

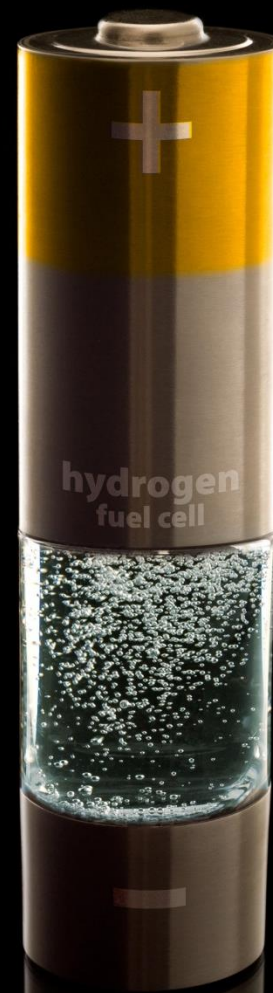
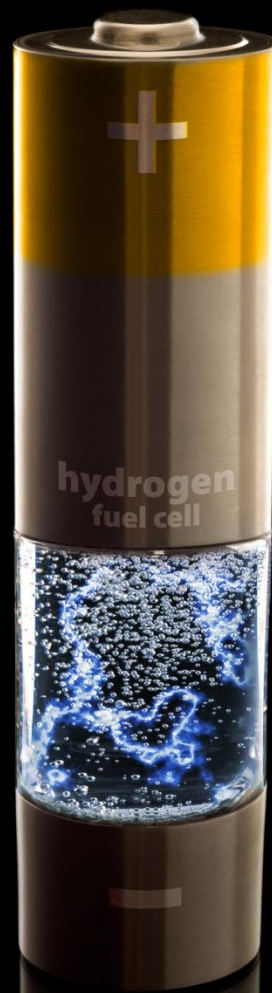
# Portable Fuel Cells

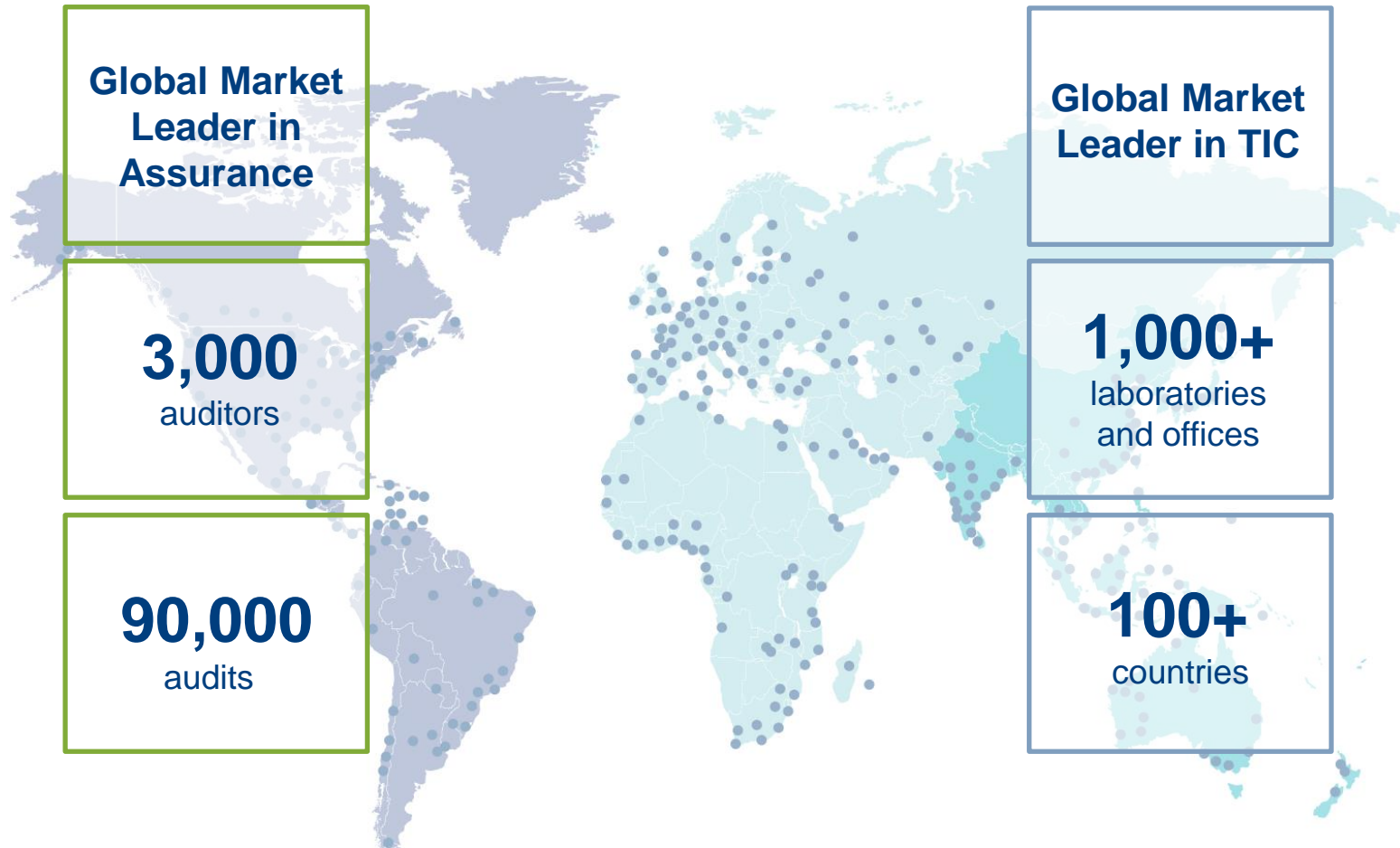
An Overview

Dr Maria Wesselmark

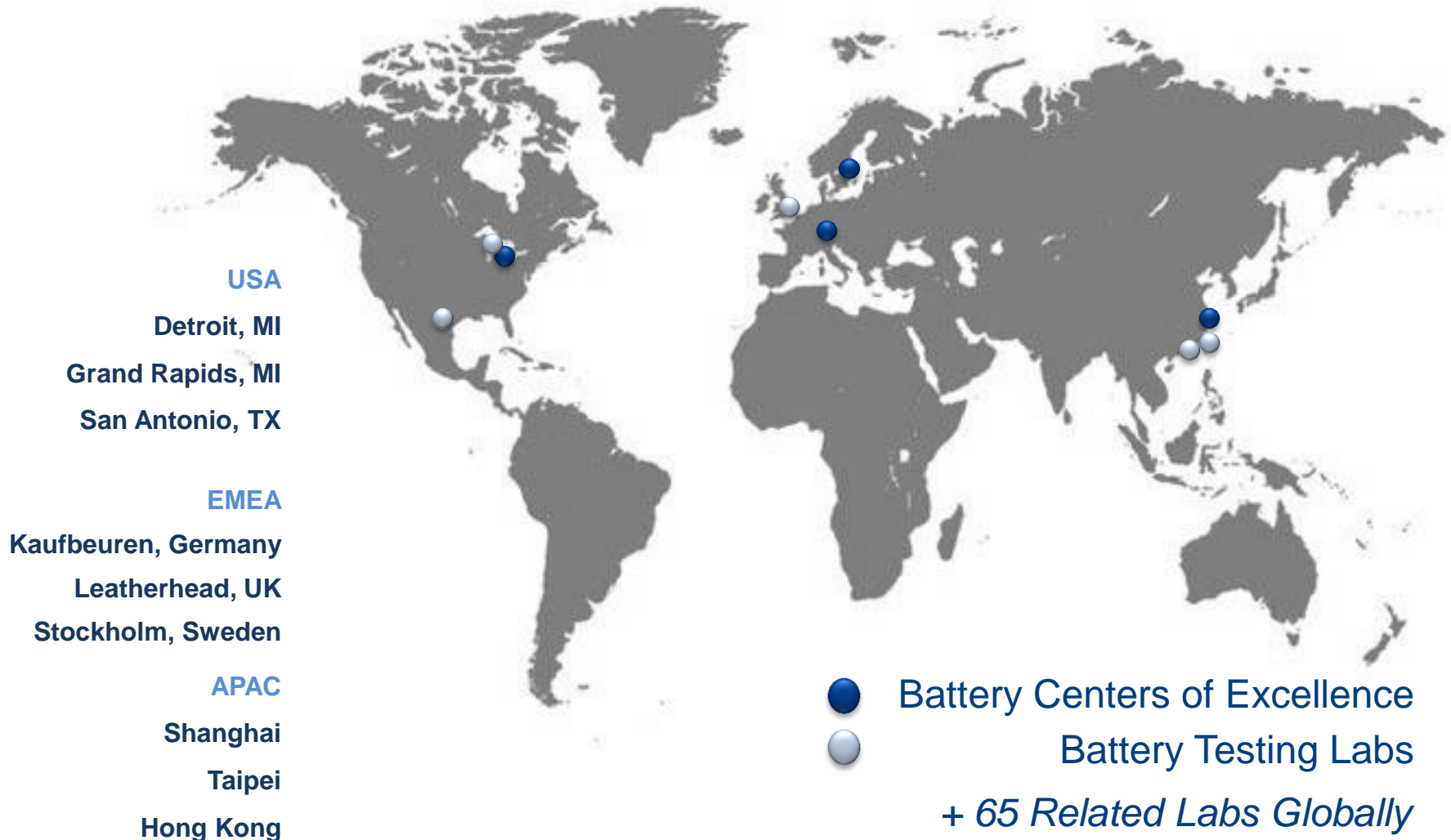
Fuel Cell and Battery Specialist

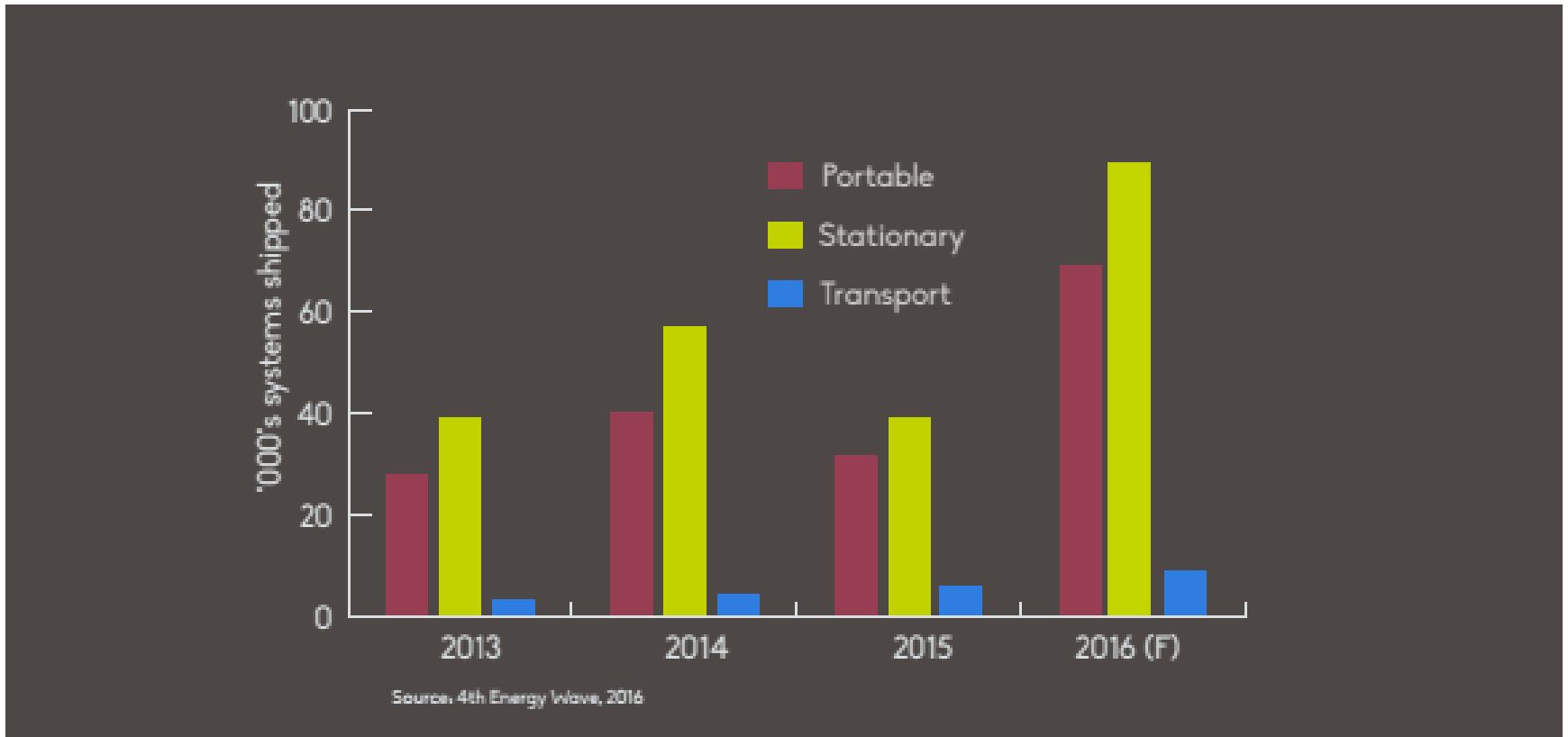
November 29, 2016



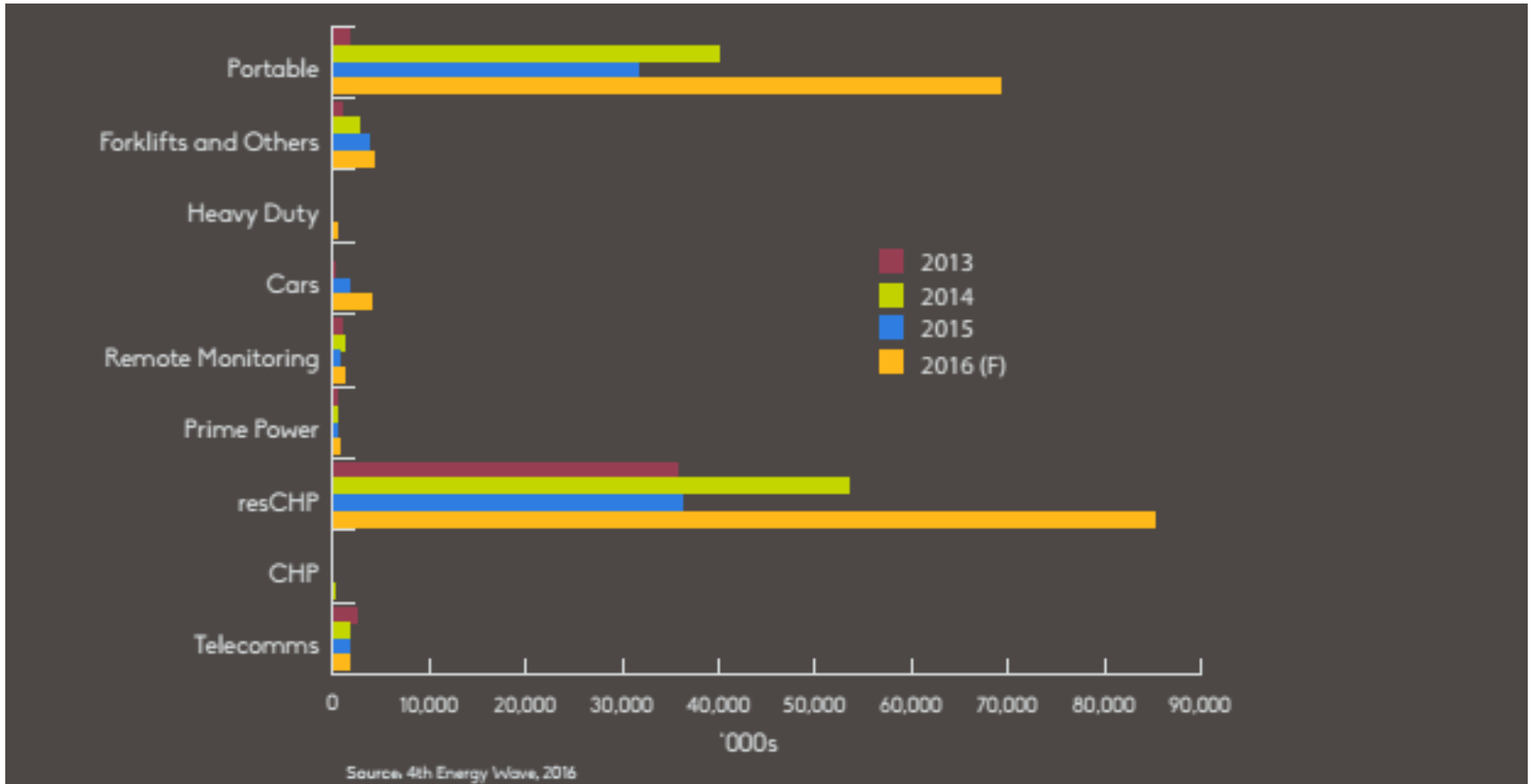


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Source: 4th Energy Wave, 2016



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- EN 62282-6-300:2013      Micro fuel cell power systems - Fuel cartridge interchangeability
- EN 62282-6-200:2012      Micro fuel cell power systems - Performance test methods,
- EN 62282-6-100:2012      Micro fuel cell power systems – Safety
- EN 62282-5-1:2012        Portable fuel cell power systems – Safety
- EN 62282-4-101:2014      Fuel cell power systems for propulsion other than road vehicles and auxiliary power units (APU) - Safety of electrically powered industrial trucks
- EN 62282-3-300:2012      Stationary fuel cell power systems – Installation
- EN 62282-3-201:2013      Stationary fuel cell power systems - Performance test methods for small fuel cell power systems
- EN 62282-3-200:2015      Stationary fuel cell power systems - Performance test methods
- EN 62282-3-100:2012      Stationary fuel cell power systems – Safety
- EN 62282-2:2012         Fuel cell modules
- EN 62282-1:2013         Terminology

- Portable chargers are addressing cost-sensitive customers (<<100 €)
- Cartridge access is important to the end user
- Horizon's 'Hydrofill' – for refuelling the 'Hydrostik' fuel cartridges
  - MiniPak + Hydrostik + Hydrofill
- Products to be launched shortly:
  - JAQ by MyFC
  - Kraftwerk by Ezelleron
- Intelligent Energy stopped production of their Upp fuel cell charger product and is now shifting towards integrated fuel cells in smart phones.



- Methanol as fuel
- SFC in serial production
  - Has launched EFOY GO and EFOY Pro 12000 Duo.
  - EFOY COMFORT fuel cell (and combine it with EFOY GO! lithium battery).
  - 'myEFOY' launched (a new feature in the EFOY app) → turn a smart-phone/tablet into a remote control for EFOY COMFORT
- Watt Fuel Cell presented beta version of the hybrid fuel cell 'Watt Imperium' in Feb 2016 (RVs, sailboats, etc)
- Horizon's EcoBox MFC Mini





- Military use, but commercial use begins to spread
- Hydrogen as fuel
- Intelligent Energy showcasing a hydrogen FC UAV at Interdrone conference, Sept 2016
- H<sup>3</sup> Dynamics:
  - HYCOPTER – a hydrogen FC multi-rotor UAV
  - HYWINGS – a hydrogen FC fixed-wing UAV (demonstrator)
- InSitu to launch a hydrogen FC version of ScanEagle



 Intelligent Energy



**H<sup>3</sup> Dynamics**



 **INSITU**

- Propane and methanol as fuel
- HTPEM, DMFC and SOFC system
- 50–300 W system
- Serial Production by UltraCell and SFC Energy
- Protonex acquired by Ballard



- Portable applications
  - Extra power to charge a mobile phone
  - Larger portable systems – recreational, off-grid industrial, surveillance
  - Military products
- Standards and regulations for micro fuel cells and fuel cell cartridges is in place to facilitate product launch.
- No major breakthroughs reported in 2016



# Questions?

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