

The Fuel Cell Industry Review 2014

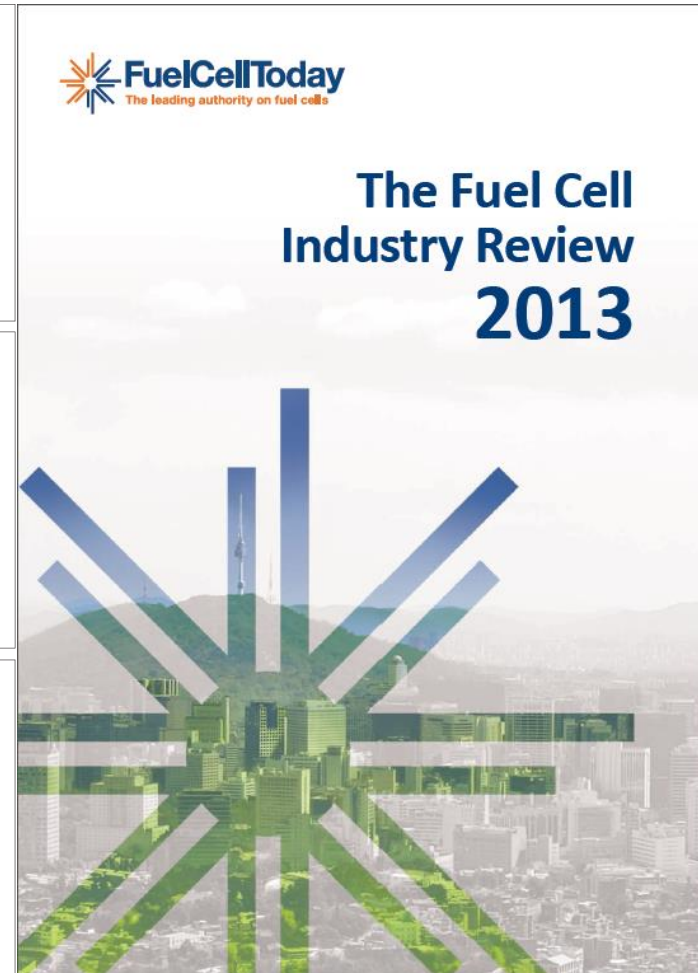
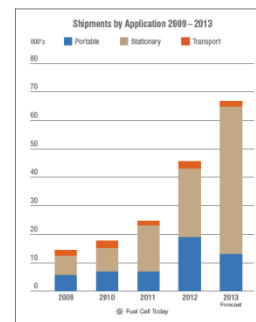
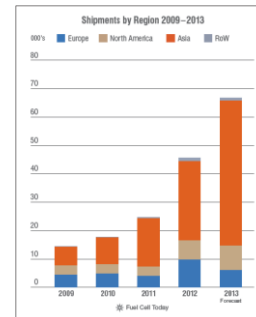
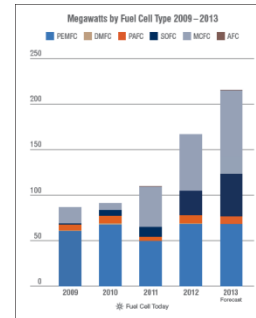
David Hart

IEA-AFC Outreach Event

Zurich, 23 April 2015

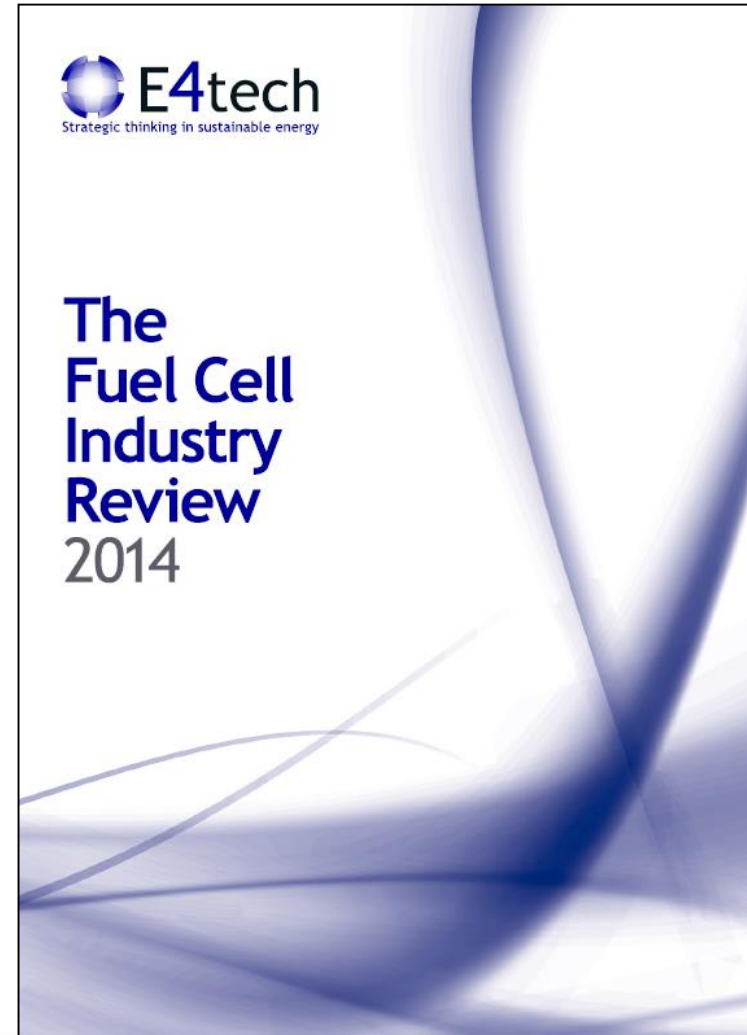
Fuel Cell Today published a freely available Fuel Cell Industry Review

- The last Fuel Cell Today Industry Review was published in 2013
- Data and commentary were given on the development of the industry
- Reviews included high level summaries of fuel cells shipped and installed
- Data were gathered from companies and public announcements
- They were fully anonymised
- They were widely quoted and used



We are continuing the tradition

- E4tech led the team, Jonathan Lewis and Bob Rose an integral and essential part
- We use a methodology similar to FCT's to gather data
- Data are aggregated and anonymised where possible and necessary
- We plan to publish annually and to expand the coverage
- The Review is, and will remain, free for download
- We hope you find it useful



Why E4tech and our partners?

- We have strong relationships in and around the industry
- Fuel cell specialists since 2001
 - All fuel cell technologies (AFC, PEM, PAFC, SOFC, MCFC ++)
 - All sectors, from electronics to transport and power generation
- The Industry Review supports all of us
 - Good industry data underpins growth – financing and business plans
 - We have invested resources and hope to build our brands further

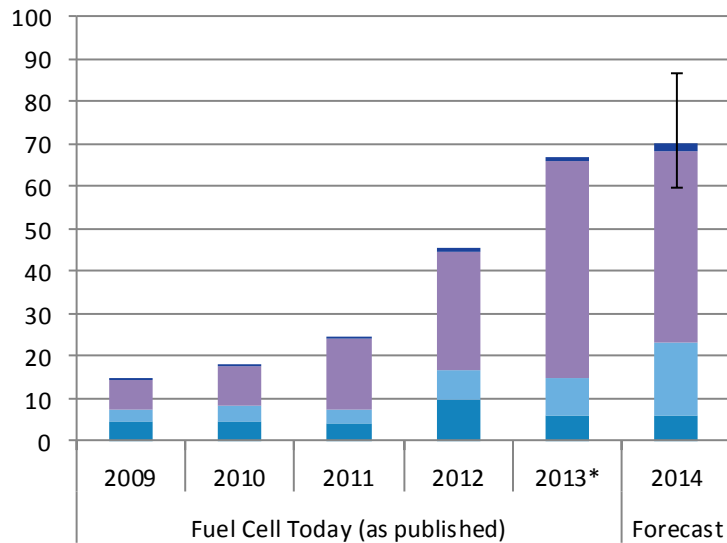
A few of our clients in Fuel Cells



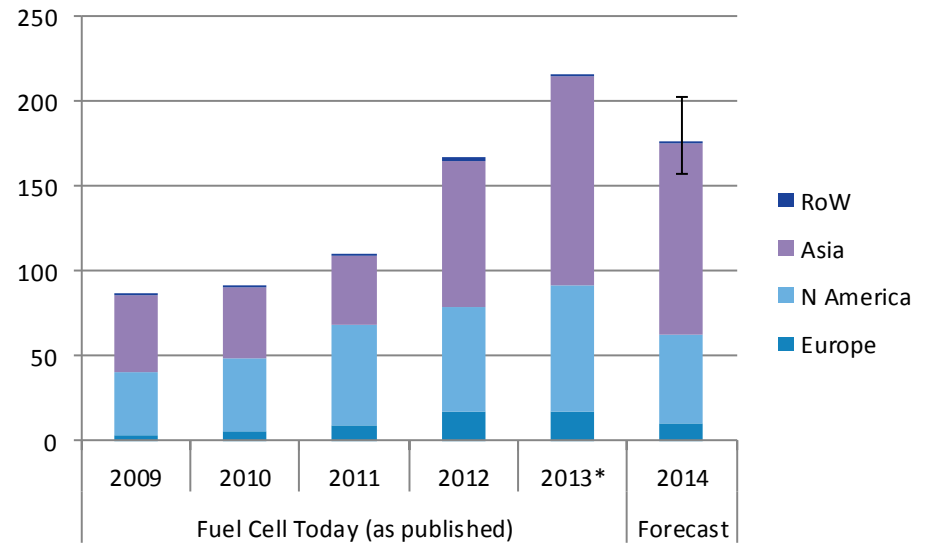
Our data show that Asia remains the major market, then North America and finally Europe

- Unit shipments were up compared to 2013, though megawatts are down*
- Japan's Ene-Farm programme and small portable systems drive unit numbers
- Large stationary power in Korea dominates the megawatt numbers
- Material handling and telecoms are still big – and likely to grow

Shipments by region 2009 - 2014 (1,000 units)



Megawatts by region 2009 - 2014

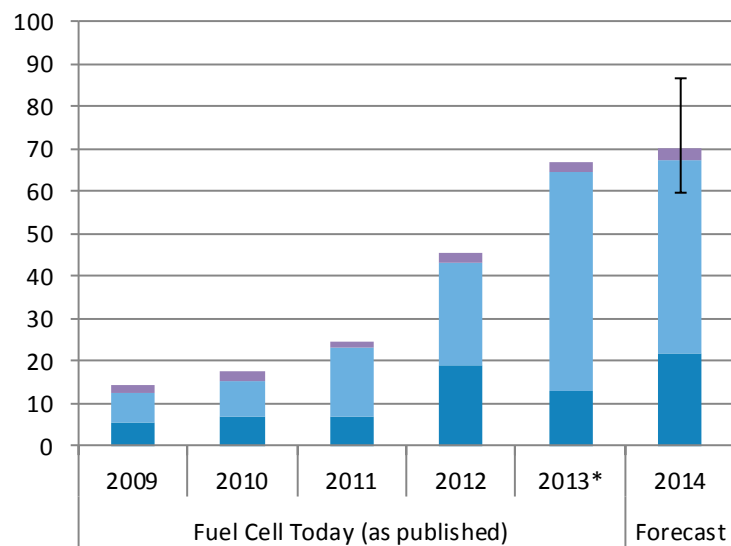


*uncorrected figures from Fuel Cell Today. We don't have access to the data, but we believe the corrected final figures are lower for 2013

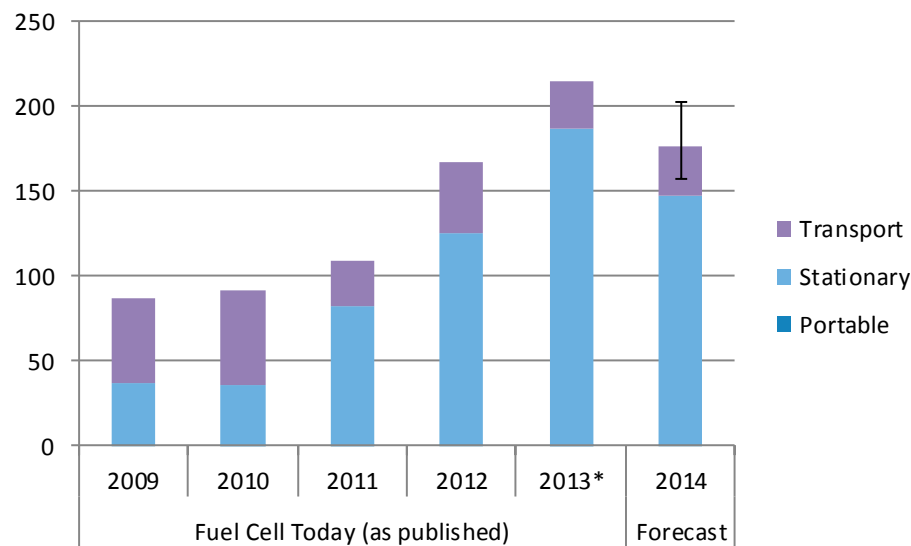
Stationary fuel cell shipments dominate portable and transport – both units and MW

- Transport shipments remain small, and dominated by material handling
- Buses are coming slowly; cars will change the 2015 picture
- Stationary units are almost all Japanese micro-CHP
- Stationary MW are largely from Bloom and FuelCell Energy

Shipments by application 2009 - 2014 (1,000 units)



Megawatts by application 2009 - 2014

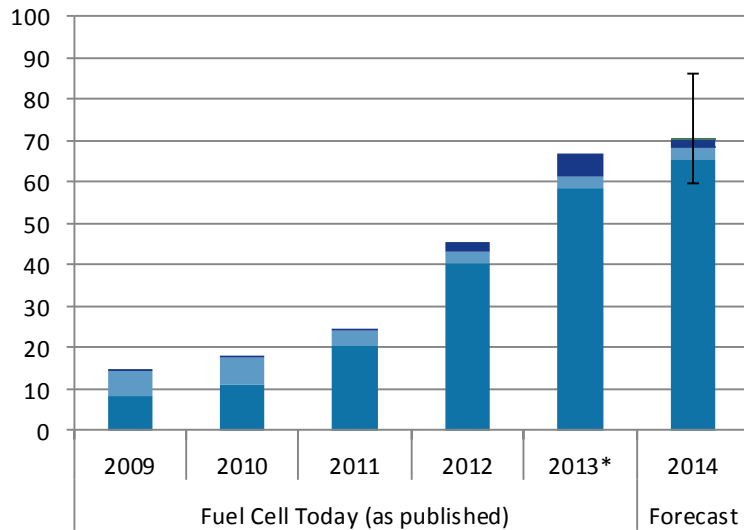


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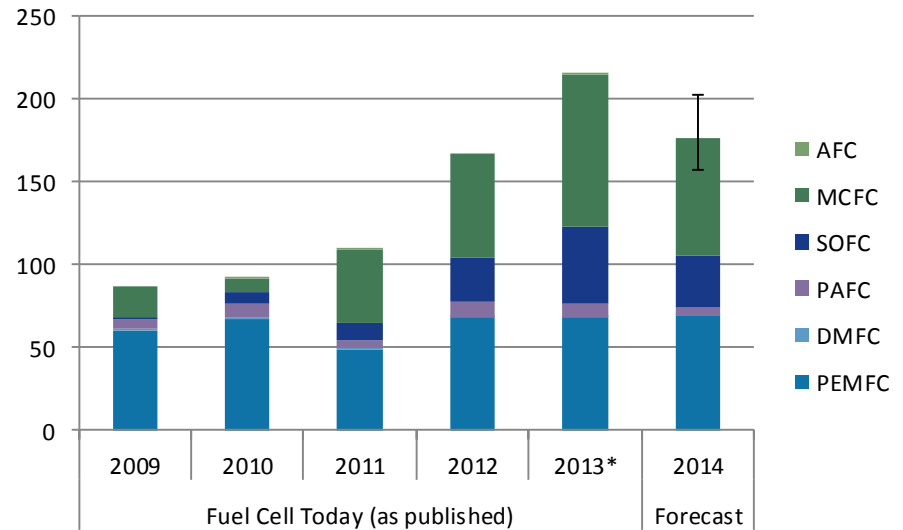
PEMFC has the most units shipped, and is significant in MW too

- PEMFC shipments are slightly up; cars in 2015 should increase that further
- MCFC is still dominant in MW shipped
- SOFC is building a base: large units from Bloom Energy; some micro-CHP
- PAFC dropped with ClearEdge Power, but Doosan aims for major shipments

Shipments by fuel cell type 2009 - 2014 (1,000 units)



Megawatts by fuel cell type 2009 - 2014



*uncorrected figures from Fuel Cell Today

Shipment numbers alone don't tell the full story

- Although the MW shipped appear down, we don't interpret this too negatively
 - Data are imperfect and much is unreported
 - A few big shipments one side or other of New Year still make a difference
 - In some cases, such as with cars, releases still tend to be in blocks, with subsequent pauses for learning and testing
 - Only when real commercial shipments occur in more sectors will data smooth out
- Successful sectors remain the same as in prior years
 - Japan has now* passed a total of 113,000 installed Ene-Farm micro-CHP units
 - Fuel cells outsell all other micro-CHP technologies in a changing energy world
 - Korea is still ramping up installed MW, mainly of MCFC, and increasing orders
 - Bloom Energy is the main contributor to installed SOFC capacity, though public numbers are down compared to 2013, when the Delmarva installation was booked

*End March 2015

A few thoughts from 2014

- The industry has very few big companies; only five may have shipped 80% of the MW:
 - FuelCell Energy, Bloom, Panasonic, Toshiba, Plug Power
- Boom and bust continue:
 - Big names went under the wave: Topsoe Fuel Cells, ClearEdge Power, Lilliputian (and now BIC and CFCL)
 - Others rode it: Plug Power, FuelCell Energy, Intelligent Energy
- Cars are finally launching: Hyundai and Toyota are the earliest
 - Hydrogen refuelling station deployment in Japan and California is getting serious
- Japan's energy policy is explicit about the key role of fuel cells and hydrogen
- The EU FCH JU programme has been renewed and expanded
- California and some other US states have big support programmes

Whither 2015? (The cloudy crystal ball)

- 2014 was about consolidation – voluntary or involuntary – for much of the nascent industry
- 2014 was not really a growth year for the industry overall
- 2015 is likely to be similar in terms of individual companies, but we think overall shipments might be well up
 - Fuel cell cars will be available – with a potential important positive psychological impact
- Some new companies may be implementing known technologies in different regions:
 - technology transfer from Europe and North America to countries like China
 - Some will have potentially new solutions to offer, through alternative materials or architectures
- But given the time needed for development, we believe many of the companies likely to succeed, when the industry matures, are already there

Acknowledgements and thanks

- Bob Rose, Breakthrough Technologies Institute
- Jonathan Lewis Consulting

- The many companies who gave time, data and images
- The ex-Fuel Cell Today team, for supportive discussions
 - We know now what this takes: respect to FCT

- This is our first attempt – we'd welcome suggestions

Thank You – now please download and read our Review!

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