



IHS Markit™

Current trends in the market for industrial motors and drives

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IHS Markit

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Agenda

- Economic update
- Motor and drive market statistics
- Emerging technologies
- Conclusion

Industrial Automation research areas

DISCRETE & PROCESS AUTOMATION

Controllers
Industrial Communications
Process Instrumentation
Visualization
Smart Manufacturing



ELECTRIC MOTOR SYSTEMS

Drives
Mechanical Power
Transmission
Motors



CAPITAL EQUIPMENT & MACHINERY

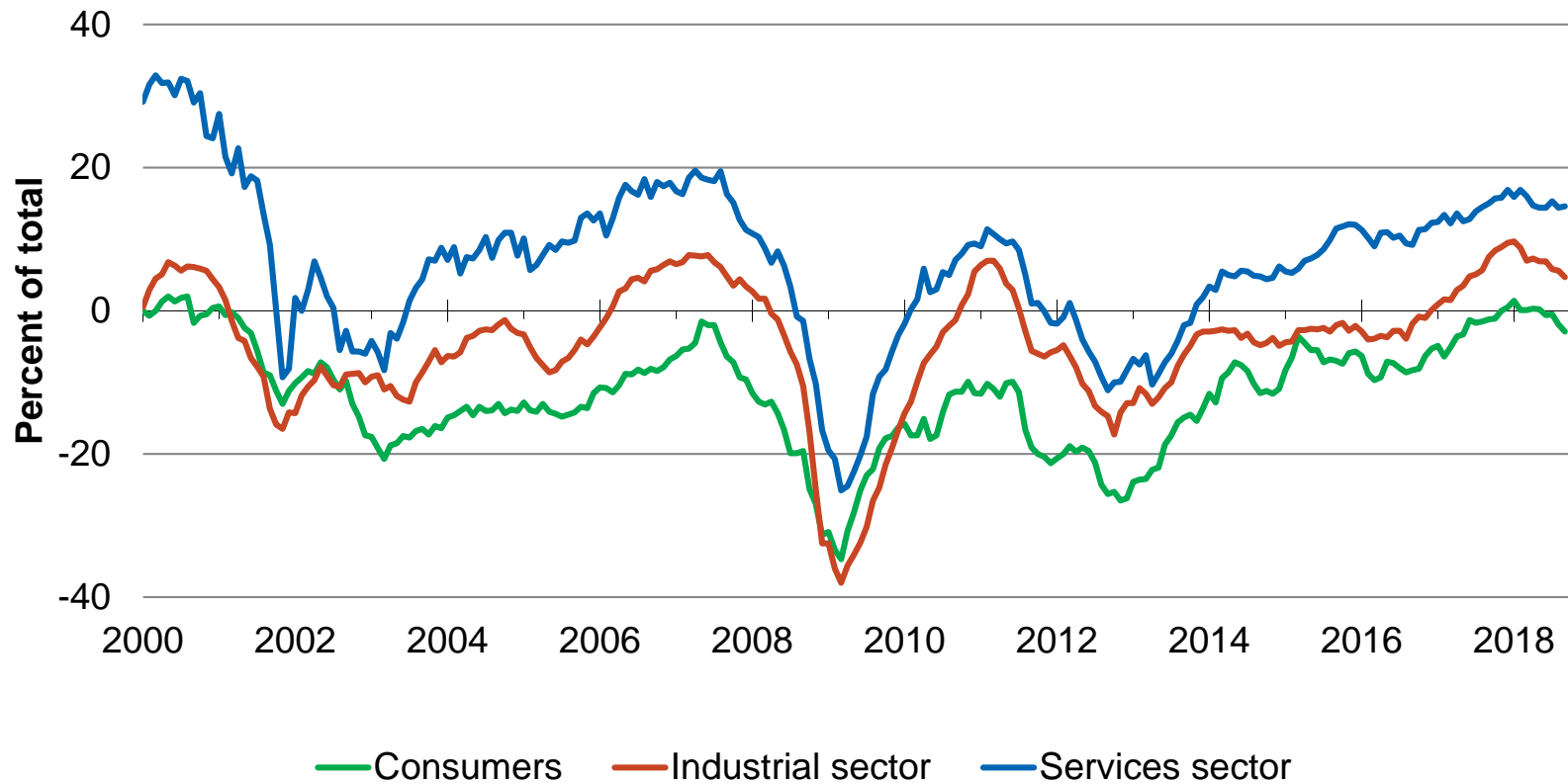
3D Printing
Generators
Machinery
Motor Driven Equipment
Switchgear
Turbines



Economic outlook

Eurozone economic sentiment has fallen from the highs of late 2017 and early 2018

Positive replies minus negative replies



Source: European Commission

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Motor and drive market statistics

Overview of industrial low-voltage motor market

2017 estimated unit shipments

World revenue by region (%)

41.7 Million

Top-4 Leading Suppliers

ABB

Siemens

WEG

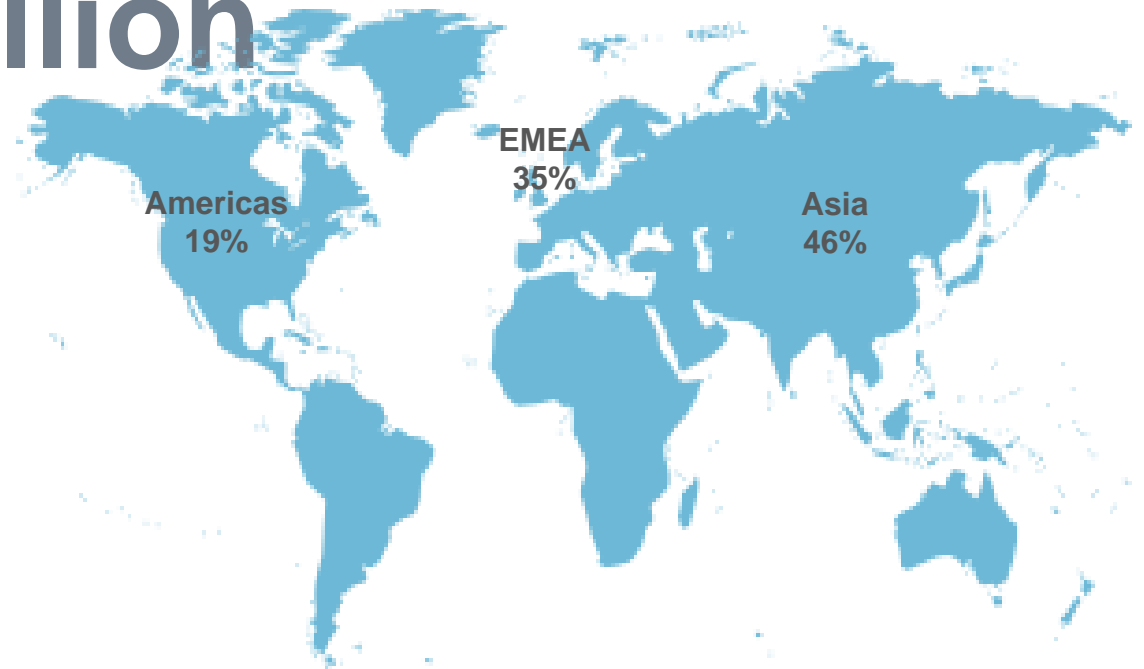
Wolong

Unit shipment CAGR *
(2017-2022)

Americas
1.7%

Asia
4.2%

EMEA **
1.5%



*) CAGR: Compound Annual Growth Rate

***) EMEA: Europe/Middle-East/Africa

Electric Motors Overview

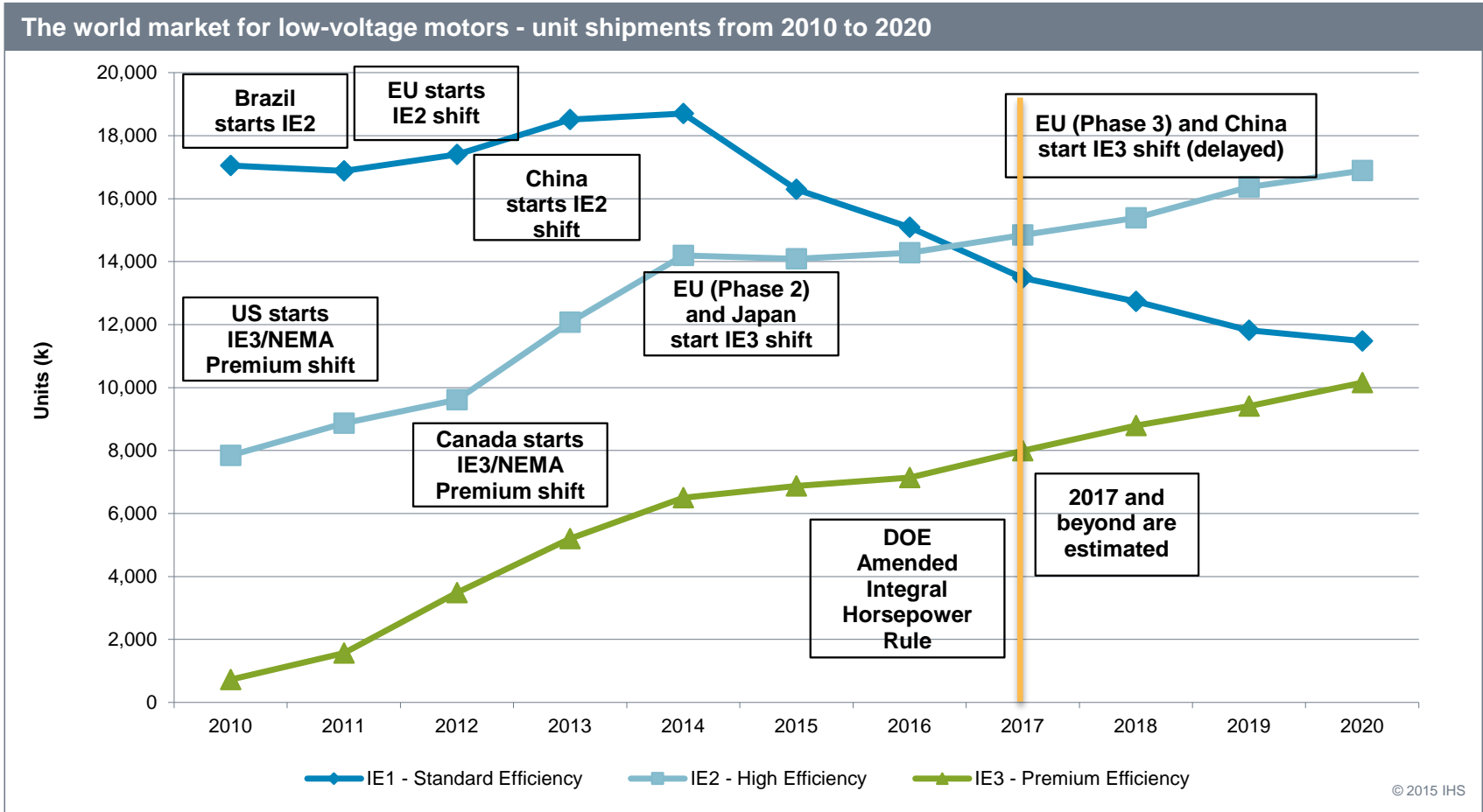
Leading regional vendors

Americas	Asia Pacific	EMEA
1 ABB	1 Wolong	1 Siemens
2 WEG	2 Siemens	2 ABB
3 Nidec	3 ABB	3 ATB Motors (Wolong)
4 Regal Beloit	4 TECO	4 WEG
5 TECO	5 Hitachi	5 Leroy Somer

Market trends: Average selling prices (ASP) and supply chain are crucial

- IE4 and IE5 motor efficiency benchmarks have been established but there are no current plans to make motors meet those efficiency levels
- The 'Industrial Internet of Things' (IIoT) continues to be widely discussed but is still experiencing a slow adoption rate. Sensors for lv motors are mostly sold after the initial motor sale.
- Primary factor influencing price are changes to input costs, such as raw materials and transportation costs
- Steel Tariffs placed by the US has caused motor prices to increase by 3–7 % as a result
- As the adoption of IE3 and more efficient motors continues, average price overall for motors will inflate

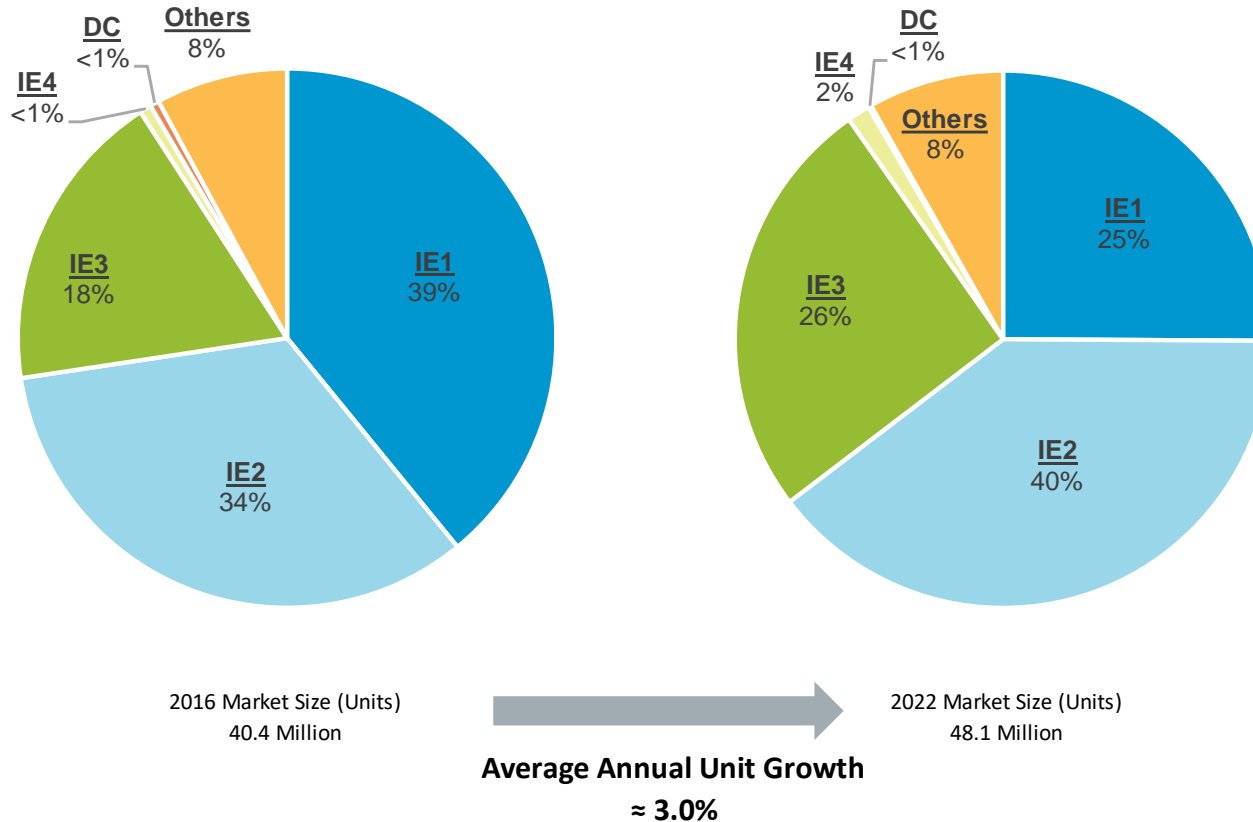
Global MEPS Timeline



The LV Motor market declined from 2014-17. 2017 and 2018 have seen strong growth, at 3.4 % and 4.6 %, respectively,

EFFICIENCY CLASS TRANSITIONS (UNITS)

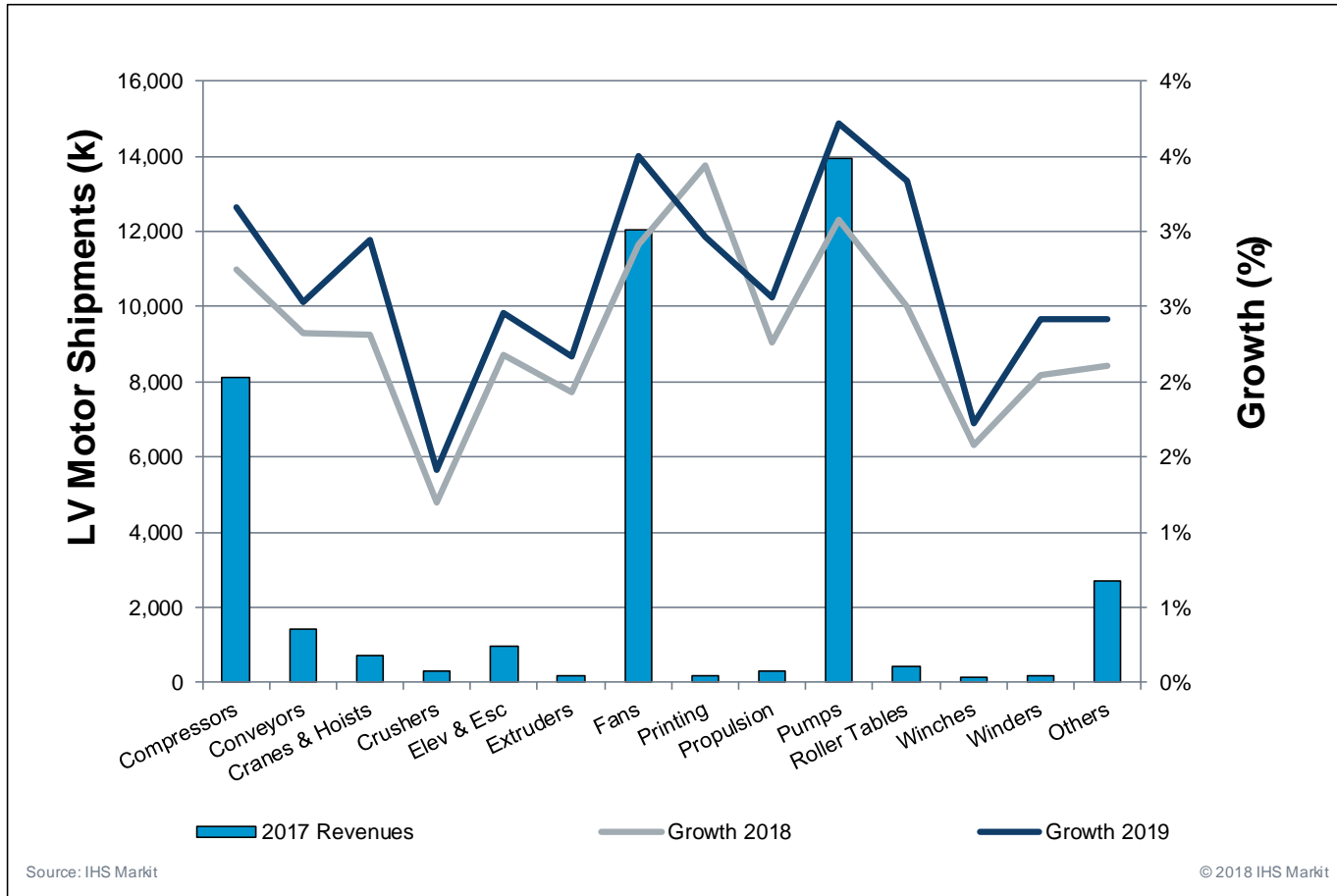
Global Low Voltage Motors - Efficiency Class Transition: 2016 to 2022



IE1 motors drastically reduced in shipments from 2014 to 2017 (46 % share to 37 %, respectively), largely due to increased focus on efficiency in Western Europe, North America, and China.

Compliance, emerging technologies are potential headwinds going forward

Major motor applications



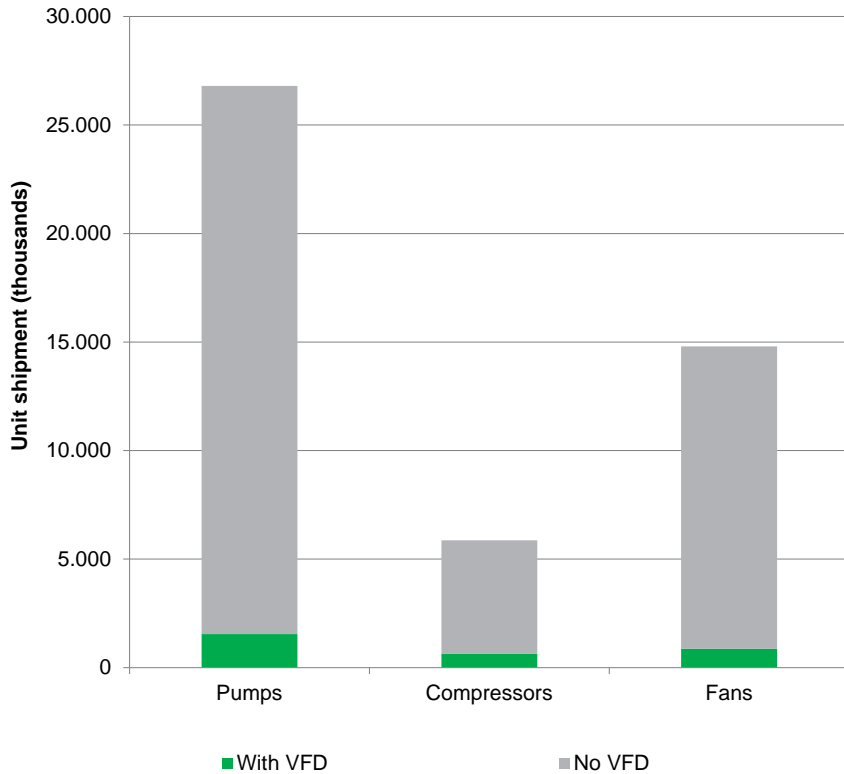
Pump, fan, and compressor applications make up about 80 % of LV motor shipments annually

MARKET INSIGHT

Motor-driven Equipment

PUMPS, FANS & COMPRESSORS WITH VFDS

Demands for efficiency boost VFD growth



Source: IHS Markit

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IMPACT OF ENERGY EFFICIENCY FOR MOTOR-DRIVEN SYSTEMS

INDUSTRIAL INTERNET OF THINGS (IIOT)

- Technical innovation related to IIoT has transformed the role of machinery components including motor-driven equipment, benefitting suppliers that digitalize and streamline automation processes through integration of separate machinery components.
- Equipment suppliers have used this opportunity to position themselves as uptime service providers rather than vendors of hardware.

MORE FOCUS ON SYSTEMS EFFICIENCY

- As market demands change, so must equipment providers. For this, motor-driven equipment manufacturers are beginning to encourage a systems approach that involves the use of more efficient motors and drives (VFDs).
- The graph to the left indicates that VFDs are a major growth opportunity for equipment providers in the near-and-long term.

OTHER TRENDS

- Training programs gaining prominence
- Properly sized motor applications can achieve monumental efficiencies

Overview of industrial low-voltage drives market

2017 estimated unit shipments

World shipments by region (%)

20.5 Million

Top-3 Leading Suppliers

ABB

Siemens

Danfoss

Unit shipment CAGR *
(2017-2022)

Americas
3.9 %

Asia
4.5 %

EMEA **
4.4 %

*) CAGR: Compound Annual Growth Rate

***) EMEA: Europe/Middle-East/Africa

Electric Drives Overview

IloT and technological developments

- Transformerless drives growing in space-needy applications
- Many energy-intensive applications don't utilize drives
 - > Large growth prospects in Heating/Ventilation/Air Conditioning (HVAC), water/wastewater, for example
- Many end users need to see a clearer value proposition in order to adopt IloT in the form of asset condition monitoring
- Operational downtime is most important; IloT has always been around for energy-intensive applications

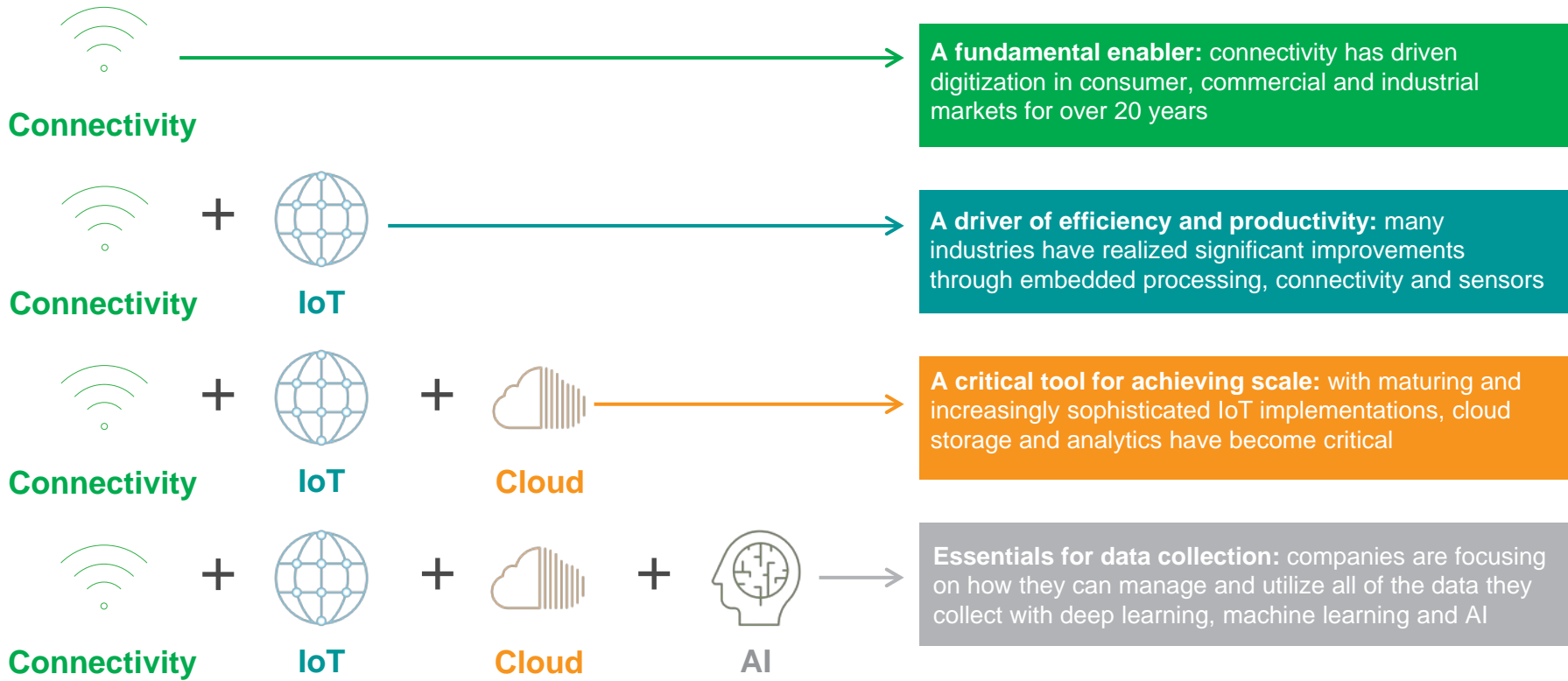
Impact on energy savings

- Aging workforce and decline in engineering skill means more demand for consistent maintenance and guaranteed uptime
- Connected drive units (IloT-enabled) has grown by almost 20% overall.
- Enabled drives have sold, but it is unlikely all are implemented and used properly

Technology changes in manufacturing and machinery

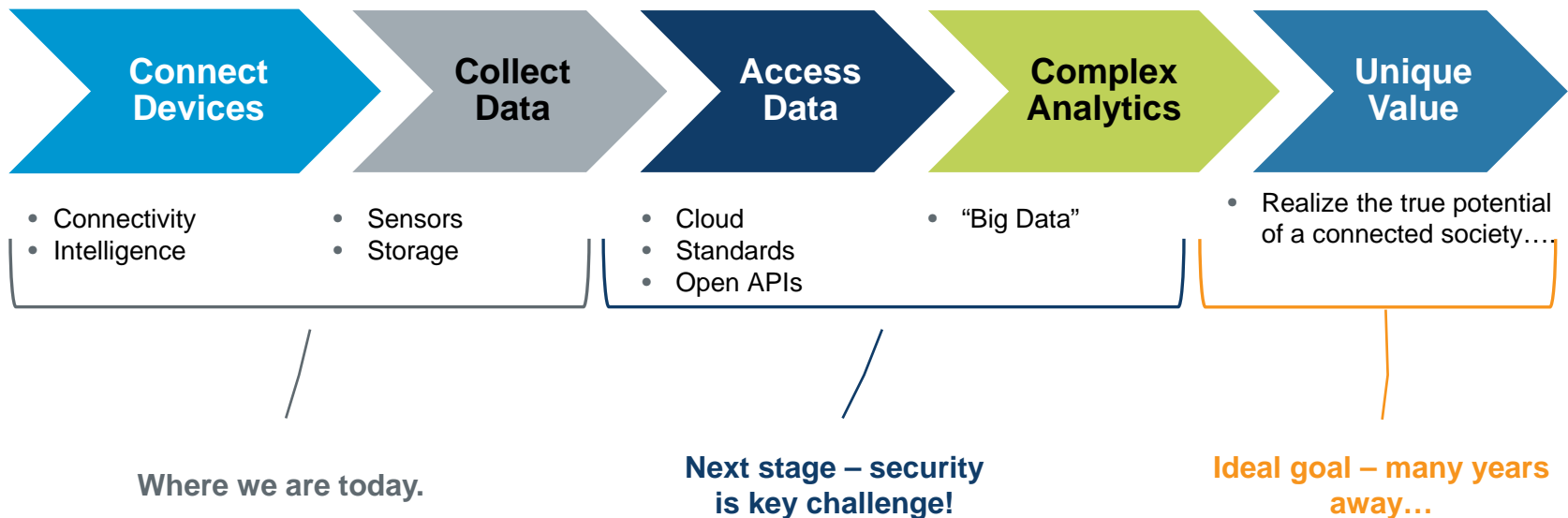
Convergence of transformative technologies accelerates change

As different transformative technologies come together, their impact goes from linear to exponential



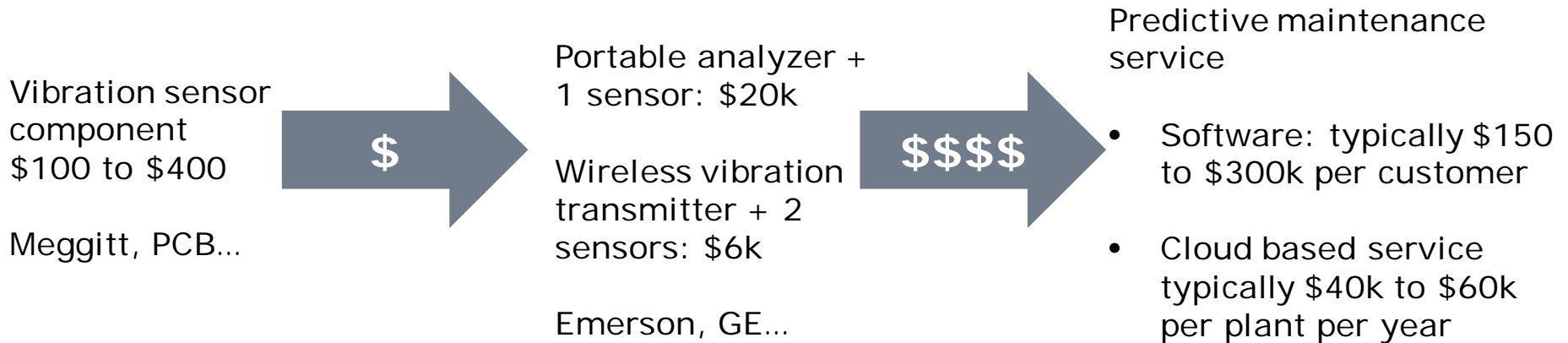
Internet of Things Evolution

Internet of Everything (IoE): represents the open access to data from one or more monitoring and control systems by third-party applications to provide unique, additional value to stakeholders.



Sensors enable new services and business models

Example vibration sensing for predictive maintenance



Shift of business from selling hardware to selling service

- GE not selling engines for aircrafts but selling uptime
- Bearing companies SKF and FAG adding sensors into bearings and selling services
 - ABB selling not only motors but energy savings and uptime

Motors in IIoT

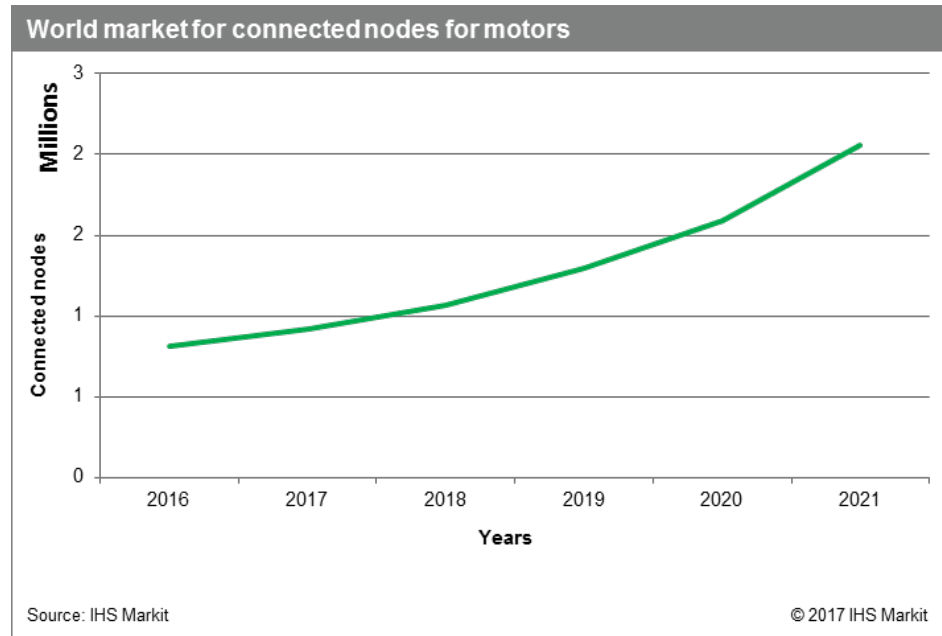
IHS Markit's Industrial Communication Intelligence Service estimates that:

- In 2016, 4.7 % of motors were network enabled
- Less than 1 % of motors were connected.

Smart motors have imbedded sensors and can monitor motor conditions

- Mostly sold aftermarket
- 2019 will see a big focus on this from the leading suppliers

<p>Motors</p> <p>4.7 % enabled devices 9.6 % new devices connected</p>	<p>Generators & turbines</p> <p>47.3 % enabled devices 100 % new devices connected</p>
<p>Pumps & compressors</p> <p>0.1 % enabled devices 2.2 % new devices connected</p>	<p>NEW TO 2017 EDITION</p>

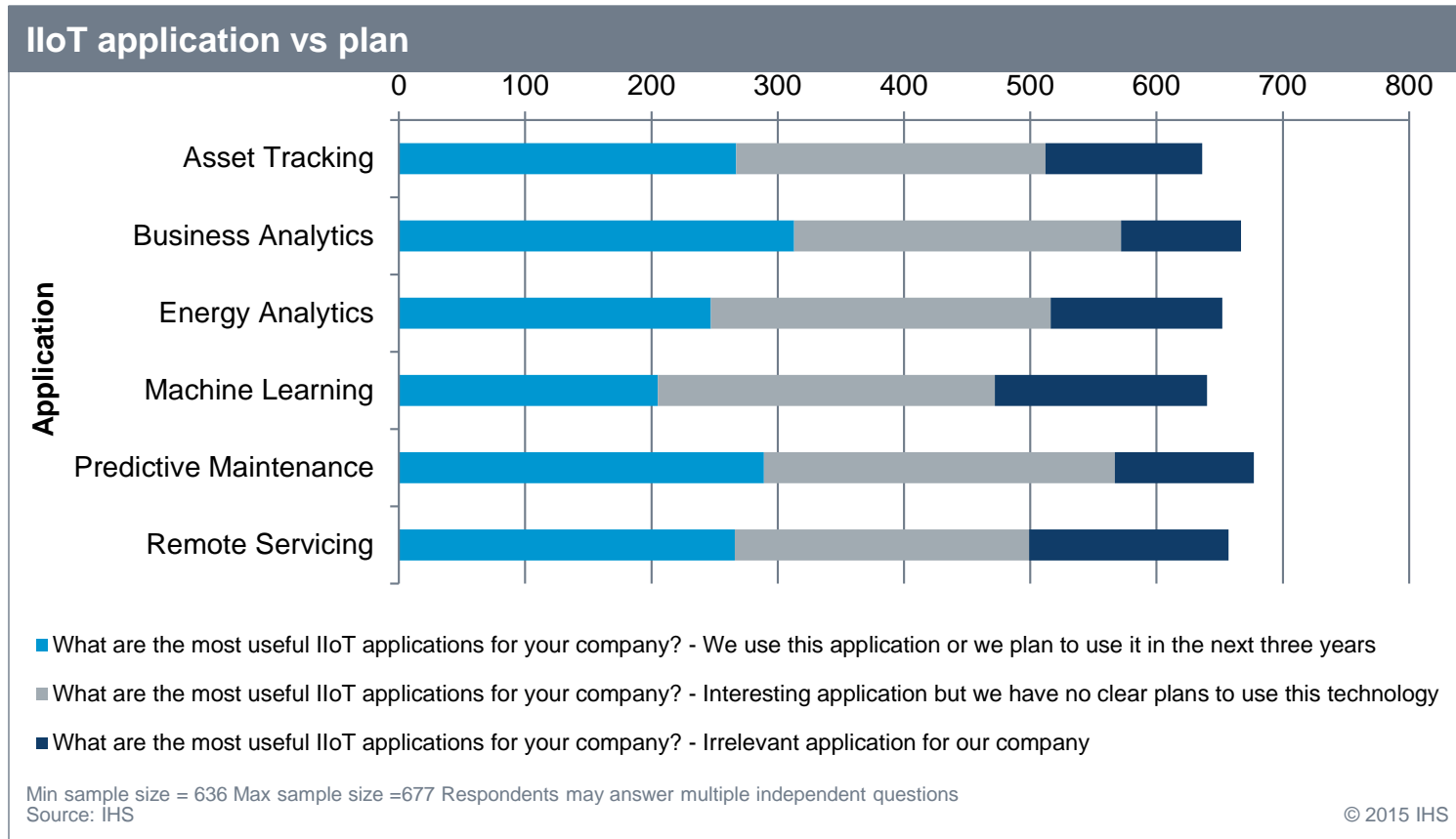


IIoT in LV Drives

What are the challenges hindering the adoption of IIoT?

- When will consumers recognize a return on the added investment?
- Can generate a lot of data analytics, but what do you do with that data?
- Many companies are now partnering with analytics providers, whilst others are trying to develop in-house expertise to support these functions. There is software and algorithms that can currently do this, although they are still quite basic in terms of the insights they can gain.
- The problem with IIoT is that it requires a knowledgeable person to evaluate the data produced and identify patterns within it. With a lack of skills in the workforce there are fewer people with this knowledge. As a result, companies are looking at ways to make the data more intuitive so that it is easier for people to identify patterns and use the information.
- Who owns the data collected?

Transformation for OEMs – what do they want?



Over the past few years, IHS Markit has noted more interest in asset tracking and predictive maintenance more than anything else, and is currently conducting new surveys on this topic

Conclusion

Conclusion

Key Takeaways:

- Efficiency will improve, but IIoT has brought forth other solutions that can dwarf the benefits of simply buying one efficient product
- Motor and drive suppliers enjoying favorable market conditions, and strong opportunities remain in industries concerned with energy consumption: construction, commercial Heating, Ventilation, Air Conditioning (HVAC), water

Notable actions:

- Full solution offerings continue to be a better business model than niche product manufacturing
- Uptime as a service is likely the future, and smart motors could take off over the next five years
- This means that motor suppliers are looking insert themselves all along the supply chain to best understand customer needs

Thank you! Any questions?

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