Enphase Energy

Analyst Day

November 2015

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, but not limited to, statements related to Enphase Energy's financial performance, advantages of its technology, product cost reductions and market trend.
- 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.
- Factors that could cause actual results to differ materially from the Company's expectations are described in the reports filed by the Company with the Securities and Exchange Commission pursuant to the Securities Exchange Act of 1934 and we encourage you to review our filing carefully, especially the sections entitled "Risk Factors" in our quarterly report on form 10-Q for the quarter ended September 30, 2015.
- 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	Enphase Energy vision
Martin Fornage	Technology for cost reduction
Greg Steele	Engineering for cost reduction
Darien Spencer	Operations and automation for cost reduction
Stefan Zschiegner	Product cost reduction roadmap
Raghu Belur	Home energy systems roadmap
Stefan Zschiegner	Enlighten demo

Paul Nahi

President and CEO

Enphase focus and priorities

Enphase is executing on its strategy to address market-driven cost pressures in the near term, while positioning the company for long-term growth:

[1] **Significantly reduce the cost of a solar system through product cost reduction and simplification of the installation process**

[2] **Create a total energy solution for homes and businesses through the development of new products, features and services**

Enphase goals

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

[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**

Enphase in more than 375,000 systems in 95 countries

Martin Fornage

Chief Technology Officer

Enphase 10 years of innovation

First predictive digital control system

First custom chip

First Mixed signal ASIC

Next Gen power train control design

Next Gen power train first operation

Next Gen enclosure prototypes

2006 **2015**

First microinverter system introduced

1 million units shipped, Enphase expands globally

Fourth-generation technology introduced

AC battery announced

Fifth-generation Introduced

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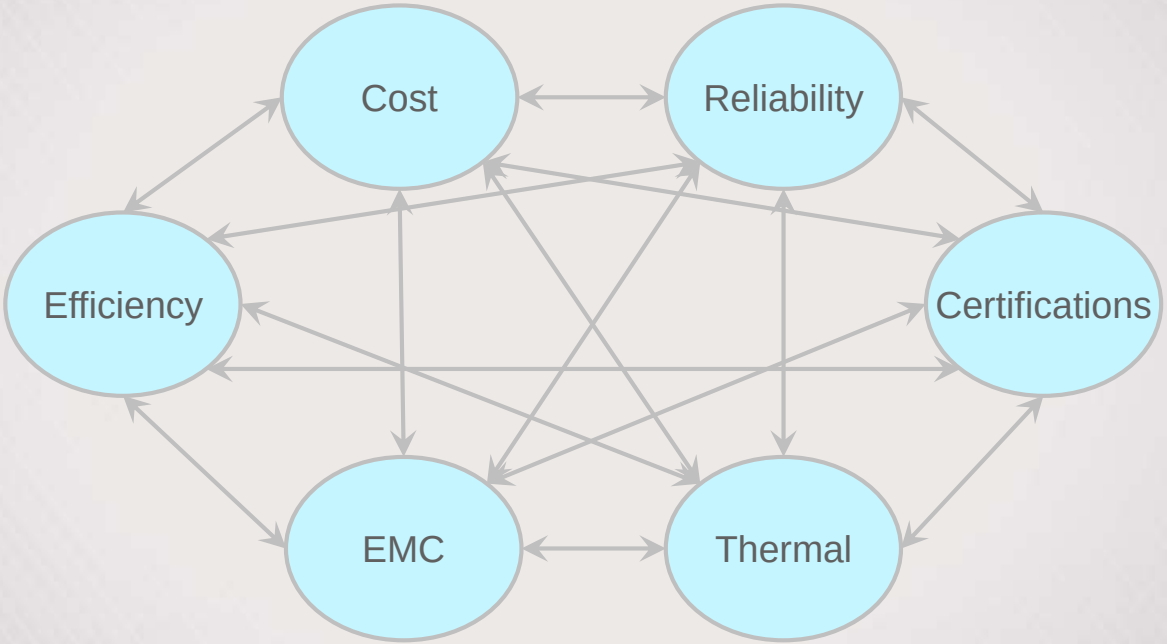
Microinverter design constraints are difficult to balance



General design philosophy

- The System approach is critical
- System behavior is defined by Software
- Distributed architecture wins
- Digital control wins

The approach to inverter system design

- Choose a low noise, high efficiency power train
- Move to a polymeric enclosure
- Simplify the wiring
- Simplify the installation

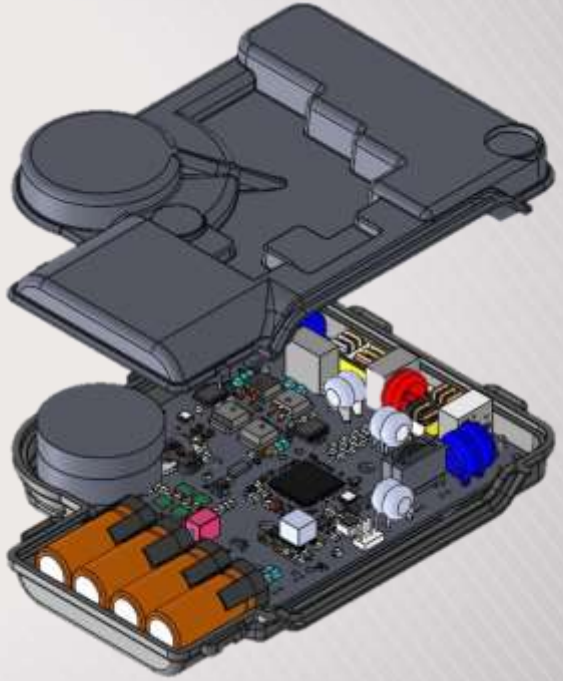
Enphase power train and control

- **Advanced power train features**
  - Fully resonant, soft-switched, bidirectional, single-stage converter
  - World's first sub-cycle control capability
  - Much improved EMC signature
  - WBG semiconductors can be used to further reduce cost and increase efficiency
- **Additional integration opportunities**

Polymeric enclosure

Low-noise power train allows for polymeric enclosure

- Reduced mechanical stress on components
- Lowest transformation cost
- Higher freedom of design
- Improved thermal performance
- No ground wire
- Embedded bulkhead connectors reduce number of cables needed



2-wire cable system

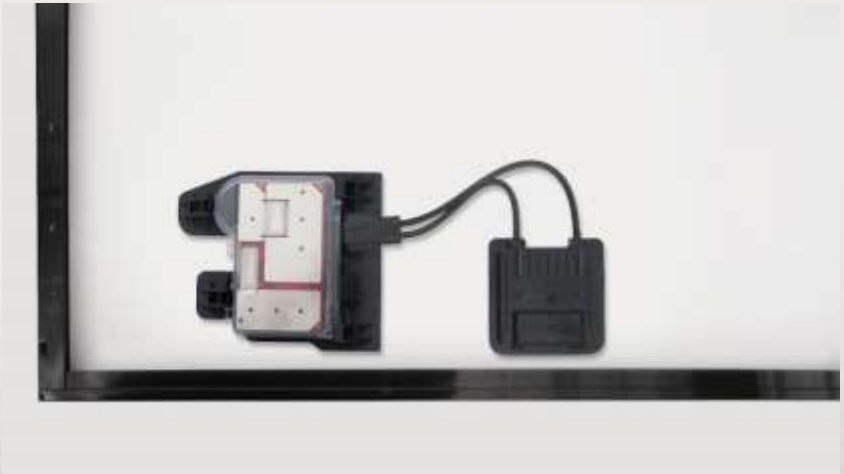
Polymeric enclosure enables a 2-wire AC cable

- Less than half the weight per inverter
- Easier installation
  - More flexible
  - Much smaller bend radius

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



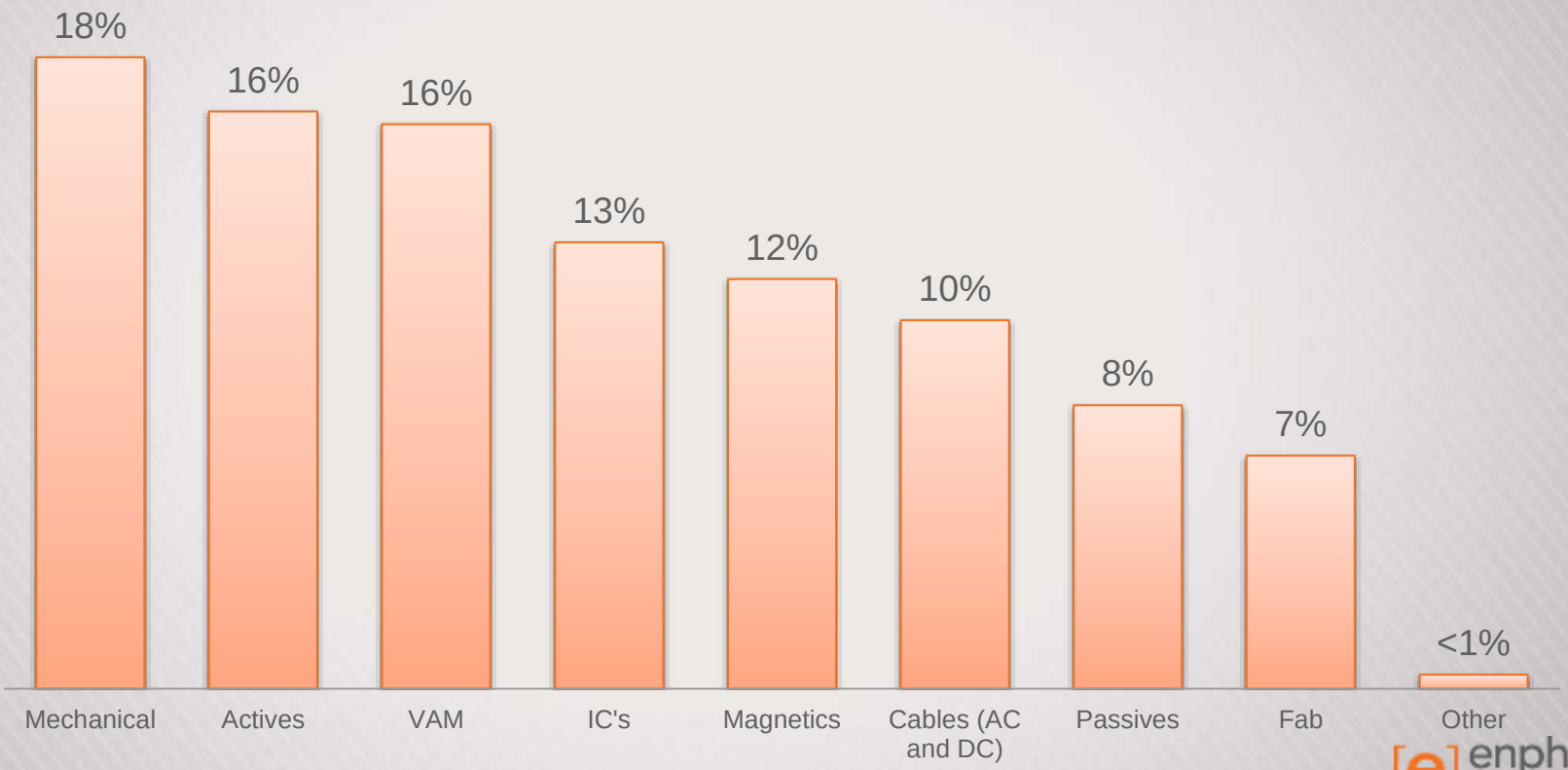
Greg Steele

Senior VP of Engineering

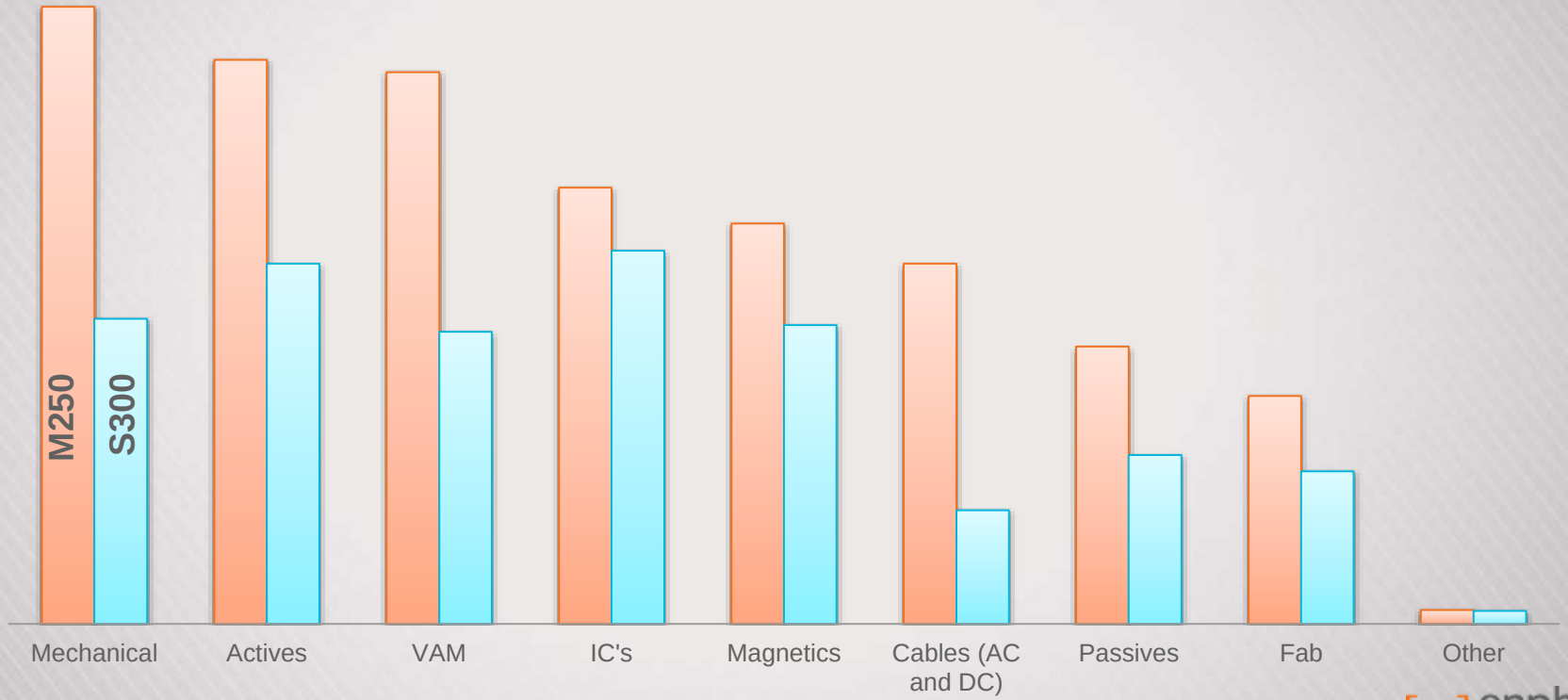
Key technologies to enable cost reductions

- **Architectural design and silicon integration**
- **Magnetics design**
- **Polymer enclosure**
- **Cable simplification**

Where is the cost in the inverter today (M250)?



Where will the cost be in the future (S300)?



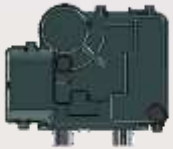
Cost reduction – “By the numbers”

	M250 2015
Part count	396
ASIC count	1
ASIC gates (millions)	1.8
AC cable wires	4
Weight (kg)	1.66
AC cable weight (kg)	0.985
Max AC power	250W

Cost reduction – “By the numbers”

	M250 2015	S290 2016	% change
Part count	396	339	-14%
ASIC count	1	1	
ASIC gates (millions)	1.8	2.8	+55%
AC cable wires	4	2	-50%
Weight (kg)	1.66	1.38	-17%
AC cable weight (kg)	0.985	0.407	-59%
Max AC power	250W	290W	+16%

Cost reduction – “By the numbers”



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

Enphase semiconductor development

- 8th generation
- 2.8 million gates
- Designed in partnership with TSMC
  - 30-person design team in Silicon Valley
- TSMC 55nm LP CMOS process for SoC

Substantial reduction in size and cost

Residential and commercial microinverters

M250

S290

S300

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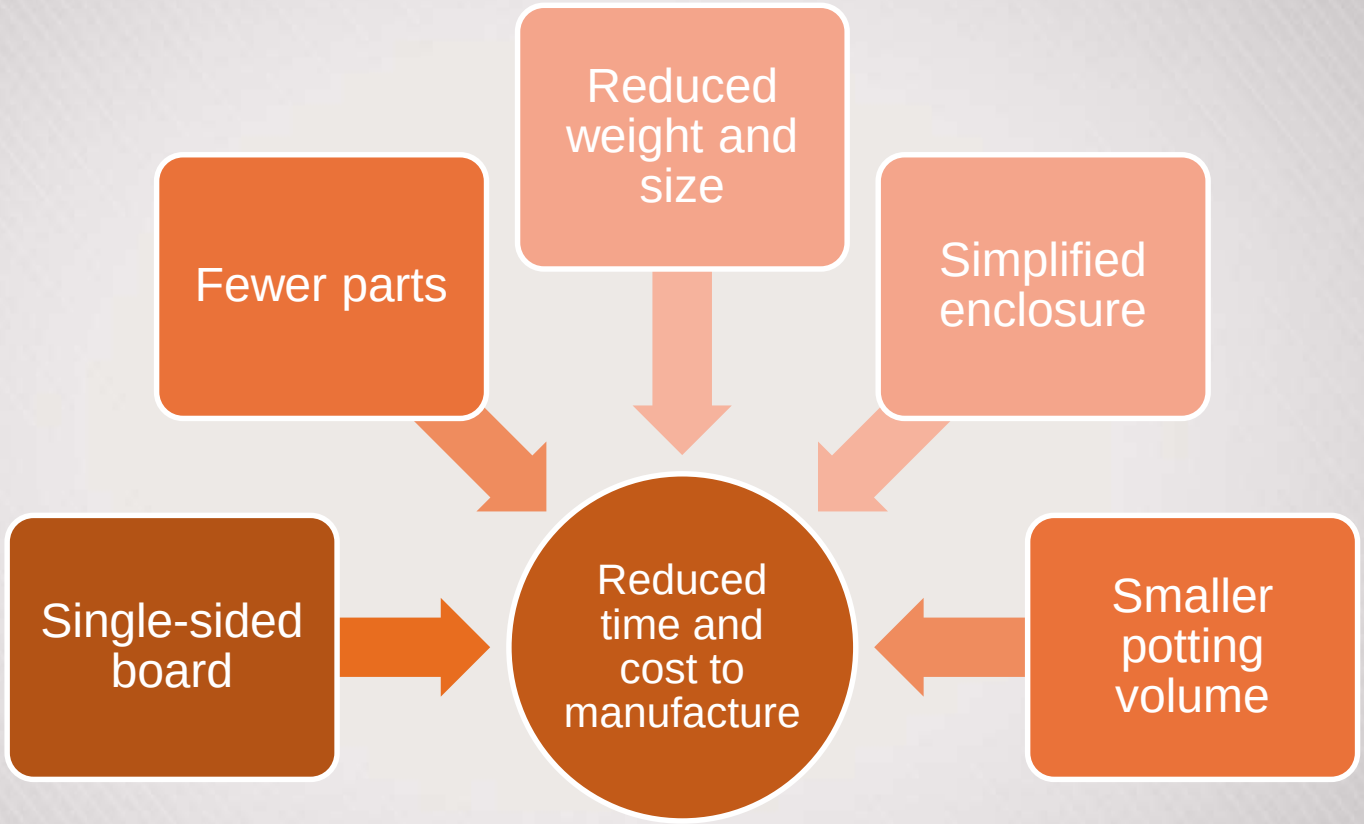
Design for reliability and manufacturability



Darien Spencer

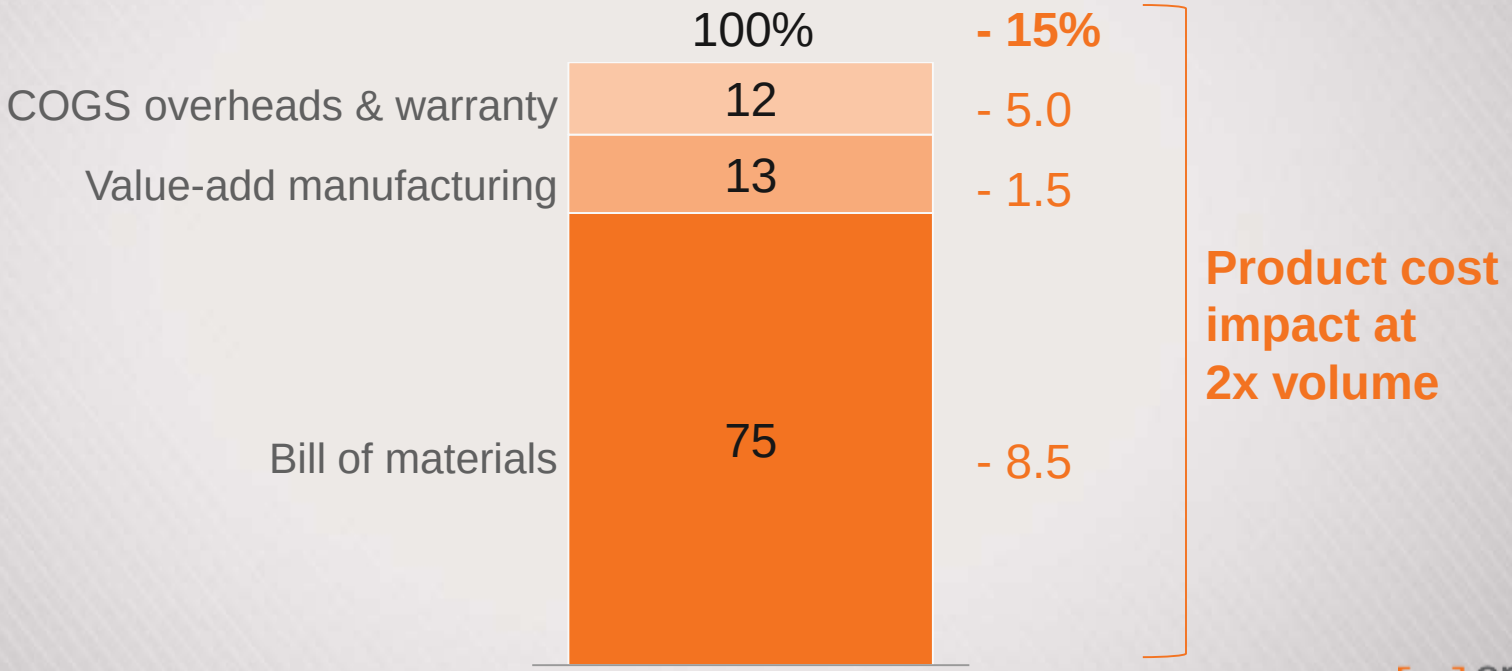
VP of Manufacturing and Operations

Global industry-leading operations

Costs	• 15% year-over-year cost reduction demonstrated	**Partners**	• Global experts • Highly leverageable
Quality & reliability	• >25 year useful life for microinverters • Highest factory yield	**Factories**	• Highly automated • Global, scalable, flexible
Inventory carrying	• Few SKUs	**Distribution**	• Global footprint • Low cost • Automated systems

Higher manufacturing volume reduces costs

Microinverter cost breakdown



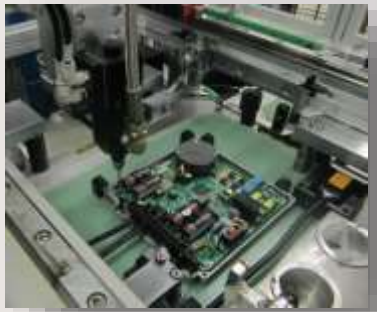
Manufacturing cost drivers continue to improve

		2013	2015	2017
Bill of materials	Sourcing localization	Asia/Europe	Asia/Europe	Asia/Europe/LA
	Raw material and transformation	Manual	Semi-automated	Automated
	Component count	425	396	250
Value-add manufacturing	Labor/automation (units/quarter/operator)	1,000	2,500	5,000
	Process touchpoints	180	96	68
	Yield management (cum)	93%	99.5%	99.8%
	SKU management (lines)	2 SKU-specific automated + 2 manual	3 universal automated	4 universal automated
	Component lead time (average days)	65	52	45
	Depreciation/asset efficiency	Baseline	+25%	+50%
	COGS overheads	Baseline	+100%/unit	+200%/unit
	Automation line throughput (number/day/line)	7,500	11,000	15,000

Quality and reliability throughout the process

Enphase continues investment in quality and reliability infrastructure with commissioning of New Zealand QA lab

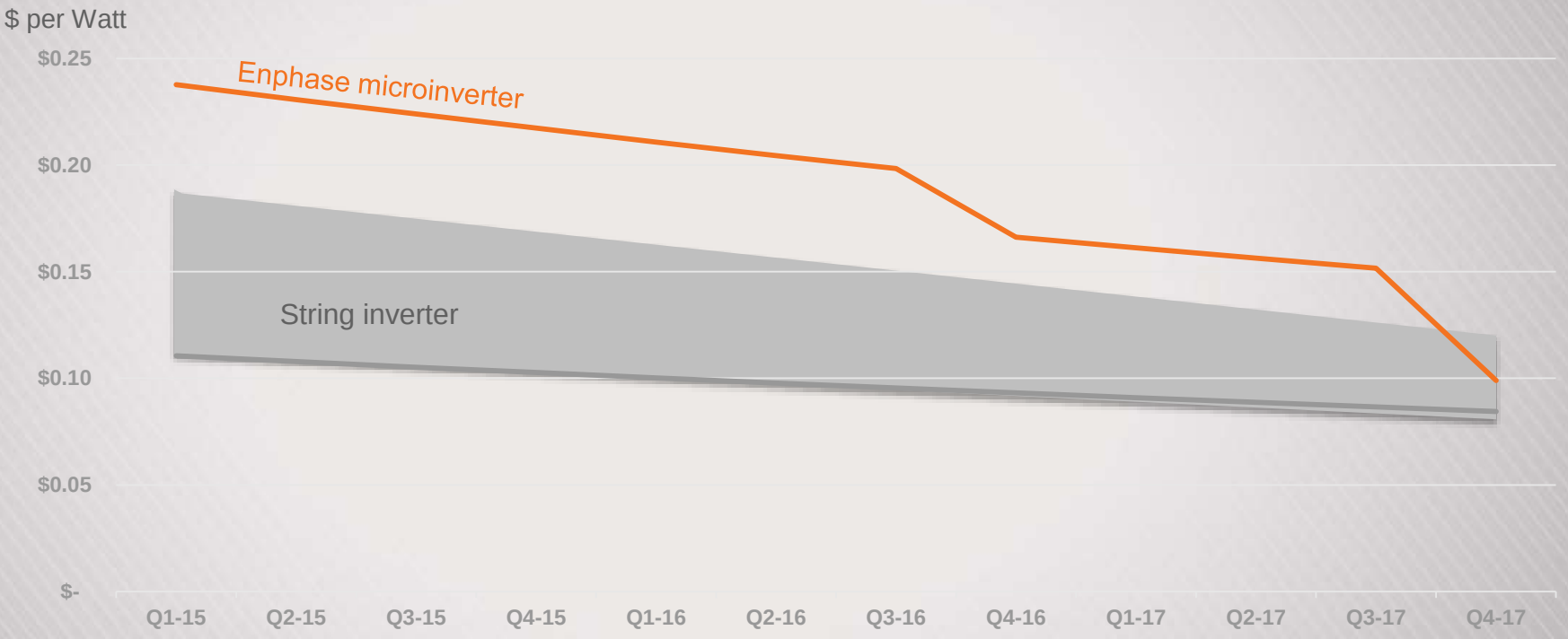
Manufacturing automation creates efficiencies



Stefan Zschiegner

VP of Product Management

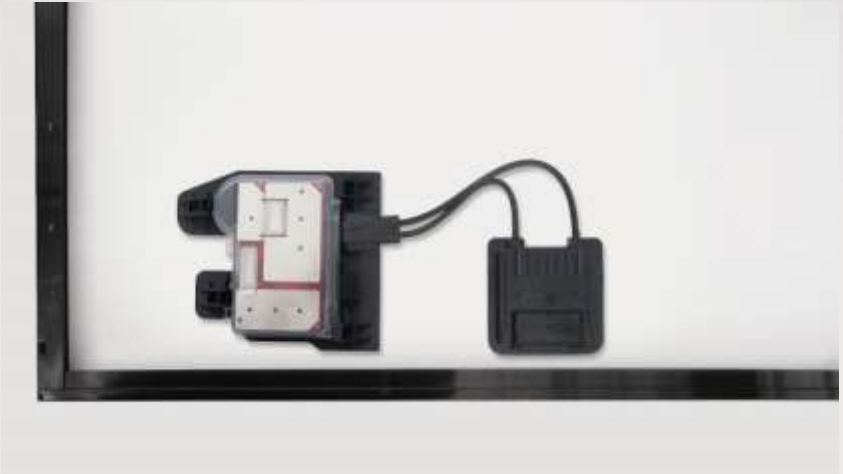
50% cost reduction in 2 years



AC Module: A solar module with an integrated microinverter

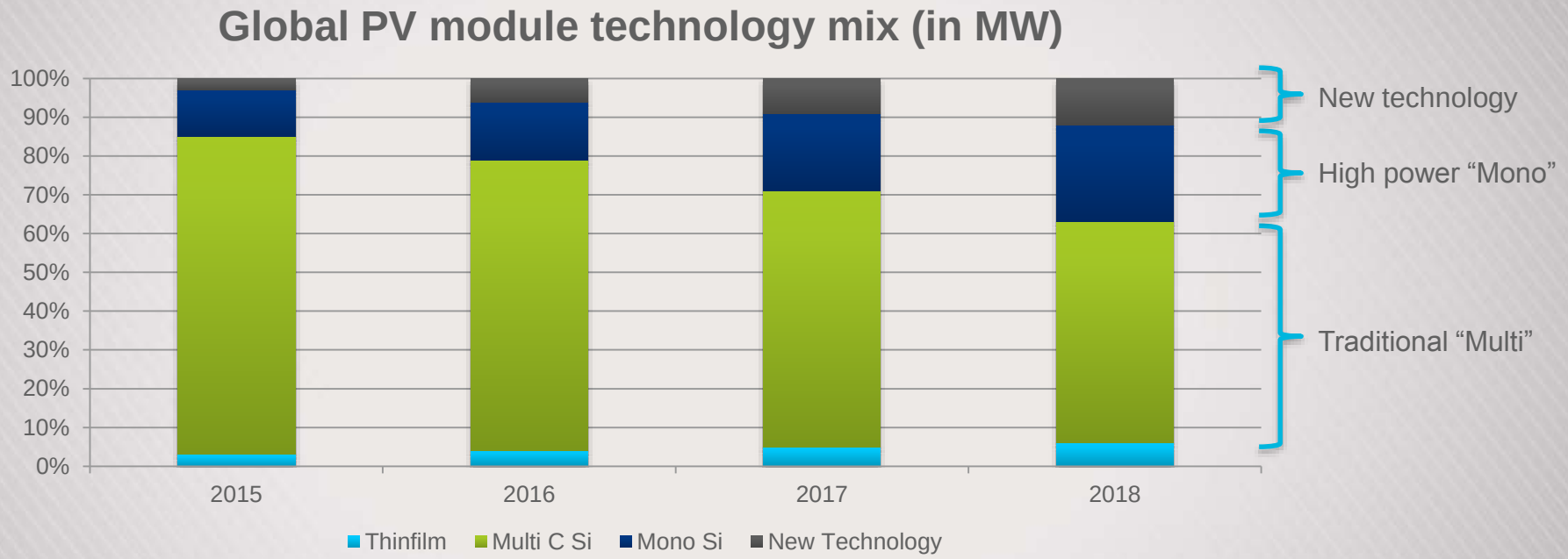
- Lower cost
  - Microinverter cost savings: 2 cents per Watt
  - Module cost savings: 3 cents per Watt
  - Installation cost savings: 2 cents per Watt

AC Module: A solar module with an integrated microinverter



- Lower cost
  - Microinverter cost savings: 2 cents per Watt
  - Module cost savings: 3 cents per Watt
  - Installation cost savings: 2 cents per Watt
- Simplified installation and logistics
  - Simplified design and installation process
  - Single SKU
  - Simplified logistics

Higher power modules uniquely benefit microinverters



Raghu Belur

VP of Products and Strategic Initiatives

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The Enphase home: Complete energy solution

Increase revenue per home from +$1,000 to +$6,000

Consumption monitoring and disaggregation

Enhancing the consumer engagement

Enphase AC Battery storage solution

1.2 kWh energy capacity, 270W power, 10+ year lifetime

- Modular and scalable distributed architecture
- Highest lifetime value
- Seamless integration
- Safe and reliable

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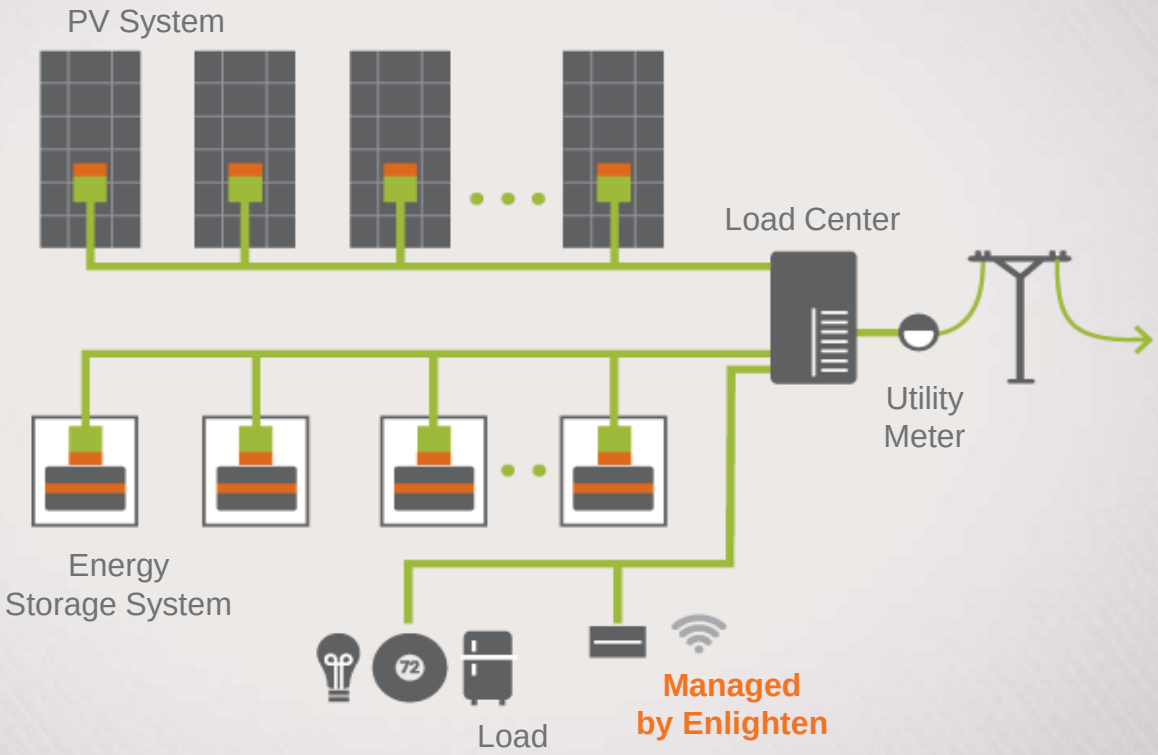
Enphase storage solution

Distributed PV (AC Module) and Distributed storage (AC Battery)



Enphase AC coupled versus DC coupled systems

Value

- Efficiency
- 2 cycles per day, >95% depth of discharge
- Less expensive to install

Modular

- Pay only for what you need
- Expandable

Reliability

- No single point of failure

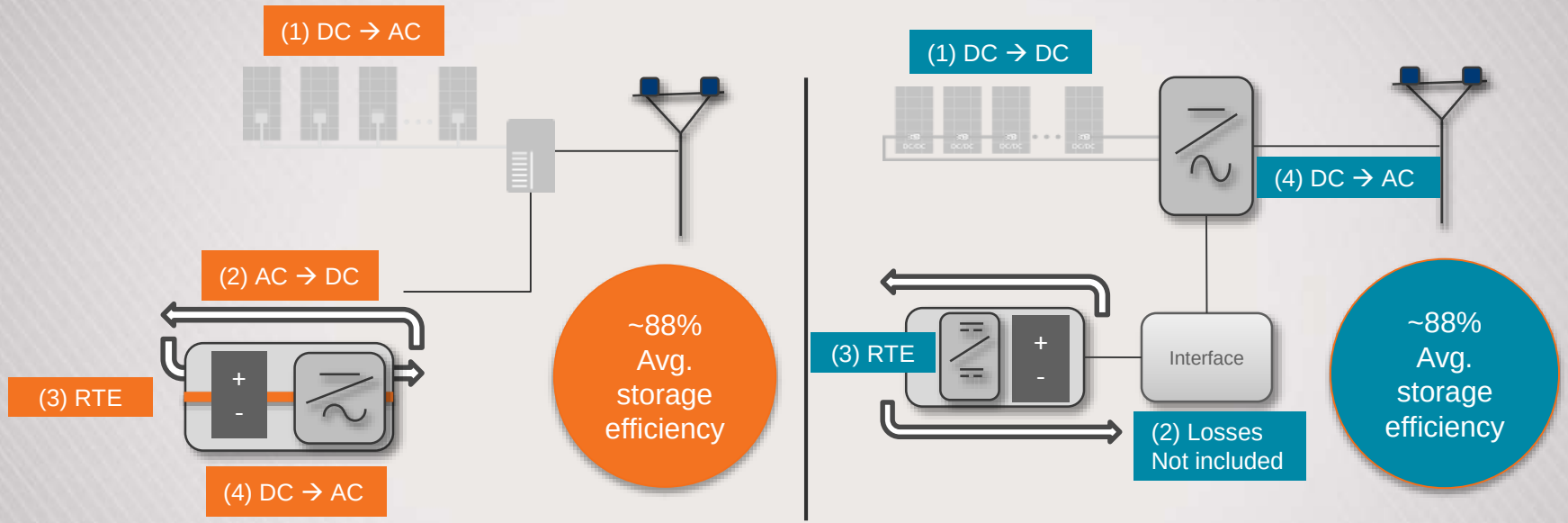
Safety

- No high voltage DC
- TUV safety certified LFP versus NCA and NMC chemistry

Retrofit

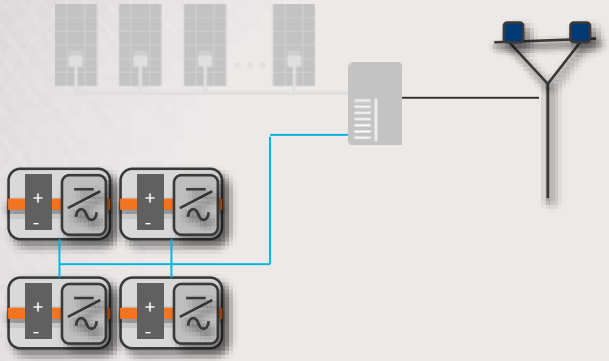
- Easy to retrofit any solar system

Efficiency in AC versus DC coupled systems



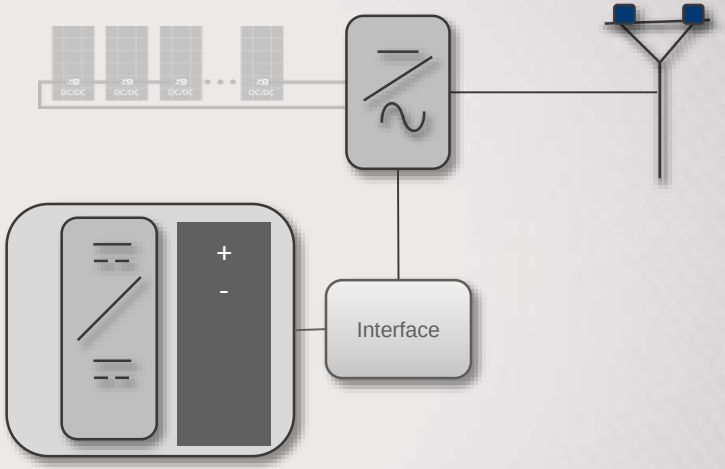
The AC coupled advantage

Enphase's distributed architecture is the clear choice for retrofits



Enphase AC Battery

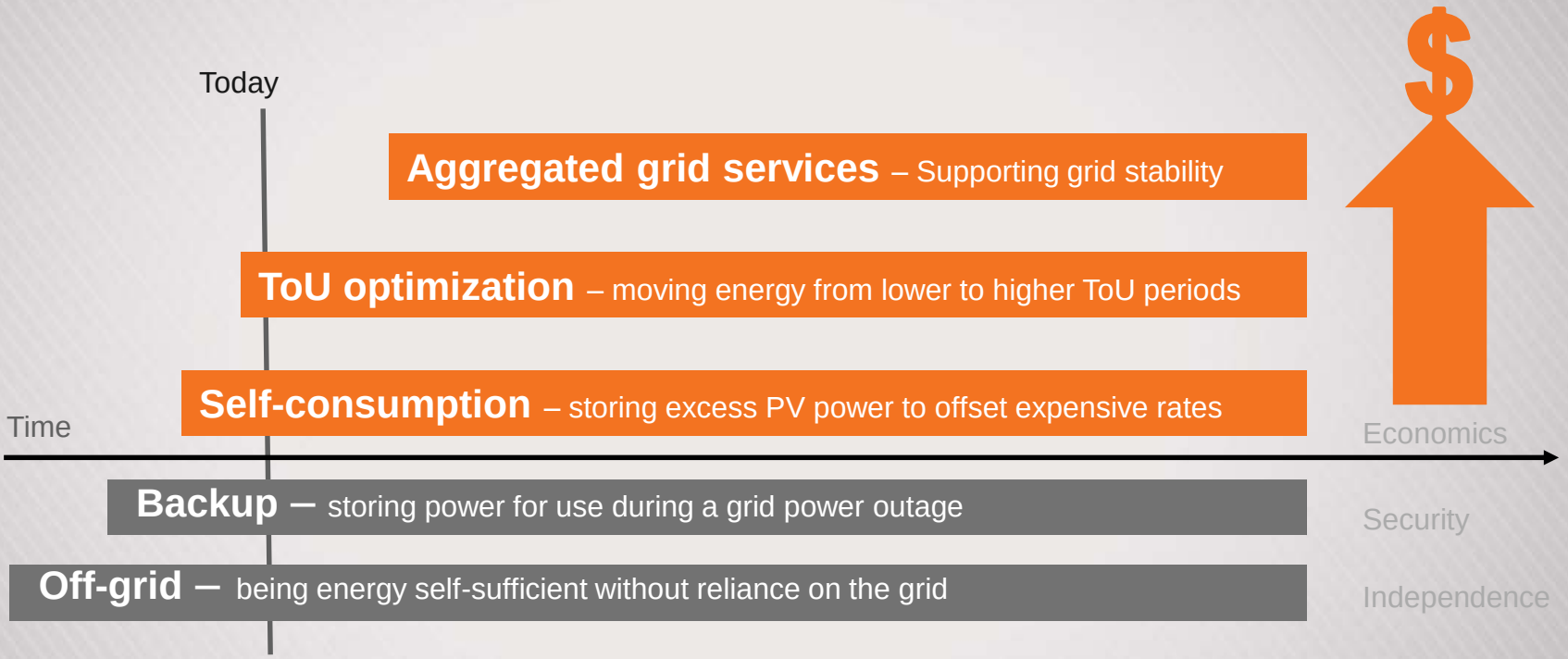
No need to replace existing inverters



DC coupled battery with string & DC optimizers

Must upsize inverter to accommodate battery

Evolution of use cases for storage



Stefan Zschiegner

VP of Product Management

Enlighten demo

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President and CEO

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The Enphase Promise:
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