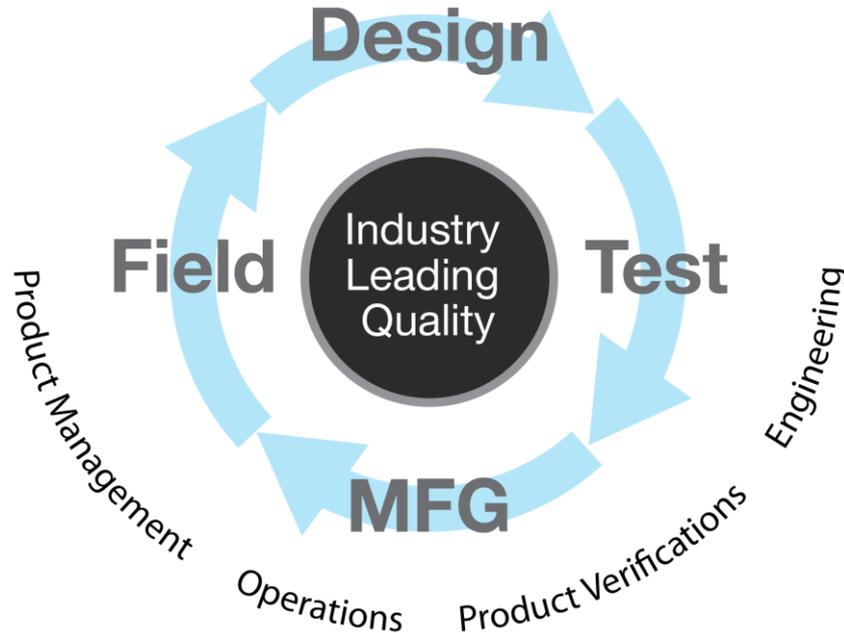
- Restructuring completed Q1'17
- Single worldwide SKU on IQ7 helps in R&D spend
- Outsourcing of non-core functions
- Continuous review and optimization of R&D portfolio

# Raghu Belur

Co-founder, Vice President of  
Products and Strategic Initiatives

# Enphase Quality

Our overarching philosophy is that quality and reliability cannot be just tested into any product – they must be ingrained into every aspect of the business



# Rigorous Testing Criteria

## Long-Term Testing Exceeds Industry Standards



Inverters in pressure vessel



Pressure apparatus in chamber

- IP 67 or NEMA6 rating
  - Testing for failure in enclosure seals, joints and cables under water

	NEMA6	Enphase Enhanced NEMA
Power	OFF	100%
Thermal cycling	None	-30C to 65C
Submersion Duration	30 mins	21 days

# Rigorous Testing Criteria

## Long-Term Testing Exceeds Industry Standards



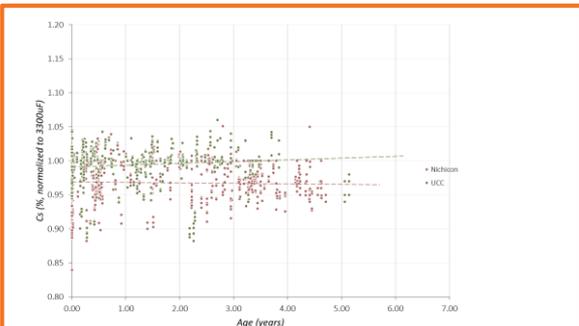
**Capacity: 1600 to 2000 Units**

- IEC 61215 Standards Testing
  - Thermal cycling
    - Between -40C to +85C
    - 6 hour cycles
  - Damp heat 85C and 85% RH

	Standard	Enphase
Thermal Cycling	200 cycles	600 cycles
Damp Heat	1000 hours	1500 hours
Powered	No	100%

# Component Level Testing

## Significant Design Margin– Electrolytic capacitors



Capacitance vs. Time

- Design margin

	Rating	Enphase
Temperature	105C	75C max.
Ripple current	3.4A rms	1.85A rms
Redundancy	1 capacitor	4 capacitors

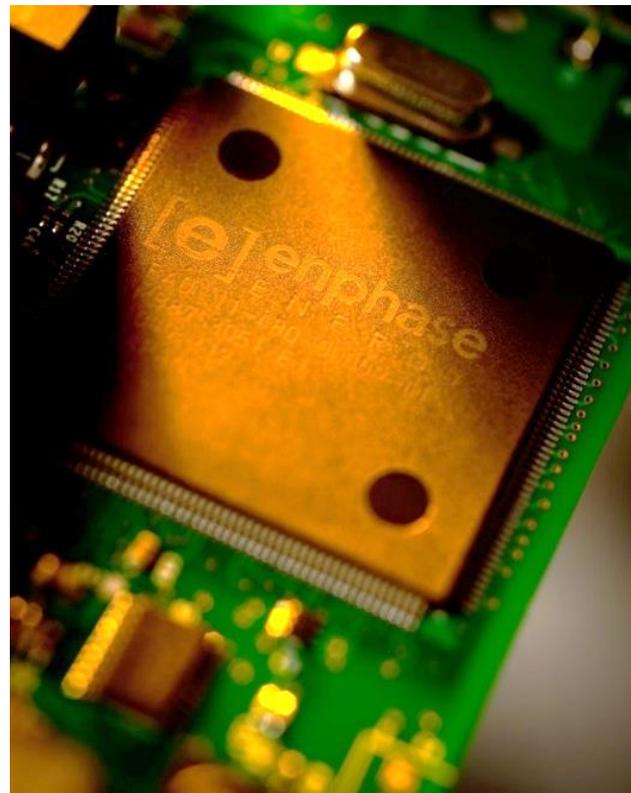
- Field data

- No degradation after 5 years of operation
- Not in the top 10 failure modes
- Lifetime failures
  - 9 out of 56 million
  - 0.16 dppm per e-cap.

Enphase has solved the e-cap problem

# The Future of Solar

**Enphase Ensemble™ is the result of 10 years of R&D with over 300 patents filed, making Enphase the only Solar 2.0 company.**



# The Essence of Enphase is Semiconductor Integration

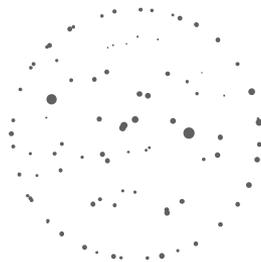
The world is moving to a networked, distributed digital architecture



Telecom



Computing



Networking

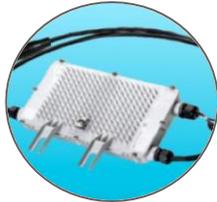


Blockchain

# 10 Years of Enphase Innovation



2006



**First micro-inverter system**  
introduced  
2008



**1 million** units  
shipped, Enphase  
expands globally  
2011



**Fourth-generation**  
technology  
introduced  
2013



**AC battery**  
introduced  
2016



**Sixth-generation**  
launched  
2017



**Ensemble™**  
Q1 '19

Distributed architecture / Systems solution / Software-defined inverters

# Enphase is Transforming Solar 1.0 into Solar 2.0

## Solar 1.0 – Grid tied or off-grid

### Grid tied

- Requires constant grid connection
- Provides bill optimization for homeowners



OR

### Off-grid

- Works in the absence of a grid connection
- Provides power in off-grid locations



## Solar 2.0 – Grid independent

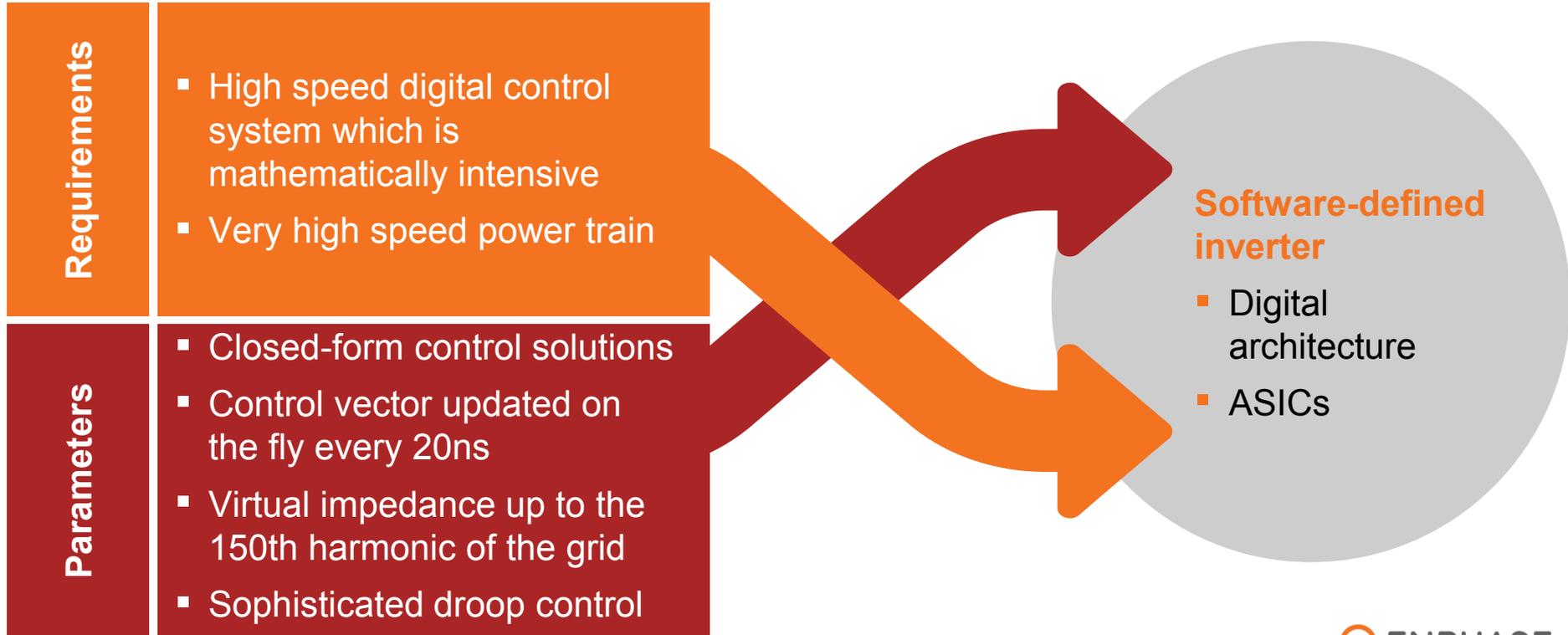
### Distributed

- Simple and reliable
- Modular and scalable

- **Seamless transition between grid tied and off-grid**

# We Cracked the Code for Solar 2.0 with Ensemble™

Ensemble™ provides a true power plant in a microinverter



# Solar 2.0 Provides the Best of All Worlds

Seamless



- **Next-generation microinverter** capable of working seamlessly in grid tied or off-grid mode

Simple



- **Modular solution:** Plug and play with AC Module & AC Battery
- **Very simple** to design, install and maintain

Scalable



- **No limitation** on system size
- **Same microinverter** for any size system

Reliable



- **Robust** with no single point of failure

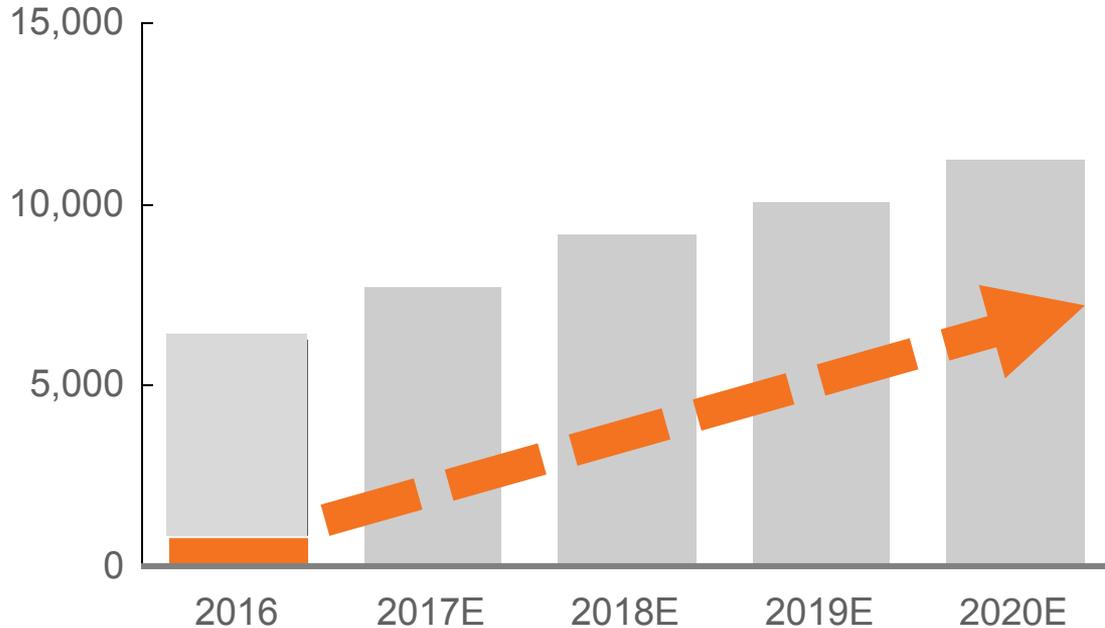
# Market Impact of Ensemble™

Expands market share and improves gross margin

## Global Market Size

Worldwide total residential market (MW)

■ Enphase share



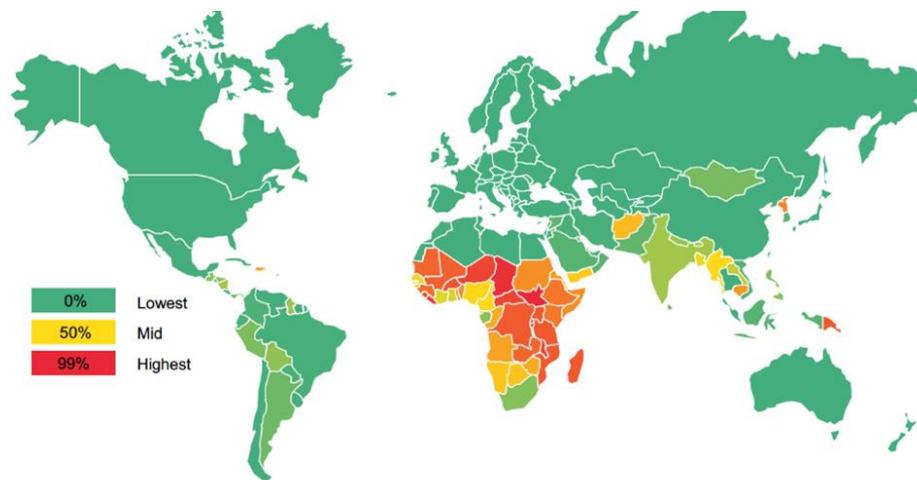
- Sets a new standard for customer expectation
- Software configurable
- Leverages existing channels
- Forecasting shipments in Q1 '19

# Ensemble™ Expands Enphase into Energy Access and Microgrids

Increasing TAM by Developing New Markets

**1.2B+ people live in off- and weak-grid areas**

**Population share without grid access**



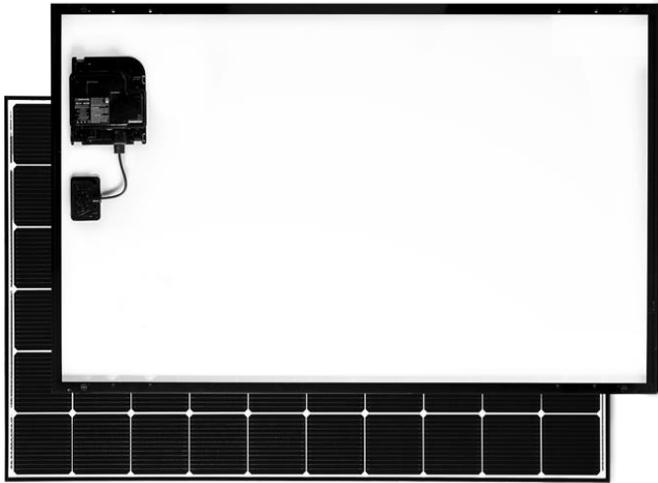
Source: World Bank, Bloomberg New Energy Finance. Note: Figures refer to 2012 data.

- President Obama signs Electrify Africa Act
- Prime Minister Modi to fully electrify India by 2021

- Today's off-grid regions well suited for solar systems
- Market Size of >\$100Bn
- Yet, major market development efforts required

# Ensemble™ Systems are Built with IoT Appliances

## AC Module



## AC Battery

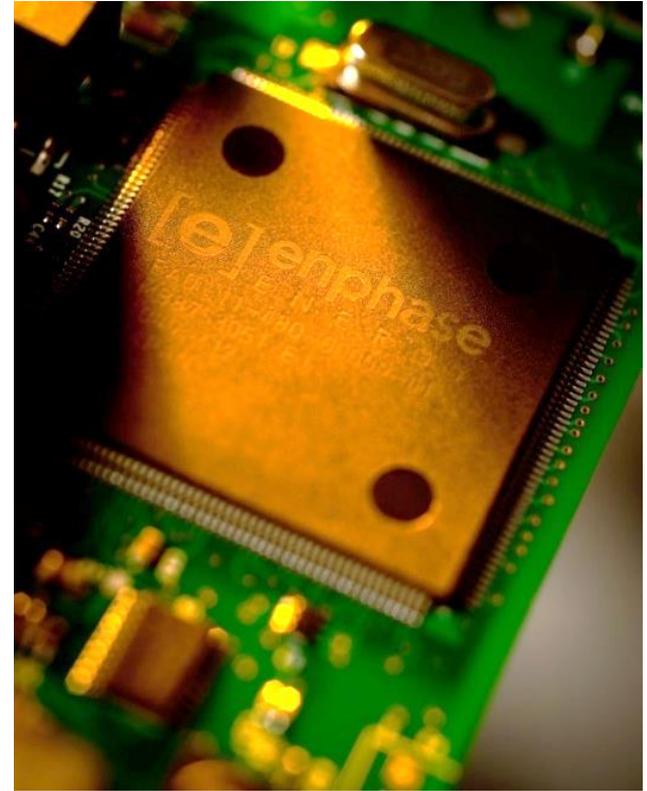


## Energy Hub



# The Future of Solar

**Enphase Ensemble™ is the result of 10 years of R&D, making Enphase the only Solar 2.0 company. We intend to own the future.**





Bert Garcia

Chief Financial Officer

# Enphase Target Operating Model: 30-20-10

## Target Model

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Gross  
Margin

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OPEX

20%

- Focus on key products
- Release a single worldwide SKU: IQ7
- Continue increasing corporate efficiency
- Disciplined lean approach

Operating  
Income

10%

- Achieve sustained profitability

# Steps Already Taken to Improve Operating Income

**Restructuring Actions – \$38M/Year in OpEx Reductions**

**Supply Chain Optimization – \$18M/Year in Reductions, Exiting Q4'17**

**Completed Investments That Will Drive Revenue Growth**

- Product Cost Reduction – IQ6
- IQ7 Development – Universal SKU
- New Products – AC Battery & AC Module
- Next-Generation Energy Technology (Ensemble™)

# Paul Nahi

## Summary and Conclusion



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